Applied GeoSystems, Inc.
A RESNA Company

RESNA
Working To Restore Nature

3315 Almaden Expressway, Suite 34
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TRANSMITTAL

TO: MR. PAUL SMITH
ACHCSA-DEH
80 SWAN WAY, ROOM 200
OAKLAND, CALIFORNIA 94621

DATE: 5/13/92
PROJECT NUMBER: 60026.06
SUBJECT: ARCO STATION 276 AT 10600 MACARTHUR BOULEVARD, OAKLAND, CA

FROM: LOU LEET
TITLE: STAFF GEOLOGIST

WE ARE SENDING YOU [XX] Attached [ ] Under separate cover via _____ the following items:

[ ] Shop drawings [ ] Prints [XX] Reports [ ] Specifications

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1	5/12/92		FINAL-FIRST QUARTER 1992 GROUNDWATER MONITORING REPORT FOR THE ABOVE SUBJECT SITE.

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REMARKS: THIS REPORT HAS BEEN FORWARDED TO YOU AS REQUESTED BY MR. MICHAEL WHELAN OF ARCO PRODUCTS COMANY.

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*Revision Date: 11/21/91
*File Name: TRANSMT.PRJ

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LETTER REPORT
QUARTERLY GROUNDWATER MONITORING
First Quarter 1992
at
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

60026.06

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May 12, 1992
0506MWHE
60026.06

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

Subject: First Quarter 1992 Groundwater Monitoring Report for ARCO Station 276, 10600 MacArthur Boulevard, Oakland, California.

Mr. Whelan:

As requested by ARCO Products Company (ARCO), this letter report summarizes the results of first quarter 1992 groundwater monitoring performed by ARCO's contractor, EMCON Associates (EMCON) of San Jose, California, at the above-referenced site. The objectives of this quarterly groundwater monitoring are to evaluate changes in the groundwater flow direction and gradient, and changes in concentrations of gasoline hydrocarbons in the local groundwater associated with the former gasoline-storage tanks at the site. This monitoring was also performed to evaluate changes in concentrations of halogenated volatile organic compounds (VOCs) in the local groundwater. The field work and laboratory analyses of groundwater samples during this quarter was performed under the direction of EMCON and included measuring depths to groundwater, subjectively analyzing groundwater for the presence of petroleum product, collecting groundwater samples from the wells for laboratory analyses, and directing a State-certified laboratory to analyze the groundwater samples. Field procedures and acquisition of field data were performed under the direction of EMCON; evaluation and warrant of their field data and field protocols is beyond RESNA Industries' (RESNA's) scope of work. RESNA's scope of work was limited to interpretation of field and laboratory analyses data, which included evaluating trends in reported hydrocarbon concentrations in the local groundwater, the groundwater gradient, and direction of groundwater flow beneath the site.

The operating Arco Station 276 is located on the southeastern corner of the intersection of 106th Avenue and MacArthur Boulevard in Oakland, California, as shown on the Site Vicinity Map, Plate 1.

DISCUSSION OF PREVIOUS WORK AND THE PRESENCE OF VOCs

For this quarter monitoring RESNA reviewed previous environmental work performed in the immediate vicinity of the subject site to evaluate potential sources of VOCs that have been detected in the second, deeper water-bearing unit beneath the site. The following information is based on review of previous environmental work performed onsite and offsite at the Foothills Square Shopping Center. The shopping center property is situated directly southeast of the subject site.

Previous Offsite Work and the Presence of VOCs

Kaldveer Associates (KA) conducted a preliminary environmental assessment of the Foothill Square Shopping Center property (KA, October 3, 1988). This environmental work focused on past and present usage within the vicinity of the shopping center property and included research of public documents and review of aerial photographs dating back to 1947 to assess whether potential adverse environmental conditions exist within 1/4 mile radius of the shopping center property. Research by KA indicated the following activities at the shopping center which had the potential to affect environmental conditions. Fageol Motors Company formerly occupied the site and manufactured tractors, trucks, and motor buses from about 1916 to the early-1960's. A dry cleaning facility has been operating at the shopping center since 1961. A USA/Olympic gasoline service station has been operating in the southeastern corner of the shopping center for an unknown time. With respect to possible contamination from site usage at the shopping center, KA concluded the following: "The primary concern is activities previously conducted at the site, primarily the automobile manufacturing plant, which could have resulted in soil or groundwater contamination. These would include contamination by hydrocarbons, paints, polychlorinated biphenyls (PCB's), and metals. The air photos show areas of drum storage, tanks, and possible waste disposal. These areas as well as the manufacturing facilities could be possible sources of contamination. Presently, the USA/Olympic service station is operating and may contain leaking underground storage tanks, although there is no definite evidence of this." Regarding the dry cleaning facility KA concluded that although dry cleaning businesses in general are known for spilling various chemicals, no evidence of spillage has occurred at this site.

KA also conducted a subsurface environmental investigation at the shopping center, which included drilling 15 soil borings on the shopping center site, collecting soil samples, collecting "grab" groundwater samples from a seasonally saturated perched water-bearing zone encountered in the borings, and analyzing soil and groundwater samples (KA, October 7, 1988). Analyses of soil and groundwater samples indicated the presence of petroleum hydrocarbons and the presence of pesticides, PCBs, and semi-volatile compounds (semi-

VOCs) primarily in the northwest parking lot area of the shopping center, which is immediately adjacent to ARCO Station 276.

In December 1988, Western Geologic Resources, Inc., (WGR) conducted a subsurface environmental investigation at the Foothill Square Shopping Center, which included constructing five groundwater monitoring wells and analyzing nine soil and five groundwater samples for total petroleum hydrocarbons as gasoline (TPHg), the gasoline constituents benzene, toluene, ethylbenzene, and total xylenes (BTEX), and VOCs (WGR, January 17, 1989). A groundwater sample was collected for analyses for VOCs from the monitoring well constructed in B-3 (MW-3), located approximately 25 feet southeast of the subject site. The groundwater sample from this well contained 0.2 ppb trichloroethane.

In August 1989, AGS performed a limited environmental investigation at the northwestern portion of the adjacent Foothill Square Shopping Center to delineate the extent of hydrocarbons in the soil offsite and directly southeast of the subject site (AGS, January 17, 1991). This work included drilling nine soil borings, sampling and laboratory analysis of soil samples for TPHg, Total Petroleum Hydrocarbons as diesel (TPHd), and BTEX. Soil samples collected directly above the local water table in six borings (B-1 through B-6), at depths of about 26-1/2 feet, were analyzed for VOCs. Detectable concentrations of VOCs other than benzene were identified in borings B-4 and B-6. The VOCs detected included several unknown compounds, 2,3-dimethylbutane, 1-ethyl-2-methylbenzene, 1,3,5-trimethylbenzene, and methylcyclohexane at concentrations ranging from 0.030 to 110 ppm.

Previous Onsite Work and the Presence of VOCs

The most likely onsite source of VOCs would have been the former underground waste-oil storage tank that was located behind the station building in the southeastern portion of the site. Between September 29 and December 6, 1988, Pacific Environmental Group, Inc. (Pacific) removed the underground waste-oil storage tank at the site, excavated soils from the tank pit, and collected soil samples for analyses for the presence of TPHg, BTEX, Total Oil and Grease (TOG), semi-VOCs and VOCs (Pacific, February 6, 1989). Laboratory analysis indicated that semi-VOCs, and VOCs were not detected in the soil in the vicinity of the onsite waste-oil tank.

In March 1989, AGS performed an environmental investigation at the subject site to delineate the extent of hydrocarbons in the soil and groundwater beneath the site. This work included drilling five soil borings (B-1 through B-5), collecting soil samples for laboratory analysis for TPHg and BTEX, installed five groundwater monitoring wells in the borings (MW-1 through MW-5, respectively), and collected and analyzed groundwater samples for TPHg and BTEX (AGS, August 8, 1989). Monitoring well MW-4 was installed directly southeast of the former waste-oil tank, and an additional groundwater sample from

MW-4 was analyzed for TOG and VOCs. The depth to first-encountered groundwater in the borings was approximately 35 feet; except in boring B-2 where groundwater was encountered at a depth of 17 feet in an apparent localized perched water-bearing zone. Laboratory analyses of groundwater from the deeper water-bearing zone, in MW-4, indicated the presence of 1.5 ppm tetrachloroethene.

In February 1991, AGS performed an investigation involving the removal and replacement of underground gasoline storage tanks, which included drilling three soil borings in the new tank pit area, and collecting soil samples for analyses for TPHg and BTEX (AGS, February 11, 1991). Analyses for VOCs were not performed.

PRESENT WORK

Groundwater Sampling and Gradient Evaluation

Depth to water measurements (DTW) were performed by EMCON field personnel on January 19, February 20, and March 10, 1992. Quarterly sampling was performed by EMCON field personnel on March 10, 1992. The results of EMCON's field work on the site, including DTW measurements and subjective analysis for the presence of product in the groundwater in MW-1 through MW-5 and RW-1, are presented on EMCON's field report sheets. These data are included in Appendix A.

The DTW levels, wellhead elevations, groundwater elevations, and subjective observations of product in the groundwater from MW-1 through MW-5, and RW-1 for this quarter and previous quarterly groundwater monitoring at the site are summarized in Table 1, Cumulative Groundwater Monitoring Data. EMCON's DTW measurements were used to evaluate groundwater elevations. EMCON's field personnel reported "traces of product -- spots" in the groundwater in well MW-2 (see EMCON's field report sheets for January 19, 1992 in Appendix A). Evidence of product or sheen was not observed in the other monitoring wells during this quarter. Groundwater elevations in wells MW-1 through MW-5, and RW-1 increased an average of about 3 feet between January 19 and March 10, 1992. The groundwater gradients interpreted from the January, February, and March 1992 groundwater monitorings are shown on the Groundwater Gradient Maps, Plates 3 through 5. Relatively flat groundwater gradients, generally less than 0.01 toward the northwest, were interpreted from EMCON's DTW measurements. The groundwater gradients for this quarter are generally consistent with previously interpreted data. Well MW-2 was not used in evaluating the gradient because this well is screened in a separate shallow perched water-bearing zone, while the other onsite wells are screened in a deeper water-bearing zone.

Groundwater monitoring wells MW-1 through MW-5, and RW-1 were purged and sampled by EMCON field personnel on March 10, 1992. EMCON's water sample field data sheets

are included in Appendix A. A minimum of five well volumes were reportedly purged before collecting groundwater samples. The purge water was removed from the site by a licensed hazardous waste hauler; the Monitoring Well Purge Water Disposal Form is also included in Appendix A.

Laboratory Methods and Analyses

Under the direction of EMCON, groundwater samples collected from the wells were analyzed by Columbia Analytical Services, Inc. located in San Jose, California (Hazardous Waste Testing Laboratory Certification No. 1426). The groundwater samples from MW-1 through MW-5, and RW-1 were analyzed for TPHg and BTEX using modified Environmental Protection Agency (EPA) Methods 5030/8020. Concentrations of TPHg and benzene in the groundwater are shown on Plate 6, TPHg Concentrations in Groundwater and Plate 7, Benzene Concentrations in Groundwater. Groundwater samples from wells MW-1 through MW-5 and RW-1 were also analyzed for VOCs using EPA Methods 5030/601. Concentrations of total VOCs in the groundwater are shown on Plate 8, Total VOC Concentrations in Groundwater. In addition, well MW-4 was analyzed for TOG using EPA Method 413.1. The Chain of Custody Records and Laboratory Analysis Reports are attached in Appendix A. Results of these and previous groundwater analyses are summarized in Table 2, Cumulative Results of Laboratory Analyses of Groundwater Samples--TPHg, TPHd, BTEX, and TOG and Table 3, Cumulative Results of Laboratory Analyses of Groundwater Samples--VOCs and Metals.
Results of this quarter's groundwater monitoring indicate:

- Concentrations of TPHg were reported as 220,000 parts per billion (ppb) in well MW-2, <730 ppb in well MW-4, <360 ppb in well MW-3, <140 ppb in well RW-1, <110 ppb in well MW-5, and <50 ppb in well MW-1. The laboratory raised the TPHg detection limits for the groundwater samples from wells MW-3 through MW-5, and RW-1, because the sample matrix reportedly contained a discrete non-fuel peak.

- Concentrations of benzene were reported as 8,200 ppb in well MW-2 and as nondetectable (<0.5 ppb) in wells MW-1, MW-3 through MW-5, and RW-1. The concentration of benzene in the groundwater from well MW-2 is greater than the California Department of Health Services Maximum Contaminant Level (MCL) of 1 ppb.

- Concentrations of toluene were reported as 13,000 ppb in well MW-2 and as nondetectable (<0.5 ppb) in wells MW-1, MW-3 through MW-5, and RW-1. The concentration of toluene in the groundwater from well MW-2 is greater

than the California Department of Health Services Drinking Water Action Level (DWAL) of 100 ppb.

- Concentrations of ethylbenzene were reported as 4,500 ppb in well MW-2 and as nondetectable (<0.5 ppb) in wells MW-1, MW-3 through MW-5, and RW-1. The concentration of ethylbenzene in the groundwater from well MW-2 is greater than the MCL of 680 ppb.

- Concentrations of total xylenes were reported as 22,000 ppb in well MW-2 and as nondetectable (<0.5 ppb) in wells MW-1, MW-3 through MW-5, and RW-1. The laboratory raised the detection limit for the groundwater samples from MW-5 and RW-1 to 0.6 ppb due to reported matrix interference. The concentration of total xylenes in the groundwater from well MW-2 is greater than the MCL of 1,750 ppb.

- The concentration of TOG was reported as nondetectable (<2,500 ppb) in well MW-4.

- The concentrations of total VOCs (predominantly tetrachloroethene) were reported as 2,317 ppb in well MW-4, 990 ppb in well MW-3, 401.7 ppb in well RW-1, 301.3 ppb in well MW-5, and 8.2 ppb in well MW-1. Concentrations of tetrachloroethene in the groundwater from wells MW-1, MW-3, MW-4, MW-5, and RW-1 are greater than the MCL of 5 ppb.

The following general trends were noted in reported petroleum hydrocarbon constituents in groundwater from the six onsite wells since the last quarterly monitoring. The reported concentrations of TPHg and BTEX are generally consistent with previously reported concentrations. Concentrations of TOG have never been detected in well MW-4, located near the former waste-oil tank. The reported concentrations of VOCs (predominantly tetrachloroethene) have increased in groundwater from wells MW-1, MW-3, MW-4, and MW-5, and decreased in RW-1. During this quarter Freon 12, which had previously not been detected, was reported at 3.4 ppb in the groundwater from well MW-4.

Monitoring and Removal of Free Product

Floating product was measured and removed from well MW-2 during monthly and quarterly monitoring. Quantities of floating product and water removed are presented in Table 4, Approximate Cumulative Product Removed. A Horner EZY Floating Product Skimmer was installed in monitoring well MW-2 on December 24, 1991, to passively collect floating product in the well. The total cumulative recovered product at the site for this quarter is 0.09 gallons; the total product recovered at this site to date is approximately 18.24 gallons.

Conclusions

The groundwater at the site has been impacted by petroleum hydrocarbons and VOCs. The concentrations of BTEX in the groundwater from well MW-2, located immediately upgradient of the former gasoline storage tanks, are greater than the California Department of Health Services MCLs and DWALs for these constituents. Tetrachloroethene is the predominant VOC in the local groundwater and is present at concentrations greater than the MCL of 5 ppb in all of the onsite wells except MW-2. The extent of petroleum hydrocarbons and VOCs in groundwater has not been defined.

An onsite source for the VOCs detected in the local groundwater beneath the site has not been established. Although concentrations of VOCs have been detected in the second water-bearing zone beneath the site VOCs were not detected in soil samples taken in the vicinity of the former waste-oil tank (Pacific, February 6, 1989). Conversely, VOCs were detected in soil and groundwater samples from the northwestern portion of the adjoining Foothill Square Shopping Center, which is situated in the inferred upgradient direction of the subject site (AGS, January 17, 1991). According to a environmental assessment of the shopping center property performed by KA (KA, October 3, 1988) a vehicle manufacturing plant formerly occupied the vicinity of the shopping center from about 1916 to the early-1960s. Evidence from aerial photographs dating from 1947 indicate the presence of stored drums, tanks, and possible waste disposal at the manufacturing plant. Therefore, existing data suggest that the former waste-oil tank at the subject site may not have been a source of VOCs, but an offsite source of VOCs from the southeast appears possible.

Recommendations

RESNA recommends monthly groundwater monitoring and quarterly groundwater sampling at the site, including analyses for TPHg, BTEX, and VOCs. In addition, RESNA recommends discontinuing analysis of groundwater samples from well MW-4 for TOG since concentrations of TOG have always been reported as below detection limits.

Schedule

Monthly groundwater monitoring and quarterly groundwater sampling will continue to be performed by ARCO's contracted sampler. At ARCO's request, RESNA will continue to analyze and report monthly and quarterly groundwater monitoring data from this site to evaluate trends in petroleum hydrocarbons and VOC concentrations in groundwater, and changes in groundwater gradient with time. The results of the subsurface and pump test performed in November 1991 will be discussed in a forthcoming report. Onsite vapor extraction wells which will be connected to the existing vapor extraction system at the site will be installed in late April to May 1992. A work plan proposing installation of offsite,

upgradient groundwater monitoring wells to identify a probable offsite source for VOCs at the site was submitted to ARCO and regulatory agencies on April 18, 1992. Upon gaining approval of the work plan and offsite access, these wells will be installed.

It is recommended that copies of this report be forwarded to:

Mr. Paul Smith
Alameda County Department of Environmental Health
80 Swan Way, Room 200
Oakland, California 94621

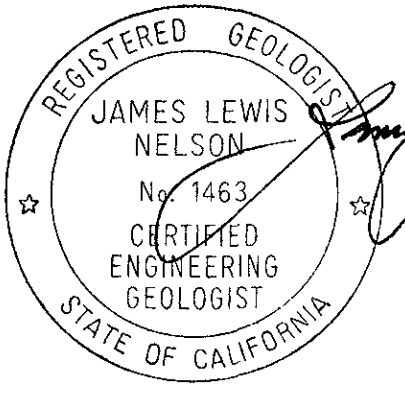
Mr. Eddy So
Regional Water Quality Control Board
San Francisco Bay Region
2101 Webster, Suite 500
Oakland, California 94612

If you have any questions or comments, please call us at (408) 264-7723.

Sincerely,
RESNA Industries

Lou Leet

Lou Leet
Staff Geologist



James L. Nelson
Certified Engineering
Geologist No. 1463

cc: H.C. Winsor, ARCO

RESNA

Enclosures: References

Plate 1, Site Vicinity Map
Plate 2, Generalized Site Plan
Plate 3, Groundwater Gradient Map, January 19, 1992
Plate 4, Groundwater Gradient Map, February 20, 1992
Plate 5, Groundwater Gradient Map, March 10, 1992
Plate 6, TPHg Concentrations in Groundwater, March 10, 1992
Plate 7, Benzene Concentration in Groundwater, March 10, 1992
Plate 8, Total VOC Concentrations in Groundwater, March 10, 1992

Table 1, Cumulative Groundwater Monitoring Data
Table 2, Cumulative Results of Laboratory Analyses of Water Samples--TPHg, TPHd, BTEX, and TOG
Table 3, Cumulative Results of Laboratory Analyses of Water Samples--VOCs and Metals
Table 4, Approximate Cumulative Product Removed

Appendix A: EMCON's Field Reports (3), Summary of Groundwater Monitoring Data, Certified Analytical Reports with Chain of Custody, and Water Sample Field Data Sheets
Monitoring Well Purge Water Disposal Form

REFERENCES

Applied GeoSystems. March 6, 1989. Site Safety Plan for ARCO Station No. 276, Oakland, California. AGS Job No. 19014-1.

Applied GeoSystems. August 8, 1989. Report Limited Subsurface Environmental Investigation. AGS Job No. 19014-1.

Applied GeoSystems. August 6, 1990. Letter Report Quarterly Ground-Water Monitoring Fourth Quarter 1989 and First and Second Quarters 1990. AGS Job No. 19014-1.

Applied GeoSystems. January 2, 1991. Letter Report Quarterly Ground-Water Monitoring Third Quarter 1990 at ARCO Station 276, 10600 MacArthur Boulevard,Oakland, California. AGS Job 60026.01.

Applied GeoSystems. January 17, 1991. Report Limited Offsite Subsurface Environmental Investigation, ARCO Station 276, 10600 MacArthur Boulevard,Oakland, California. AGS Job 19014.01.

Applied GeoSystems. January 29, 1991. Fourth Quarter 1990 Ground-Water Monitoring at ARCO Station 276, 10600 MacArthur Boulevard, Oakland, California. AGS Job 60026.01.

Applied GeoSystems, February 11, 1991. Report Underground Gasoline Storage Tank Removal and Replacement at ARCO Station 276, 10600 MacArthur Boulevard,Oakland, California. AGS Job 19014-5.

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Kaldveer Associates. October 3, 1988. Preliminary Environmental Assessment Proposed Foothill Square Oakland, California. Job No. KE812-3, 12056.

Kaldveer Associates. October 7, 1988. Preliminary Soil And Groundwater Quality Testing Program Foothill Square Oakland, California. Job No. KE812-3A, 12302.

Pacific Environmental Group, Inc., February 6, 1989. Former Waste-Oil Tank Pit Analytical Results and Site Plan of ARCO Station No. 276. Copy of letter sent to Ms. Mary Meirs, Alameda County Environmental Health Department Hazardous Material Division.

REFERENCES
(continued)

Pacific Environmental Group, Inc., July 17, 1989. Soil Gas Investigation at ARCO Station No. 276.

Pacific Environmental Group, Inc., April 25, 1989. Letter Report-Removal of Waste-Oil Tank and Soil Sampling at ARCO Station 276, 10600 MacArthur Boulevard, Oakland, California. Job No. 330-40.01

RESNA June 27, 1991. Work Plan for Subsurface Investigations and Remediation at ARCO Station 276, 10600 MacArthur Boulevard, Oakland, California. AGS 60026-3W.

RESNA. June 27, 1991.Addendum One to Work Plan at ARCO Station 276, 10600 MacArthur Boulevard, Oakland, California. AGS 60026-3.

RESNA/Applied GeoSystems. July 11, 1991. Letter Report Quarterly Ground-Water Monitoring, Second Quarter 1991 at ARCO Station 276, 10600 MacArthur Boulevard, Oakland, California. AGS 60026.02

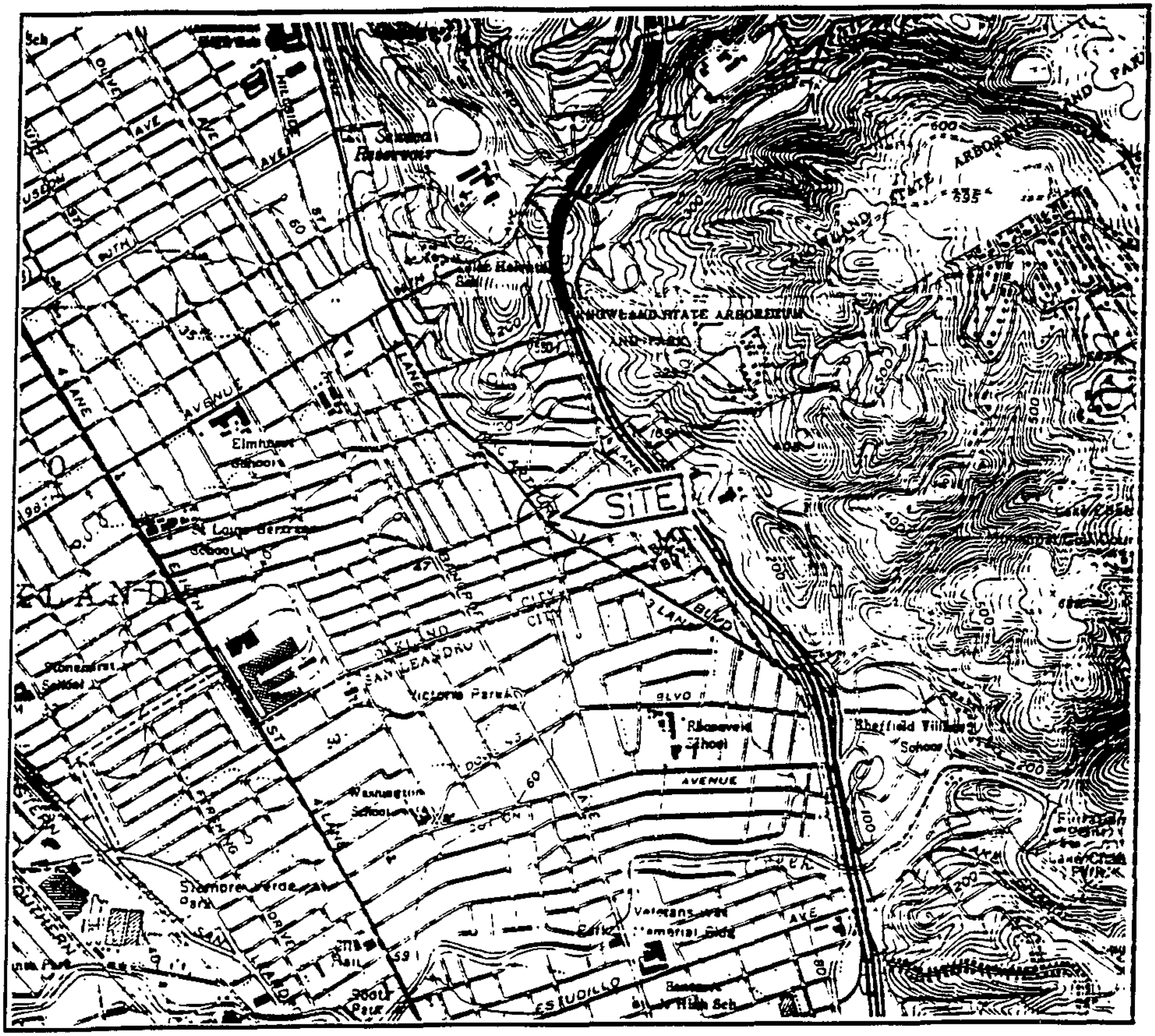
RESNA. September 23, 1991. Addendum Two to Work Plan at ARCO Station 276, 10600 MacArthur Boulevard, Oakland, California. RESNA 60026-5.

RESNA. December 2, 1991. Letter Report Quarterly Groundwater Monitoring, Third Quarter 1991 at ARCO Station 276, 10600 MacArthur Boulevard, Oakland, California. 60026.02

RESNA. March 9, 1992. Letter Report Quarterly Groundwater Monitoring, Fourth Quarter 1991 at ARCO Station 276, 10600 MacArthur Boulevard, Oakland, California. 60026.06

RESNA. March 18, 1992. Addendum Three to Work Plan Interim Groundwater Remediation at ARCO Station 276, 10600 MacArthur Boulevard, Oakland, California. 60026.08

Western Geologic Resources, Inc. January 17, 1989. Soil Sampling and Monitoring Well Installation Foothill Square Shopping Center Oakland, California. Job No. 8-088.01.



Base: U.S. Geological Survey
7.5-Minute Quadrangles
Oakland East/San Leandro,
Photorevised 1980

N

LEGEND

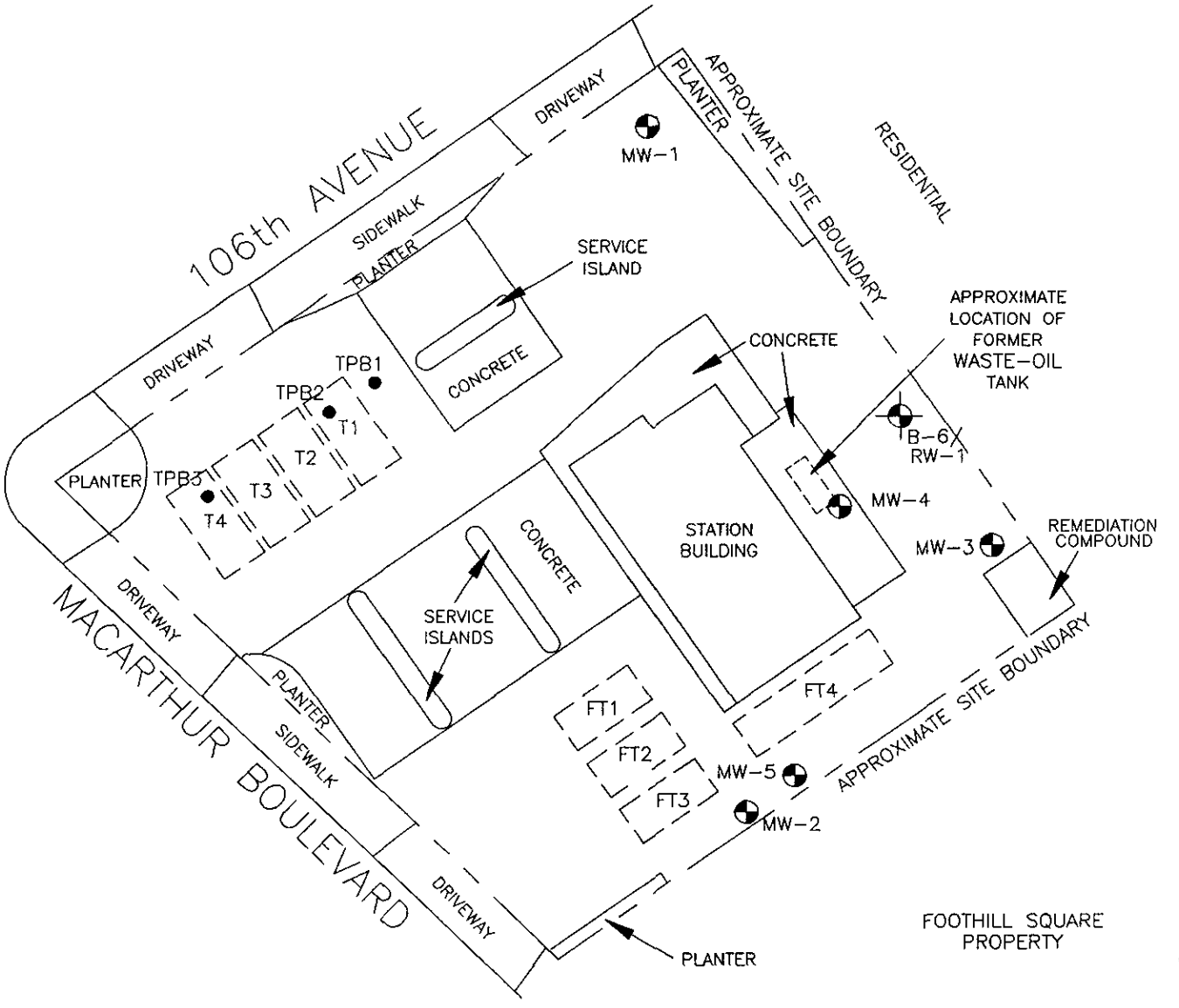
(•) = Site Location

Approximate Scale

2000 1000 0 2000 4000

feet

RESNA	**SITE VICINITY MAP** **ARCO Station 276** **10600 MacArthur Boulevard** **Oakland, California**	**PLATE** **1**
PROJECT 60026.06		



EXPLANATION

- B-6/RW-1 = Recovery well (RESNA, 1991)
- MW-5 = Monitoring well (RESNA, 1989)
- TPB3 = Soil boring (RESNA, January 31, 1990)
- T4 = Existing underground storage tanks
- FT4 = Former underground storage tanks

N

Approximate Scale

30 15 0 30 60

feet

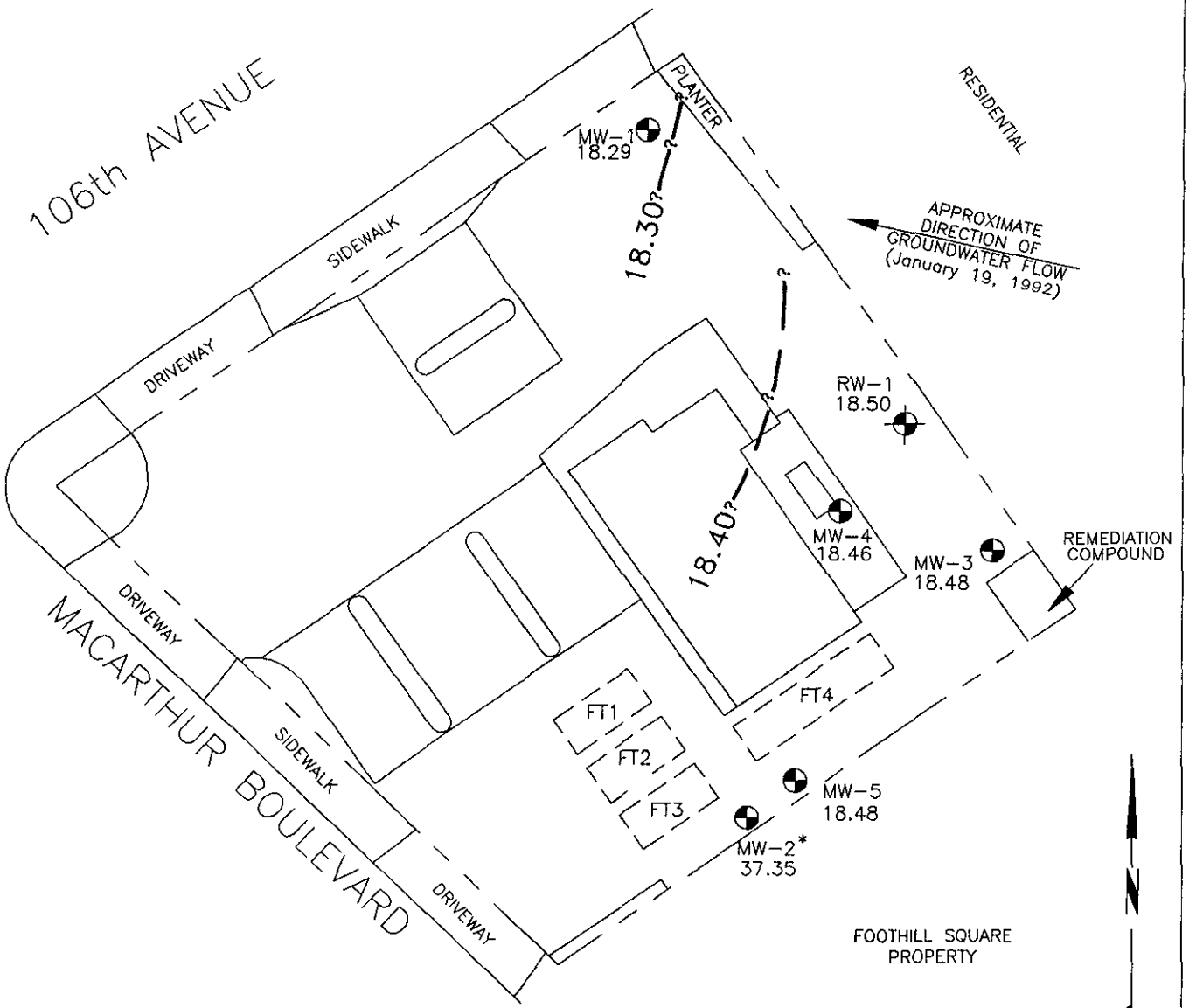
Source: Modified from plan supplied by ARCO and surveyed by Ron Archer, Civil Engineer, Inc. and John Koch, Land Surveyor.

RESNA

PROJECT 60026.06

GENERALIZED SITE PLAN
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE 2



EXPLANATION

18.40 = Line of equal elevation of groundwater in feet above mean sea level (MSL)

37.35 = Elevation of groundwater in feet above MSL, January 19, 1992

MW-2* = Well constructed in a shallow, perched water bearing zone and not used for groundwater gradient interpretation

= Recovery well (RESNA, October 1991)

RW-1

MW-5 = Monitoring well (RESNA, 1989)

FT4 = Former underground storage tank

Approximate Scale

30 15 0 30 60

feet

Source: Modified from plan supplied by ARCO and surveyed by Ron Archer, Civil Engineer, Inc. and John Koch, Land Surveyor.

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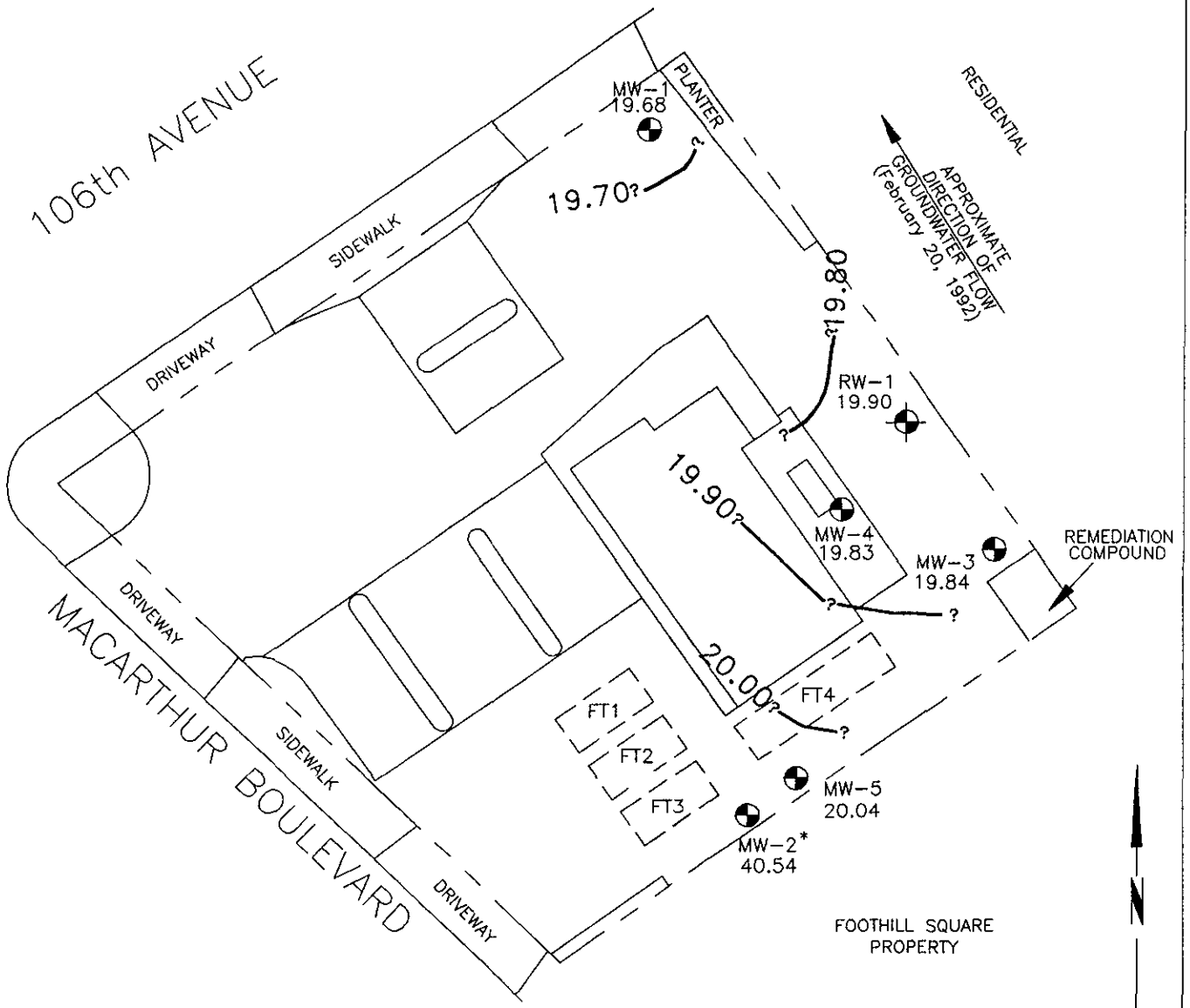
PROJECT 60026.06

GROUNDWATER GRADIENT MAP
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE 3



EXPLANATION

20.00 = Line of equal elevation of groundwater in feet above mean sea level (MSL)

40.54 = Elevation of groundwater in feet above MSL, February 20, 1992

MW-2* = Well constructed in a shallow, perched water-bearing zone and not used for groundwater gradient interpretation

RW-1 = Recovery well (RESNA, October 1991)

MW-5 = Monitoring well (RESNA, 1989)

FT4 = Former underground storage tanks

Approximate Scale

30 15 0 30 60

feet

Source: Modified from plan supplied by ARCO and surveyed by Ron Archer, Civil Engineer, Inc. and John Koch, Land Surveyor.

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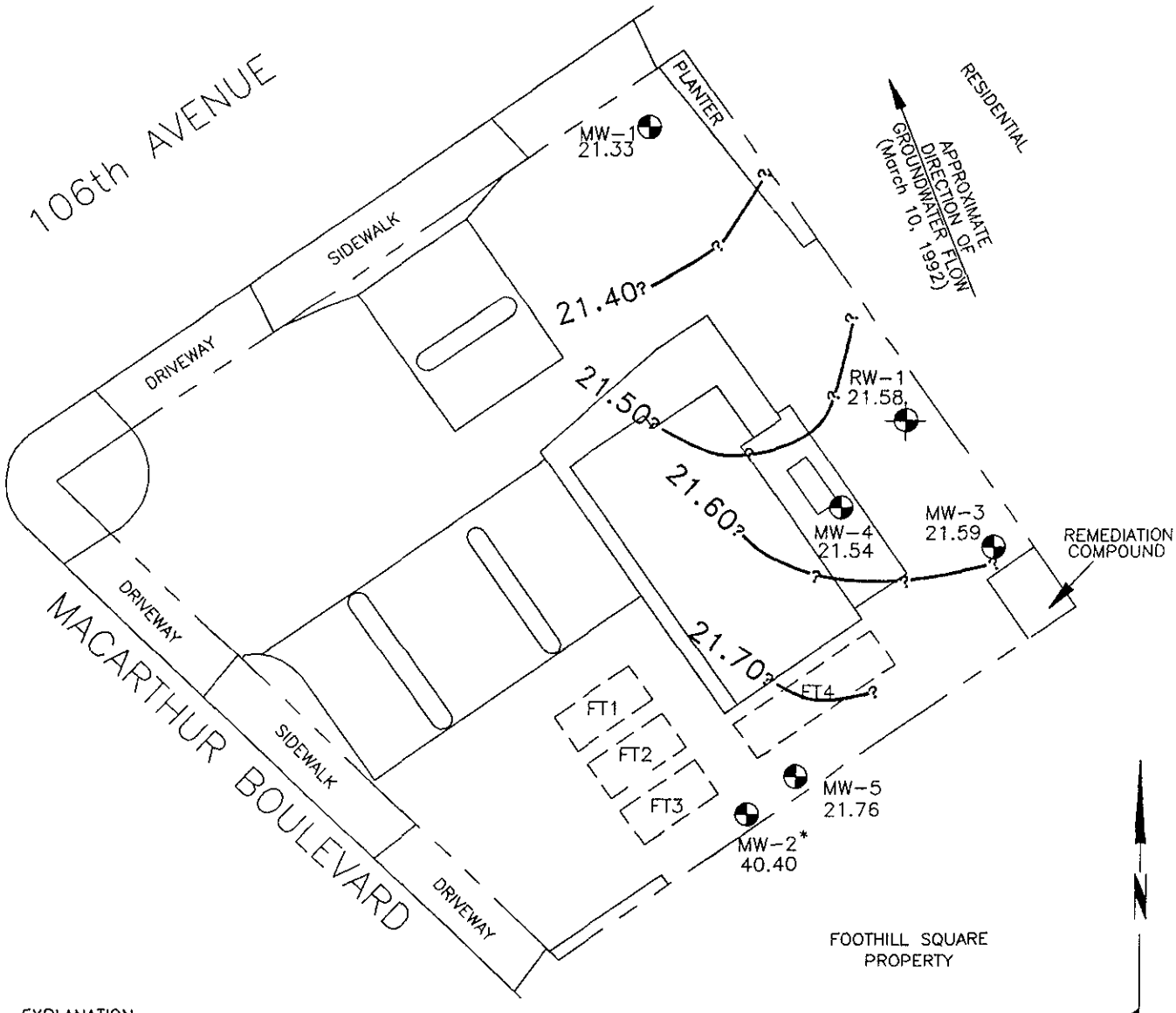
PROJECT 60026.06

GROUNDWATER GRADIENT MAP
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE 4



EXPLANATION

21.70 = Line of equal elevation of groundwater in feet above mean sea level (MSL)

40.40 = Elevation of groundwater in feet above MSL, March 10, 1992

MW-2* = Well constructed in a shallow, perched water-bearing zone and not used for groundwater gradient interpretation

RW-1 = Recovery well (RESNA, October 1991)

MW-5 = Monitoring well (RESNA, 1989)

FT4 = Former underground storage tanks

Approximate Scale

30 15 0 30 60

feet

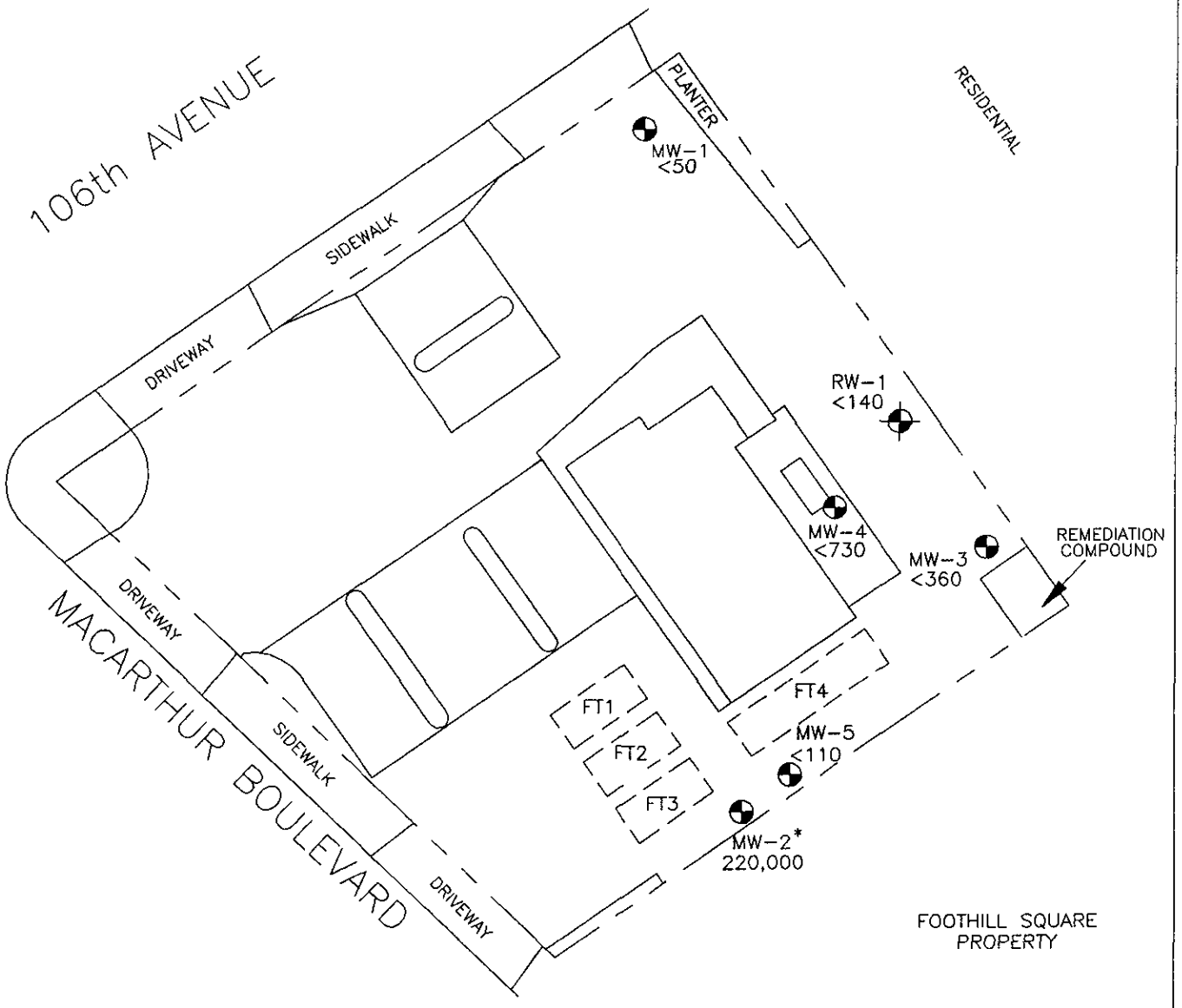
Source: Modified from plan supplied by ARCO and surveyed by Ron Archer, Civil Engineer, Inc. and John Koch, Land Surveyor.

RESNA

PROJECT 60026.06

GROUNDWATER GRADIENT MAP
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE 5



EXPLANATION

220,000 = Concentration of TPHg in groundwater, in parts per billion, March 10, 1992

* = Well constructed in shallow, water-bearing zone

RW-1 = Recovery well (RESNA, October 1991)

MW-5 = Monitoring well (RESNA, 1989)

FT4 = Former underground storage tanks

N

Approximate Scale

30 15 0 30 60

feet

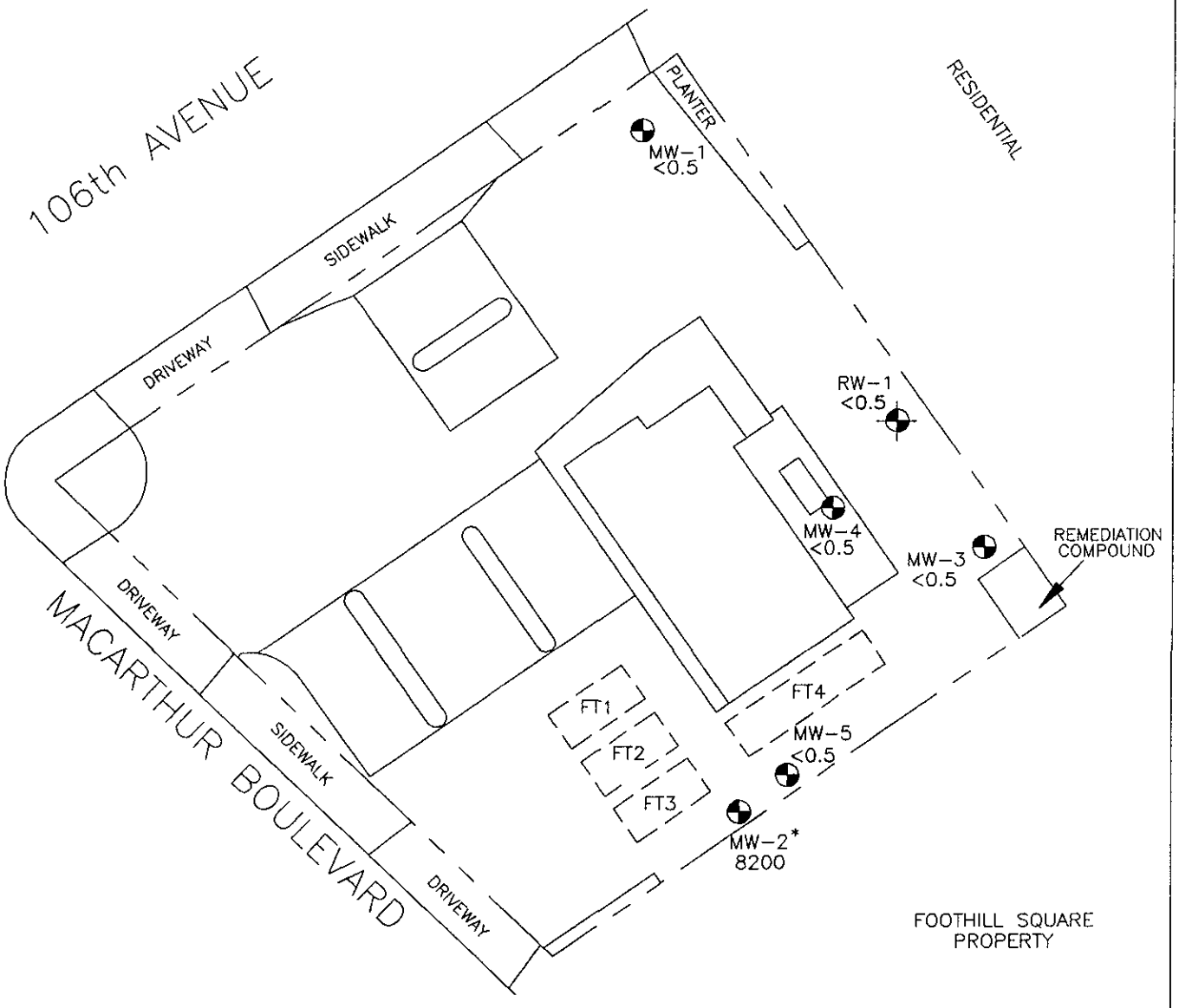
Source: Modified from plan supplied by ARCO and surveyed by Ron Archer, Civil Engineer, Inc. and John Koch, Land Surveyor.

RESNA

PROJECT 60026.06

TPHg CONCENTRATIONS IN GROUNDWATER
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE 6



EXPLANATION

8200 = Concentration of benzene in groundwater, in parts per billion, March 10, 1992

* = Well constructed in shallow, water-bearing zone

RW-1 = Recovery well (RESNA, October 1991)

MW-5 = Monitoring well (RESNA, 1989)

FT4 = Former underground storage tanks

N

Approximate Scale

30 15 0 30 60

feet

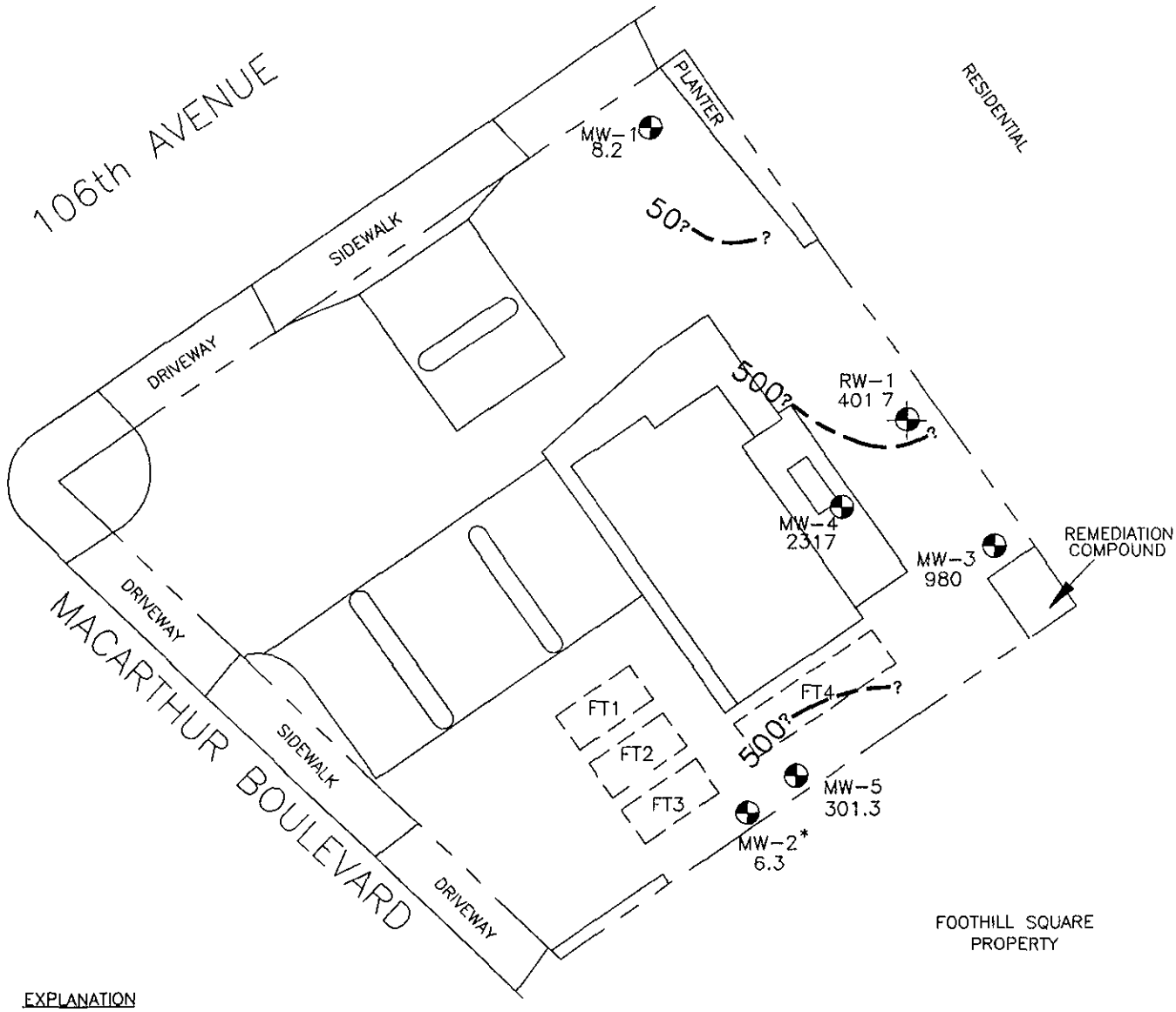
Source: Modified from plan supplied by ARCO and surveyed by Ron Archer, Civil Engineer, Inc. and John Koch, Land Surveyor.

RESNA

PROJECT 60026.06

BENZENE CONCENTRATION IN GROUNDWATER
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE 7



EXPLANATION

1000 = Line of equal concentration of total halogenated volatile organic compounds (VOCs) in groundwater in parts per billion (ppb) as determined by laboratory method EPA 601

2317 = Concentration of total VOCs in groundwater in ppb, March 10, 1992, by EPA method 601

MW-2* = Well constructed in shallow, water-bearing zone

RW-1 = Recovery well (RESNA, October 1991)

MW-5 = Monitoring well (RESNA, 1989)

FT4 = Former underground storage tanks

N

Approximate Scale

30 15 0 30 60

feet

Source: Modified from plan supplied by ARCO and surveyed by Ron Archer, Civil Engineer, Inc. and John Koch, Land Surveyor.

RESNA	**TOTAL VOC CONCENTRATIONS IN GROUNDWATER ARCO Station 276 10600 MacArthur Boulevard Oakland, California**	**PLATE 8**
PROJECT 60026.06		

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 276
Oakland, California
(Page 1 of 4)

Date Well Measured	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-1				
04/17/89		33.04	22.87	None
04/24/89		33.84	22.07	None
10/13/89	55.91	37.19	18.72	None
02/01/90		36.73	19.18	None
07/31/90		36.42	19.49	None
08/01/90		36.41	19.50	None
08/28/90		36.88	19.03	None
10/30/90		37.73	18.18	None
11/20/90		37.92	18.37	None
12/19/90		37.90	18.01	None
01/30/91		38.06	17.85	None
02/27/91		37.66	18.25	None
03/20/91		36.77	19.14	None
04/30/91		34.63	21.28	None
05/31/91		34.83	21.08	None
07/24/91		35.96	19.95	None
08/06/91		36.21	19.70	None
09/03/91		36.74	19.17	None
10/17/91		37.57	18.34	None
11/05/91		37.65	18.26	None
12/24/91		38.14	17.77	None
01/19/92		37.62	18.29	None
02/20/92		36.23	19.68	None
03/10/92		34.58	21.33	None
MW-2				
04/17/89		17.20	38.15	None
04/24/89		17.83	37.52	None
10/13/89	55.35	20.15*	35.20*	0.03
02/01/90		NM	NM	Sheen
07/31/90		18.90	36.45	None
08/01/90		18.23*	37.03*	1.04
08/28/90		21.25*	34.10*	0.83
10/30/90		24.21*	31.14*	1.04
11/20/90		25.08*	30.27*	0.60
12/19/90		18.23*	37.12*	None
01/30/91		19.47*	35.88*	0.03
02/27/91		18.84*	36.51*	0.02
03/20/91		16.02*	39.33*	0.01
04/30/91		16.55	38.80	Sheen
05/31/91		18.41*	36.94*	0.01
07/24/91		19.81	35.54	Sheen

See notes on page 4 of 4.

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 276
Oakland, California
(Page 2 of 4)

Date Well Measured	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-2 Cont.				
08/06/91		20.59*	34.76*	0.14
09/03/91		23.23*	32.12*	0.54
10/17/91		24.81*	30.54*	0.20
11/05/91		18.88*	36.47*	0.01
12/24/91		19.34*	36.01*	0.09
01/19/92		18.00	37.35	Sheen
02/20/92		14.81**	40.54	Skimmer
03/10/92		14.95**	40.40	Skimmer
MW-3				
04/24/89		34.47	22.08	None
10/13/89	56.55	37.60	18.95	None
02/01/90		37.20	19.35	None
07/31/90		36.90	19.65	None
08/01/90		36.87	19.68	None
08/28/90		37.33	19.22	None
10/30/90		38.15	18.40	None
11/20/90		38.33	18.58	None
12/19/90		38.30	18.25	None
01/30/91		Well	Dry	
02/27/91		38.11	18.44	None
03/20/91		37.26	19.29	None
04/30/91		35.02	21.53	None
05/31/91		35.26	21.29	None
07/24/91		36.40	20.15	None
08/06/91		36.66	19.89	None
09/03/91		37.20	19.35	None
10/17/91		38.04	18.51	None
11/05/91		38.08	18.47	None
12/24/91		Well	Dry	
01/19/92		38.07	18.48	None
02/20/92		36.71	19.84	None
03/10/92		34.96	21.59	None

See notes on page 4 of 4.

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 276
Oakland, California
(Page 3 of 4)

Date Well Measured	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-4				
04/17/89		33.87	22.07	None
04/24/89		33.76	22.18	None
10/13/89	55.94	37.03	18.91	None
02/01/90		36.57	19.37	None
07/31/90		36.39	19.55	None
08/01/90		36.32	19.62	None
08/28/90		36.79	19.15	None
10/30/90		37.62	18.32	None
11/20/90		37.82	18.52	None
12/19/90		37.74	18.20	None
01/30/91		37.97	17.97	None
02/27/91		37.52	18.42	None
03/20/91		36.69	19.25	None
04/30/91		34.48	21.46	None
05/31/91		34.73	21.21	None
07/24/91		35.86	20.08	None
08/06/91		36.15	19.79	None
09/03/91		36.66	19.28	None
10/17/91		37.49	18.45	None
11/05/91		37.54	18.40	None
12/24/91		38.01	17.93	None
01/19/92		37.48	18.46	None
02/20/92		36.11	19.83	None
03/10/92		34.96	21.54	None
MW-5				
04/17/89		33.17	22.26	None
04/24/89		33.06	22.37	None
10/13/89	55.43	36.33	19.10	None
02/01/90		35.96	19.47	None
07/31/90		35.70	19.73	None
08/01/90		35.69	19.74	None
08/28/90		36.14	19.29	None
10/30/90		36.94	18.49	None
11/20/90		37.09	18.64	None
12/19/90		37.05	18.38	None
01/30/91		37.26	18.17	None
02/27/91		36.81	18.62	None
03/20/91		36.04	19.39	None
04/30/91		33.75	21.68	None
05/31/91		34.01	21.42	None

See notes on page 4 of 4.

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 276
Oakland, California
(Page 4 of 4)

Date Well Measured	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-5				
07/24/91		35.20	20.23	None
08/06/91		35.48	19.95	None
09/03/91		36.00	19.43	None
10/17/91		36.84	18.59	None
11/05/91		36.86	18.57	None
12/24/91		37.31	18.12	None
01/19/92		36.95	18.48	None
02/20/92		35.39	20.04	None
03/10/92		33.67	21.76	None
RW-1				
11/05/91	56.32	37.89	18.43	None
12/24/91		38.35	17.97	None
01/19/92		37.82	18.50	None
02/20/92		36.42	19.90	None
03/10/92		34.74	21.58	None

Depths are in feet below top of each well casing.
Elevations are referenced in feet above mean sea level.
Floating product reported in feet.
* = Depth to water and water elevation adjusted as followed: The thickness of the floating product and the ground-water depths were recorded. The recorded thickness of the floating product was then multiplied by 0.80 to obtain an approximate value for the displacement of water by the floating product. This approximate displacement value was then subtracted from the measured depth to water to obtain a calculated depth to water (potentiometric surface).

TABLE 2
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES--TPHg, TPHd, BTEX, and TOG
ARCO Station 276
Oakland, California
(Page 1 of 2)

Date/Well	TPHg (ppb)	TPHd (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	TOG (ppb)
MW-1							
04/24/89	<50	NA	<0.50	<0.50	<0.50	<0.50	NA
10/13/89	<20	NA	<0.50	<0.50	<0.50	<0.50	NA
02/01/90	91	NA	<0.30	<0.30	<0.30	0.36	NA
07/31/90	<20	NA	<0.50	<0.50	<0.50	<0.50	NA
10/30/90	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
01/30/91	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
04/30/91	<30	NA	<0.30	<0.30	<0.30	<0.30	NA
08/06/91	<30	NA	<0.30	<0.30	<0.30	<0.30	NA
11/05/91	<30	NA	<0.30	<0.30	<0.30	<0.30	NA
03/10/92	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
MW-2							
04/24/89	165,000	NA	13,000	21,000	2,100	12,700	NA
10/13/89	Not sampled--floating product						
02/01/90	Not sampled--sheen						
07/31/90	240,000	NA	14,000	24,000	3,000	17,000	NA
10/30/90	Not sampled--floating product						
01/30/91	Not sampled--floating product						
04/30/91	Not sampled--sheen						
08/06/91	Not sampled--floating product						
11/05/91	Not sampled--floating product						
03/10/92	220,000	NA	8,200	13,000	4,500	22,000	NA
MW-3							
04/24/89	560	NA	0.54	0.75	<0.50	<0.50	NA
10/13/89	450	NA	<0.50	<0.50	<0.50	<0.50	NA
02/01/90	360	NA	<0.30	<0.30	<0.30	0.85	NA
08/01/90	440	NA	<0.50	<0.50	<0.50	<0.50	NA
10/30/90	340	NA	<0.5	<0.5	<0.5	<0.5	NA
01/30/91	Not sampled--well dry						
04/30/91	Not sampled--well inaccessible due to construction						
08/06/91	430	NA	<0.30	<0.30	<0.30	<0.30	NA
11/05/91	290	NA	<1.5	<1.5	<1.5	<1.5	NA
03/10/92	<360**	NA	<0.5	<0.5	<0.5	<0.5	NA
MW-4							
04/24/89	2,500	NA	270	1.4	<0.50	85	NA
10/13/89	760	NA	0.86	<0.50	1.2	<0.50	NA
02/01/90	680	NA	<0.30	<0.30	<0.30	1.6	NA
07/31/90	470	240	<0.50	<0.50	<0.50	<0.50	<5,000
10/30/90	430	<100	<0.5	<0.5	<0.5	<0.5	<5,000
01/30/91	<50	<100	<0.5	<0.5	1.2	<0.5	<5,000

See notes on Page 2 of 2.

TABLE 2
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES–TPHg, TPHd, BTEX, and TOG
ARCO Station 276
Oakland, California
(Page 2 of 2)

Date/Well	TPHg (ppb)	TPHd (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	TOG (ppb)
MW-4							
04/30/91	600	NA	<0.30	0.30	<0.30	0.43	NA
08/06/91	520	NA	<0.30	<0.30	<0.30	<0.30	NA
11/05/91	900	NA	<3.0	<3.0	<3.0	<3.0	NA
03/10/92	<730**	NA	<0.5	<0.5	<0.5	<0.5	<2500
MW-5							
04/24/89	130	NA	0.67	<0.50	<0.50	<0.50	NA
10/13/89	75	NA	<0.50	<0.50	<0.50	<0.50	NA
02/01/90	81	NA	0.94	0.88	<0.30	1.8	NA
07/31/90	110	NA	<0.50	<0.50	<0.50	<0.50	NA
10/30/90	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
01/30/91	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
04/30/91	120	NA	<0.30	<0.30	<0.30	<0.30	NA
08/06/91	<30	NA	<0.30	<0.30	<0.30	<0.30	NA
11/05/91	77	NA	1.0	3.6	0.60	2.6	NA
03/10/92	<110**	NA	<0.5	<0.5	<0.5	<0.6*	NA
RW-1							
11/05/91	750	NA	4.8	3.7	<3.0	<3.0	NA
03/10/92	<140**	NA	<0.5	<0.5	<0.5	<0.6*	NA
January 1990							
MCLs	—	—	1.0	—	680	1,750	—
Als	—	—	—	100	—	—	—

Results in parts per billion (ppb).
TPHg: Total petroleum hydrocarbons as gasoline by EPA method 8015.
TPHd: Total petroleum hydrocarbons as diesel by EPA method 3550/3510.
B: Benzene, T: Toluene, E: Ethylbenzene, T: Total Xylene isomers
BTEX: Measured by EPA method 8020/602.
NA: Not analyzed.
<: Results reported as less than detection limit.
*: Detection limit reportedly raised by laboratory due to matrix interference.
**: Detections limit reportedly raised by laboratory because matrix contains a discrete non-fuel peak.

TABLE 3
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES--VOCs and Metals
ARCO Station 276
Oakland, California
(Page 1 of 2)

Date/Well	Compound	VOCs (ppb)	Cd (ppm)	Cr (ppm)	Pb (ppm)	Zn (ppm)	Ni (ppm)
MW-1							
09/03/91	Tetrachloroethene	4.5	NA	NA	NA	NA	NA
11/06/91	All Compounds	<2.0	NA	NA	NA	NA	NA
03/10/92	Tetrachloroethene	8.2*	NA	NA	NA	NA	NA
MW-2							
09/03/91	————	Not sampled--floating product					
11/06/91	————	Not sampled--floating product					
03/10/92	Tetrachlorethene	0.9	NA	NA	NA	NA	NA
	1,2-Dichloroethane	5.4					
MW-3							
09/03/91	Tetrachloroethene	1,600*	NA	NA	NA	NA	NA
11/06/91	Tetrachloroethene	400*	NA	NA	NA	NA	NA
03/10/92	Freon 12	3.4	NA	NA	NA	NA	NA
	cis-1,2-Dichloroethene	1.0					
	Trichloroethene	5.6					
	Tetrachloroethene	980*					
MW-4							
07/31/90	Trichloroethene	7.5	NA	NA	NA	NA	NA
	Tetrachloroethene	1600*	NA	NA	NA	NA	NA
	1,2 Dichloroethene	0.7	NA	NA	NA	NA	NA
10/30/90	Trichloroethene	8.1	NA	NA	NA	NA	NA
	Tetrachloroethene	3600*	NA	NA	NA	NA	NA
	1,2 Dichloroethene	0.7	NA	NA	NA	NA	NA
01/30/91	Trichloroethene	12	NA	NA	NA	NA	NA
	Tetrachloroethene	4,900*	NA	NA	NA	NA	NA
04/30/91	Tetrachloroethene	2,200*	NA	NA	NA	NA	NA
08/06/91	Tetrachloroethene	1,700*	<0.010	0.065	0.0067	0.14	0.096
09/03/91	Tetrachloroethene	2,000*	NA	NA	NA	NA	NA
11/06/91	Tetrachloroethene	1,000*	NA	NA	NA	NA	NA
	Trichloroethene	6.3	NA	NA	NA	NA	NA
03/10/92	cis-1,2-Dichloroethene	4.0	NA	NA	NA	NA	NA
	Trichloroethene	13					
	Tetrachloroethene	2,300*					
MW-5							
08/06/91	Tetrachloroethene	7.3*	NA	NA	NA	NA	NA
09/03/91	Tetrachloroethene	25*	NA	NA	NA	NA	NA
11/06/91	Tetrachloroethene	12*	NA	NA	NA	NA	NA
03/10/92	Trichloroethene	1.3	NA	NA	NA	NA	NA
	Tetrachloroethene	300*					

See notes on Page 2 of 2.

TABLE 3
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES–VOCs and Metals
ARCO Station 276
Oakland, California
(Page 2 of 2)

Date/Well	Compound	VOCs (ppb)	Cd (ppm)	Cr (ppm)	Pb (ppm)	Zn (ppm)	Ni (ppm)
RW-1							
11/06/91	Tetrachloroethene	980*	NA	NA	NA	NA	NA
03/10/92	Trichloroethene	1.7	NA	NA	NA	NA	NA
	Tetrachloroethene	400*					
MCLs		—	0.010	0.05	0.05	5.0	—

Results in parts per billion (ppb), except heavy metals which are in parts per million (ppm).
VOCs: Halogenated Volatile Organic Compounds by EPA method 601/8010. Compounds not shown were not detected.
Cd: Cadmium by EPA method 200.7.
Cr: Chromium by EPA method 200.7.
Pb: Lead by EPA method 239.7.
Zn: Zinc by EPA method 200.7.
Ni: Nickel by EPA method 200.7.
<: Results reported as less than the detection limit.
NA: Not analyzed. Compounds not shown not detected.
*: Exceeds the MCL of 5 ppb concentration of tetrachloroethene.
MCLs: Maximum Contaminant Levels as reported by the California Department of Health Services 10/24/90.

TABLE 4
APPROXIMATE CUMULATIVE PRODUCT REMOVED
ARCO Station 276
Oakland, California

Year		Floating Product Removed (gallons)
1991	TOTAL:	18.15

Date	Floating Product Removed (gallons)
1992	
MW-2	
01-29-92	0.09
02-28-92	None present
03-25-92	None present
Total:	0.09 Gallons

APPENDIX A

EMCON'S FIELD REPORTS
SUMMARY OF GROUNDWATER MONITORING DATA
CERTIFIED ANALYTICAL REPORTS WITH CHAIN-OF-CUSTODY
WATER SAMPLE FIELD DATA SHEETS
MONITORING WELL PURGE WATER DISPOSAL FORM

EMCON ASSOCIATES
Consultants in Wastes Management and Environmental Control

Date January 29, 1992
Project G70-02.01

To:
Mr. Joel Coffman
RESNA/ Applied Geosystems
3315 Almaden Expressway, Suite 34
San Jose, California 95118

We are enclosing:

Copies	Description
1	DTW/FP Survey Form, January 1992 monthly water level survey, ARCO station 276, 10600 MacArthur Boulevard, Oakland, CA

For your: X Information Sent by: X Mail

Comments:
Monthly water level data for the above mentioned site are attached. Please call if you have any questions: (408) 453-2266.

Reviewed by:

REGISTERED PROFESSIONAL ENGINEER
ROBERT CURTIS PORTER
No: 4094
Exp. 6/30/92
INDUSTRIAL
STATE OF CALIFORNIA

Mark Knuttel MK

Robert C Porter
Robert Porter, Senior P.E. #4094

Field Services: 1938 Junction Avenue, San Jose, California 95131-2102, (408) 453-0719 Fax (408) 453-0452

FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : G70-02.01 STATION ADDRESS : 10600 MacArthur Blvd. Oakland DATE : 1-19-92

ARCO STATION # : 276 FIELD TECHNICIAN : J. Williams DAY : ~~Saturday~~ Sunday

DTW Order	WELL ID	Well Box Seal	Well Lid Secure	Gasket	Lock	Locking Well Cap	FIRST DEPTH TO WATER (feet)	SECOND DEPTH TO WATER (feet)	DEPTH TO FLOATING PRODUCT (feet)	FLOATING PRODUCT THICKNESS (feet)	WELL TOTAL DEPTH (feet)	COMMENTS
1	MW-1	ok	yes	ok	yes	yes	37.62	37.62	ND	ND	38.84	—
2	MW-5	ok	yes				36.95	36.95	ND	ND	47.04	—
3	MW-3	ok					38.07	38.07	ND	ND	38.60	—
4	RW-1	ok					37.82	37.62	ND	ND	48.80	—
5	MW-4	ok					37.48	37.48	ND	ND	49.00	—
6	MW-2	ok					18.00	18.00	ND	ND	25.62	~~Sheen~~ Traces of product. spots

EMCON ASSOCIATES
Consultants in Wastes Management and Environmental Control

RECEIVED
MAR 2 - 1992
RESNA
SAN JOSE

Date February 25, 1992
Project G70-02.01

To:
Mr. Joel Coffman
RESNA/ Applied Geosystems
3315 Almaden Expressway, Suite 34
San Jose, California 95118

We are enclosing:

Copies	Description
1	Depth To Water/Floating Product Survey Form, February 1992 monthly water level survey, ARCO station 276, 10600 MacArthur Boulevard, Oakland, CA

For your: X Information Sent by: X Mail

Comments:
Monthly water level data for the above mentioned site are attached. Please call if you have any questions: (408) 453-2266.

Reviewed by:

REGISTERED PROFESSIONAL ENGINEER ROBERT CURTIS PORTER No: 4094 Exp. 4/30/92 INDUSTRIAL STATE OF CALIFORNIA

Mark Knuttel MK

Robert Porter, Senior Project Engineer.

FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : G70-02.01 STATION ADDRESS : 10600 MacArthur Blvd. Oakland DATE : 2-20-92

ARCO STATION # : 276 FIELD TECHNICIAN : Vince Barlock DAY : Thursday

DTW Order	WELL ID	Well Box Seal	Well Lid Secure	Gasket	Lock	Locking Well Cap	FIRST DEPTH TO WATER (feet)	SECOND DEPTH TO WATER (feet)	DEPTH TO FLOATING PRODUCT (feet)	FLOATING PRODUCT THICKNESS (feet)	WELL TOTAL DEPTH (feet)	COMMENTS
1	MW-1	Cracks	YES	TORN	YES	YES	36.23	36.23	ND	ND	38.83	—
2	MW-5	Cracks	YES	OK	YES	YES	35.39	35.39	ND	ND	47.40	—
3	MW-3	OK	YES	OK	YES	YES	36.71	36.71	ND	ND	38.57	
4	RW-1	cracks	YES	OK	NO	SLIP CAP	36.42	36.42	ND	ND	48.88	WELL BOX FULL OF WATER
5	MW-4	OK	YES	OK	YES	YES	36.10	36.11	ND	ND	48.93	—
6	MW-2	cracks	YES	OK	YES	YES	14.81	14.81	ND	ND	25.62	Dedicated Bailer

EMCON ASSOCIATES
Consultants in Wastes Management and Environmental Control

APR 0 1992

Date March 25 1992
Project G70-02.01

To:
Mr. Joel Coffman
RESNA/ Applied Geosystems
3315 Alamden Expressway, Suite 34
San Jose, California 95050

We are enclosing:

Copies	Description
1	Depth To Water / Floating Product Survey Results
2	Summary of Groundwater Monitoring Data
1	Certified Analytical Reports with Chain-of-Custody
6	Water Sample Field Data Sheets

For your: X Information Sent by: X Mail

Comments:

Enclosed are the data from the first quarter 1992 monitoring event at ARCO service station 276, 10600 MacArthur Boulevard, Oakland, California. Please call if you have any questions:.(408) 453-2266.

MK

Mark Knuttel

Reviewed by:

REGISTERED PROFESSIONAL ENGINEER ROBERT PORTER No: 4884 Exp. 6/30/92 INDUSTRIAL STATE OF CALIFORNIA

Robert Porter, Senior Project Engineer.

1938 Junction Avenue, San Jose, California 95131-2102, (408) 453-0719, Fax (408) 453-0452

FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : G70-02.01　　STATION ADDRESS : 10600 MacArthur Blvd. Oakland　　DATE : TUESDAY

ARCO STATION # : 276　　FIELD TECHNICIAN : L. RATH　　DAY : 3/10/92

DTW Order	WELL ID	Well Box Seal	Well Lid Secure	Gasket	Lock	Locking Well Cap	FIRST DEPTH TO WATER (feet)	SECOND DEPTH TO WATER (feet)	DEPTH TO FLOATING PRODUCT (feet)	FLOATING PRODUCT THICKNESS (feet)	WELL TOTAL DEPTH (feet)	COMMENTS
1	MW-1	good	yes	Broken	3259	good	34.38	34.58	ND	ND	38.85	—
2	MW-5	good	yes	good	3259	good	33.67	33.67	ND	ND	47.05	—
3	MW-3	good	yes	good	3259	good	34.96	34.96	ND	ND	38.6	—
4	RW-1	Broken	yes	good	slip cap	slip cap	34.74	34.74	ND	ND	48.9	No lock slip cap is Broken Water in Box
5	MW-4	good	yes	good	3259	good	34.40	34.40	ND	ND	49.0	—
6	MW-2	good	yes	good	3259	good	14.95	14.95	ND	ND	25.65	—

Summary of Groundwater Monitoring Data
First Quarter 1992
ARCO Service Station 276
10600 MacArthur Boulevard, Oakland, California
micrograms per liter (µg/l) and milligrams per liter (mg/l)

Well ID and Sample Depth	Sampling Date	Depth To Water (feet)	Floating Product Thickness (feet)	TPH[1] as Gasoline (µg/l)	Benzene (µg/l)	Toluene (µg/l)	Ethyl-benzene (µg/l)	Total Xylenes (µg/l)	Total Oil and Grease (mg/l)
MW-1(37)	03/10/92	34.58	ND.[2]	<50	<0.5	<0.5	<0.5	<0.5	NR.[3]
MW-2(24)	03/10/92	14.95	ND.	220,000.	8,200.	13,000.	4,500.	22,000.	NR.
MW-3(37)	03/10/92	34.96	ND.	<360.**	<0.5	<0.5	<0.5	<0.5	NR.
MW-4(48)	03/10/92	34.40	ND.	<730.**	<0.5	<0.5	<0.5	<0.5	<2.5
MW-5(46)	03/10/92	33.67	ND.	<110.**	<0.5	<0.5	<0 5	<0.6*	NR.
RW-1(47)	03/10/92	34.74	ND.	<140.**	<0.5	<0.5	<0.5	<0.6*	NR.
FB-1[4]	03/10/92	NA.[5]	NA.	<50	<0.5	<0.5	<0.5	<0.5	NR.

1. TPH. = Total petroleum hydrocarbons
2. ND. = Not detected
3. NR. = Not reported; sample was not scheduled for analysis of the selected parameter
4. FB. = Field blank
5. NA. = Not applicable

*. = Raised method reporting limit due to matrix interference
**. = Raised method reporting limit because the sample matrix contains a discrete non-fuel peak

Summary of Analytical Results
Halogenated Volatile Organic Compounds by EPA[1] Methods 5030/601
First Quarter 1992
ARCO Service Station 1326
840 San Antonio Road, Palo Alto, California
micrograms per liter (µg/l) or parts per billion (ppb)

Well ID and Sample Depth	Sampling Date	Freon 12[2] (ppb)	cis-1,2-DCE[3] (ppb)	TCE[4] (ppb)	PCE[5] (ppb)	1,2-DCA[6] (ppb)	Chloroform (ppb)
MW-1(37)	03/10/92	<1	<0.5	<0.5	8 2	<0.5	<0.5
MW-2(24)	03/10/92	<1	<0.5	<0.5	0.9	5.4	<0.5
MW-3(37)	03/10/92	3.4	1 0	5.6	980.	<0.5	<0.5
MW-4(48)	03/10/92	<1	4.0	13.	2,300.	<0.5	<0.5
MW-5(46)	03/10/92	<1	<0.5	1.3	300.	<0.5	<0.5
RW-1(47)	03/10/92	<1	<0.5	1 7	400.	<0.5	<0.5
FB-1	03/10/92	<1	<0.5	<0.5	<0.5	<0.5	7.0

1. EPA = United States Environmental Protection Agency.
2. Freon 12 = Dichlorodifluoromethane (Freon 12)
3. cis-1,2-DCE = cis-1,2-Dichloroethene
4. TCE = Trichloroethene
5. PCE = Tetrachloroethene
6. 1,2-DCA = 1,2-Dichloroethane

Columbia Analytical Services inc.

March 24, 1992

Mark Knuttel
EMCON Associates
1921 Ringwood Avenue
San Jose, CA 95131

Re: **EMCON Project No. G70-02.01**
Arco Facility No. 276

Dear Mr. Knuttel:

Enclosed are the results of the water samples submitted to our lab on March 10, 1992. For your reference, our service request number for this work is SJ92-0253.

All analyses were performed in accordance with the laboratory's quality assurance program.

Please call if you have any questions.

Respectfully submitted:

Carol J Klein for

Keoni A. Murphy
COLUMBIA ANALYTICAL SERVICES, INC.

jb/KAM

1904 Ringwood Avenue • San Jose, California 95131 • Telephone 408/437-2400 • Fax 408/437-9356

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Associates	**Date Received:**	03/10/92
Project:	EMCON Project No. G70-02.01	**Work Order #:**	SJ92-0253
	Arco Facility No. 276	**Sample Matrix:**	Water

Inorganic Parameters[1]
mg/L (ppm)

Sample Name:		MW-4 (48)	Method Blank
Date Sampled:		03/10/92	
Analyte	**Method**	**MRL**	
Total Oil and Grease	413.1	2.5	ND ND

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
[1] Unless otherwise noted, all analyses were performed within EPA recommended maximum holding times specified in *Test Methods for Evaluating Solid Waste,* (SW-846, 3rd Edition) and *Methods for Chemical Analysis of Water and Waste* (EPA-600/4-79-020, Revised March 1983).

Approved by Carol Klein Date 3-24-92

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON Associates
Project: EMCON Project No. G70-02.01
Arco Facility No. 276

Date Received: 03/10/92
Work Order #: SJ92-0253
Sample Matrix: Water

BTEX and TPH as Gasoline
EPA Methods 5030/8020/DHS LUFT Method
µg/L (ppb)

Sample Name:		MW-1 (37)	MW-5 (46)	MW-3 (37)
Date Analyzed:		03/12/92	03/12/92	03/12/92
Analyte	**MRL**			
Benzene	0.5	ND	ND	ND
Toluene	0.5	ND	ND	ND
Ethylbenzene	0.5	ND	ND	ND
Total Xylenes	0.5	ND	<0.6*	ND
TPH as Gasoline	50	ND	<110.**	<360.**

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
* Raised MRL due to matrix interference.
** Raised MRL because the sample matrix contains a discrete non-fuel peak.

Approved by Carol J Klein Date 3-24-92

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Associates	**Date Received:**	03/10/92
Project:	EMCON Project No. G70-02.01	**Work Order #:**	SJ92-0253
	Arco Facility No. 276	**Sample Matrix:**	Water

BTEX and TPH as Gasoline
EPA Methods 5030/8020/DHS LUFT Method
µg/L (ppb)

Sample Name:		RW-1 (47)	MW-4 (48)	MW-2 (24)
Date Analyzed:		03/12/92	03/12/92	03/12/92
Analyte	**MRL**			
Benzene	0.5	ND	ND	8,200.
Toluene	0.5	ND	ND	13,000.
Ethylbenzene	0.5	ND	ND	4,500.
Total Xylenes	0.5	<0.6*	ND	22,000.
TPH as Gasoline	50	<140.**	<730.**	220,000.

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
* Raised MRL due to matrix interference.
** Raised MRL because the sample matrix contains a discrete non-fuel peak.

Approved by Carol J Klein Date 3-24-92

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON Associates
Project: EMCON Project No. G70-02.01
Arco Facility No. 276

Date Received: 03/10/92
Work Order #: SJ92-0253
Sample Matrix: Water

BTEX and TPH as Gasoline
EPA Methods 5030/8020/DHS LUFT Method
µg/L (ppb)

Sample Name:		FB-1	Method Blank	Method Blank
Date Analyzed:		03/13/92	03/12/92	03/13/92
Analyte	**MRL**			
Benzene	0.5	ND	ND	ND
Toluene	0.5	ND	ND	ND
Ethylbenzene	0.5	ND	ND	ND
Total Xylenes	0.5	ND	ND	ND
TPH as Gasoline	50	ND	ND	ND

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Carol J Klein Date 3-24-92

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON Associates
Project: EMCON Project No. G70-02.01
Arco Facility No. 276

Date Received: 03/10/92
Work Order #: SJ92-0253
Sample Matrix: Water

Halogenated Volatile Organic Compounds
EPA Methods 5030/601
µg/L (ppb)

Sample Name:		MW-1 (37)	MW-5 (46)	MW-3 (37)
Date Analyzed:		03/11/92	03/11/92	03/11/92
Analyte	**MRL**			
Dichlorodifluoromethane (Freon 12)	1	ND	ND	3.4
Chloromethane	1	ND	ND	ND
Vinyl Chloride	0.5	ND	ND	ND
Bromomethane	0.5	ND	ND	ND
Chloroethane	0.5	ND	ND	ND
Trichlorofluoromethane (Freon 11)	0.5	ND	ND	ND
1,1-Dichloroethene	0.5	ND	ND	ND
Trichlorotrifluoroethane (Freon 113)	0.5	ND	ND	ND
Methylene Chloride	0.5	ND	ND	ND
trans-1,2-Dichloroethene	0.5	ND	ND	ND
cis-1,2-Dichloroethene	0.5	ND	ND	1.0
1,1-Dichloroethane	0.5	ND	ND	ND
Chloroform	0.5	ND	ND	ND
1,1,1-Trichloroethane (TCA)	0.5	ND	ND	ND
Carbon Tetrachloride	0.5	ND	ND	ND
1,2-Dichloroethane	0.5	ND	ND	ND
Trichloroethene (TCE)	0.5	ND	1.3	5.6
1,2-Dichloropropane	0.5	ND	ND	ND
Bromodichloromethane	0.5	ND	ND	ND
2-Chloroethyl Vinyl Ether	5	ND	ND	ND
trans-1,3-Dichloropropene	0.5	ND	ND	ND
cis-1,3-Dichloropropene	0.5	ND	ND	ND
1,1,2-Trichloroethane	0.5	ND	ND	ND
Tetrachloroethene (PCE)	0.5	8.2	300.	980.
Dibromochloromethane	0.5	ND	ND	ND
Chlorobenzene	0.5	ND	ND	ND
Bromoform	0.5	ND	ND	ND
1,1,2,2-Tetrachloroethane	0.5	ND	ND	ND
1,3-Dichlorobenzene	1	ND	ND	ND
1,4-Dichlorobenzene	1	ND	ND	ND
1,2-Dichlorobenzene	1	ND	ND	ND

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Carol J Klein Date 3-24-92

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON Associates
Project: EMCON Project No. G70-02.01
Arco Facility No. 276

Date Received: 03/10/92
Work Order #: SJ92-0253
Sample Matrix: Water

Halogenated Volatile Organic Compounds
EPA Methods 5030/601
µg/L (ppb)

Sample Name:		RW-1 (47)	MW-4 (48)	MW-2 (24)
Date Analyzed:		03/11/92	03/11/92	03/16/92
Analyte	**MRL**			
Dichlorodifluoromethane (Freon 12)	1	ND	ND	ND
Chloromethane	1	ND	ND	ND
Vinyl Chloride	0.5	ND	ND	ND
Bromomethane	0.5	ND	ND	ND
Chloroethane	0.5	ND	ND	ND
Trichlorofluoromethane (Freon 11)	0.5	ND	ND	ND
1,1-Dichloroethene	0.5	ND	ND	ND
Trichlorotrifluoroethane (Freon 113)	0.5	ND	ND	ND
Methylene Chloride	0.5	ND	ND	ND
trans-1,2-Dichloroethene	0.5	ND	ND	ND
cis-1,2-Dichloroethene	0.5	ND	4.0	ND
1,1-Dichloroethane	0.5	ND	ND	ND
Chloroform	0.5	ND	ND	ND
1,1,1-Trichloroethane (TCA)	0.5	ND	ND	ND
Carbon Tetrachloride	0.5	ND	ND	ND
1,2-Dichloroethane	0.5	ND	ND	5.4
Trichloroethene (TCE)	0.5	1.7	13.	ND
1,2-Dichloropropane	0.5	ND	ND	ND
Bromodichloromethane	0.5	ND	ND	ND
2-Chloroethyl Vinyl Ether	5	ND	ND	ND
trans-1,3-Dichloropropene	0.5	ND	ND	ND
cis-1,3-Dichloropropene	0.5	ND	ND	ND
1,1,2-Trichloroethane	0.5	ND	ND	ND
Tetrachloroethene (PCE)	0.5	400.	2,300.	0.9
Dibromochloromethane	0.5	ND	ND	ND
Chlorobenzene	0.5	ND	ND	ND
Bromoform	0.5	ND	ND	ND
1,1,2,2-Tetrachloroethane	0.5	ND	ND	ND
1,3-Dichlorobenzene	1	ND	ND	ND
1,4-Dichlorobenzene	1	ND	ND	ND
1,2-Dichlorobenzene	1	ND	ND	ND

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Carol J Klein Date 3-24-92

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON Associates
Project: EMCON Project No. G70-02.01
Arco Facility No. 276

Date Received: 03/10/92
Work Order #: SJ92-0253
Sample Matrix: Water

Halogenated Volatile Organic Compounds
EPA Methods 5030/601
µg/L (ppb)

Sample Name:		FB-1	Method Blank	Method Blank
Date Analyzed:		03/11/92	03/11/92	03/16/92
Analyte	**MRL**			
Dichlorodifluoromethane (Freon 12)	1	ND	ND	ND
Chloromethane	1	ND	ND	ND
Vinyl Chloride	0.5	ND	ND	ND
Bromomethane	0.5	ND	ND	ND
Chloroethane	0.5	ND	ND	ND
Trichlorofluoromethane (Freon 11)	0.5	ND	ND	ND
1,1-Dichloroethene	0.5	ND	ND	ND
Trichlorotrifluoroethane (Freon 113)	0.5	ND	ND	ND
Methylene Chloride	0.5	ND	ND	ND
trans-1,2-Dichloroethene	0.5	ND	ND	ND
cis-1,2-Dichloroethene	0.5	ND	ND	ND
1,1-Dichloroethane	0.5	ND	ND	ND
Chloroform	0.5	7.0	ND	ND
1,1,1-Trichloroethane (TCA)	0.5	ND	ND	ND
Carbon Tetrachloride	0.5	ND	ND	ND
1,2-Dichloroethane	0.5	ND	ND	ND
Trichloroethene (TCE)	0.5	ND	ND	ND
1,2-Dichloropropane	0.5	ND	ND	ND
Bromodichloromethane	0.5	ND	ND	ND
2-Chloroethyl Vinyl Ether	5	ND	ND	ND
trans-1,3-Dichloropropene	0.5	ND	ND	ND
cis-1,3-Dichloropropene	0.5	ND	ND	ND
1,1,2-Trichloroethane	0.5	ND	ND	ND
Tetrachloroethene (PCE)	0.5	ND	ND	ND
Dibromochloromethane	0.5	ND	ND	ND
Chlorobenzene	0.5	ND	ND	ND
Bromoform	0.5	ND	ND	ND
1,1,2,2-Tetrachloroethane	0.5	ND	ND	ND
1,3-Dichlorobenzene	1	ND	ND	ND
1,4-Dichlorobenzene	1	ND	ND	ND
1,2-Dichlorobenzene	1	ND	ND	ND

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Carol J Klein Date 3-24-92

APPENDIX A

LABORATORY QC RESULTS

Client: EMCON Associates
Project: EMCON Project No. G70-02.01
Arco Facility No. 276

Date Received: 03/10/92
Work Order #: SJ92-0253
Sample Matrix: Water

QA/QC Report
Surrogate Recovery Summary
BTEX and TPH as Gasoline
EPA Methods 5030/8020/DHS LUFT Method

Sample Name	Date Analyzed	Percent Recovery α,α,α-Trifluorotoluene
MW-1 (37)	03/12/92	104.
MW-5 (46)	03/12/92	113.
MW-3 (37)	03/12/92	109.
RW-1 (47)	03/12/92	113.
MW-4 (48)	03/12/92	104.
MW-2 (24)	03/12/92	93.
FB-1	03/13/92	117.
Method Blank	03/12/92	84.
Method Blank	03/13/92	110.
	CAS Acceptance Criteria	70-130

TPH Total Petroleum Hydrocarbons

Approved by Carol J Klein Date 3-24-92

Client: EMCON Associates
Project: EMCON Project No. G70-02.01
Arco Facility No. 276

Date Received: 03/10/92
Work Order #: SJ92-0253
Sample Matrix: Water

QA/QC Report
Surrogate Recovery Summary
Halogenated Volatile Organic Compounds
EPA Methods 5030/601

Sample Name	Date Analyzed	Percent Recovery *4-Bromofluorobenzene*
MW-1 (37)	03/11/92	108.
MW-5 (46)	03/11/92	114.
MW-3 (37)	03/11/92	120.
RW-1 (47)	03/11/92	120.
MW-4 (48)	03/11/92	108.
MW-2 (24)	03/16/92	79.
FB-1	03/11/92	104.
Method Blank	03/11/92	98.
Method Blank	03/16/92	70.
	CAS Acceptance Criteria	70-130

Approved by Carol Klein Date 3-24-92

APPENDIX B

CHAIN OF CUSTODY

ARCO Products Company
Division of AtlanticRichfieldCompany

Task Order No. EMCGC-92-1

Chain of Custody

ARCO Facility no: 276
City (Facility): Oakland
Project manager (Consultant): Mark Knutter
Laboratory name: CAS

ARCO engineer: Kyle Christie
Telephone no. (ARCO): 415-571-2434
Telephone no. (Consultant): 408-453-0719
Fax no. (Consultant): 408-453-0452

Consultant name: Emcon Associates
Address (Consultant): 1938 Junction Ave. San Jose, CA.
Contract number: 07077

Method of shipment: Sampler will deliver

Sample I.D	Lab no	Container no	Matrix: Soil	Matrix: Water	Matrix: Other	Preservation: Ice	Preservation: Acid	Sampling date	Sampling time	BTEX 602/EPA 8020	BTEX/TPH Gas EPA M602/8020/8015	TPH Modified 8015 Gas ☐ Diesel ☐	Oil and Grease 413.1 ☑ 413.2 ☐	TPH EPA 418.1/SM503E	EPA 601/8010	EPA 624/8240	EPA 625/8270	TCLP Metals ☐ VOA ☐ Semi VOA ☐	CAM Metals EPA 6010/7000 TTLC ☐ STLC ☐	Lead Org./DHS ☐ Lead EPA 7420/7421 ☑		
MW-1(37)	1-4	~~8~~4		X		X	HCl	3/10/92	1010		X				X							
MW-5(46)	5-8	~~8~~4		X		X	HCl	↓	1050		X				X							
MW-3(37)	9-12	~~8~~4		X		X	HCl	↓	1130		X				X							
MW-1(47)	13-16	~~8~~4		X		X	HCl	↓	1230		X				X							
MW-4(48)	17-20	~~8~~4		X		X	HCl	↓	1315		X				X							
[illegible](24)	21-24	~~8~~4		X		X	HCl	↓	1405		X				X							
[illegible]	25-28	~~8~~4		X		X	HCl	↓			X				X							
MW-4(48)	29-30	2		X		X	HCl	↓	1315				X									
MW-2(2-1)		1		X		X	HNO_3	✓	1405											X		

Special detection Limit/reporting: Lowest possible

Special QA/QC: as normal

Remarks: G70-02.01
TPH-G/BTXE
2 40 ml VOAs HCl
EPA 601
2-40 ml VOAs HCl
TOG
2 liter glass HCL
TOTAL LEAD - NOT Filtered
1 500 ml LPE HNO_3

Lab number: 3192-0253

Condition of sample: OK
Temperature received: Cool

Relinquished by sampler	Date	Time	Received by	Date	Time
[signature] Roth	3/10/92	1600	[signature]	3-10-92	16:00

Relinquished by	Date	Time	Received by

Relinquished by	Date	Time	Received by laboratory	Date	Time

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

Distribution: White copy — Laboratory; Canary copy — ARCO Environmental Engineering; Pink copy — Consultant
APPC-3292 (2-91)

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: G70-0201 SAMPLE ID: MW-1

PURGED BY: L. RATH CLIENT NAME: ARCO 276

SAMPLED BY: L RATH LOCATION: 10600 McArthur Blvd Oakland

TYPE: Ground Water X Surface Water ___ Treatment Effluent ___ Other ___

CASING DIAMETER (inches): 2 X 3 ___ 4 ___ 4.5 ___ 6 ___ Other ___

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 0.69

DEPTH TO WATER (feet): 34.58 CALCULATED PURGE (gal.): 3.48

DEPTH OF WELL (feet): 38.85 4.27 x .816 ACTUAL PURGE VOL. (gal.): 3.50

DATE PURGED: 3/10/92 Start (2400 Hr) 0940 End (2400 Hr) 0953

DATE SAMPLED: ↓ Start (2400 Hr) 1010 End (2400 Hr) 1010

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
0945	.75	6.00	4410	65.5	BROWN	MOD
0947	1.5	6.08	4340	65.4	"	"
0951	2.25	6.12	4330	65.2	"	"
0953	3.00	6.10	4340	65.0	"	"
1010	~~3.75~~ Recharge	6.12	4330	65.1	"	"

D. O. (ppm): NR ODOR: NO

COLOR (COBALT 0 - 100): NR

TURBIDITY (NTU 0 - 200): NR

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): FB-1

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
___ 2" Bladder Pump	___ Bailer (Teflon®)	___ 2" Bladder Pump	X Bailer (Teflon®)
___ Centrifugal Pump	X Bailer (PVC)	___ DDL Sampler	___ Bailer (Stainless Steel)
___ Submersible Pump	___ Bailer (Stainless Steel)	___ Dipper	___ Submersible Pump
___ Well Wizard™	___ Dedicated	___ Well Wizard™	___ Dedicated
Other: ___		Other: ___	

WELL INTEGRITY: good LOCK #: 3259

REMARKS: well Dried at 3.5 gal at 0955

MW-1 (37)

Meter Calibration: Date: 3/10/92 Time: 0929 Meter Serial #: 6111 Temperature °F: 61.9

(EC 1000 938 / 1000) (DI 12.75) (pH 7 7.03 / 7.00) (pH 10 9.99 / 10.00) (pH 4 4.00 / ___)

Location of previous calibration: ___

Signature: [signature] Reviewed By: MK Page 1 of 6

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/

EMCON ASSOCIATES

PROJECT NO: G70 02 01 | SAMPLE ID: mw-2

PURGED BY: L. RATIT | CLIENT NAME: ARCO 276

SAMPLED BY: L. RATIT | LOCATION: 10600 McArthur Blvd Oakland

TYPE: Ground Water X | Surface Water ___ | Treatment Effluent ___ | Other ___

CASING DIAMETER (inches): 2 ___ | 3 ___ | 4 X | 4.5 ___ | 6 ___ | Other ___

CASING ELEVATION (feet/MSL): NR

DEPTH TO WATER (feet): 14.95

DEPTH OF WELL (feet): 25.65

VOLUME IN CASING (gal.): 7.01

CALCULATED PURGE (gal.): 35.09

ACTUAL PURGE VOL. (gal.): 36.0

DATE PURGED: 3/10/92 | Start (2400 Hr) 1340 | End (2400 Hr) 1400

DATE SAMPLED: ↓ | Start (2400 Hr) 1405 | End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1343	7	4.53	909	70.1	Brown	Heavy
1348	14	4.35	891	68.9	"	"
1350	21	4.33	887	68.6	"	"
1356	28	4.26	884	68.1	"	"
1400	36	4.24	880	68.1	"	"

D. O. (ppm): NR | ODOR: Heavy/Strong | NR (COBALT 0 - 100) | NR (NTU 0 - 200)

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): NR

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
___ 2" Bladder Pump	___ Bailer (Teflon®)	___ 2" Bladder Pump	X Bailer (Teflon®)
___ Centrifugal Pump	___ Bailer (PVC)	___ DDL Sampler	___ Bailer (Stainless Steel)
X Submersible Pump	___ Bailer (Stainless Steel)	___ Dipper	___ Submersible Pump
___ Well Wizard™	___ Dedicated	___ Well Wizard™	___ Dedicated
Other: ___		Other: ___	

WELL INTEGRITY: good | LOCK #: 3259

REMARKS: Intermitent product

mw-2 (24)

Meter Calibration: Date: 3/10/92 Time: ___ Meter Serial #: 9111 Temperature °F: ___

(EC 1000 ___ / ___) (DI ___) (pH 7 ___ / ___) (pH 10 ___ / ___) (pH 4 ___ / ___)

Location of previous calibration: mw-1

Signature: [signature] | Reviewed By: MK | Page 2 of 6

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/

EMCON ASSOCIATES

PROJECT NO: G70 0201 | SAMPLE ID: MW-3

PURGED BY: L. RATLIFF | CLIENT NAME: ARCO 276

SAMPLED BY: L. RATLIFF | LOCATION: 10600 McArthur Blvd Oakland

TYPE: Ground Water X | Surface Water ___ | Treatment Effluent ___ | Other ___

CASING DIAMETER (inches): 2 X | 3 ___ | 4 ___ | 4.5 ___ | 6 ___ | Other ___

CASING ELEVATION (feet/MSL): NR | VOLUME IN CASING (gal.): .59

DEPTH TO WATER (feet): 34.96 | CALCULATED PURGE (gal.): 2.97

DEPTH OF WELL (feet): 38.60 | ACTUAL PURGE VOL. (gal.): 4.0

DATE PURGED: 3/10/92 | Start (2400 Hr) 1115 | End (2400 Hr) 1128

DATE SAMPLED: ↓ | Start (2400 Hr) 1130 | End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1117	75	5.49	1262	65.1	Brown	Heavy
1120	1.5	5.27	1238	64.5	"	"
1122	2.25	5.24	1275	63.8	"	"
1125	3.00	5.22	1280	63.3	"	"
1128	3.75	5.20	1285	63.3	"	"

D. O. (ppm): NR | ODOR: NO | NR (COBALT 0 - 100) | NR (NTU 0 - 200)

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): NR

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
___ 2" Bladder Pump	___ Bailer (Teflon®)	___ 2" Bladder Pump	X Bailer (Teflon®)
___ Centrifugal Pump	X Bailer (PVC)	___ DDL Sampler	___ Bailer (Stainless Steel)
___ Submersible Pump	___ Bailer (Stainless Steel)	___ Dipper	___ Submersible Pump
___ Well Wizard™	___ Dedicated	___ Well Wizard™	___ Dedicated
Other: ___		Other: ___	

WELL INTEGRITY: Good | LOCK #: 3259

REMARKS: MW3 (37)

Meter Calibration: Date: 3/10/92 | Time: ___ | Meter Serial #: 9111 | Temperature °F: ___

(EC 1000 ___ / ___) (DI ___) (pH 7 ___ / ___) (pH 10 ___ / ___) (pH 4 ___ / ___)

Location of previous calibration: MW-1

Signature: [signature] | Reviewed By: MK | Page 3 of 6

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/

EMCON ASSOCIATES

PROJECT NO: G70 02 01 | SAMPLE ID: (LH) ~~[illegible]~~ MW-4

PURGED BY: L. RATH | CLIENT NAME: ARCO 276

SAMPLED BY: L. RATH | LOCATION: 10600 McArthur Bl Oakland

TYPE: Ground Water X Surface Water ___ Treatment Effluent ___ Other ___

CASING DIAMETER (inches): 2 X 3 ___ 4 ___ 4.5 ___ 6 ___ Other ___

CASING ELEVATION (feet/MSL): NR | VOLUME IN CASING (gal.): 2.38

DEPTH TO WATER (feet): 34.40 | CALCULATED PURGE (gal.): 11.91

DEPTH OF WELL (feet): 49.0 14.6 | ACTUAL PURGE VOL. (gal.): 12.5

DATE PURGED: 3/10/92 | Start (2400 Hr) 1250 | End (2400 Hr) 1315

DATE SAMPLED: ↓ | Start (2400 Hr) 1315 | End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1259	2.5	4.51	1769	71.5	Brown	Heavy
1304	5.0	4.37	1670	67.4	"	"
1307	7.5	4.29	1635	66.1	"	"
1311	10.0	4.29	1660	65.5	"	"
1315	12.50	4.29	1658	65.0	"	"
					NR (COBALT 0 - 100)	NR (NTU 0 - 200)

D. O. (ppm): NR | ODOR: ND

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): NR

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
___ 2" Bladder Pump	___ Bailer (Teflon®)	___ 2" Bladder Pump	X Bailer (Teflon®)
___ Centrifugal Pump	X Bailer (PVC)	___ DDL Sampler	___ Bailer (Stainless Steel)
___ Submersible Pump	___ Bailer (Stainless Steel)	___ Dipper	___ Submersible Pump
___ Well Wizard™	___ Dedicated	___ Well Wizard™	___ Dedicated
Other: ___		Other: ___	

WELL INTEGRITY: good | LOCK #: 3259

REMARKS: MW1 (48)

Meter Calibration: Date: 3/10/92 Time: ___ Meter Serial #: 6111 Temperature °F: ___

(EC 1000 ___ / ___) (DI ___) (pH 7 ___ / ___) (pH 10 ___ / ___) (pH 4 ___ / ___)

Location of previous calibration: MW-1

Signature: Lara Rath | Reviewed By: MK | Page 4 of 6

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/

EMCON ASSOCIATES

PROJECT NO: G70 0201 | SAMPLE ID: MW-5

PURGED BY: L. RATH | CLIENT NAME: ARCO 276

SAMPLED BY: L. RATH | LOCATION: 10600 McArthur Blvd Oakland

TYPE: Ground Water X | Surface Water ___ | Treatment Effluent ___ | Other ___

CASING DIAMETER (inches): 2 ___ | 3 ___ | 4 X | 4.5 ___ | 6 ___ | Other ___

CASING ELEVATION (feet/MSL): NR

DEPTH TO WATER (feet): 33.67

DEPTH OF WELL (feet): 47.05 (1338 x)

VOLUME IN CASING (gal.): 6.07

CALCULATED PURGE (gal.): 30.39

ACTUAL PURGE VOL. (gal.): (E) ~~31.5~~ 31.5

DATE PURGED: 3/10/92 | Start (2400 Hr) 1030 | End (2400 Hr) 1045

DATE SAMPLED: ↓ | Start (2400 Hr) 1050 | End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1033	6.25	6.40	695	67.0	Clear	light
1035	12.50	6.68	683	67.5	"	"
1039	18.75	6.75	678	67.8	"	"
1041	25.00	6.46	659	67.7	"	"
1045	31.25	6.416	6419	67.6	"	"

D. O. (ppm): NR | ODOR: NO | COLOR: NR (COBALT 0 - 100) | TURBIDITY: NR (NTU 0 - 200)

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): NR

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
___ 2" Bladder Pump	___ Bailer (Teflon®)	___ 2" Bladder Pump	X Bailer (Teflon®)
___ Centrifugal Pump	___ Bailer (PVC)	___ DDL Sampler	___ Bailer (Stainless Steel)
X Submersible Pump	___ Bailer (Stainless Steel)	___ Dipper	___ Submersible Pump
___ Well Wizard™	___ Dedicated	___ Well Wizard™	___ Dedicated
Other: 2" Grundfos		Other:	

WELL INTEGRITY: Good | LOCK #: 3259

REMARKS: MW5 (46)

Meter Calibration: Date: 3/10/92 Time: ___ Meter Serial #: 9111 Temperature °F: ___

(EC 1000 ___ / ___) (DI ___) (pH 7 ___ / ___) (pH 10 ___ / ___) (pH 4 ___ / ___)

Location of previous calibration: MW-1

Signature: [signature] Reviewed By: MR

WATER SAMPLE FIELD DATA SHEET

Rev. 2.5/

EMCON ASSOCIATES

PROJECT NO: 70021 SAMPLE ID: RW-1

PURGED BY: L.RATLIFF CLIENT NAME: ARCO 276

SAMPLED BY: L.RATLIFF LOCATION: 10600 McArthur Oakland

TYPE: Ground Water X Surface Water ___ Treatment Effluent ___ Other ___

CASING DIAMETER (inches): 2 ___ 3 ___ 4 ___ 4.5 ___ 6 X Other ___

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 20.77

DEPTH TO WATER (feet): 34.75 CALCULATED PURGE (gal.): 103.86

DEPTH OF WELL (feet): 48.9 ACTUAL PURGE VOL (gal.): 104.0

14.15 x 7.34

DATE PURGED: 3/10/92 Start (2400 Hr) 1158 End (2400 Hr) 1227

DATE SAMPLED: ↓ Start (2400 Hr) 1230 End (2400 Hr) —

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (Visual)	TURBIDITY (Visual)
1206	20.75	4.59	1207	72.5	Clear	light
1213	41.50	4.34	1187	71.5	"	"
1218	62.25	4.23	1175	71.3	"	"
1222	83.00	4.10	1170	71.2	"	"
1227	104.00	4.08	1175	70.9	"	"

D. O. (ppm): NR ODOR: ND

NR (COBALT 0 - 100) NR (NTU 0 - 200)

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): NR

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
___ 2" Bladder Pump	___ Bailer (Teflon®)	___ 2" Bladder Pump	X Bailer (Teflon®)
___ Centrifugal Pump	___ Bailer (PVC)	___ DDL Sampler	___ Bailer (Stainless Steel)
X Submersible Pump	___ Bailer (Stainless Steel)	___ Dipper	___ Submersible Pump
___ Well Wizard™	___ Dedicated	___ Well Wizard™	___ Dedicated
Other: 2" Grundfos		Other:	

WELL INTEGRITY: Good LOCK #: Slip cap

REMARKS: RW-1 (47)

Meter Calibration: Date: 3/10/92 Time: ___ Meter Serial #: 9111 Temperature °F: ___

(EC 1000 ___/___) (DI ___) (pH 7 ___/___) (pH 10 ___/___) (pH 4 ___/___)

Location of previous calibration: MW-1

Signature: [signature] Reviewed By: MK Page 6 of 6