Applied GeoSystems, Inc.
A RESNA Company

RESNA
Working To Restore Nature

3315 Almaden Expressway, Suite 34
San Jose, CA 95118
Phone: (408) 264-7723
Fax: (408) 264-2435

TRANSMITTAL

TO: Mr. Barney Chan
Alameda County Health Care Services
80 Swan Way, Room 200
Oakland, California 94621

DATE: September 25, 1992
PROJECT NUMBER: 60026.06
SUBJECT: Final - Second Quarter 1992 Quarterly Groundwater Monitoring at ARCO Station 276, 10600 MacArthur Blvd., Oakland, California.

FROM: Erin McLucas
TITLE: Staff Geologist

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COPIES	DATED	DESCRIPTION
1	9/25/92	Final - Second Quarter 1992, Groundwater Monitoring at the above subject site.

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REMARKS: cc: Mr. H.C. Winsor, ARCO Products Company
Mr. Michael Whelan, ARCO Products Company
Mr. Richard Hiett, CRWQCB, San Francisco Bay Region
Mr. Joel Coffman, RESNA Industries Inc.

Copies: 1 to RESNA project file no. 60026.06

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

60026.06

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Fax: (408) 264-2435

September 25, 1992
0721MWHE
60026.06

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

Subject: Second 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 second 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 petroleum 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 were 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 Inc.'s (RESNA's) scope of work. RESNA's scope of work was limited to interpretation of field and laboratory analytical 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. The locations of the former and existing underground storage tanks and groundwater monitoring wells are shown on Plate 2.

DISCUSSION OF PREVIOUS WORK AND THE PRESENCE OF VOCs

For this quarterly 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 Foothill 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 ¼ mile radius of the shopping center property. Research by KA indicated former activities at the shopping center site which potentially could have caused negative environmental impact. These former activities include the following: 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. KA concluded the following concerning possible environmental impact from former usage at the shopping site: "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." KA also concluded that although dry cleaning businesses are often known to be responsible for spills of various halogenated compounds, no apparent evidence of spillage was found 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), and 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 parts per billion (ppb) trichloroethane.

In August 1989, Applied GeoSystems (AGS) (now RESNA), 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 unidentified compounds, 2,3-dimethylbutane, 1-ethyl-2-methylbenzene, 1,3,5-trimethylbenzene, and methylcyclohexane at concentrations ranging from 0.030 to 110 parts per million (ppm).

In June 1992, RESNA initiated a subsurface investigation which included the drilling and installation of two offsite groundwater monitoring wells (MW-6 and MW-7). The results of this investigation will be presented in a forthcoming report.

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. Based on these results, it was concluded the waste-oil tank was not a source for VOCs or semi-VOCs.

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, installing five groundwater monitoring wells in the borings (MW-1 through MW-5, respectively), and collecting and analyzing 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 perched water-bearing zone. Laboratory analyses of groundwater from the deeper water-bearing zone, in MW-4, indicated the presence of 1.5 ppm tetrachloroethane. From data which now exists, it appears that two water-bearing zones are present beneath the subject site and beneath the Foothill Shopping Center. Recovery well RW-1 was installed in October 1991 and an aquifer test was performed. Onsite well MW-2 was screened in the shallow water bearing zone and onsite wells MW-1, MW-3, MW-4, MW-5, and RW-1 were screened in the deeper zone (AGS, January 17, 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. An onsite groundwater well and seven onsite vapor extraction wells were installed in July 1992.

PRESENT WORK

Groundwater Sampling and Gradient Evaluation

Depth to water measurements (DTW) were performed by EMCON field personnel on April 20, May 15, and June 30, 1992, and quarterly sampling was performed by EMCON field personnel on June 30, 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. DTW and subjective analysis for the presence of product in the groundwater for wells MW-6 and MW-7 on June 30, 1992, are also included in 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-7, 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 from MW-1

through MW-5 and RW-1 were used to evaluate groundwater elevations. EMCON's field personnel reported a sheen on the groundwater in well MW-2 (see EMCON's water sample field sheet for June 30, 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 decreased between approximately 1.46 feet and 2.98 feet between April 20, and June 30, 1992. The groundwater gradients and flow directions interpreted from the April and May 1992 groundwater monitoring events are shown on the Groundwater Gradient Maps, Plates 3 and 4. Relatively flat groundwater gradients, about 0.004 to 0.002 toward the northwest, were interpreted from EMCON's DTW measurements for April and May 1992, respectively. The groundwater gradient and flow direction were not interpreted for the June monitoring due to an anomolously high groundwater elevation in MW-4, MW-5, MW-3, and RW-1. The groundwater gradients for April and May are generally consistent with previously interpreted data. Wells MW-2, MW-6 and MW-7 were not used in evaluating the gradient this quarter. MW-2 and MW-7 were not used because these wells are screened in a separate shallow perched water-bearing zone, while wells MW-1 and MW-3 through MW-6, and RW-1 are screened in a deeper water-bearing zone. Wells MW-6 and MW-7 were also not used because they had not been surveyed for elevations on the date of monitoring.

Groundwater monitoring wells MW-1 through MW-7, and RW-1 were purged and sampled by EMCON field personnel on June 30, 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 Results

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-7, 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 5, TPHg Concentrations in Groundwater and Plate 6, Benzene Concentrations in Groundwater. Groundwater samples from wells MW-1 through MW-7 and RW-1 were also analyzed for VOCs using EPA Methods 5030/601. Concentrations of total VOCs in the groundwater are shown on Plate 7, Tetrachloroethene 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: detectable

- Concentrations of TPHg were reported as 130,000 ppb in well MW-2, 71,000 ppb in well MW-7, <670 ppb in well MW-4, <530 ppb in well MW-3, <400 ppb in well RW-1, <850 ppb in well MW-6, and nondeductible (<50 ppb) in wells MW-1 and MW-5. The laboratory raised the TPHg detection limits for the groundwater samples from wells MW-3, MW-4, MW-6 and RW-1, because the sample matrix reportedly contained a discrete non-fuel peak which did not match the typical gasoline fingerprint. What's this stuff chemically?

- Concentrations of benzene were reported as 10,000 ppb in well MW-2, 5,100 ppb in well MW-7, and as nondeductible (<0.5 ppb) in wells MW-1, MW-3 through MW-6, and RW-1. The concentration of benzene in the groundwater from wells MW-2 and MW-7 is greater than the California Department of Health Services Maximum Contaminant Level (MCL) of 1 ppb.

- Concentrations of toluene were reported as 16,000 ppb in well MW-2, 6,600 ppb in MW-7, and as nondeductible (<0.5 ppb) in wells MW-1, MW-3 through MW-6, and RW-1. The concentration of toluene in the groundwater from wells MW-2 and MW-7 is greater than the California Department of Health Services Drinking Water Action Level (DWAL) of 100 ppb.

- Concentrations of ethylbenzene were reported as 4,700 ppb in well MW-2, 2,300 ppb in well MW-7, and as nondeductible (<0.5 ppb) in wells MW-1, MW-3 through MW-6, and RW-1. The concentration of ethylbenzene in the groundwater from wells MW-2 and MW-7 is greater than the MCL of 680 ppb. The laboratory raised the detection limit in the groundwater sample from MW-4 due to matrix interference.

- Concentrations of total xylenes were reported as 24,000 ppb in well MW-2, 14,000 ppb in well MW-7, and as nondeductible (<0.5 ppb) in wells MW-1, MW-3 through MW-6, and RW-1. The concentration of total xylenes in the groundwater from wells MW-2 and MW-7 is greater than the MCL of 1,750 ppb.

- TOG was detected at exactly the laboratory detection limit of 0.5 ppm in well MW-4. In discussion with laboratory personnel (Keoni Murphy, Columbia Analytical Laboratories, September 2, 1992), we found that the EPA Method used, 413.2, uses freon as an extraction medium. Freon extracts both naturally occurring and petroleum based oil and grease. Therefore, these results probably do not reflect

total oil and grease from a petroleum source. EPA Method 418.1 uses silicon gel for extraction which is a more effective method for detecting the petroleum hydrocarbons based oil and grease.

- Excluding BTEX, the only remaining VOC found was tetrachloroethene (PCE) at concentrations of 2,400 ppb in offsite, upgradient well MW-6, 1,800 ppb in well MW-4, 1,500 ppb in well MW-3, 1,100 ppb in well RW-1, 30 ppb in well MW-5, and 15 ppb in well MW-1. The detection limits had to be raised in wells MW-2, MW-3, MW-4, MW-6, MW-7, and RW-1 due to high analyte concentrations requiring sample dilution. Monitoring wells MW-2 and MW-7 had nondetectable concentrations at less than 100 and less than 50 ppb respectively. Concentrations of tetrachloroethane in the groundwater from wells MW-1, MW-3, MW-4, MW-5, MW-6 and RW-1 are greater than the MCL of 5 ppb. Monitoring well MW-2 and offsite well MW-7 are screened in a shallow perching zone, and MW-1, MW-3 through MW-6 and RW-1 are screened in a deeper water-bearing zone which contains the PCE.

Since the last quarter, concentrations of TPHg in MW-2 decreased, and BTEX in MW-2 increased. Concentrations of TOG, never previously detected in well MW-4, were reported at exactly the Method Reporting Limit of 500 ppb. As stated, this is probably due to the method of analysis used which detects naturally occurring TOG along with any petroleum based TOG which may be present. The reported concentrations of tetrachloroethane have increased in groundwater from wells MW-1, MW-3, MW-5, and RW-1, and decreased in MW-4. Wells MW-1, MW-3, MW-4, MW-5, and RW-1 have continued to have nondetectable concentrations of TPHg and BTEX.

Monitoring and Removal of Free Product

Floating product was not detected in any of the wells during monthly DTW measurements or this 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 shallow perched groundwater at the site has been impacted by petroleum hydrocarbons and the deeper groundwater zone has been impacted by VOCs but not gasoline hydrocarbons. The concentrations of BTEX in the groundwater from well MW-2, located immediately upgradient of the former gasoline storage tanks, and newly installed offsite well

MW-7 are greater than the California Department of Health Services MCLs and DWALs for these constituents. TOG should be analyzed by EPA Method 418.1 in MW-4 in future monitorings. Tetrachloroethene (PCE) 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 (screened in the shallow zone). PCE was detected at greatest concentrations in groundwater and in a soil sample collected from the offsite, upgradient boring/well B-10/MW-6 at a concentration of 2,400 ppb in groundwater and 220 ppb in soil (from the current subsurface investigation). This concentration of PCE in the upgradient offsite well MW-6 indicates a probable offsite source for PCE. The extent of petroleum hydrocarbons and VOCs in groundwater has not been defined.

Although concentrations of VOCs have been detected in the lower water-bearing zone beneath the site VOCs were not detected in soil samples taken in the vicinity of the former waste-oil tank during it's removal (Pacific, February 6, 1989). VOCs were detected in soil and groundwater samples from the northwestern portion of the adjoining Foothill Square Shopping Center (southeast of the subject site), which is situated in the interpreted upgradient direction to the subject site (AGS, January 17, 1991). According to an 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. These data suggest former use of the adjoining Foothill Square Shopping Center property as a likely source of the VOCs found in the deeper zone at the ARCO site.

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

Mr. Barney Chan
Alameda County Health Care Services Agency
Department of Environmental Health
80 Swan Way, Room 200
Oakland, California 94621

Mr. Richard Hiett
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 Inc.

Erin McLucas
Staff Geologist

Joan E. Tiernan
Registered Civil
Engineer #044600

cc: H.C. Winsor, ARCO Products Company

Enclosures: References

Plate 1, Site Vicinity Map
Plate 2, Generalized Site Plan
Plate 3, Groundwater Gradient Map, April 20, 1992
Plate 4, Groundwater Gradient Map, May 15, 1992
Plate 5, TPHg Concentrations in Groundwater, June 30, 1992
Plate 6, Benzene Concentration in Groundwater, June 30, 1992
Plate 7, Tetrachloroethene Concentrations in Groundwater, June 30, 1992

Table 1, Cumulative Groundwater Monitoring Data
Table 2, Cumulative Results of Laboratory Analyses of Groundwater Samples--TPHg, TPHd, BTEX, and TOG
Table 3, Cumulative Results of Laboratory Analyses of Groundwater 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

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

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

RESNA. April 16, 1992. Addendum Four to Work Plan at ARCO Station 276, 10600 MacArthur Boulevard, Oakland, California. RESNA Report 60026.10

RESNA. May 12, 1992. Letter Report Quarterly Groundwater Monitoring, First Quarter 1992 at ARCO Station 276, 10600 MacArthur Boulevard, Oakland, California. RESNA Report 60026.06

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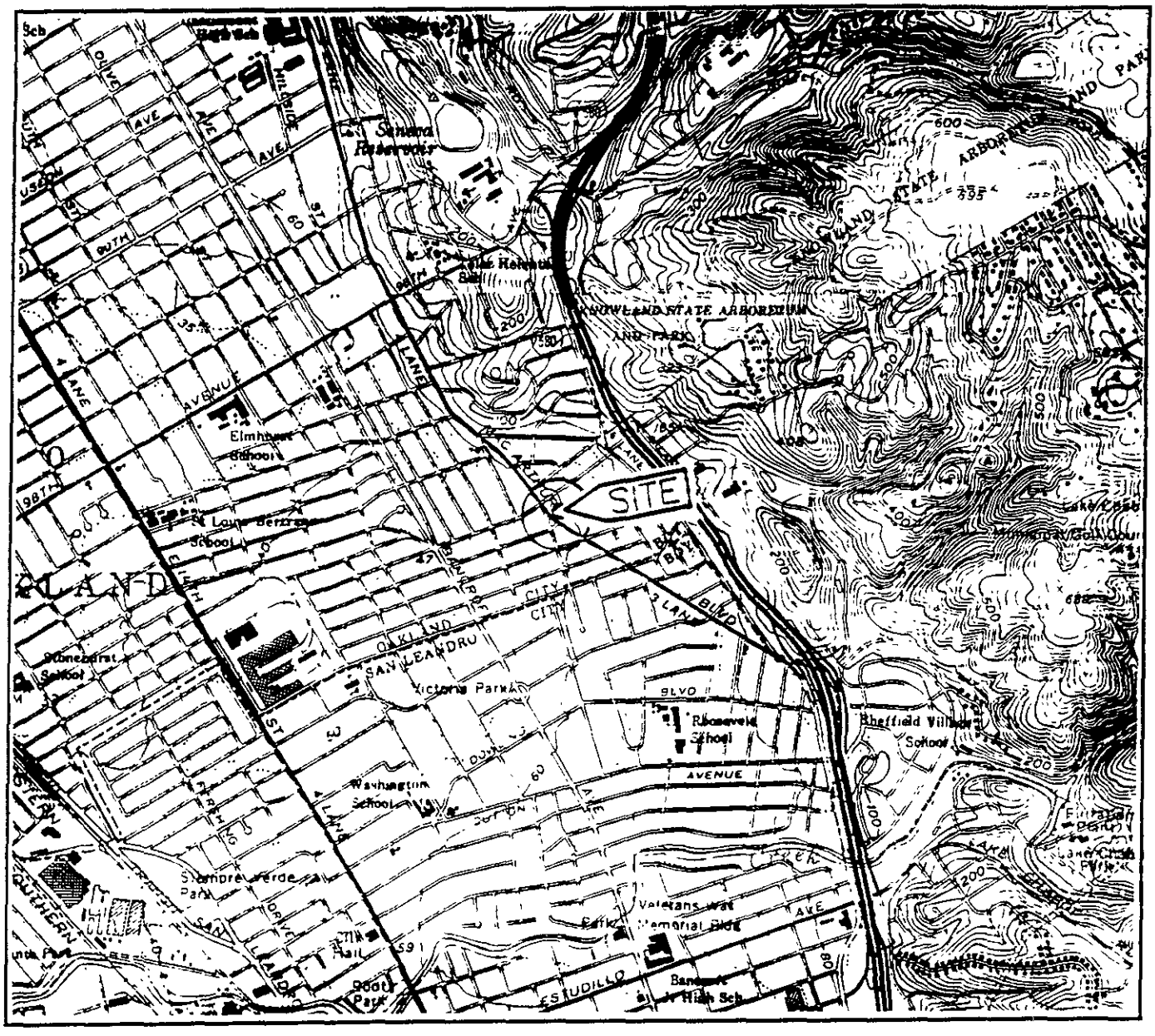

Base: U.S. Geological Survey
7.5-Minute Quadrangles
Oakland East/San Leandro, California
Photorevised 1980

LEGEND

⊙ = Site Location

N

Approximate Scale

2000 1000 0 2000 4000

feet

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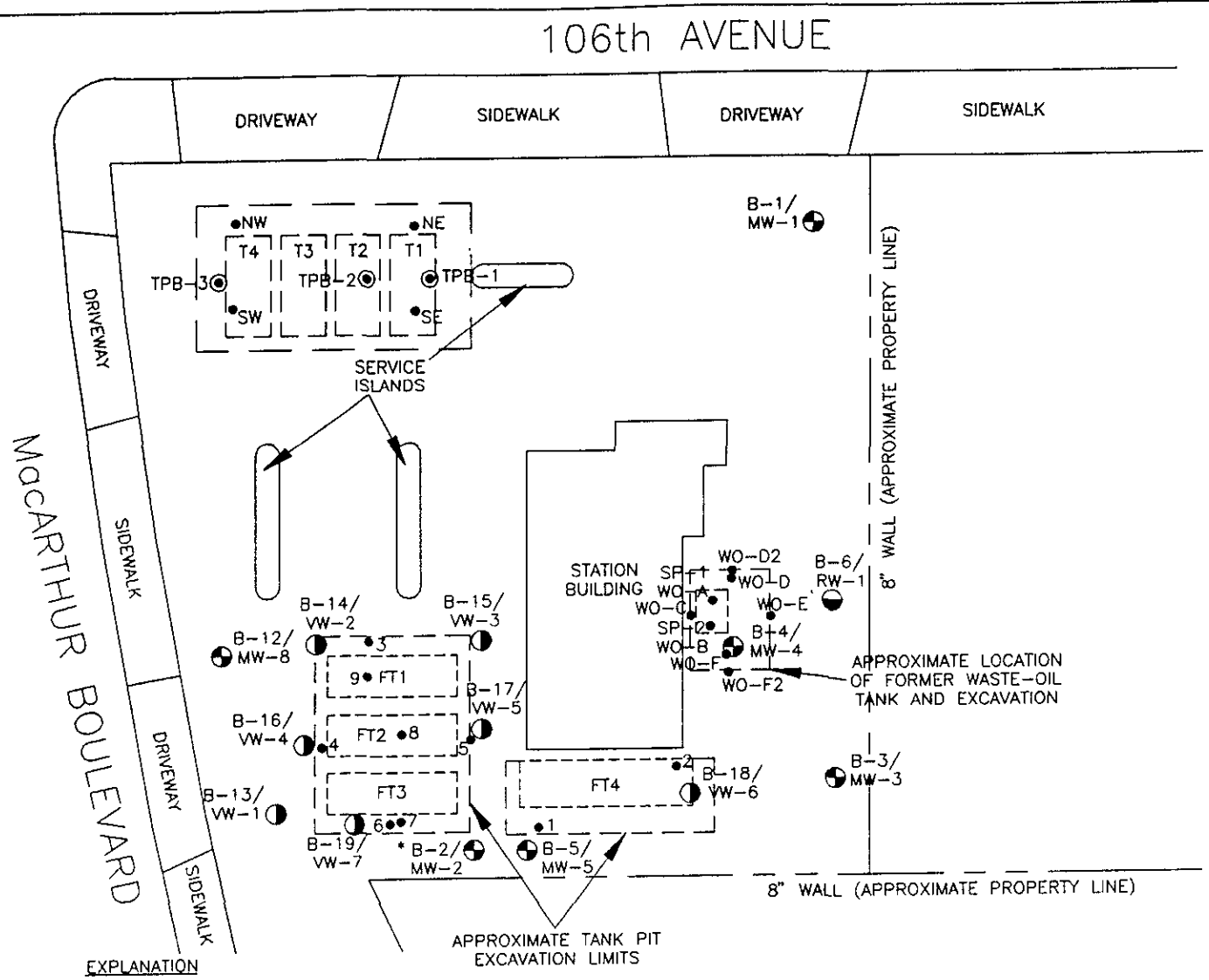
SITE VICINITY MAP
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE
1



EXPLANATION

NW ● = New tank pit excavation bottom sample (RESNA, 1990)

9 ● = Former tank pit sample (S7-TP1SW-1 through -9; RESNA, 1990)

SP-2 WO-F ● WO-F2 = Former waste-oil tank pit excavation bottom and sidewall sample (PEG, 1988)

TPB-3 ◉ = Boring in proposed new tank pit (RESNA, 1990)

B-19/ VW-7 ◑ = Vapor well (RESNA, 1992)

B-12/ MW-8 ◒ = Groundwater monitoring well (RESNA, 1989 and 1992)

B-7/ RW-1 ◒ = Recovery well (RESNA, 1991)

MW-3 (WGR) ⊗ = Groundwater monitoring well (WGR, 1988)

T4 = Existing underground storage tanks

FT4 = Former underground storage tanks

B-10/ MW-6

* B-11/ MW-7

MW-3 (WGR)

* = Screened in a shallow water-bearing zone

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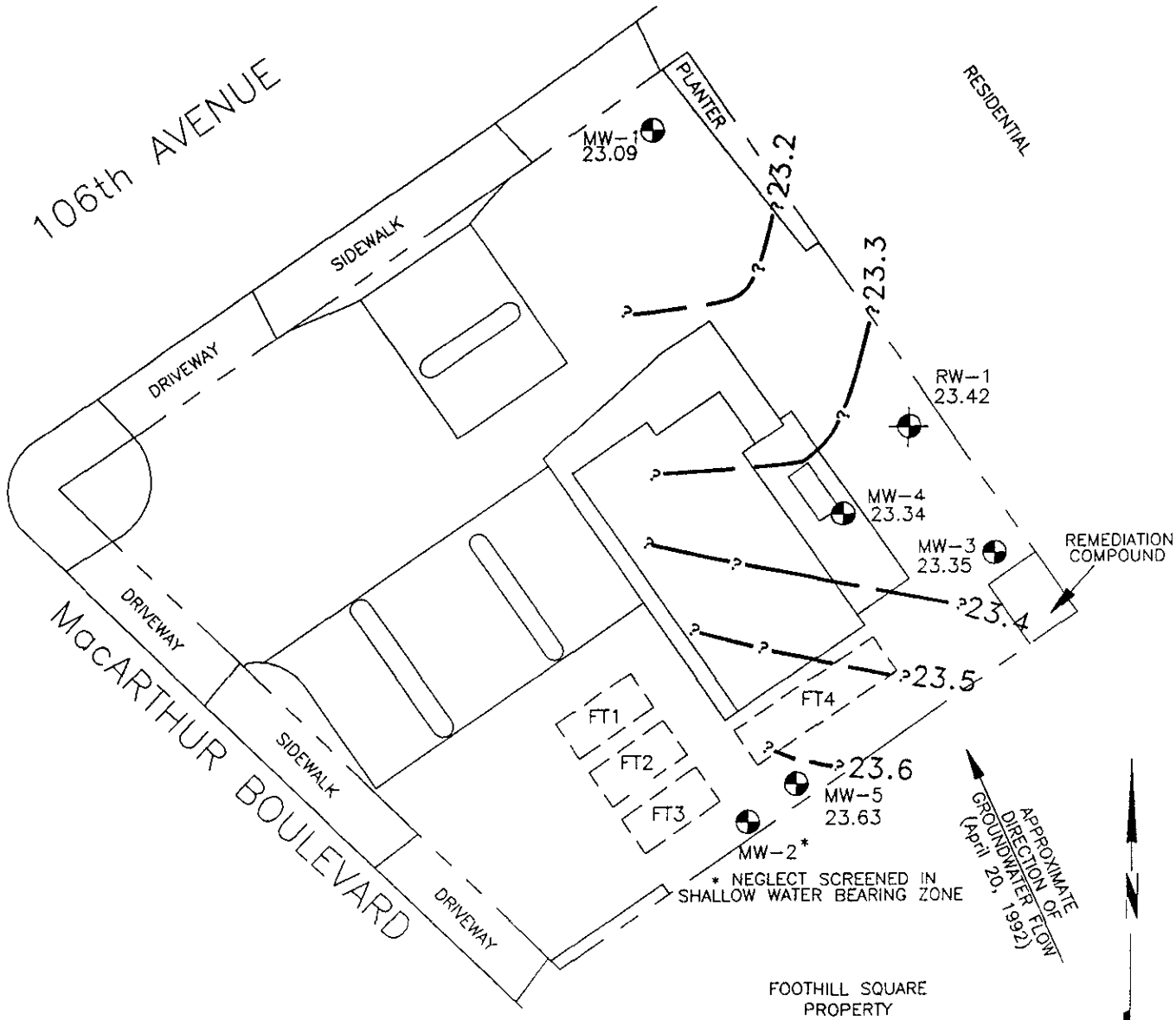
GENERALIZED SITE PLAN
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE
2



EXPLANATION

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

23.42 = Elevation of groundwater in feet above MSL.

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

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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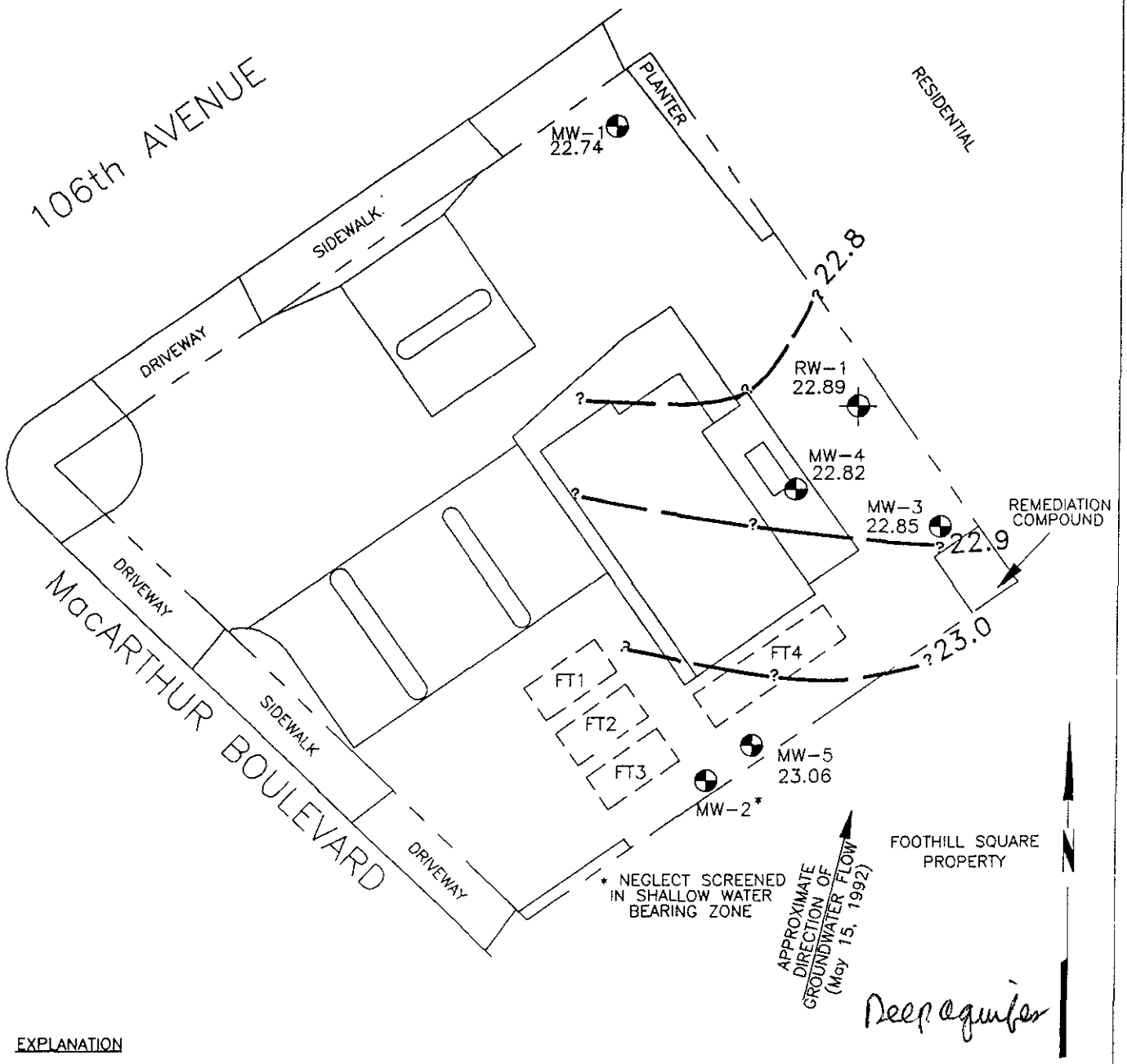
PROJECT 60026.06

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

PLATE 3



EXPLANATION

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

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

= 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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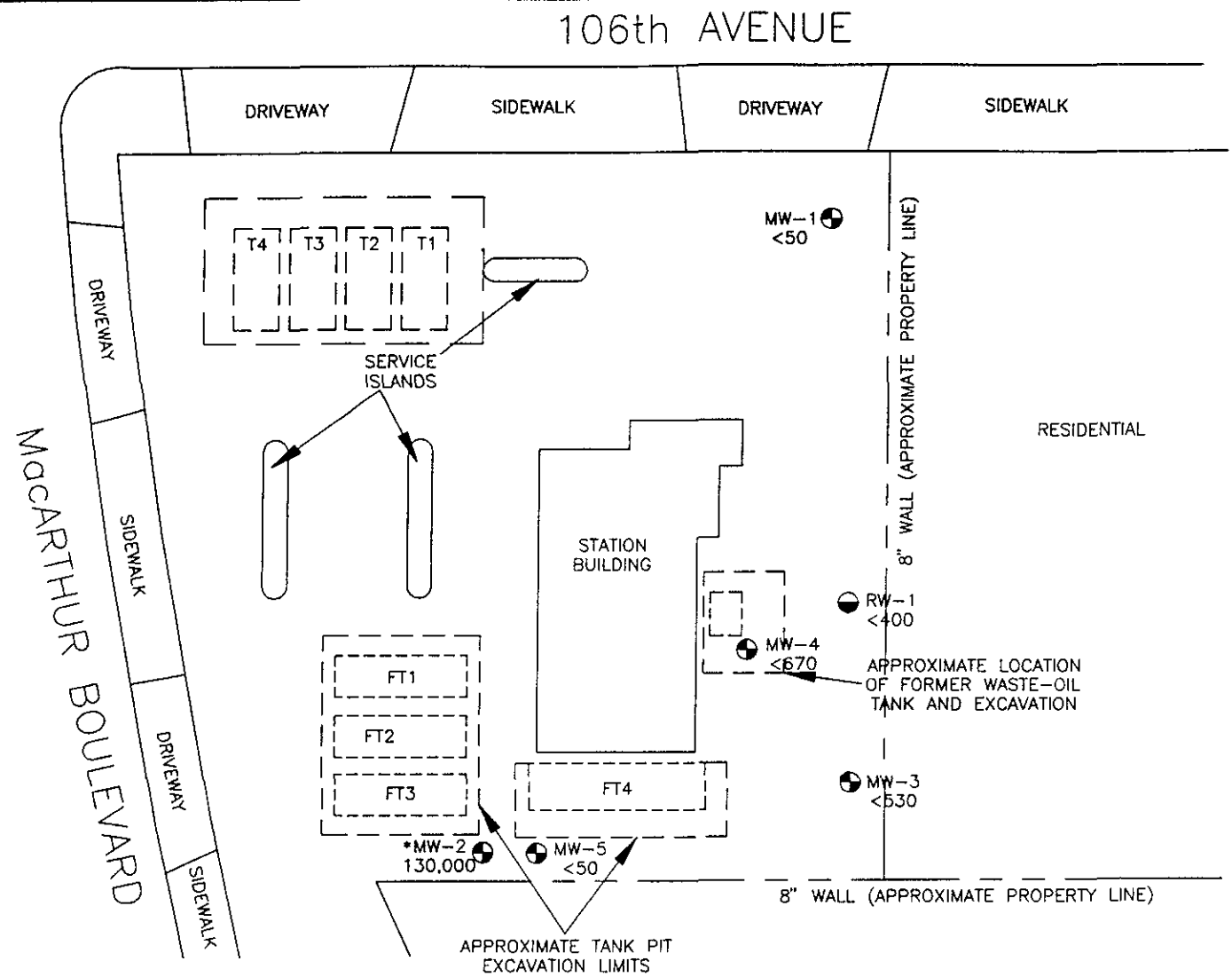
PROJECT 60026.06

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

PLATE
4



EXPLANATION

130,000 = Concentration of TPHg in groundwater in parts per billion, June 30, 1992

NS = Not sampled

* = Well constructed in shallow water-bearing zone

MW-8 = Groundwater monitoring well (RESNA, 1989 and 1992)

RW-1 = Recovery well (RESNA, 1991)

MW-3 (WGR) = Groundwater monitoring well (WGR, 1988)

T4 = Existing underground storage tanks

FT4 = Former underground storage tanks

MW-6 <850

*MW-7 71,000 MW-3 (WGR) NS

MW-6 and MW-7 have not been surveyed.

Approximate Scale

30 15 0 30 60

feet

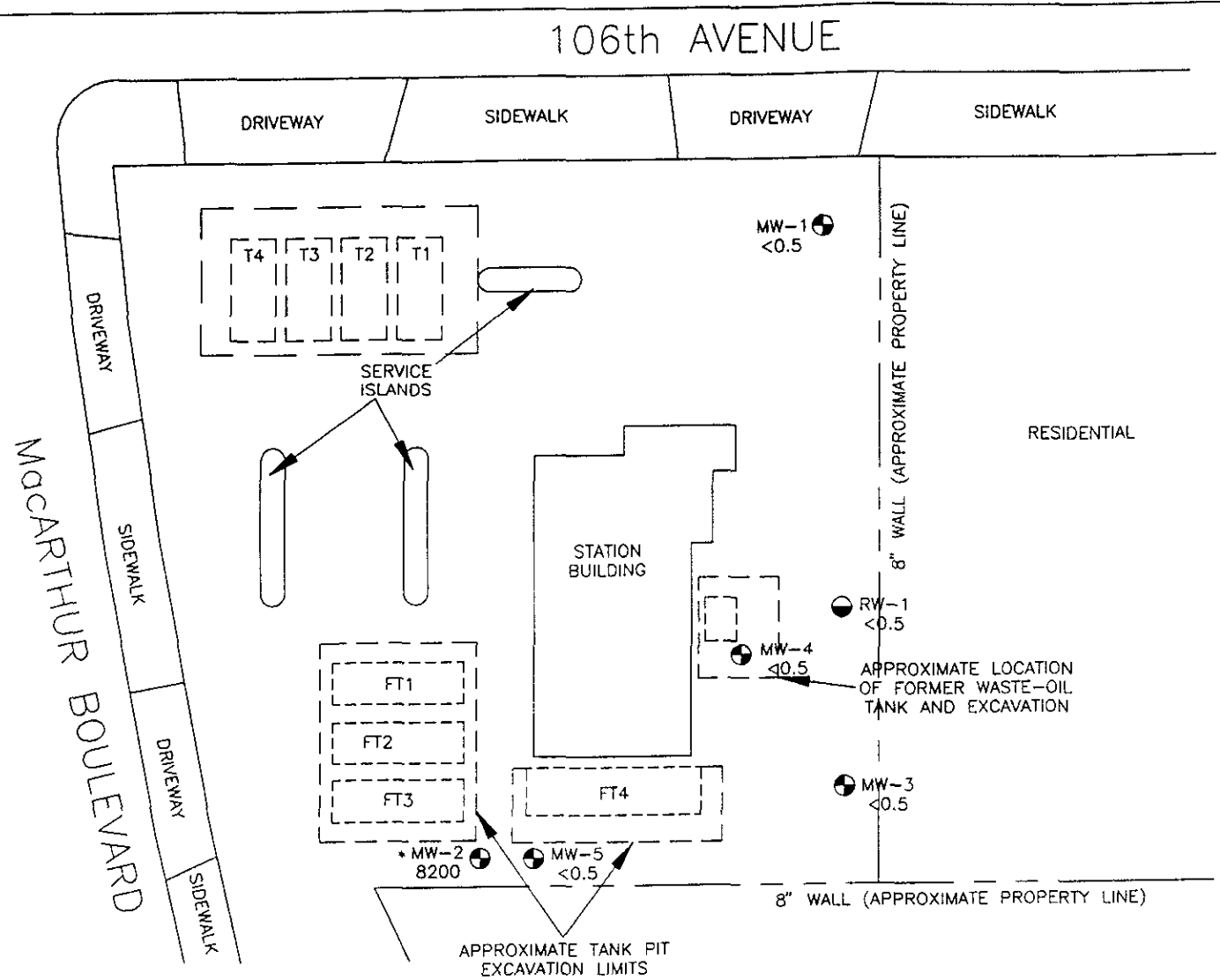
Source: Modified from plan supplied by ARCO and surveyed by Ron Archer, Civil Engineer, Inc. and John Koch, Land Surveyor.

RESNA
Working to Restore Nature

PROJECT 60026.06

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

PLATE 5



EXPLANATION

8200 = Concentration of benzene in groundwater in parts per billion, June 30, 1992

NS = Not sampled

* = Well constructed in shallow water-bearing zone

MW-8 = Groundwater monitoring well (RESNA, 1989 and 1992)

RW-1 = Recovery well (RESNA, 1991)

MW-3 (WGR) = Groundwater monitoring well (WGR, 1988)

T4 = Existing underground storage tanks

FT4 = Former underground storage tanks

MW-6 <0.5

* MW-7 5100

MW-3 (WGR) NS

MW-6 and MW-7 have not been surveyed

Approximate Scale

30 15 0 30 60

feet

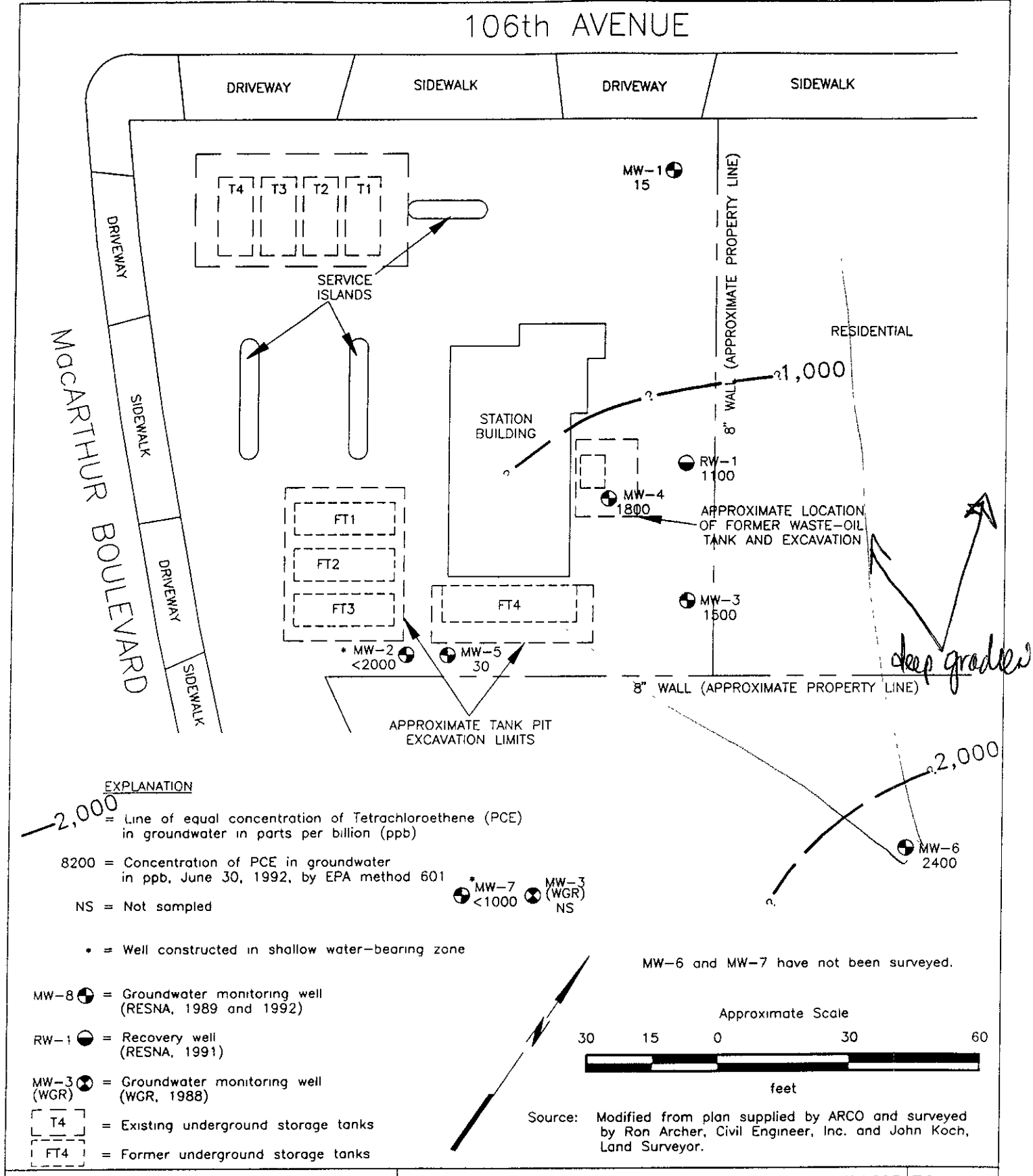
Source: Modified from plan supplied by ARCO and surveyed by Ron Archer, Civil Engineer, Inc. and John Koch, Land Surveyor.

RESNA
Working to Restore Nature

PROJECT 60026.06

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

PLATE 6



RESNA
Working to Restore Nature

PROJECT 60026.06

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

PLATE 7

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
04/20/92		32.82	23.09	None
05/15/92		33.17	22.74	None
06/30/92		34.55	21.36	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
04/20/92		16.13	39.22	None
05/15/92		17.66	37.69	None
06/30/92		19.11	36.24	Sheen
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
04/20/92		33.20	23.35	None
05/15/92		33.70	22.85	None
06/30/92		34.97	21.58	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
04/20/92		32.60	23.34	None
05/15/92		33.12	22.82	None
06/30/92		34.06	21.88	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
04/20/92		31.80	23.63	None
05/15/92		32.37	23.06	None
06/30/92		34.00	21.43	None
MW-6	61.21			
06/30/92		35.50	25.71	None
MW-7	58.22			
06/30/92		23.70	34.52	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
04/20/92		32.90	23.42	None
05/15/92		33.43	22.89	None
06/30/92		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
06/30/92	<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
06/30/92	130,000	NA	10,000(9,300)	16,000(18,000)	4,700(4,200)	24,000(27,000)	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
06/30/92	<530**	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
06/30/92	<670**	NA	<0.5	<0.5	<2.3**	500	500
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
06/30/92	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
MW-6							
06/30/92	<850**	NA	<0.5	<0.5	<0.5	<0.5	NA
MW-7							
06/30/92	71,000	NA	5,100(5,100)	6,600(6,800)	2,300(2,300)	14,000(16,000)	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
06/30/92	<400**	NA	<0.5	<0.5	<0.5	<0.5	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.
#: Based on new results, the previous data is being re-evaluated to determine a single peak hydrocarbon.
*: Detection limit reportedly raised by laboratory due to matrix interference.
**: Detections limit reportedly raised by laboratory because matrix contains a discrete non-fuel peak.
( ): *BTEX as measured by EPA Method 624*

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
06/30/92	Tetrachloroethene	15*	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-Dichloroethene	5.4					
06/30/92**	All Compounds	<2,000	NA	NA	NA	NA	NA
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*					
06/30/92**	Tetrachloroethene	1,500*	NA	NA	NA	NA	NA
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*					
06/30/92**	Tetrachloroethene	1,800*	NA	NA	NA	NA	NA

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)
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*					
06/30/92	Tetrachloroethene	30*	NA	NA	NA	NA	NA
MW-6							
06/30/92**	Tetrachloroethene	2,400*	NA	NA	NA	NA	NA
MW-7							
06/30/92**	All Compounds	<1000	NA	NA	NA	NA	NA
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*					
06/30/92**	Tetrachloroethene	1,100*	NA	NA	NA	NA	NA
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 tetrachloroethane.
MCLs: Maximum Contaminant Levels as reported by the California Department of Health Services 10/24/90.
**: Raised Method Reporting Limit (MRL) due to high analyte concentration requiring sample dilution.

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
06-30-92	None present
Total:	0.09 Gallons

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

EMCON ASSOCIATES
Consultants in Wastes Management and Environmental Control

Date April 27, 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 Results
	April 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: 6/30/92

Mark Knuttel MK

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 : 04-20-92.

ARCO STATION # : 276 FIELD TECHNICIAN : LARRY NESS DAY : MONDAY

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	OK	BAD	OK	OK	32.82	32.82	ND	ND	38.84	—
2	MW-5	OK	OK	OK	OK	OK	31.80	31.80	ND	ND	47.0	—
3	MW-3	OK	OK	OK	OK	OK	33.20	33.20	ND	ND	38.6	—
4	RW-1	OK	OK	OK	—	—	32.90	32.90	ND	ND	48.90	—
5	MW-4	OK	OK	OK	CUT	OK	32.60	32.60	ND	ND	48.80	CUT LOCK. CHANGED TO 0464
6	MW-2	OK	OK	OK	OK	OK	16.13	16.13	ND	ND	25.62	—

EMCON
ASSOCIATES
Consultants in Wastes
Management and
Environmental Control

RECEIVED
MAY 27 1992
RESNA
SAN JOSE

Date May 21, 1992
Project G70-02.01

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

We are enclosing:

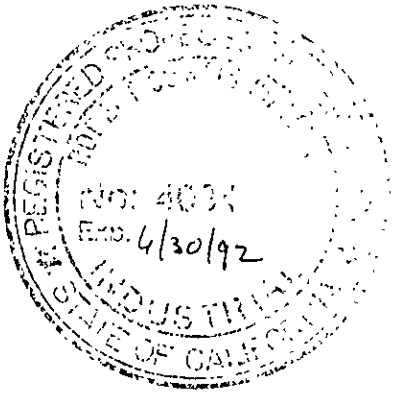
Copies	Description
1	Depth To Water/Floating Product Survey Results
	May 1992 monthly water level survey, ARCO
	station 276, 10600 MacArthur Boulevard, Oakland, CA

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.

Jim Butera

Reviewed by:



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 : 5-13-96

ARCO STATION # : 276 FIELD TECHNICIAN : C. Clinco / M. KNUTTEL DAY : Friday

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	YES	3259	YES	33.17	33.17	ND	ND	38.88	Broken well cap
2	MW-5	OK	Y	Y	3259	Y	32.37	32.36	ND	ND	47.06	—
3	RW-1	OK	YES	NO	NO	NO	33.43	33.44	ND	ND	48.60	—
4	MW-3	OK	YES	YES	3259	YES	33.70	33.70	ND	ND	38.6	—
5	MW-4	OK	YES	YES	YES	YES	33.12	33.12	ND	ND	48.8	UNSURE OF LOCK # CAP PULLS OFF
6	MW-2	OK	Y	Y	3259	Y	17.66	17.65	ND	ND	25.6	Strong odor

APPENDIX A

LABORATORY QC RESULTS

APPENDIX B

CHAIN OF CUSTODY

[redacted]CO [redacted]duc[redacted]ompany [redacted]
Division of AtlanticRichfieldCompany

Task Order No. EMCGC-92-1

Chain of Custody

ARCO Facility no	276
City (Facility)	OAKLAND
Project manager (Consultant)	Jim Butera
ARCO engineer	Kyle Christie
Telephone no. (ARCO)	(415) 571-2434
Telephone no. (Consultant)	(408) 453-2266
Fax no. (Consultant)	(408) 453-0452
Consultant name	EMCON ASSOCIATES
Address (Consultant)	1938 Junction Ave San Jose
Laboratory name	CAS
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(39)	1-4	4		X		X	HCl	6-29-92	1437		X					X						
MW-2(25)	5-8	4		X		X	HCl	6-30-92	1441		X					X						
MW-3(38)	9-12	4		X		X	HCl	6-29-92	1602		X					X						
MW-4(48)	13-18	6		X		X	HCl	6-30-92	1209		X		X			X						
MW-5(47)	19-22	4		X		X	HCl	6-29-92	1405		X					X						
MW-6(55)	23-26	4		X		X	HCl	6-30-92	1353		X					X						
MW-7(36)	27-30	4		X		X	HCl	6-30-92	1340		X					X						
MW-1(48)	31-34	4		X		X	HCl	6-30-92	1205		X					X						
FB-1	35-38	4		X		X	HCl	6-30-92	1232		X					X						

Special detection Limit/reporting: Lowest Possible

Special QA/QC: AS Normal

Remarks: 4-40ml VOA's per well
MW-4 add: 2-Liter glass HCl
G70-02.01

Lab number: SJ92-0792

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

Condition of sample: OK			Temperature received: Cool	
Relinquished by sampler: Kevin Reichldorfer (signature)	Date 7-1-92	Time 0931	Received by: (signature)	7-1-92 0931
Relinquished by	Date	Time	Received by	
Relinquished by	Date	Time	Received by laboratory	Date / Time

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

EMCON ASSOCIATES
Consultants in Wastes Management and Environmental Control

Date July 15, 1992
Project G70-02.01

To:
Mr. Joel Coffman
RESNA/ Applied Geosystems
3315 Almaden 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
8	Water Sample Field Data Sheets

For your: X Information Sent by: X Mail

Comments:

Enclosed are the data from the second quarter 1992 monitoring event at ARCO service station 276, 10600 MacArthur Boulevard, Oakland, CA. Groundwater monitoring is conducted consistent with applicable regulatory guidelines. Please call if you have any questions: (408) 453-2266.

Jim Butera JB

Reviewed by:

6/30/92

Robert Porter, Senior Project Engineer.

FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : G70-02.01 STATION ADDRESS : 10600 MacArthur Blvd. Oakland DATE : 6 · 30 · 92

ARCO STATION # : 276 FIELD TECHNICIAN : MG / JW / KLR DAY : TUESDAY

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	OK	OK	OK	OK	34.55	34.55	ND	ND	39.20	—
2	MW-5	OK	OK	OK	OK	BAD	34.00	34.00	ND	ND	47.62	NEEDS NEW L.W.C.
3	MW-3	OK	OK	OK	OK	OK	34.97	34.97	ND	ND	38.75	—
4	RW-1	OK	OK	OK	~~OK~~ NO	BAD	34.55	34.55	ND	ND	48.80	WATER IN BOX, NO LOCK, NEEDS NEW L.W.C.
5	MW-4	OK	OK	OK	OK	OK	34.06	34.06	ND	ND	48.90	—
6	MW-6	good	yes	yes	no	yes	35.5	35.5	ND	ND	55.90	—
7	MW-7	good	yes	yes	no	yes	23.7	23.7	ND	ND	37.3	NO LOCK
8	MW-2	OK	OK	OK	OK	[illegible]	[illegible]	[illegible]	ND	ND	25.50	SKIMMER WASN'T IN WATER

Summary of Groundwater Monitoring Data
Second 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(39)	06/30/92	34 55	ND.[2]	<50	<0 5	<0 5	<0 5	<0.5	NR[3]
MW-2(25)	06/30/92	19 11	ND	130,000	10,000	16,000	4,700	24,000.	NR
MW-3(38)	06/30/92	34 97	ND.	<530	<0.5	<0 5	<0.5	<0.5	NR
MW-4(48)	06/30/92	34 06	ND	<670	<0.5	<0.5	<2 3	<0 5	0 5
MW-5(47)	06/30/92	34.00	ND.	<50	<0.5	<0 5	<0.5	<0.5	NR
MW-6(55)	06/30/92	35 50	ND.	<850.	<0.5	<0 5	<0.5	<0.5	NR
MW-7(36)	06/30/92	23.70	ND.	71,000	5,100	6,600.	2,300	14,000.	NR.
RW-1(48)	06/30/92	34 74	ND.	<400.	<0.5	<0.5	<0 5	<0.5	NR
FB-1[4]	06/30/92	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

Columbia Analytical Services inc.

July 13, 1992

Jim Butera
EMCON Associates
1921 Ringwood Avenue
San Jose, CA 95131

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

Dear Mr. Butera:

Enclosed are the results of the water samples submitted to our lab on July 1, 1992. For your reference, our service request number for this work is SJ92-0792.

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

Please call if you have any questions.

Respectfully submitted:

COLUMBIA ANALYTICAL SERVICES, INC.

Keoni A. Murphy
Laboratory Manager

Annelise J. Bazar
Regional QA Coordinator

le/KAM

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

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

Date Received: 07/01/92
Work Order #: SJ92-0792
Sample Matrix: Water

Inorganic Parameters[1]
mg/L (ppm)

Sample Name:	MW-4 (48)	Method Blank
Date Sampled:	06/30/92	

Analyte	Method	MRL		
Total Oil and Grease	413.1	0.5	0.5	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 _____ Date July 13, 1992

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

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

Date Received: 07/01/92
Work Order #: SJ92-0792
Sample Matrix: Water

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

Sample Name:		MW-1 (39)	MW-2 (25)	MW-3 (38)
Date Analyzed:		07/02/92	07/01/92	07/02/92
Analyte	**MRL**			
Benzene	0.5	ND	10,000.	ND
Toluene	0.5	ND	16,000.	ND
Ethylbenzene	0.5	ND	4,700.	ND
Total Xylenes	0.5	ND	24,000.	ND
TPH as Gasoline	50	ND	130,000.	<530.*

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
* Sample matrix contains discrete, non-fuel peaks. The chromatogram does not match the typical gasoline fingerprint.

Approved by Kenneth Murphy Date July 13, 1992

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Associates	Date Received:	07/01/92
Project:	EMCON Project No. G70-02.01	Work Order #:	SJ92-0792
	Arco Facility No. 276	Sample Matrix:	Water

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

Sample Name:		MW-4 (48)	MW-5 (47)	MW-6 (55)
Date Analyzed:		07/02/92	07/02/92	07/07/92
Analyte	**MRL**			
Benzene	0.5	ND	ND	ND
Toluene	0.5	ND	ND	ND
Ethylbenzene	0.5	<2.3**	ND	ND
Total Xylenes	0.5	ND	ND	ND
TPH as Gasoline	50	<670.*	ND	<850.*

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
* Sample matrix contains discrete, non-fuel peaks. The chromatogram does not match the typical gasoline fingerprint.
** Raised MRL due to matrix interference.

Approved by Keelan Murphy Date July 13, 1992

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Associates	**Date Received:**	07/01/92
Project:	EMCON Project No. G70-02.01	**Work Order #:**	SJ92-0792
	Arco Facility No. 276	**Sample Matrix:**	Water

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

Sample Name:		MW-7 (36)	RW-1 (48)	FB-1
Date Analyzed:		07/02/92	07/02/92	07/02/92
Analyte	**MRL**			
Benzene	0.5	5,100.	ND	ND
Toluene	0.5	6,600.	ND	ND
Ethylbenzene	0.5	2,300.	ND	ND
Total Xylenes	0.5	14,000.	ND	ND
TPH as Gasoline	50	71,000.	<400.*	ND

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
* Sample matrix contains, discrete non-fuel peaks. The chromatogram does not match the typical gasoline fingerprint.

Approved by Kevin Murphy Date July 13, 1992

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

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

Date Received: 07/01/92
Work Order #: SJ92-0792
Sample Matrix: Water

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

Sample Name:		Method Blank	Method Blank	Method Blank
Date Analyzed:		07/01/92	07/02/92	07/07/92
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 Kenneth Murphy Date July 13, 1992

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

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

Date Received: 07/01/92
Work Order #: SJ92-0792
Sample Matrix: Water

Volatile Organic Compounds
EPA Method 624
µg/L (ppb)

Sample Name:		MW-1 (39)	MW-2 (25)*	MW-3 (38)*
Date Analyzed:		07/07/92	07/08/92	07/09/92
Analyte	MRL			
Chloromethane	1	ND	<100.	<20.
Vinyl Chloride	1	ND	<100.	<20.
Bromomethane	1	ND	<100.	<20.
Chloroethane	1	ND	<100.	<20.
Trichlorofluoromethane (Freon 11)	1	ND	<100.	<20.
Trichlorotrifluoroethane (Freon 113)	10	ND	<1,000.	<200.
1,1-Dichloroethene	1	ND	<100.	<20.
Acetone	20	ND	<2,000.	<400.
Carbon Disulfide	1	ND	<100.	<20.
Methylene Chloride	10	ND	<1,000.	<200.
trans-1,2-Dichloroethene	1	ND	<100.	<20.
cis-1,2-Dichloroethene	1	ND	<100.	<20.
2-Butanone (MEK)	10	ND	<1,000.	<200.
1,1-Dichloroethane	1	ND	<100.	<20.
Chloroform	1	ND	<100.	<20.
1,1,1-Trichloroethane (TCA)	1	ND	<100.	<20.
Carbon Tetrachloride	1	ND	<100.	<20.
Benzene	1	ND	9,300.	<20.
1,2-Dichloroethane	1	ND	<100.	<20.
Vinyl Acetate	10	ND	<1,000.	<200.
Trichloroethene (TCE)	1	ND	<100.	<20.
1,2-Dichloropropane	1	ND	<100.	<20.
Bromodichloromethane	1	ND	<100.	<20.
2-Chloroethyl Vinyl Ether	10	ND	<1,000.	<200.
trans-1,3-Dichloropropene	1	ND	<100.	<20.
2-Hexanone	10	ND	<1,000.	<200.
4-Methyl-2-pentanone (MIBK)	10	ND	<1,000.	<200.
Toluene	1	ND	18,000.	<20.
cis-1,3-Dichloropropene	1	ND	<100.	<20.
1,1,2-Trichloroethane	1	ND	<100.	<20.
Tetrachloroethene (PCE)	1	15.	<100.	1,500.
Dibromochloromethane	1	ND	<100.	<20.
Chlorobenzene	1	ND	<100.	<20.
Ethylbenzene	1	ND	4,200.	<20.
Styrene	1	ND	<100.	<20.
Total Xylenes	1	ND	27,000.	<20.
Bromoform	1	ND	<100.	<20.
1,1,2,2-Tetrachloroethane	1	ND	<100.	<20.
1,3-Dichlorobenzene	1	ND	<100.	<20.
1,4-Dichlorobenzene	1	ND	<100.	<20.
1,2-Dichlorobenzene	1	ND	<100.	<20.

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
* Raised MRL due to high analyte concentration requiring sample dilution.

Approved by Kevin Murphy Date July 13, 1992

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

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

Date Received: 07/01/92
Work Order #: SJ92-0792
Sample Matrix: Water

Volatile Organic Compounds
EPA Method 624
µg/L (ppb)

Sample Name:		MW-4 (48)*	MW-5 (47)	MW-6 (55)*
Date Analyzed:		07/09/92	07/09/92	07/09/92
Analyte	MRL			
Chloromethane	1	<20.	ND	<20.
Vinyl Chloride	1	<20.	ND	<20.
Bromomethane	1	<20.	ND	<20.
Chloroethane	1	<20.	ND	<20.
Trichlorofluoromethane (Freon 11)	1	<20.	ND	<20.
Trichlorotrifluoroethane (Freon 113)	10	<200.	ND	<200.
1,1-Dichloroethene	1	<20.	ND	<20.
Acetone	20	<400.	ND	<400.
Carbon Disulfide	1	<20.	ND	<20.
Methylene Chloride	10	<200.	ND	<200.
trans-1,2-Dichloroethene	1	<20.	ND	<20.
cis-1,2-Dichloroethene	1	<20.	ND	<20.
2-Butanone (MEK)	10	<200.	ND	<200.
1,1-Dichloroethane	1	<20.	ND	<20.
Chloroform	1	<20.	ND	<20.
1,1,1-Trichloroethane (TCA)	1	<20.	ND	<20.
Carbon Tetrachloride	1	<20.	ND	<20.
Benzene	1	<20.	ND	<20.
1,2-Dichloroethane	1	<20.	ND	<20.
Vinyl Acetate	10	<200.	ND	<200.
Trichloroethene (TCE)	1	<20.	ND	<20.
1,2-Dichloropropane	1	<20.	ND	<20.
Bromodichloromethane	1	<20.	ND	<20.
2-Chloroethyl Vinyl Ether	10	<200.	ND	<200.
trans-1,3-Dichloropropene	1	<20.	ND	<20.
2-Hexanone	10	<200.	ND	<200.
4-Methyl-2-pentanone (MIBK)	10	<200.	ND	<200.
Toluene	1	<20.	ND	<20.
cis-1,3-Dichloropropene	1	<20.	ND	<20.
1,1,2-Trichloroethane	1	<20.	ND	<20.
Tetrachloroethene (PCE)	1	1,800.	30.	2,400.
Dibromochloromethane	1	<20.	ND	<20.
Chlorobenzene	1	<20.	ND	<20.
Ethylbenzene	1	<20.	ND	<20.
Styrene	1	<20.	ND	<20.
Total Xylenes	1	<20.	ND	<20.
Bromoform	1	<20.	ND	<20.
1,1,2,2-Tetrachloroethane	1	<20.	ND	<20.
1,3-Dichlorobenzene	1	<20.	ND	<20.
1,4-Dichlorobenzene	1	<20.	ND	<20.
1,2-Dichlorobenzene	1	<20.	ND	<20.

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
* Raised MRL due to high analyte concentration requiring sample dilution.

Approved by Kathleen Murphy Date July 13, 1992

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

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

Date Received: 07/01/92
Work Order #: SJ92-0792
Sample Matrix: Water

Volatile Organic Compounds
EPA Method 624
µg/L (ppb)

Sample Name:		MW-7 (36)*	RW-1 (48)*	FB-1
Date Analyzed:		07/09/92	07/09/92	07/09/92
Analyte	MRL			
Chloromethane	1	<50.	<20.	ND
Vinyl Chloride	1	<50.	<20.	ND
Bromomethane	1	<50.	<20.	ND
Chloroethane	1	<50.	<20.	ND
Trichlorofluoromethane (Freon 11)	1	<50.	<20.	ND
Trichlorotrifluoroethane (Freon 113)	10	<500.	<200.	ND
1,1-Dichloroethene	1	<50.	<20.	ND
Acetone	20	<1,000.	<400.	ND
Carbon Disulfide	1	<50.	<20.	ND
Methylene Chloride	10	<500.	<200.	ND
trans-1,2-Dichloroethene	1	<50.	<20.	ND
cis-1,2-Dichloroethene	1	<50.	<20.	ND
2-Butanone (MEK)	10	<500.	<200.	ND
1,1-Dichloroethane	1	<50.	<20.	ND
Chloroform	1	<50.	<20.	ND
1,1,1-Trichloroethane (TCA)	1	<50.	<20.	ND
Carbon Tetrachloride	1	<50.	<20.	ND
Benzene	1	5,100.	<20.	ND
1,2-Dichloroethane	1	<50.	<20.	ND
Vinyl Acetate	10	<500.	<200.	ND
Trichloroethene (TCE)	1	<50.	<20.	ND
1,2-Dichloropropane	1	<50.	<20.	ND
Bromodichloromethane	1	<50.	<20.	ND
2-Chloroethyl Vinyl Ether	10	<500.	<200.	ND
trans-1,3-Dichloropropene	1	<50.	<20.	ND
2-Hexanone	10	<500.	<200.	ND
4-Methyl-2-pentanone (MIBK)	10	<500.	<200.	ND
Toluene	1	6,800.	<20.	ND
cis-1,3-Dichloropropene	1	<50.	<20.	ND
1,1,2-Trichloroethane	1	<50.	<20.	ND
Tetrachloroethene (PCE)	1	<50.	1,100.	ND
Dibromochloromethane	1	<50.	<20.	ND
Chlorobenzene	1	<50.	<20.	ND
Ethylbenzene	1	2,300.	<20.	ND
Styrene	1	<50.	<20.	ND
Total Xylenes	1	16,000.	<20.	ND
Bromoform	1	<50.	<20.	ND
1,1,2,2-Tetrachloroethane	1	<50.	<20.	ND
1,3-Dichlorobenzene	1	<50.	<20.	ND
1,4-Dichlorobenzene	1	<50.	<20.	ND
1,2-Dichlorobenzene	1	<50.	<20.	ND

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
* Raised MRL due to high analyte concentration requiring sample dilution.

Approved by Kevin Murphy Date July 13, 1992

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

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

Date Received: 07/01/92
Work Order #: SJ92-0792
Sample Matrix: Water

Volatile Organic Compounds
EPA Method 624
µg/L (ppb)

Sample Name:		Method Blank	Method Blank	Method Blank
Date Analyzed:		07/07/92	07/08/92	07/09/92
Analyte	MRL			
Chloromethane	1	ND	ND	ND
Vinyl Chloride	1	ND	ND	ND
Bromomethane	1	ND	ND	ND
Chloroethane	1	ND	ND	ND
Trichlorofluoromethane (Freon 11)	1	ND	ND	ND
Trichlorotrifluoroethane (Freon 113)	10	ND	ND	ND
1,1-Dichloroethene	1	ND	ND	ND
Acetone	20	ND	ND	ND
Carbon Disulfide	1	ND	ND	ND
Methylene Chloride	10	ND	ND	ND
trans-1,2-Dichloroethene	1	ND	ND	ND
cis-1,2-Dichloroethene	1	ND	ND	ND
2-Butanone (MEK)	10	ND	ND	ND
1,1-Dichloroethane	1	ND	ND	ND
Chloroform	1	ND	ND	ND
1,1,1-Trichloroethane (TCA)	1	ND	ND	ND
Carbon Tetrachloride	1	ND	ND	ND
Benzene	1	ND	ND	ND
1,2-Dichloroethane	1	ND	ND	ND
Vinyl Acetate	10	ND	ND	ND
Trichloroethene (TCE)	1	ND	ND	ND
1,2-Dichloropropane	1	ND	ND	ND
Bromodichloromethane	1	ND	ND	ND
2-Chloroethyl Vinyl Ether	10	ND	ND	ND
trans-1,3-Dichloropropene	1	ND	ND	ND
2-Hexanone	10	ND	ND	ND
4-Methyl-2-pentanone (MIBK)	10	ND	ND	ND
Toluene	1	ND	ND	ND
cis-1,3-Dichloropropene	1	ND	ND	ND
1,1,2-Trichloroethane	1	ND	ND	ND
Tetrachloroethene (PCE)	1	ND	ND	ND
Dibromochloromethane	1	ND	ND	ND
Chlorobenzene	1	ND	ND	ND
Ethylbenzene	1	ND	ND	ND
Styrene	1	ND	ND	ND
Total Xylenes	1	ND	ND	ND
Bromoform	1	ND	ND	ND
1,1,2,2-Tetrachloroethane	1	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 Kenneth Murphy Date July 13, 1992

Rev. 2, 5/91

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 670-02.01 SAMPLE ID: RW-1(48)

PURGED BY: J Williams CLIENT NAME: ARCO 276

SAMPLED BY: J Williams LOCATION: Oakland

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

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

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 20.91

DEPTH TO WATER (feet): 34.55 CALCULATED PURGE (gal.): 104.59

DEPTH OF WELL (feet): 48.80 ACTUAL PURGE VOL. (gal.): 105

DATE PURGED: 06-30-97 Start (2400 Hr) 11:15 End (2400 Hr) 11:59

DATE SAMPLED: 06-30-97 Start (2400 Hr) 12:01 End (2400 Hr) 12:05

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual) (48)
1126	21	6.48	1158	66.5	CLEAR	0
1135	42	6.14	996	64.3	↓	↓
1145	63	6.07	855	61.0	↓	↓
1152	84	6.00	854	62.9	↓	↓
1159	105	6.05	820	66.7	↓	↓

D. O. (ppm): NR ODOR: None NR (COBALT 0 - 100) NR (NTU 0 - 200)

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

PURGING EQUIPMENT

- ___ 2" Bladder Pump
- ___ Bailer (Teflon®)
- ✓ Centrifugal Pump
- ___ Bailer (PVC)
- 2" Submersible Pump
- ___ Bailer (Stainless Steel)
- ___ Well Wizard™
- ___ Dedicated

Other: ___

SAMPLING EQUIPMENT

- ___ 2" Bladder Pump
- ✓ Bailer (Teflon®)
- ___ DDL Sampler
- ___ Bailer (Stainless Steel)
- ___ Dipper
- ___ Submersible Pump
- ___ Well Wizard™
- ___ Dedicated

Other: ___

WELL INTEGRITY: WATER IN BOX LOCK #: ON LOCK OF LOCKING CAP

REMARKS: CAP IS BROKEN

Meter Calibration: Date: 6-30 Time: ___ Meter Serial #: 9203 Temperature °F: 91.4

(EC 1000 949 / 1000) (DI ___) (pH 7 6.67 / 700) (pH 10 993 / 1000) (pH 4 3.93 / —)

Location of previous calibration: ___

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: 670-02.01 SAMPLE ID: MW-1 (39)

PURGED BY: S. Williams CLIENT NAME: ARCO 276

SAMPLED BY: S. Williams LOCATION: Oakland, CA

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

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

CASING ELEVATION (feet/MSL): N/C VOLUME IN CASING (gal.): .75

DEPTH TO WATER (feet): 34.55' CALCULATED PURGE (gal.): 3.75

DEPTH OF WELL (feet): 39.20 ACTUAL PURGE VOL. (gal.): 5

DATE PURGED: 06-29-95 Start (2400 Hr) 1407 End (2400 Hr) 1432

DATE SAMPLED: 06-29-95 Start (2400 Hr) 1435 End (2400 Hr) 1437

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual) (39)
1414	1	6.37	3640	68.1	BROWN	HEAVY
1418	2	6.49	3710	67.9	"	"
1422	3	6.46	3[illegible]	67.[illegible]	"	"
1428	4	6.51	3750	68.[illegible]	"	"
1432	5	6.53	3841	66.8	"	"

D. O. (ppm): N/A ODCR: NONE VR (COBALT 0 - 100) 26 (NTU 0 - 200)

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

PURGING EQUIPMENT		SAMPLING EQUIPMENT	
___ 2" Bladder Pump	___ Bailer (Teflon®)	___ 2" Bladder Pump	✓ Bailer (Teflon®)
___ Centrifugal Pump	✓ 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: OK LOCK #: 3259

REMARKS: ___

Meter Calibration: Date: 6-29-95 Time: 1312 Meter Serial #: 9203 Temperature °F: 70.9

(EC 1000 1413 / 1000) (DI ___) (pH 7 6.91 / 7.00) (pH 10 10.04 / 10.00) (pH 4 3.99 / ___)

Location of previous calibration: ___

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: G70 02.01 | SAMPLE ID: MW-2( )

PURGED BY: J WILLIAMS | CLIENT NAME: ARCO 276

SAMPLED BY: J. WILLIAMS | LOCATION: 10600 MacARTHUR 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):	-	VOLUME IN CASING (gal.):	4.19
DEPTH TO WATER (feet):	19.11	CALCULATED PURGE (gal.):	20.95
DEPTH OF WELL (feet):	25.5	ACTUAL PURGE VOL. (gal.):	16.50

DATE PURGED: 6-30-92 | Start (2400 Hr) 1423 | End (2400 Hr) 1~~434~~

DATE SAMPLED: 6-30-92 | Start (2400 Hr) 1440 | End (2400 Hr) 1441

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1423	4.25	6.18	955	70.2	CLOUDY	LIGHT
1427	8.50	6.29	948	71.0		
	12.75	6.34	928	70.3		
~~1433~~	~~17.00~~	DRIED @	16.50 GALLONS			
1444	~~RECHARGE~~	6.42	946	73.7	↓	↓

D. O. (ppm): NR | ODOR: STRONG | 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	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: SHEEN ON TOP OF WATER
SKIMMER WASN'T IN WATER
DRIED WELL @ 16.50 GALLONS (1433)

Meter Calibration: Date: 6-30-92 Time: ___ Meter Serial #: 9203 Temperature °F: ___

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

Location of previous calibration: RW-1

Signature: [signature] | Reviewed By: JB | Page 3 of 5

Rev. 2, 5/91

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 620-021.1 SAMPLE ID: MW-3

PURGED BY: M. Gallegos CLIENT NAME: ARCO - 770

SAMPLED BY: M. Gallegos LOCATION: 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): ___ VOLUME IN CASING (gal.): 0.61

DEPTH TO WATER (feet): ~~24.74~~ 24.97 CALCULATED PURGE (gal.): 3.05

DEPTH OF WELL (feet): ~~28.75~~ 28.75 ACTUAL PURGE VOL. (gal.): 3.5

DATE PURGED: 6-29-92 Start (2400 Hr) 1532 End (2400 Hr) 1554

DATE SAMPLED: 6-29-92 Start (2400 Hr) 1600 End (2400 Hr) 1602

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1534	.5	6.84	1390	66.4	Brown	Heavy
1541	1.0	6.77	1380	65.9	"	"
1545	1.5	6.68	1365	66.2	"	"
1550	2.0	6.65	1442	66.2	"	"
1554	3.0	6.66	1455	66.1	"	"

D. O. (ppm): NR ODOR: None NR (COBALT 0 - 100) NR (NTU 0 - 200)

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

Meter Calibration: Date: ___ Time: ___ Meter Serial #: ___ Temperature °F: ___

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

Location of previous calibration: Well-1

Signature: ___ Reviewed By: JA Page 4 of 5

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: G70-02.01 SAMPLE ID: MW-4

PURGED BY: K REICHELDERFER CLIENT NAME: ARCO 276

SAMPLED BY: K REICHELDERFER LOCATION: 10600 MacARTHUR 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): — VOLUME IN CASING (gal.): 2.42

DEPTH TO WATER (feet): 34.06 CALCULATED PURGE (gal.): 12.11

DEPTH OF WELL (feet): 48.90 ACTUAL PURGE VOL. (gal.): 12.50

DATE PURGED: 6-30-92 Start (2400 Hr) 1119 End (2400 Hr) 1146

DATE SAMPLED: 6-30-92 Start (2400 Hr) 1203 End (2400 Hr) 1209

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1119	2.50	6.81	1326	67.6	BROWN	HEAVY
1124	5.00	6.67	1233	66.0		
1131	7.50	6.48	1230	64.6		
1138	10.00	6.30	843	62.0		
1146	12.50	6.38	885	61.2	↓	↓

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

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	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: SUSPECT PROBLEM W/ METER — CHANGED TO J. WILLIAMS' METER

PH meter, not water meter

Meter Calibration: Date: 6-30-92 Time: ___ Meter Serial #: 9203 Temperature °F: ___

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

Location of previous calibration: RW-1

Signature: [signature] Reviewed By: JB Page 5 of 8

Rev. 2, 5/91

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: G70-02.01 SAMPLE ID: MW-5

PURGED BY: S.W. Williams CLIENT NAME: ARCO 271

SAMPLED BY: S.W. Williams LOCATION: Oakland Ca

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

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

CASING ELEVATION (feet/MSL): ___ VOLUME IN CASING (gal.): 8.93

DEPTH TO WATER (feet): 8.40 CALCULATED PURGE (gal.): 44.67

DEPTH OF WELL (feet): 47.6 ACTUAL PURGE VOL. (gal.): 45

DATE PURGED: 06-29-92 Start (2400 Hr) 1536 End (2400 Hr) 1406

DATE SAMPLED: 06-29-92 Start (2400 Hr) 1402 End (2400 Hr) 1405

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1544	9	6.71	571	68.9	CLEAR	0
1543	14	6.70	577	69.1	2	
1552	27	~~6.66~~ 6.64	563	68.6	1	2
1555	36	6.67	554	68.3	1	1
1400	45	6.61	564	68.7	1	1

D. O. (ppm): ___ ODOR: None NP (COBALT 0 - 100) 1 K (NTU 0 - 200)

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

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

WELL INTEGRITY: OK inner well locking LOCK #: 8259

REMARKS: CAP

Meter Calibration: Date: ___ Time: ___ Meter Serial #: ___ Temperature °F: ___

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

Location of previous calibration: MW-1

TD

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: 670-02.01 SAMPLE ID: MW-6

PURGED BY: K. REICHELDERFER CLIENT NAME: ARCO 276

SAMPLED BY: K REICHELDERFER LOCATION: 10600 MacARTHUR 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):	—	VOLUME IN CASING (gal.):	2.57
DEPTH TO WATER (feet):	39.26	CALCULATED PURGE (gal.):	12.84
DEPTH OF WELL (feet):	55.06	ACTUAL PURGE VOL. (gal.):	13.75

DATE PURGED: 6-30-92 Start (2400 Hr) 1305 End (2400 Hr) 1339

DATE SAMPLED: 6-30-92 Start (2400 Hr) 1350 End (2400 Hr) 1353

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1308	2.75	6.30	2050	70.1	BROWN	HEAVY
1314	5.50	6.56	2650	67.8		
1324	8.25	6.63	2640	67.5		
1332	11.00	6.60	2660	68.2		
1339	13.75	6.67	2460	68.3		

D. O. (ppm): NR ODOR: NONE

COLOR (visual) (COBALT 0 - 100): NR

TURBIDITY (visual) (NTU 0 - 200): NR

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 #: NO LOCK

REMARKS: WATER IN C-BOX

Meter Calibration: Date: 6-30 92 Time: ___ Meter Serial #: 9203 Temperature °F: ___

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

Location of previous calibration: RW-1

Signature: Kevin Reichelderfer Reviewed By: ___ Page 7 of 8

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: 670-02.01 SAMPLE ID: MW-7

PURGED BY: S. Williams CLIENT NAME: ARCO 276

SAMPLED BY: S. Williams LOCATION: Oakland, CA

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

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

CASING ELEVATION (feet/MSL): N/A VOLUME IN CASING (gal.): 2.3

DEPTH TO WATER (feet): 22.66 CALCULATED PURGE (gal.): 11.51

DEPTH OF WELL (feet): 37. ACTUAL PURGE VOL. (gal.): 12.0

DATE PURGED: 6-30-92 Start (2400 Hr) 13:05 End (2400 Hr) 13:35

DATE SAMPLED: 6-30-92 Start (2400 Hr) 13:38 End (2400 Hr) 13:40

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1310	2	6.25	936	70.1	BROWN	HEAVY
1315	5	6.34	895	69.1	〃	〃
1321	7.5	6.35	881	69.4	〃	〃
1327	10	6.33	851	69.1	〃	〃
1335	12	6.35	879	69.5	〃	〃

D. O. (ppm): N/A ODOR: STRONG

COLOR (COBALT 0 - 100): N/A

TURBIDITY (NTU 0 - 200): ___

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

PURGING EQUIPMENT

___ 2" Bladder Pump
___ Centrifugal Pump
___ Submersible Pump
___ Well Wizard™
___ Bailer (Teflon®)
✓ Bailer (PVC)
___ Bailer (Stainless Steel)
___ Dedicated
Other: ___

SAMPLING EQUIPMENT

___ 2" Bladder Pump
___ DDL Sampler
___ Dipper
___ Well Wizard™
✓ Bailer (Teflon®)
___ Bailer (Stainless Steel)
___ Submersible Pump
___ Dedicated
Other: ___

WELL INTEGRITY: OK LOCK #: NO LOCK

REMARKS: ___

Meter Calibration: Date: ___ Time: ___ Meter Serial #: ___ Temperature °F: ___

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

Location of previous calibration: RW-1

TB - 8.8

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

Date Received: 07/01/92
Work Order #: SJ92-0792
Sample Matrix: Water

QA/QC Report
Continuing Calibration Summary
BTEX and TPH as Gasoline
EPA Methods 5030/8020/DHS LUFT Method
Nanograms

Date Analyzed: 07/01/92

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Benzene	250.	239.	96.	85-115
Toluene	250.	254.	102.	85-115
Ethylbenzene	250.	253.	101.	85-115
Total Xylenes	750.	698.	93.	85-115
TPH as Gasoline	2,500.	2,482.	99.	90-110

Date Analyzed: 07/02/92

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Benzene	250.	263.	105.	85-115
Toluene	250.	280.	112.	85-115
Ethylbenzene	250.	280.	112.	85-115
Total Xylenes	750.	776.	103.	85-115
TPH as Gasoline	2,500.	2,511.	100.	90-110

TPH Total Petroleum Hydrocarbons

Approved by Kevin Murphy Date July 13, 1992

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

Date Received: 07/01/92
Work Order #: SJ92-0792
Sample Matrix: Water

QA/QC Report
Continuing Calibration Summary
BTEX and TPH as Gasoline
EPA Methods 5030/8020/DHS LUFT Method
Nanograms

Date Analyzed: 07/07/92

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Benzene	250.	248.	99.	85-115
Toluene	250.	262.	105.	85-115
Ethylbenzene	250.	260.	104.	85-115
Total Xylenes	750.	710.	95.	85-115
TPH as Gasoline	2,500.	2,331.	93.	90-110

TPH Total Petroleum Hydrocarbons

Approved by Kenneth Murphy Date July 13, 1992

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

Date Received: 07/01/92
Work Order #: SJ92-0792
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 (39)	07/02/92	107.
MW-2 (25)	07/01/92	109.
MW-3 (38)	07/02/92	116.
MW-4 (48)	07/02/92	110.
MW-5 (47)	07/02/92	111.
MW-6 (55)	07/07/92	103.
MW-7 (36)	07/02/92	117.
RW-1 (48)	07/02/92	111.
FB-1	07/02/92	110.
MW-1 (39) MS	07/02/92	113.
MW-1 (39) DMS	07/02/92	115.
Method Blank	07/01/92	111.
Method Blank	07/02/92	103.
Method Blank	07/07/92	98.
	CAS Acceptance Criteria	70-130

TPH Total Petroleum Hydrocarbons

Approved by Kevin Murphy Date July 13, 1992

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

Date Received: 07/01/92
Work Order #: SJ92-0792
Sample Matrix: Water

QA/QC Report
Matrix Spike/Duplicate Matrix Spike Summary
TPH as Gasoline
EPA Method 5030/DHS LUFT Method
µg/L (ppb)

Sample Name: MW-1 (39)
Date Analyzed: 07/02/92

			Spike Result		Percent Recovery		
Analytes	Spike Level	Sample Result	MS	DMS	MS	DMS	Acceptance Criteria
TPH as Gasoline	250.	ND	271.	260.	108.	104.	70-140

TPH Total Petroleum Hydrocarbons
ND None Detected at or above the *method reporting limit*

Approved by Kenneth Murphy Date July 13, 1992

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

Date Received: 07/01/92
Work Order #: SJ92-0792
Sample Matrix: Water

QA/QC Report
Continuing Calibration Summary
Volatile Organic Compounds
EPA Method 624
µg/L (ppb)

Date Analyzed: 07/07/92

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Chloromethane	50	53.5	107.	70-130
Vinyl Chloride	50	53.4	107.	70-130
Bromomethane	50	57.9	116.	70-130
Chloroethane	50	54.0	108.	70-130
Acetone	50	48.2	96.	70-130
1,1-Dichloroethene	50	49.5	99.	70-130
Carbon Disulfide	50	46.1	92.	70-130
Methylene Chloride	50	48.2	96.	70-130
trans-1,2-Dichloroethene	50	48.8	98.	70-130
cis-1,2-Dichloroethene	50	47.7	95.	70-130
1,1-Dichloroethane	50	45.7	91.	70-130
Vinyl Acetate	50	43.2	86.	70-130
2-Butanone	50	45.5	91.	70-130
Chloroform	50	47.3	95.	70-130
1,1,1-Trichloroethane (TCA)	50	47.3	95.	70-130
Carbon Tetrachloride	50	49.6	99.	70-130
Benzene	50	47.3	95.	70-130
1,2-Dichloroethane	50	47.4	95.	70-130
Trichloroethene (TCE)	50	50.4	101.	70-130
1,2-Dichloropropane	50	45.8	92.	70-130
Bromodichloromethane	50	47.6	95.	70-130
2-Chloroethyl Vinyl Ether	50	46.0	92.	70-130
2-Hexanone	50	45.3	91.	70-130
trans-1,3-Dichloropropene	50	48.9	98.	70-130
Toluene	50	48.8	98.	70-130
cis-1,3-Dichloropropene	50	47.9	96.	70-130
1,1,2-Trichloroethane	50	48.3	97.	70-130
Tetrachloroethene (PCE)	50	49.9	100.	70-130
Dibromochloromethane	50	50.7	101.	70-130
Chlorobenzene	50	49.7	99.	70-130
Ethylbenzene	50	48.7	97.	70-130
o Xylene	50	48.2	96.	70-130
Styrene	50	48.6	97.	70-130
Bromoform	50	49.8	100.	70-130
1,1,2,2-Tetrachloroethane	50	46.9	94.	70-130

Approved by Kenneth Murphy Date July 13, 1992

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

Date Received: 07/01/92
Work Order #: SJ92-0792
Sample Matrix: Water

QA/QC Report
Continuing Calibration Summary
Volatile Organic Compounds
EPA Method 624
µg/L (ppb)

Date Analyzed: 07/08/92

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Chloromethane	50	58.2	116.	70-130
Vinyl Chloride	50	57.0	114.	70-130
Bromomethane	50	59.7	119.	70-130
Chloroethane	50	59.2	118.	70-130
Acetone	50	49.2	98.	70-130
1,1-Dichloroethene	50	51.0	102.	70-130
Carbon Disulfide	50	46.8	94.	70-130
Methylene Chloride	50	49.5	99.	70-130
trans-1,2-Dichloroethene	50	50.6	101.	70-130
cis-1,2-Dichloroethene	50	49.0	98.	70-130
1,1-Dichloroethane	50	46.0	92.	70-130
Vinyl Acetate	50	54.5	109.	70-130
2-Butanone	50	49.5	99.	70-130
Chloroform	50	48.8	98.	70-130
1,1,1-Trichloroethane (TCA)	50	48.1	96.	70-130
Carbon Tetrachloride	50	49.6	99.	70-130
Benzene	50	48.6	97.	70-130
1,2-Dichloroethane	50	48.5	97.	70-130
Trichloroethene (TCE)	50	49.6	99.	70-130
1,2-Dichloropropane	50	46.3	93.	70-130
Bromodichloromethane	50	48.3	97.	70-130
2-Chloroethyl Vinyl Ether	50	47.5	95.	70-130
2-Hexanone	50	48.2	96.	70-130
trans-1,3-Dichloropropene	50	51.3	103.	70-130
Toluene	50	49.4	99.	70-130
cis-1,3-Dichloropropene	50	49.2	98.	70-130
1,1,2-Trichloroethane	50	51.1	102.	70-130
Tetrachloroethene (PCE)	50	52.3	105.	70-130
Dibromochloromethane	50	52.2	104.	70-130
Chlorobenzene	50	51.8	104.	70-130
Ethylbenzene	50	50.7	101.	70-130
o Xylene	50	49.6	99.	70-130
Styrene	50	50.3	101.	70-130
Bromoform	50	52.7	105.	70-130
1,1,2,2-Tetrachloroethane	50	52.4	105.	70-130

Approved by Keon A Murphy Date July 13, 1992

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

Date Received: 07/01/92
Work Order #: SJ92-0792
Sample Matrix: Water

QA/QC Report
Continuing Calibration Summary
Volatile Organic Compounds
EPA Method 624
µg/L (ppb)

Date Analyzed: 07/09/92

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Chloromethane	50	52.1	104.	70-130
Vinyl Chloride	50	45.8	92.	70-130
Bromomethane	50	59.5	119.	70-130
Chloroethane	50	49.3	99.	70-130
Acetone	50	56.8	114.	70-130
1,1-Dichloroethene	50	40.9	82.	70-130
Carbon Disulfide	50	39.6	79.	70-130
Methylene Chloride	50	50.0	100.	70-130
trans-1,2-Dichloroethene	50	44.9	90.	70-130
cis-1,2-Dichloroethene	50	48.4	97.	70-130
1,1-Dichloroethane	50	44.1	88.	70-130
Vinyl Acetate	50	56.9	114.	70-130
2-Butanone	50	55.1	110.	70-130
Chloroform	50	48.2	96.	70-130
1,1,1-Trichloroethane (TCA)	50	39.7	79.	70-130
Carbon Tetrachloride	50	38.6	77.	70-130
Benzene	50	54.3	109.	70-130
1,2-Dichloroethane	50	50.5	101.	70-130
Trichloroethene (TCE)	50	52.3	105.	70-130
1,2-Dichloropropane	50	54.9	110.	70-130
Bromodichloromethane	50	57.6	115.	70-130
2-Chloroethyl Vinyl Ether	50	59.7	119.	70-130
2-Hexanone	50	58.5	117.	70-130
trans-1,3-Dichloropropene	50	47.6	95.	70-130
Toluene	50	54.4	109.	70-130
cis-1,3-Dichloropropene	50	60.0	120.	70-130
1,1,2-Trichloroethane	50	56.6	113.	70-130
Tetrachloroethene (PCE)	50	46.0	92.	70-130
Dibromochloromethane	50	57.4	115.	70-130
Chlorobenzene	50	54.1	108.	70-130
Ethylbenzene	50	47.8	96.	70-130
o Xylene	50	50.6	101.	70-130
Styrene	50	53.2	106.	70-130
Bromoform	50	59.0	118.	70-130
1,1,2,2-Tetrachloroethane	50	56.6	113.	70-130

Approved by Kenneth Murphy Date July 13, 1992

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

Date Received: 07/01/92
Work Order #: SJ92-0792
Sample Matrix: Water

QA/QC Report
Surrogate Recovery Summary
Volatile Organic Compounds
EPA Method 624

		Percent Recovery		
		1,2-Dichloroethane - D_4	Toluene - D_8	4-Bromofluorobenzene
Sample Name	Date Analyzed			
MW-1 (39)	07/07/92	95.	96.	100.
MW-2 (25)	07/08/92	97.	99.	96.
MW-3 (38)	07/09/92	95.	97.	98.
MW-4 (48)	07/09/92	93.	98.	99.
MW-5 (47)	07/09/92	94.	96.	98.
MW-6 (55)	07/09/92	92.	97.	99.
MW-7 (36)	07/09/92	92.	96.	99.
RW-1 (48)	07/09/92	94.	96.	99.
FB-1	07/09/92	94.	98.	99.
MW-1 (39) MS	07/07/92	90.	94.	96.
MW-1 (39) DMS	07/07/92	91.	96.	95.
Method Blank	07/07/92	92.	94.	98.
Method Blank	07/08/92	94.	95.	98.
Method Blank	07/09/92	94.	98.	98.
EPA Acceptance Criteria		76-114	88-110	86-115

Approved by Keown Murphy Date July 13, 1992

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

Date Received: 07/01/92
Work Order #: SJ92-0792
Sample Matrix: Water

QA/QC Report
Matrix Spike/Duplicate Matrix Spike Summary
Volatile Organic Compounds
EPA Method 624
µg/L (ppb)

Sample Name: MW-1 (39)
Date Analyzed: 07/07/92

Analyte	Spike Level	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	EPA Acceptance Criteria	Relative Percent Difference
1,1-Dichloroethene	50	ND	54.7	49.2	109.	98.	61-145	11.
Trichloroethene	50	ND	48.2	43.3	96.	87.	71-120	11.
Chlorobenzene	50	ND	52.4	47.3	105.	95.	75-130	10.
Toluene	50	ND	47.8	43.4	96.	87.	76-125	10.
Benzene	50	ND	47.9	43.9	96.	88.	76-127	9.

ND None Detected at or above the method reporting limit

Approved by Reviewed by Date July 13, 1992