RESNA
Working To Restore Nature

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TRANSMITTAL

DATE: May 5, 1993
PROJECT NO.: 60026.13

TO: Alameda County Health Care Agency
Department of Environmetnal Health
80 Swan Way, Room 200
Oakland, California 94621

ATTENTION: Mr. Barney Chan

SUBJECT: ARCO Station No. 276

WE ARE SENDING YOU:

COPIES	DATED	DESCRIPTION
1	4/29/93	First Quarter 1993 Groundwater Monitoring and Remedial Performance Evaluation Report for ARCO Station No. 276. 10600 MacArthur Boulevard, Oakland, California.

THESE ARE TRANSMITTED as checked below:

☐ For review and comment ☐ As requested ☑ For your files ☐ For approval

REMARKS:

James L. Nelson, C.E.G. 1463

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Working To Restore Nature

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LETTER REPORT
QUARTERLY GROUNDWATER MONITORING AND REMEDIAL PERFORMANCE EVALUATION

First Quarter 1993
at
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

60026.13

interpreting field and laboratory analytical data; and evaluating trends in reported hydrocarbon and volatile organic compounds (VOCs) concentrations in the local groundwater, groundwater levels, 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, groundwater monitoring wells and vapor extraction wells are shown on the Generalized Site Plan, Plate 2.

Previous environmental work is discussed in prior subsurface investigation reports listed in the References section.

Groundwater Sampling and Gradient Evaluation

Depth to water (DTW) levels in wells MW-1 through MW-8, and RW-1 were measured by EMCON field personnel on January 22, February 12, and March 26, 1993 and quarterly sampling was performed by EMCON field personnel on February 12, 1993. 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, MW-2, MW-4 through MW-8, and RW-1, are presented on EMCON's Field Reports, Summary of Groundwater Monitoring Data, and Water Sample Field Data Sheets. Copies of these reports 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-8, and RW-1 for this and previous quarters are summarized in Table 1, Cumulative Groundwater Monitoring Data. EMCON's DTW measurements were used to evaluate groundwater gradients for this quarter. The average groundwater gradient and flow direction for this quarter was 0.008 to the northeast.

Floating product 0.02 and 0.04 foot thick was detected in offsite well MW-7 on January 22 and February 12, and floating product 0.05 foot thick was detected after purging well MW-2 on February 12, 1993. Floating product was not detected in well MW-7 on March 26, 1993. Because a car was parked over well MW-2, it was not monitored on March 26, 1993 (see EMCON's Field Reports Appendix A). RESNA field personnel conducted monthly inspections of wells MW-2 and MW-7 for the presence of floating product on January 29, February 26, and March 24, 1993. Petroleum product sheen was detected in wells MW-2 and MW-7 by RESNA field personnel during this quarter. Evidence of product or sheen was not observed in the other monitoring wells during this quarter. Quantities of floating product and water removed are presented in Table 2, Approximate Cumulative Product

Removed. There was no product recovered at the site for this quarter; the total product removed at this site to date by hand bailing is approximately 19 gallons.

Wells MW-1, MW-3, through MW-6, MW-8, and RW-1 were constructed in a deeper water-bearing zone, and offsite well MW-7 and onsite well MW-2 were constructed in a shallow water-bearing zone.

Groundwater elevations of the shallow and deep water-bearing zone for this quarter are shown on the Groundwater Gradient Maps, Plates 3 through 5. The gradients depicted on Plates 3 through 5 are those interpreted for the deeper water-bearing zone.

Groundwater monitoring wells MW-1, MW-3 through MW-6, MW-8, and RW-1 were purged and sampled by EMCON field personnel on February 12, 1993. Monitoring wells MW-2 and MW-7 contained floating product during EMCON's sampling at the site and were not sampled. Purge water generated during purging and sampling of the monitoring wells was transported to Gibson Environmental in Redwood City, California for recycling.

REMEDIAL PERFORMANCE EVALUATION

Vapor Extraction System Description

The data presented in this section covers the period from January 1, 1993 to March 31, 1993. The system began continuous operation on August 25, 1992. The system was monitored by Pacific Environmental Group (PEG) during the previous quarter (from August 25, 1992 to October 5, 1992). The onsite vapor extraction system (VES) uses a 1.5 horsepower Rotron vacuum blower to extract petroleum hydrocarbon vapor from subsurface soils associated with the former USTs at the site. Plate 6, VES Schematic, depicts the location of the eight onsite vapor extraction wells (VW-1 through VW-7, and monitoring well MW-2) that are used to extract vapor from hydrocarbon-impacted subsurface soils by use of the Rotron blower. Monitoring well MW-8 is also manifolded to the VES but is shutoff because it is screened in the lower water bearing zone. Extracted vapor is directed to a 500 standard cubic feet per minute (scfm at 70 degrees Fahrenheit) gas fired Anguil Catalytic Oxidizer (Catox) for abatement prior to discharge to the atmosphere. System operation is regulated under the Bay Area Air Quality Management District (BAAQMD) Permit to Operate Number 5998. Sample ports are located influent and effluent to the CatOx, at the wellheads, and in the vapor manifold piping from the extraction wells to the blower, prior to fresh air dilution.

System Monitoring

The onsite VES is monitored every two weeks (when operating) to evaluate the treatment system performance, at which time the following measurements are recorded: applied vacuum on the wells; average extracted air flow rates influent to the blower (prior to fresh air dilution); and extracted hydrocarbon vapor concentrations from the well field, influent to the CatOx, and effluent to the CatOx as measured by a flame-ionization detector (FID). In addition to these measurements, several other parameters such as the process temperature, stack temperature, and flame voltage are also recorded during every site visit for maintenance purposes.

LABORATORY METHODS AND RESULTS

Groundwater Samples

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, MW-3 through MW-6, MW-8, and RW-1 were analyzed for total petroleum hydrocarbons as gasoline (TPHg) and benzene, toluene, ethylbenzene,and xylenes (BTEX) using modified Environmental Protection Agency (EPA) Methods 5030/8020 DHS LUFT Method. Concentrations of TPHg and benzene in groundwater are shown on Plate 7, Concentrations of TPHg and Benzene in Groundwater. Groundwater samples from wells MW-1, MW-3 through MW-6, MW-8, and RW-1 were also analyzed for VOCs using EPA Method 624. Concentrations of VOCs in the groundwater are shown on Plate 8, PCE Concentrations in Groundwater. In addition, the sample from well MW-4 was analyzed for total oil and grease (TOG) using Standard Method 5520C/F. The Chain of Custody Records and Laboratory Analysis Reports are included in Appendix A. Results of these and previous groundwater analyses are summarized in Table 3, Cumulative Results of Laboratory Analyses of Groundwater Samples--TPHg, TPHd, BTEX, and TOG and Table 4, Cumulative Results of Laboratory Analyses of Groundwater Samples--VOCs and Metals.

Since the last quarter, floating product has continued to be detected in MW-2 and MW-7 by EMCON and RESNA field personnel. Laboratory analytical results of groundwater samples from wells MW-1, MW-3 through MW-6, MW-8, and RW-1 indicated nondetectable concentrations of TPHg (less than 50 parts per billion [ppb]; except for the sample collected from MW-6, where detection limits were raised due to the presence of PCE in the sample matrix) and BTEX (less than 0.5 ppb; except for samples collected from wells MW-3, MW-4, and RW-1, where the detection limits were raised as mentioned above). Concentrations of

TOG increased in well MW-4; concentrations of PCE increased in wells MW-1, MW-3, MW-4, MW-5, and MW-6, decreased in MW-8, and RW-1.

Air Samples

Because the VES remediation system was shut down this quarter, air samples were not collected.

RESULTS OF REMEDIAL PERFORMANCE EVALUATION

As previously mentioned, the VES remediation system at the site was shut down due to high water levels in the vapor extraction wells and could not be evaluated.

CONCLUSIONS

The shallow water-bearing zone at the site has been impacted by petroleum hydrocarbons. The deeper water-bearing zone has been impacted by VOCs, but does not appear to have been impacted by gasoline hydrocarbons. Floating petroleum product was observed by EMCON and RESNA field personnel in shallow onsite well MW-2 and shallow offsite well MW-7 this quarter. Analytical results of groundwater samples from deeper wells MW-1, MW-3, MW-4, MW-5, MW-6, MW-8 and RW-1 indicated nondetectable TPHg and BTEX. However, in wells MW-3, MW-4, MW-5, MW-6, and RW-1 the samples reportedly contained a high concentration of a discrete, non-fuel component (PCE) in the gasoline range. PCE is the predominant VOC in the deeper groundwater zone and appears to be migrating beneath the ARCO site from an offsite and upgradient source (near offsite deeper well MW-6). This possibility was discussed in greater detail in RESNA's recent Additional Subsurface Investigation and Interim Remediation report (RESNA, February 1, 1993). This possibility of an offsite PCE source was evaluated and confirmed by the ACHCSA in their letter to the owners of the adjacent property dated March 23, 1993.

Due to significant rain fall this quarter, the shallow water-bearing zone has recharged. As a result, in early January the vapor extraction system was shut-off because available well screen was submerged by groundwater. The VES will be re-started once water levels decrease to allow sufficient well screen in vapor extraction wells at the site.

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

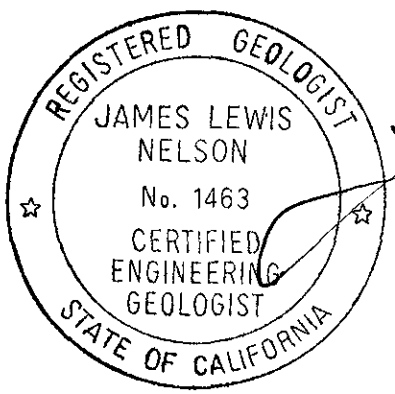
Mr. Barney Chan
Alameda County Health Care Services Agency
Department of Environmental Health
80 Swan Way, Room 200
Oakland, California 94621

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.

Robert D. Campbell
Staff Geologist



James L. Nelson
C.E.G. No. 1463

Enclosures: References

Plate 1, Site Vicinity Map
Plate 2, Generalized Site Plan
Plate 3, Groundwater Gradient Map, January 22, 1993
Plate 4, Groundwater Gradient Map, February 12, 1993
Plate 5, Groundwater Gradient Map, March 26, 1993
Plate 6, VES Schematic
Plate 7, TPHg and Benzene Concentrations in Groundwater, February 12, 1993
Plate 8, PCE Concentrations in Groundwater, February 12, 1993

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

Appendix A: EMCON's Field Reports- Summary of Groundwater Monitoring Data- Certified Analytical Reports with Chain-of- Custody- Water Sample Field Data Sheets

REFERENCES

Alameda County Health Care Services Agency. March 23, 1993. Letter to Drake Builders informing them of perchloroethylene on their property and requesting a work plan to address the problem.

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

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

Department of Health Services, State of California. October 24, 1990. Summary of California Drinking Water Standards.

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.

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

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

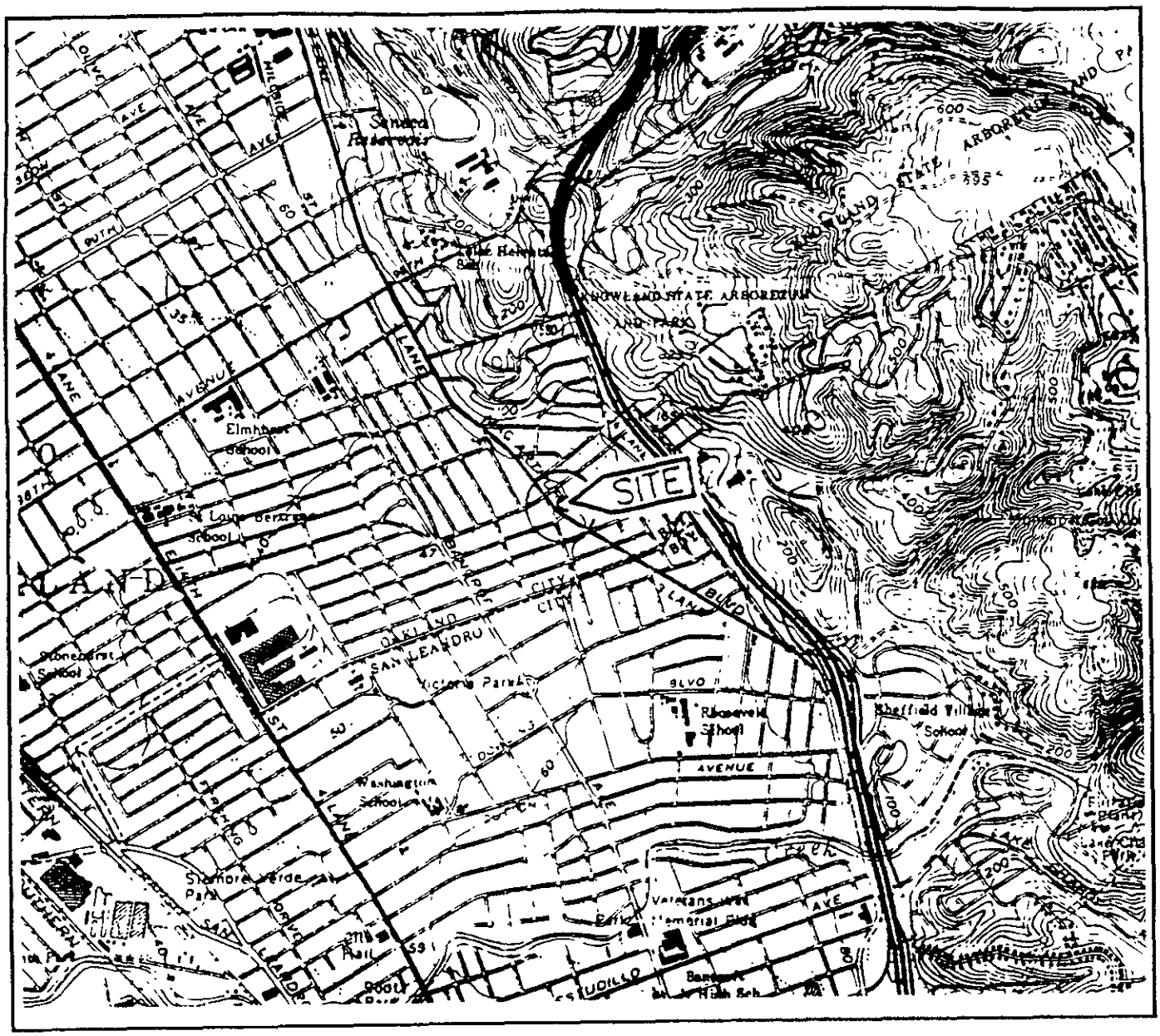
RESNA. December 28, 1992. Letter Report on Quarterly Groundwater Monitoring Third Quarter 1992 at ARCO Station 276, 10600 MacArthur Boulevard in Oakland, California. RESNA Report 60026.06.

REFERENCES
(Continued)

RESNA. February 1, 1993. Additional Subsurface Investigation and Interim Remediation at ARCO Station 276, 10600 MacArthur Boulevard in Oakland, California. RESNA Report 60026.05.

RESNA. March 11, 1993. Letter Report Quarterly Groundwater Monitoring and Remedial Performance Evaluation Fourth Quarter 1992 at ARCO Station 276, 10600 MacArthur Boulevard in Oakland, California. RESNA Report 60026.13.

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, West, California
Photorevised 1980

LEGEND

● = Site Location

Approximate Scale

2000 1000 0 2000 4000

feet

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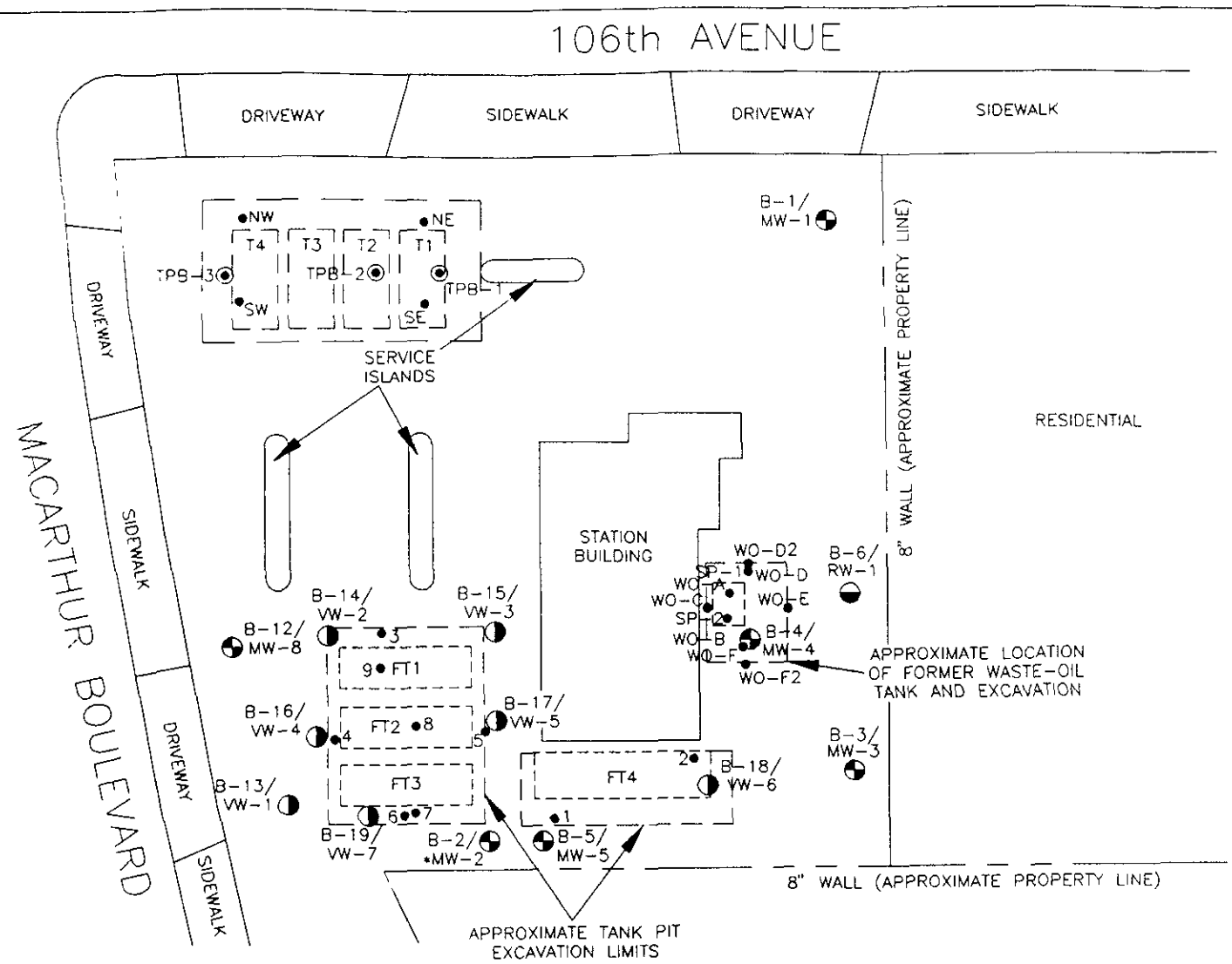
SITE VICINITY MAP
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE
1



EXPLANATION

- 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)
- • = Well screened in shallow water-bearing zone
- 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)
- T4 = Existing underground storage tanks
- FT4 = Former underground storage tanks

B-10/ MW-6

B-11/ *MW-7

MW-3 (WGR)

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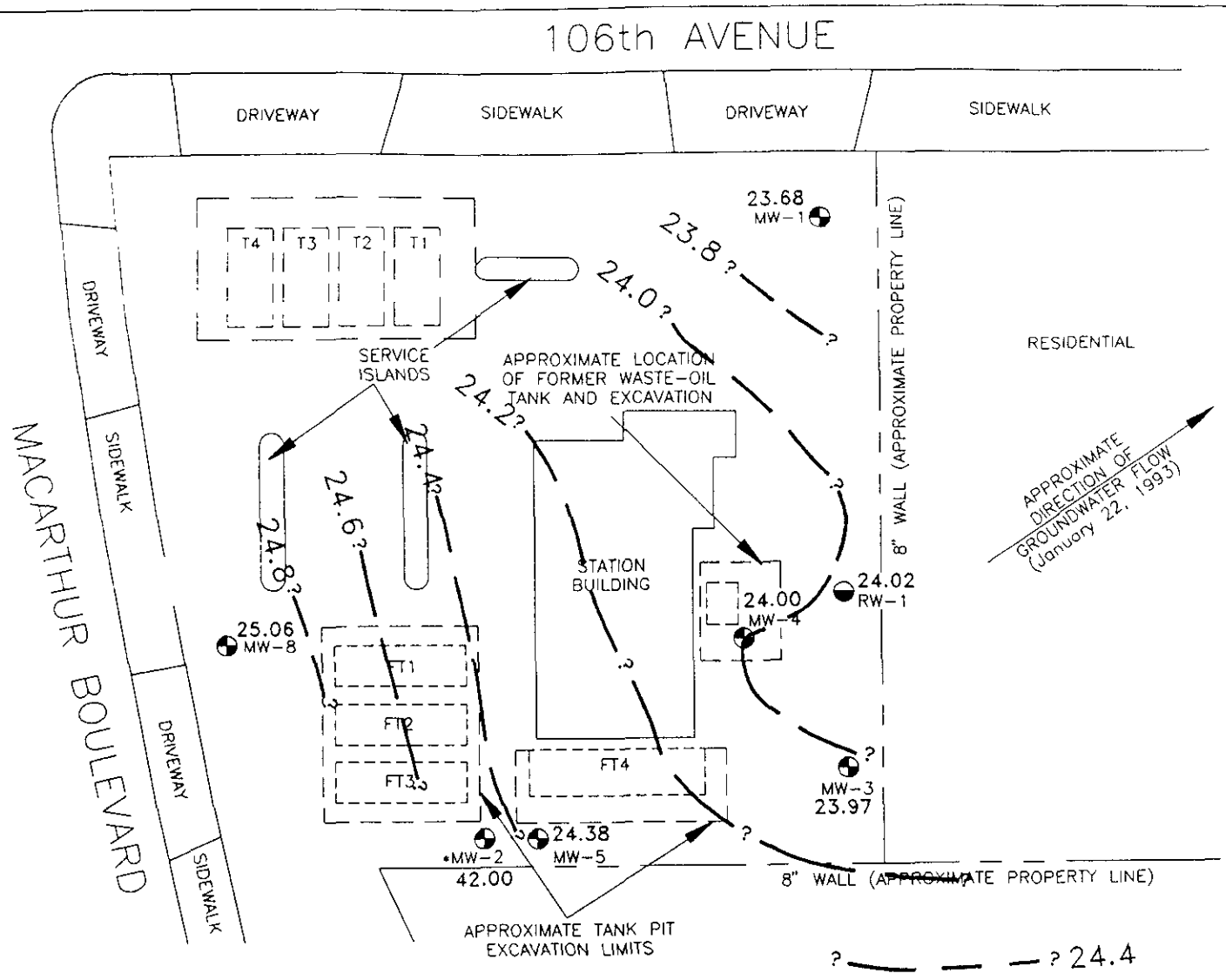
GENERALIZED SITE PLAN
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE 2



EXPLANATION

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

25.06 = Elevation of groundwater in feet above MSL, January 22, 1993

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

RW-1 = Recovery well (RESNA, 1991)

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

NM = Not monitored

FP = Floating product

* = Well screened in shallow water-bearing zone

FP 41.66 *MW-7

NM MW-3 (WGR)

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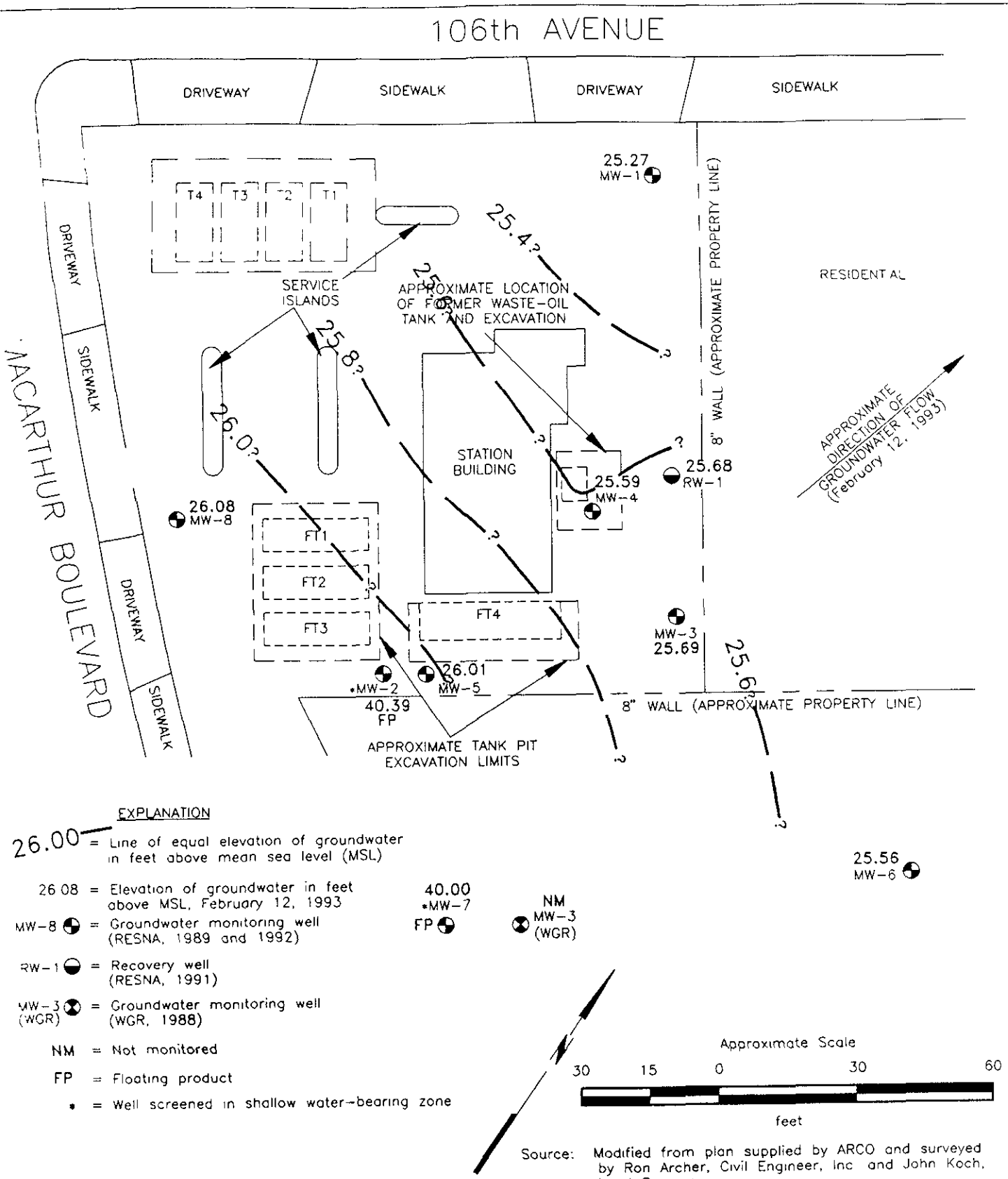
GROUNDWATER GRADIENT MAP
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE 3



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

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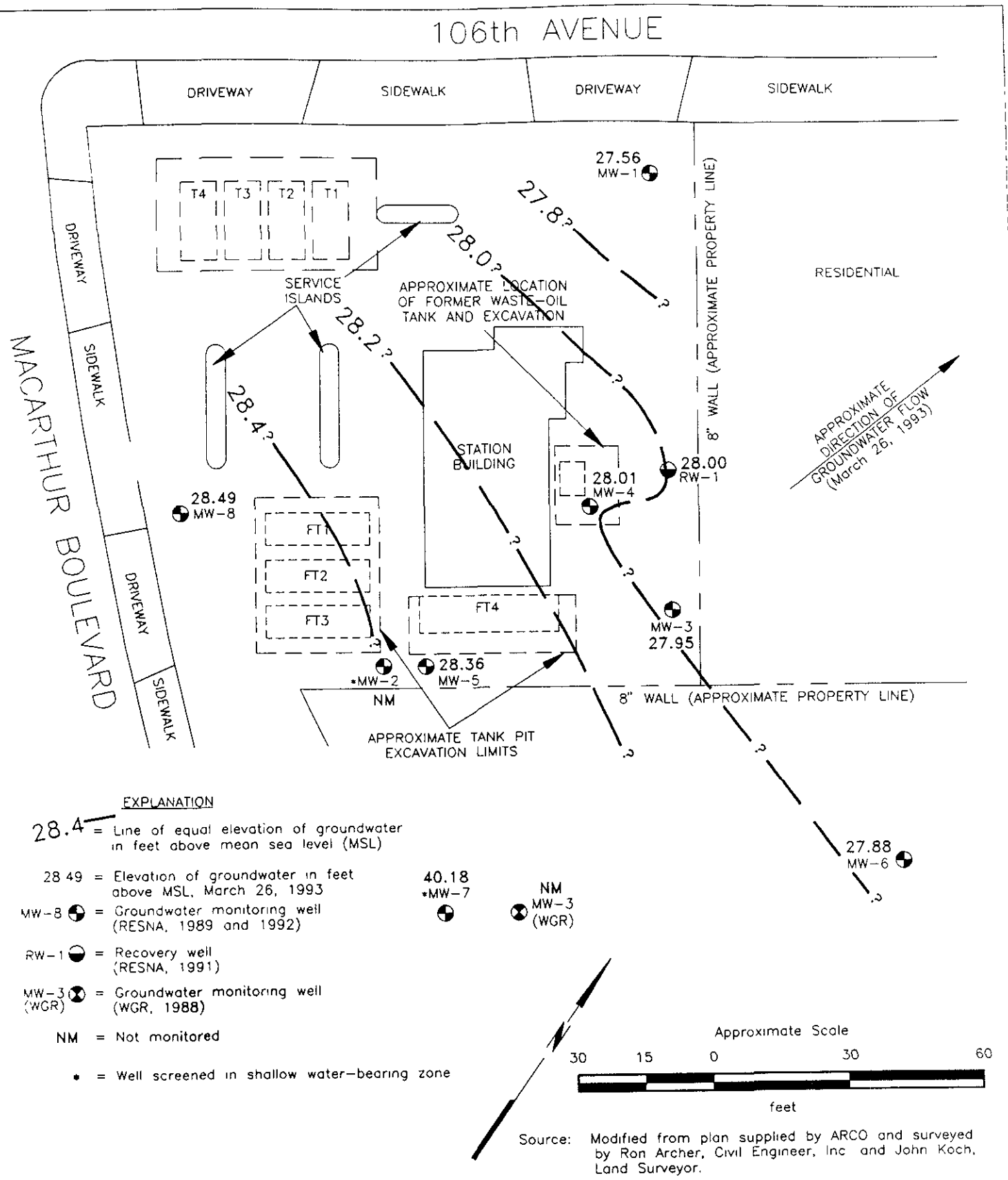
GROUNDWATER GRADIENT MAP
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE
4



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

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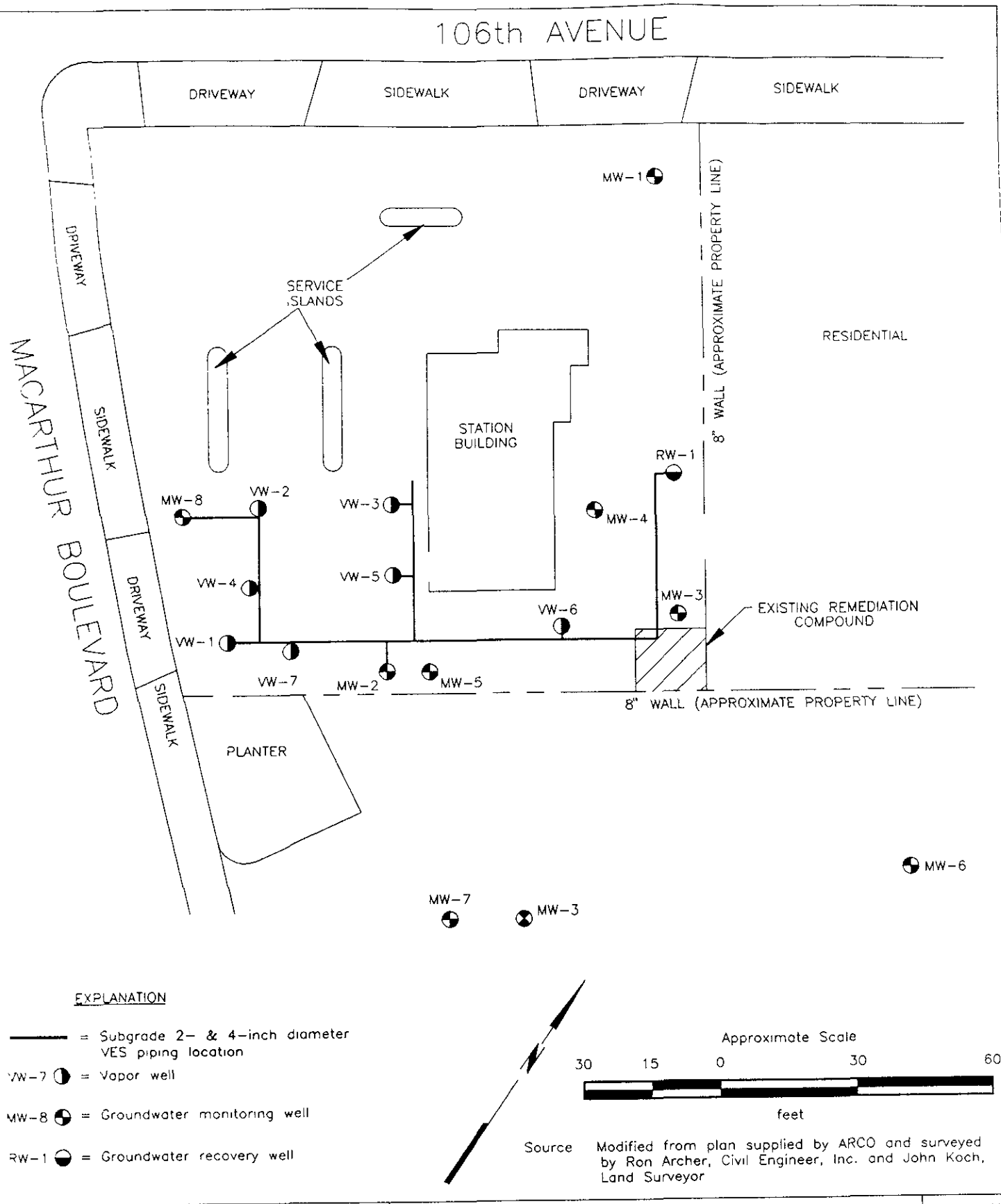
GROUNDWATER GRADIENT MAP
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE
5



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

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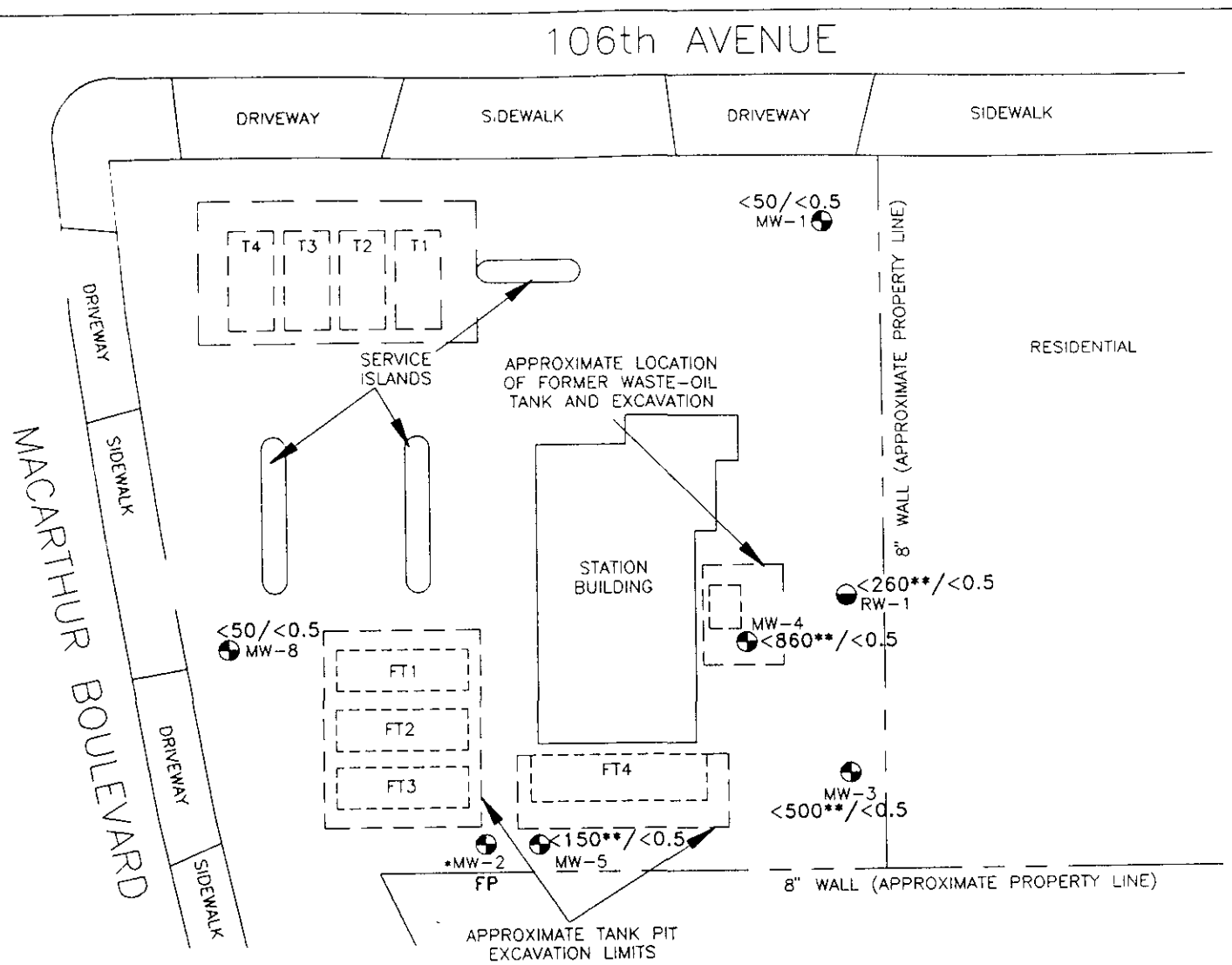
VES SCHEMATIC
ARCO Station 276
10600 MacArthur Boulevard
Oakland, California

PLATE
6



EXPLANATION

<50/<0.5 = Concentrations of total petroleum hydrocarbons as gasoline (TPHg) and benzene in groundwater in parts per billion, February 12, 1993

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

RW-1 = Recovery well (RESNA, 1991)

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

NS = Not sampled

** = Detection limit reportedly raised by laboratory because matrix contains PCE

FP = Floating product in well, not sampled

* = Well screened in shallow water-bearing zone

<1,900**/<2.5**
MW-6

FP
*MW-7

NS
MW-3
(WGR)

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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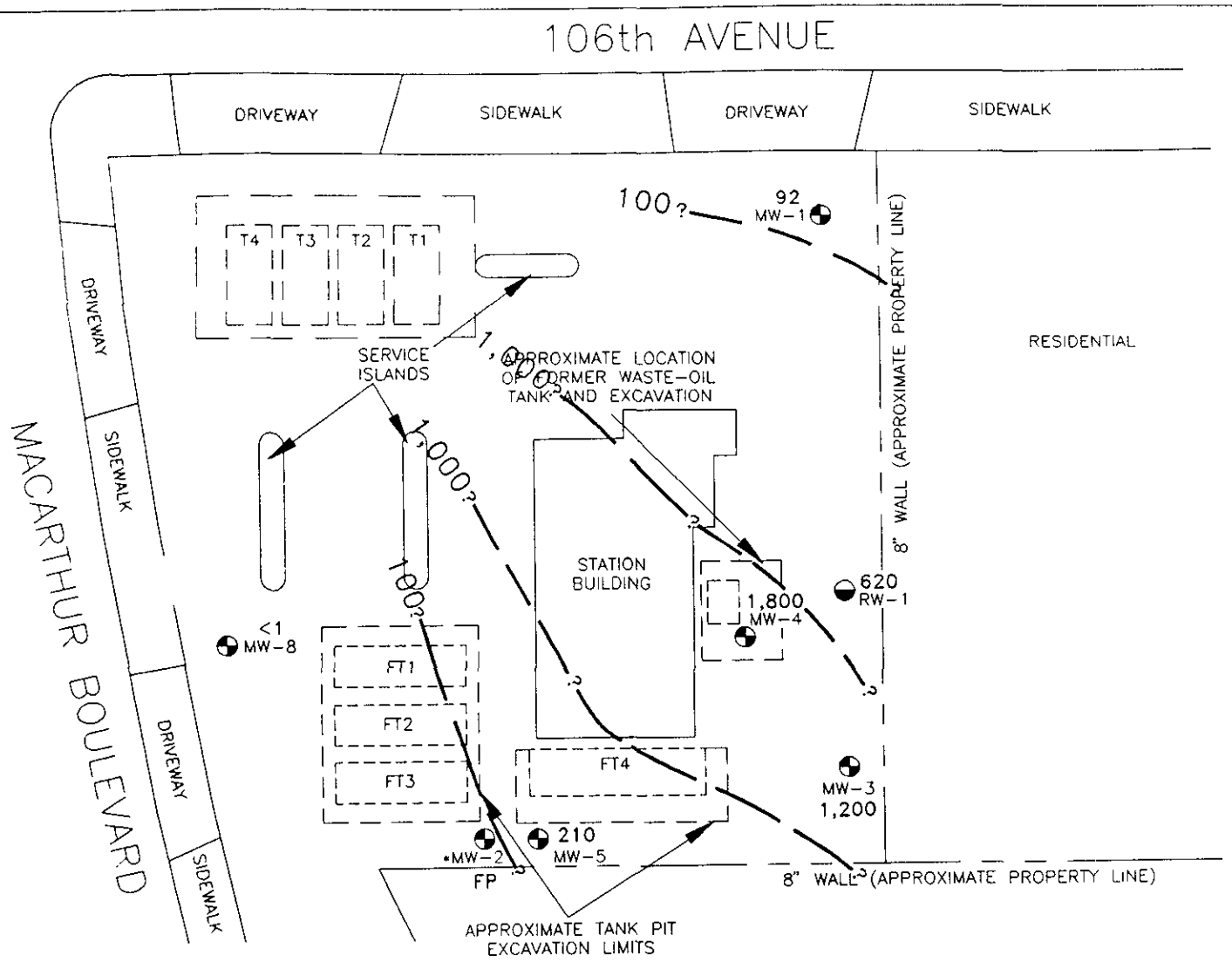
PROJECT 60026.13

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

PLATE 7



EXPLANATION

1,000 = Line of equal concentration of Tetrachloroethane (PCE) in groundwater in parts per billion (ppb)

4,200 = Concentration of PCE in ppb, February 12, 1993

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

RW-1 = Recovery well (RESNA, 1991)

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

NS = Not sampled

FP = Floating product in well, not sampled

< = Less than laboratory detection limit

* = Well screened in shallow water-bearing zone

FP *MW-7

NS MW-3 (WGR)

4,200 MW-6

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

PLATE 8

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 276
Oakland, California
(Page 1 of 6)

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
07/15/92		34.90	21.01	None
08/25/92	55.92	35.34	20.58	None
09/09/92		35.71	20.21	None
10/31/92		36.62	19.30	None
11/20/92		36.90	19.02	None
12/16/92		36.18	19.74	None
01/22/93		32.24	23.68	None
02/12/93		30.65	25.27	None
03/26/93		28.36	27.56	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	NM
07/31/90		18.90	36.45	None

See notes on page 6 of 6.

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 276
Oakland, California
(Page 2 of 6)

Date Well Measured	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-2 Cont.				
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
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
07/15/92		19.50	35.85	None
08/25/92	55.10	21.35*	33.73*	0.05
09/09/92		22.70*	32.40*	0.05
10/31/92		22.34	32.76	None
11/20/92		19.85*	32.25*	0.02[1]
12/16/92		NM	NM	NM
01/22/93		13.10	42.00	None
02/12/93		14.71	40.39	0.05[1]
03/26/93		Well	Inaccessible	
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	

See notes on page 6 of 6.

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 276
Oakland, California
(Page 3 of 6)

Date Well Measured	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-3 Cont.				
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
07/15/92		35.35	21.20	None
08/25/92	56.55	35.94	20.61	None
09/09/92		36.19	20.36	None
10/31/92		36.13	20.42	None
11/20/92		37.40	19.15	None
12/16/92		36.68	19.87	None
01/22/93		32.58	23.97	None
02/12/93		30.86	25.69	None
03/26/93		28.60	27.95	None
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

See notes on page 6 of 6.

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 276
Oakland, California
(Page 4 of 6)

Date Well Measured	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-4 Cont.				
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
07/15/92		NR	NR	NR
08/25/92	55.98	35.22	20.76	None
09/09/92		35.63	20.35	None
10/31/92		33.84	22.14	None
11/20/92		36.87	19.11	None
12/16/92		36.09	19.89	None
01/22/93		31.98	24.00	None
02/12/93		30.31	25.59	None
03/26/93		27.97	28.01	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
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

See notes on page 6 of 6.

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 276
Oakland, California
(Page 5 of 6)

Date Well Measured	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-5 Cont.				
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
07/15/92		34.32	21.11	None
08/25/92	55.43	35.76	19.67	None
09/09/92		34.97	20.46	None
10/31/92		35.97	19.46	None
11/20/92		36.26	19.17	None
12/16/92		35.45	19.98	None
01/22/93		31.05	24.38	None
02/12/93		29.42	26.01	None
03/26/93		27.07	28.36	None
MW-6				
06/30/92		35.50	25.71	None
07/15/92		39.89	21.32	None
08/25/92	61.21	34.90	26.31	None
09/09/92		NM	NM	NM
10/31/92		NM	NM	NM
11/20/92		NM	NM	NM
12/16/92		NM	NM	NM
01/22/93		36.52	24.69	None
02/12/93		35.65	25.56	None
03/28/93		33.33	27.88	None
MW-7	58.22			
06/30/92		23.70	34.52	None
07/15/92		23.10	35.12	None
08/25/92	58.22	34.23	23.99	None
09/09/92		26.30*	31.92*	1.31
10/31/92		35.44	22.78	None
11/20/92		23.47*	34.75*	0.02
12/16/92		19.07*	39.15*	0.04
01/22/93		16.56*	41.66*	0.02
02/12/93		18.22*	40.00*	0.04
03/26/93		18.04	40.18	None
MW-8				
08/25/92	53.65	NR	NR	NR
09/09/92		33.20	20.45	None

See notes on page 6 of 6.

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 276
Oakland, California
(Page 6 of 6)

Date Well Measured	Well Elevation	Depth to Water	Water Elevation	Floating Product
MW-8 Cont.				
10/31/92		37.12	16.53	None
11/24/92		34.45	19.20	None
12/16/92		NM	NM	NM
01/22/93		28.59	25.06	None
02/12/93		27.57	26.08	None
03/26/93		25.16	28.49	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
07/15/92		35.12	21.20	None
08/25/92	56.32	36.75	19.57	None
09/09/92		35.99	20.33	None
10/31/92		34.32	22.00	None
11/20/92		37.11	19.21	None
12/16/92		36.40	19.92	None
01/22/93		32.30	24.02	None
02/12/93		30.64	25.68	None
03/26/93		28.32	28.00	

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).
1 = Floating product was detected after purging well.
NM = Not monitored.

Quarterly Monitoring Performance Evaluation
ARCO Station 276, Oakland, California

April 29, 1993
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TABLE 2
APPROXIMATE CUMULATIVE PRODUCT REMOVED
ARCO Station 276
Oakland, California

Year		Floating Product Removed (gallons)
1991	TOTAL:	18.15
1992		0.39

Date	Floating Product Removed (gallons)
1993	
MW-2	
01-29-93	Sheen - Not Removed
02-26-93	Sheen - Not Removed
03-24-93	Sheen - Not Removed
MW-7	
01-29-93	Sheen - Not Removed
02-26-93	Sheen - Not Removed
03-24-93	Sheen - Not Removed
1993 Total:	0.00 Gallons
Product Removed to Date:	18.54 gallons

TABLE 3
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES–TPHg, TPHd, BTEX, and TOG
ARCO Station 276
Oakland, California
(Page 1 of 3)

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
09/09/92	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
11/20/92	<50	<0.5	<0.5	<0.5	<0.5	<0.5	NA
02/12/93	<50	<0.5	<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
09/09/92		Not sampled–floating product					
11/20/92		Not sampled–floating product					
		Not sampled–floating product					
02/12/93		Not sampled–floating product					
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

See notes on Page 3 of 3.

TABLE 3
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES--TPHg, TPHd, BTEX, and TOG
ARCO Station 276
Oakland, California
(Page 2 of 3)

Date/Well	TPHg (ppb)	TPHd (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	TOG (ppb)
MW-3 Cont.							
06/30/92	<530**	NA	<0.5	<0.5	<0.5	<0.5	NA
09/09/92	<290**	NA	<0.5	<0.5	<0.5	<0.5	NA
11/20/92	<270**	NA	<0.5	<0.5	<2.4*	<1.8*	NA
02/12/93	<500***	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
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
09/09/92	<470**	NA	<0.5	<0.5	<0.5	<0.5	3,600
11/20/92	<680**	NA	<0.5	<0.5	<6.3*	<3.2*	800
02/12/93	<860***	NA	<0.5	<0.5	<0.5	<0.5	25,000
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
09/09/92	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
11/24/92	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
02/12/93	<150***	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
09/09/92	NS	NS	NS	NS	NS	NS	NS
11/20/92	NS	NS	NS	NS	NS	NS	NS
02/12/93	<1,900***	NA	<2.5****	<2.5****	<2.5****	<2.5****	NA

See notes on page 3 of 3.

Quarterly Monitoring Performance Evaluation
ARCO Station 276, Oakland, California

April 29, 1993
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TABLE 3
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES–TPHg, TPHd, BTEX, and TOG
ARCO Station 276
Oakland, California
(Page 3 of 3)

Date/Well	TPHg (ppb)	TPHd (ppb)	B (ppb)	T (ppb)	E (ppb)	X (ppb)	TOG (ppb)
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
09/09/92		Not sampled–floating product					
11/20/92		Not sampled–floating product					
02/12/93		Not sampled–floating product					
MW-8							
09/09/92	<50	NA	3.4(4)	<0.5	<0.5	0.7	NA
11/24/92	<50	NA	<0.5	<0.5	<0.5	<0.5	NA
02/12/93	<50	NA	<0.5	<0.5	<0.5	<0.5	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
09/09/92	<520**	NA	<0.5	<0.5	<0.5	<0.5	NA
11/24/92	<650**	NA	<0.5	<0.5	<8.6*	<7.2*	NA
02/12/93	<260***	NA	<0.5	<0.5	<0.5	<0.5	NA
January 1990							
MCLs	—	—	1.0	—	680	1,750	—
DWAL	—	—	—	100	—	—	—

Results in parts per billion (ppb).
TPHg and
BTEX: Total petroleum hydrocarbons as gasoline and benzene, toluene, ethylbenzene, and xylenes by EPA method 5030/8020/California DHS LUFT Method.
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.
TOG: Total oil and grease by Standard Method 5520 C&F.
NA: Not analyzed.
NS: Not sampled.
<: Results reported as less than detection limit.
#: Based on new results, the chromatograph peaks previously interpreted to be TPHg and BTEX have been reinterpreted to be a single peak hydrocarbon possibly (PCE).
*: Detection limit reportedly raised by laboratory due to matrix interference.
**: Detections limit reportedly raised by laboratory because matrix contains a discrete non-fuel peak (PCE).
***: Detection limit reportedly raised by laboratory because sample contains a high concentration of a non-fuel component eluting in the gasoline range (PCE).
****: Detection limit reportedly raised by the laboratory because sample contained high concentration of a non analyte component requiring dilution of the sample (PCE).
( ): BTEX as measured by EPA Method 624
1: Analyte concentration is an estimate because this analyte was also found in the method blank.
MCL: Maximum contaminant level
DWAL: Drinking water action level

TABLE 4
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES–VOCs and Metals
ARCO Station 276
Oakland, California
(Page 1 of 3)

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
09/09/92	Tetrachloroethene	6	NA	NA	NA	NA	NA
11/20/92	Tetrachloroethene	2	NA	NA	NA	NA	NA
02/12/93	Tetrachloroethene	92	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
09/09/92	----------	Not sampled–floating product					
11/20/92	----------	Not sampled–floating product					
02/12/93	----------	Not sampled–floating product					
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
09/09/92	Tetrachloroethene	800	NA	NA	NA	NA	NA
11/20/92	Tetrachloroethene	690	NA	NA	NA	NA	NA
02/12/93	Tetrachloroethene	1,200	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

See notes on Page 3 of 3.

TABLE 4
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES--VOCs and Metals
ARCO Station 276
Oakland, California
(Page 2 of 3)

Date/Well	Compound	VOCs (ppb)	Cd (ppm)	Cr (ppm)	Pb (ppm)	Zn (ppm)	Ni (ppm)
MW-4 Cont.							
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
09/09/92	Tetrachloroethene	1,300	NA	NA	NA	NA	NA
11/20/92	Tetrachloroethene	1,700	NA	NA	NA	NA	NA
02/12/93	Tetrachloroethene	1,800	NA	NA	NA	NA	NA
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
09/09/92	Tetrachloroethene	120	NA	NA	NA	NA	NA
11/24/92	Tetrachloroethene	93	NA	NA	NA	NA	NA
02/12/93	Tetrachloroethene	210	NA	NA	NA	NA	NA
MW-6							
06/30/92**	Tetrachloroethene	2,400	NA	NA	NA	NA	NA
09/09/92	————		Inaccessible well--paved over				
11/20/92	————		Inaccessible well--paved over				
02/12/93	Tetrachloroethene	4,200	NA	NA	NA	NA	NA
MW-7							
06/30/92**	All Compounds	<1000	NA	NA	NA	NA	NA
09/09/92	————		Not sampled--floating product				
11/20/92	————		Not sampled--floating product				
02/12/93	————		Not sampled--floating product				
MW-8							
09/09/92	Tetrachloroethene	37	NA	NA	NA	NA	NA
11/24/92	Tetrachloroethene	2					
02/12/93	Tetrachloroethene	<1	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					

See notes on Page 3 of 3.

TABLE 4
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES--VOCs and Metals
ARCO Station 276
Oakland, California
(Page 3 of 3)

Date/Well	Compound	VOCs (ppb)	Cd (ppm)	Cr (ppm)	Pb (ppm)	Zn (ppm)	Ni (ppm)
RW-1 Cont.							
06/30/92**	Tetrachloroethene	1,100	NA	NA	NA	NA	NA
09/09/92	Tetrachloroethene	1,500	NA	NA	NA	NA	NA
11/24/92	Tetrachloroethene	1,500	NA	NA	NA	NA	NA
02/12/93	Tetrachloroethene	620	NA	NA	NA	NA	NA
MCLs		5	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 and 624. 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.

APPENDIX A

EMCON'S FIELD REPORTS-
SUMMARY OF GROUNDWATER MONITORING DATA
CERTIFIED ANALYTICAL REPORTS WITH CHAIN-OF-CUSTODY
AND WATER SAMPLE FIELD DATA SHEETS

EMCON Associates

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

Date April 1, 1993

Project 0G70-002.01

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
	March 1993 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 JB

Reviewed by:

REGISTERED PROFESSIONAL ENGINEER ROBERT CURTIS PORTER No: 4094 EXP. 6/30/96 INDUSTRIAL STATE OF CALIFORNIA

Robert Porter, Senior Project Engineer.

FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : 0G70-002.01 STATION ADDRESS : 10600 MacArthur Blvd. Oakland DATE : 3-26-93

ARCO STATION # : 276 FIELD TECHNICIAN : B. Stafford 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	VW-7	ok	Yes	ok	None	None	14.20	14.20	ND	ND	17.4	* * All Most wells need tool for opening 3" □ lids
2	VW-2	ok	Yes	ok	None	None	12.10	12.10	ND	ND	13.0	*
3	VW-3	OK	Yes	ok	None	None	12.16	12.15	ND	ND	16.0	*
4	VW-4	ok	Yes	ok	None	None	13.36	13.36	ND	ND	17.4	*
5	VW-5	OK	Yes	ok	None	None	12.45	12.45	ND	ND	16.0	*
6	VW-6	ok	Yes	ok	None	None	Dry	Dry	ND	ND	8.6	*
7	VW-1	ok	Yes	ok	None	None	13.60	13.60	ND	ND	16.2	*
8	MW-5	ok	Yes	ok	3491	Yes	27.07	27.07	ND	ND	47.0	—
9	MW-1	ok	Yes	ok	3259	Yes	28.36	28.36	ND	ND	38.8	
10	MW-6	ok	Yes	ok	None	Yes	33.33	33.32	ND	ND	54.2	H2O in C. Bot above L.W.C.
11	MW-8	ok	Yes	ok	None	Slip cap	25.16	25.16	ND	ND	47.8	* lid sticks use 2 screwdrivers to pry open
12	MW-3	ok	Yes	ok	3259	Yes	28.60	28.59	ND	ND	38.6	—
13	MW-4	ok	Yes	ok	3259	Yes	27.97	27.97	ND	ND	48.4	—
14	RW-1	ok	Yes	ok	None	Cracked slip cap	28.32	28.32	ND	ND	48.8	—

SURVEY POINTS ARE TOP OF WELL CASINGS

FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : 0G70-002.01 STATION ADDRESS : 10600 MacArthur Blvd. Oakland DATE : 3/26/93

ARCO STATION # : 276 FIELD TECHNICIAN : B. Stafford 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
15	**MW-2**	Well	is	parked	over	by Brown Nissan			ND	Data	available.	—
16	**MW-7**	OK	Yes	OK	3259	Yes	18.04	18.04	ND	ND	37.0	H2O in C Box above Lid

SURVEY POINTS ARE TOP OF WELL CASINGS

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

RECEIVED
MAR 1 1993

Date March 11, 1993
Project 0G70-002.01
60026.13

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
1	Summary of Groundwater Monitoring Data
1	Certified Analytical Reports with Chain-of-Custody
9	Water Sample Field Data Sheets

For your: X Information Sent by: X Mail

Comments:
Enclosed are the data from the first quarter 1993 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:

REGISTERED PROFESSIONAL ENGINEER ROBERT CURTIS PORTER No. 4094 Exp 6/30/96

Robert Porter, Senior Project Engineer.

FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : 0G70-002.01 STATION ADDRESS : 10600 MacArthur Blvd. Oakland DATE : 2-12-93

ARCO STATION # : 276 FIELD TECHNICIAN : IAN GRAHAM 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	VW-1	OK	YES	YES	NO	NO	I.W.	NR	NR	NR	NR	NO WATER LEVEL ACCESS PORT
2	VW-2	OK	YES	YES	NO	NO	I.W.	NR	NR	NR	NR	
3	VW-3	OK	YES	YES	NO	NO	I.W.	NR	NR	NR	NR	
4	VW-4	OK	YES	YES	NO	NO	I.W.	NR	NR	NR	NR	
5	VW-5	OK	YES	YES	NO	NO	I.W.	NR	NR	NR	NR	
6	VW-6	OK	YES	YES	NO	NO	I.W.	NR	NR	NR	NR	
7	VW-7	OK	YES	YES	NO	NO	I.W.	NR	NR	NR	NR	
8	MW-5	OK	NO	YES	3499	OK	29.42	29.42	ND	NR	47.1	NO SCREWS
9	MW-1	OK	NO	NO	3259	OK	30.65	30.65	ND	NR	36.8	NO SCREWS
10	MW-6	OK	YES	YES	NONE	OK	35.65	35.65	ND	NR	54.2	NO LOCK BOX FULL OF WATER
11	MW-8	OK	YES	YES	NONE	OK	27.57	27.57	ND	NR	47.8	CROWBAR NEEDED
12	MW-3	OK	YES	NO	3616	OK	30.86	30.86	ND	NR	38.6	—
13	MW-4	OK	YES	NO	3616	OK	30.31	30.31	ND	NR	48.9	—
14	RW-1	OK	YES	YES	NONE	SLIP CAP	30.64	30.64	ND	NR	48.9	WATER IN BOX SLIP CAP CRACKED

SURVEY POINTS ARE TOP OF WELL CASINGS

FIELD REPORT
DEPTH TO WATER / FLOATING PRODUCT SURVEY

PROJECT # : 0G70-002.01 STATION ADDRESS : 10600 MacArthur Blvd. Oakland DATE : 2-12-93

ARCO STATION # : 276 FIELD TECHNICIAN : IAN GRAHAM 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
15	**MW-2**	OK	YES	YES	NONE	SLIP CAP	14.71	14.71	*ND	NR	25.5	*STRONG ODOR PRODUCT CAME IN PUMP-PURGE
16	**MW-7**	OK	YES	YES	DOLPHIN	OK	18.25	18.25	18.21	0.04	55.0	NEEDS CROWBAR ASPHALT AROUND LID

SURVEY POINTS ARE TOP OF WELL CASINGS

Summary of Groundwater Monitoring Data
First Quarter 1993
ARCO Service Station 276
10600 MacArthur Boulevard, Oakland, California
micrograms per liter (µg/l) or parts per billion (ppb)

Well ID and Sample Depth	Sampling Date	Depth To Water (feet)	Floating Product Thickness (feet)	TPH[1] as Gasoline (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Total Xylenes (ppb)	TOG[2] Grease 5520C/F (ppb)
MW-1(37)	02/12/93	30.65	ND.[3]	<50.	<0.5	<0.5	<0.5	<0 5	NR.[4]
MW-2	02/12/93	14.71	0.05	FP.[5]	FP.	FP.	FP.	FP.	NR.
MW-3(37)	02/12/93	30.86	ND.	<500.	<0.5	<0.5	<0.5	<0.5	NR
MW-4(47)	02/12/93	30.31	ND.	<860.	<0.5	<0.5	<0.5	<0.5	25,000 *
MW-5(46)	02/12/93	29.42	ND.	<150.	<0.5	<0.5	<0.5	<0.5	NR.
MW-6(53)	02/12/93	35.65	ND.	<1,900.	<2.5	<2.5	<2.5	<2.5	NR.
MW-7	02/12/93	18.25	0.04	FP.	FP.	FP.	FP.	FP.	NR
MW-8(46)	02/12/93	27.57	ND.	<50.	<0.5	<0.5	<0.5	<0.5	NR.
RW-1(47)	02/12/93	30.64	ND.	<260.	<0.5	<0.5	<0.5	<0.5	NR.
FB-1[6]	02/12/93	NA.[7]	NA.	<50	<0.5	<0.5	<0.5	<0.5	NR.

1. TPH. = Total petroleum hydrocarbons
2. TOG. = Total Oil and Grease
3. ND. = Not detected
4. NR. = Not reported; sample was not scheduled for analysis of the selected parameter
5. FP. = Floating product detected in well, no samples were taken
6. FB. = Field blank
7. NA. = Not applicable

* = Was reported as parts per million, it has been converted to parts per billion on this summary sheet

Summary of Analytical Results
Volatile Organic Compounds by EPA[1] Methods 624
First Quarter 1993
ARCO Service Station 276
10600 MacArthur Boulevard, Oakland, California
micrograms per liter (µg/l) or parts per billion (ppb)

Well ID and Sample Depth	Sampling Date	PCE[2] (ppb)
MW-1(37)	02/12/93	92.
MW-2	02/12/93	FP.[3]
MW-3(387)	02/12/93	1,200.
MW-4(47)	02/12/93	1,800.
MW-5(46)	02/12/93	210.
MW-6(53)	02/12/93	4,200.
MW-7	02/12/93	FP.
MW-8(46)	02/12/93	<1.
RW-1(47)	02/12/93	620.
FB-1[4]	02/12/93	<1.

1. EPA = United States Environmental Protection Agency
2. PCE = Tetrachloroethene
3. FP. = Floating product detected in well, no samples were taken
4. FB = Field blank

Columbia Analytical Services, Inc.

March 3, 1993

Service Request No. SJ93-0204

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

Re: **EMCON Project No. 0G70-002.01**
ARCO Facility No. 276

Dear Mr. Butera:

Attached are the results of the water samples submitted to our lab on February 12, 1993. For your reference, these analyses have been assigned our service request number SJ93-0204.

All analyses were performed consistent with our laboratory's quality assurance program. All results are intended to be considered in their entirety, and CAS is not responsible for use of less than the complete report. Results apply only to the samples analyzed.

Please call if you have any questions.

Respectfully submitted:

COLUMBIA ANALYTICAL SERVICES, INC.

Keoni A. Murphy
Laboratory Manager

Annelise J. Bazar
Regional QA Coordinator

KAM/kt

1921 Ringwood Avenue • San Jose, California 95131 • Telephone 408/437-2400 • Fax 408/437-9356

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-002.01
ARCO Facility No. 276

Date Received: 02/12/93
Service Request No.: SJ93-0204
Sample Matrix: Water

Inorganic Parameters[1]
mg/L (ppm)

Sample Name:		MW-4 (47)	Method Blank
Date Sampled:		02/12/93	
Analyte	**Method**	**MRL**	
Total Oil and Grease	SM 5520C	0.5	25. ND
Hydrocarbons, IR	SM 5520F	0.5	25. ND

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
SM *Standard Methods for the Examination of Water and Wastewater*, 17th Ed., 1989
[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: Kenneth Murphy Date: March 3, 1993

1924 Pinewood Avenue • San Jose, California 95131 • Telephone 408/437-2400 • Fax 408/437-9356

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Associates	**Date Received:**	02/12/93
Project:	EMCON Project No. 0G70-002.01	**Service Request No.:**	SJ93-0204
	ARCO Facility No. 276	**Sample Matrix:**	Water

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

Sample Name:		MW-1 (37)	MW-3 (37)	MW-4 (47)
Date Analyzed:		02/25/93	02/25/93	02/25/93
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	<500. *	<860. *

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
* Raised MRL due to matrix interference. The sample contains a high concentration of a non-fuel component eluting in the gasoline range.

Approved by: _____ Date: March 3, 1993

1921 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:**	02/12/93
Project:	EMCON Project No. 0G70-002.01	**Service Request No.:**	SJ93-0204
	ARCO Facility No. 276	***Sample Matrix:***	Water

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

Sample Name:		MW-5 (46)	MW-6 (53)	MW-8 (46)
Date Analyzed:		02/25/93	02/26/93	02/25/93 *
Analyte	**MRL**			
Benzene	0.5	ND	<2.5 ***	ND
Toluene	0.5	ND	<2.5 ***	ND
Ethylbenzene	0.5	ND	<2.5 ***	ND
Total Xylenes	0.5	ND	<2.5 ***	ND
TPH as Gasoline	50	<150. **	<1,900. **	ND

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
* This sample was part of the analytical batch started on February 25, 1993. However, it was analyzed after midnight so the actual date analyzed is February 26, 1993.
** Raised MRL due to matrix interference. The sample contains a high concentration of a non fuel component eluting in the gasoline range.
*** Raised MRL due to matrix interference. The sample contains a high concentration of a non analyte component requiring dilution of sample.

Approved by: Keith A Murphy Date: March 3, 1993

1921 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:**	02/12/93
Project:	EMCON Project No. 0G70-002.01	**Service Request No.:**	SJ93-0204
	ARCO Facility No. 276	**Sample Matrix:**	Water

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

Sample Name:		RW-1 (47)	FB-1	Method Blank
Date Analyzed:		02/25/93 *	02/25/93	02/25/93
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	<260. **	ND	ND

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
* This sample was part of the analytical batch started on February 25, 1993. However, it was analyzed after midnight so the actual date analyzed is February 26, 1993.
** Raised MRL due to matrix interference. The sample contains a high concentration of a non fuel component eluting in the gasoline range.

Approved by: Kevin Murphy Date: March 3, 1993

1921 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:**	02/12/93
Project:	EMCON Project No. 0G70-002.01	**Service Request No.:**	SJ93-0204
	ARCO Facility No. 276	**Sample Matrix:**	Water

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

Sample Name:	**Method Blank**
Date Analyzed:	**02/26/93**

Analyte	MRL	
Benzene	0.5	ND
Toluene	0.5	ND
Ethylbenzene	0.5	ND
Total Xylenes	0.5	ND
TPH as Gasoline	50	ND

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

Approved by: Kevin Murphy Date: March 3, 1993

1921 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:**	02/12/93
Project:	EMCON Project No. 0G70-002.01 ARCO Facility No. 276	**Service Request No.:** **Sample Matrix:**	SJ93-0204 Water

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

Sample Name:		MW-1 (37)	MW-3 (37) *	MW-4 (47) *
Date Analyzed:		02/23/93	02/24/93	02/23/93
Analyte	**MRL**			
Chloromethane	1	ND	<20.	<20.
Vinyl Chloride	1	ND	<20.	<20.
Bromomethane	1	ND	<20.	<20.
Chloroethane	1	ND	<20.	<20.
Trichlorofluoromethane (Freon 11)	1	ND	<20.	<20.
Trichlorotrifluoroethane (Freon 113)	10	ND	<200.	<200.
1,1-Dichloroethene	1	ND	<20.	<20.
Acetone	20	ND	<400.	<400.
Carbon Disulfide	1	ND	<20.	<20.
Methylene Chloride	10	ND	<200.	<200.
trans-1,2-Dichloroethene	1	ND	<20.	<20.
cis-1,2-Dichloroethene	1	ND	<20.	<20.
2-Butanone (MEK)	10	ND	<200.	<200.
1,1-Dichloroethane	1	ND	<20.	<20.
Chloroform	1	ND	<20.	<20.
1,1,1-Trichloroethane (TCA)	1	ND	<20.	<20.
Carbon Tetrachloride	1	ND	<20.	<20.
Benzene	1	ND	<20.	<20.
1,2-Dichloroethane	1	ND	<20.	<20.
Vinyl Acetate	10	ND	<200.	<200.
Trichloroethene (TCE)	1	ND	<20.	<20.
1,2-Dichloropropane	1	ND	<20.	<20.
Bromodichloromethane	1	ND	<20.	<20.
2-Chloroethyl Vinyl Ether	10	ND	<200.	<200.
trans-1,3-Dichloropropene	1	ND	<20.	<20.
2-Hexanone	10	ND	<200.	<200.
4-Methyl-2-pentanone (MIBK)	10	ND	<200.	<200.
Toluene	1	ND	<20.	<20.
cis-1,3-Dichloropropene	1	ND	<20.	<20.
1,1,2-Trichloroethane	1	ND	<20.	<20.
Tetrachloroethene (PCE)	1	92.	1,200.	1,800.
Dibromochloromethane	1	ND	<20.	<20.
Chlorobenzene	1	ND	<20.	<20.
Ethylbenzene	1	ND	<20.	<20.
Styrene	1	ND	<20.	<20.
Total Xylenes	1	ND	<20.	<20.
Bromoform	1	ND	<20.	<20.
1,1,2,2-Tetrachloroethane	1	ND	<20.	<20.
1,3-Dichlorobenzene	1	ND	<20.	<20.
1,4-Dichlorobenzene	1	ND	<20.	<20.
1,2-Dichlorobenzene	1	ND	<20.	<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: Kedrick Murphy Date: March 3, 1993

1921 Ringwood Avenue • San Jose, California 95131 • Telephone 408/437-2400 • Fax 408/437-9356

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-002.01
ARCO Facility No. 276

Date Received: 02/12/93
Service Request No.: SJ93-0204
Sample Matrix: Water

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

Sample Name:		MW-5 (46)	MW-6 (53) *	MW-8 (46)
Date Analyzed:		02/24/93	02/24/93	02/23/93
Analyte	**MRL**			
Chloromethane	1	ND	<50.	ND
Vinyl Chloride	1	ND	<50.	ND
Bromomethane	1	ND	<50.	ND
Chloroethane	1	ND	<50.	ND
Trichlorofluoromethane (Freon 11)	1	ND	<50.	ND
Trichlorotrifluoroethane (Freon 113)	10	ND	<500.	ND
1,1-Dichloroethene	1	ND	<50.	ND
Acetone	20	ND	<1,000.	ND
Carbon Disulfide	1	ND	<50.	ND
Methylene Chloride	10	ND	<500.	ND
trans-1,2-Dichloroethene	1	ND	<50.	ND
cis-1,2-Dichloroethene	1	ND	<50.	ND
2-Butanone (MEK)	10	ND	<500.	ND
1,1-Dichloroethane	1	ND	<50.	ND
Chloroform	1	ND	<50.	ND
1,1,1-Trichloroethane (TCA)	1	ND	<50.	ND
Carbon Tetrachloride	1	ND	<50.	ND
Benzene	1	ND	<50.	ND
1,2-Dichloroethane	1	ND	<50.	ND
Vinyl Acetate	10	ND	<500.	ND
Trichloroethene (TCE)	1	ND	<50.	ND
1,2-Dichloropropane	1	ND	<50.	ND
Bromodichloromethane	1	ND	<50.	ND
2-Chloroethyl Vinyl Ether	10	ND	<500.	ND
trans-1,3-Dichloropropene	1	ND	<50.	ND
2-Hexanone	10	ND	<500.	ND
4-Methyl-2-pentanone (MIBK)	10	ND	<500.	ND
Toluene	1	ND	<50.	ND
cis-1,3-Dichloropropene	1	ND	<50.	ND
1,1,2-Trichloroethane	1	ND	<50.	ND
Tetrachloroethene (PCE)	1	210.	4,200.	ND
Dibromochloromethane	1	ND	<50.	ND
Chlorobenzene	1	ND	<50.	ND
Ethylbenzene	1	ND	<50.	ND
Styrene	1	ND	<50.	ND
Total Xylenes	1	ND	<50.	ND
Bromoform	1	ND	<50.	ND
1,1,2,2-Tetrachloroethane	1	ND	<50.	ND
1,3-Dichlorobenzene	1	ND	<50.	ND
1,4-Dichlorobenzene	1	ND	<50.	ND
1,2-Dichlorobenzene	1	ND	<50.	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: Lee M. Murphy Date: March 3, 1993

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-002.01
ARCO Facility No. 276

Date Received: 02/12/93
Service Request No.: SJ93-0204
Sample Matrix: Water

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

Sample Name:		RW-1 (47) *	FB-1	Method Blank
Date Analyzed:		02/24/93	02/24/93	02/23/93
Analyte	**MRL**			
Chloromethane	1	<20.	ND	ND
Vinyl Chloride	1	<20.	ND	ND
Bromomethane	1	<20.	ND	ND
Chloroethane	1	<20.	ND	ND
Trichlorofluoromethane (Freon 11)	1	<20.	ND	ND
Trichlorotrifluoroethane (Freon 113)	10	<200.	ND	ND
1,1-Dichloroethene	1	<20.	ND	ND
Acetone	20	<400.	ND	ND
Carbon Disulfide	1	<20.	ND	ND
Methylene Chloride	10	<200.	ND	ND
trans-1,2-Dichloroethene	1	<20.	ND	ND
cis-1,2-Dichloroethene	1	<20.	ND	ND
2-Butanone (MEK)	10	<200.	ND	ND
1,1-Dichloroethane	1	<20.	ND	ND
Chloroform	1	<20.	ND	ND
1,1,1-Trichloroethane (TCA)	1	<20.	ND	ND
Carbon Tetrachloride	1	<20.	ND	ND
Benzene	1	<20.	ND	ND
1,2-Dichloroethane	1	<20.	ND	ND
Vinyl Acetate	10	<200.	ND	ND
Trichloroethene (TCE)	1	<20.	ND	ND
1,2-Dichloropropane	1	<20.	ND	ND
Bromodichloromethane	1	<20.	ND	ND
2-Chloroethyl Vinyl Ether	10	<200.	ND	ND
trans-1,3-Dichloropropene	1	<20.	ND	ND
2-Hexanone	10	<200.	ND	ND
4-Methyl-2-pentanone (MIBK)	10	<200.	ND	ND
Toluene	1	<20.	ND	ND
cis-1,3-Dichloropropene	1	<20.	ND	ND
1,1,2-Trichloroethane	1	<20.	ND	ND
Tetrachloroethene (PCE)	1	620.	ND	ND
Dibromochloromethane	1	<20.	ND	ND
Chlorobenzene	1	<20.	ND	ND
Ethylbenzene	1	<20.	ND	ND
Styrene	1	<20.	ND	ND
Total Xylenes	1	<20.	ND	ND
Bromoform	1	<20.	ND	ND
1,1,2,2-Tetrachloroethane	1	<20.	ND	ND
1,3-Dichlorobenzene	1	<20.	ND	ND
1,4-Dichlorobenzene	1	<20.	ND	ND
1,2-Dichlorobenzene	1	<20.	ND	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: Kenneth Murphy Date: March 3, 1993

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-002.01
ARCO Facility No. 276

Date Received: 02/12/93
Service Request No.: SJ93-0204
Sample Matrix: Water

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

Sample Name:	Method Blank
Date Analyzed:	02/24/93

Analyte	MRL	
Chloromethane	1	ND
Vinyl Chloride	1	ND
Bromomethane	1	ND
Chloroethane	1	ND
Trichlorofluoromethane (Freon 11)	1	ND
Trichlorotrifluoroethane (Freon 113)	10	ND
1,1-Dichloroethene	1	ND
Acetone	20	ND
Carbon Disulfide	1	ND
Methylene Chloride	10	ND
trans-1,2-Dichloroethene	1	ND
cis-1,2-Dichloroethene	1	ND
2-Butanone (MEK)	10	ND
1,1-Dichloroethane	1	ND
Chloroform	1	ND
1,1,1-Trichloroethane (TCA)	1	ND
Carbon Tetrachloride	1	ND
Benzene	1	ND
1,2-Dichloroethane	1	ND
Vinyl Acetate	10	ND
Trichloroethene (TCE)	1	ND
1,2-Dichloropropane	1	ND
Bromodichloromethane	1	ND
2-Chloroethyl Vinyl Ether	10	ND
trans-1,3-Dichloropropene	1	ND
2-Hexanone	10	ND
4-Methyl-2-pentanone (MIBK)	10	ND
Toluene	1	ND
cis-1,3-Dichloropropene	1	ND
1,1,2-Trichloroethane	1	ND
Tetrachloroethene (PCE)	1	ND
Dibromochloromethane	1	ND
Chlorobenzene	1	ND
Ethylbenzene	1	ND
Styrene	1	ND
Total Xylenes	1	ND
Bromoform	1	ND
1,1,2,2-Tetrachloroethane	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND

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

Approved by: Kedan A Murphy Date: March 3, 1993

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APPENDIX A

LABORATORY QC RESULTS

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-002.01
ARCO Facility No. 276

Date Received: 02/12/93
Service Request No.: SJ93-0204
Sample Matrix: Water

Continuing Calibration Summary
Inorganics
SM5520F
mg/L

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Hydrocarbons, IR	100.	110.	110.	90-110

SM *Standard Methods for the Examination of Water and Wastewater,* 17th Ed., 1989

Approved by: Keenan Murphy Date: March 3, 1993

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-002.01
ARCO Facility No. 276

Date Received: 02/12/93
Service Request No.: SJ93-0204
Sample Matrix: Water

Matrix Spike/Duplicate Matrix Spike Summary
Inorganic Parameters
SM5520F
mg/L (ppm)

Sample Name: MW-4 (47)
Date Analyzed: 03/03/93

Percent Recovery

Analyte	Spike Level	Sample Result	Spike Result MS	Spike Result DMS	% Recovery MS	% Recovery DMS	EPA Acceptance Criteria
Hydrocarbons, IR	4.0	25.	28.	29.	75.	100.	56-151

SM *Standard Methods for the Examination of Water and Wastewater*, 17th Ed., 1989

Approved by: Kevin Murphy Date: March 3, 1993

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-002.01
ARCO Facility No. 276

Date Received: 02/12/93
Service Request No.: SJ93-0204

Initial Calibration Verification
BTEX and TPH as Gasoline
EPA Methods 5030/8020/DHS LUFT Method
Nanograms

Date Analyzed: 02/25/93

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Benzene	250.	239.	96.	85-115
Toluene	250.	251.	101.	85-115
Ethylbenzene	250.	250.	100.	85-115
Total Xylenes	750.	747.	100.	85-115
TPH as Gasoline	2,500.	2,569.	103.	90-110

Date Analyzed: 02/26/93

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Benzene	250.	237.	95.	85-115
Toluene	250.	258.	103.	85-115
Ethylbenzene	250.	254.	102.	85-115
Total Xylenes	750.	772.	103.	85-115
TPH as Gasoline	2,500.	2,581.	103.	90-110

TPH Total Petroleum Hydrocarbons

Approved by: _____ Date: March 3, 1993

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-002.01
ARCO Facility No. 276

Date Received: 02/12/93
Service Request No.: SJ93-0204
Sample Matrix: Water

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

Sample Name	Date Analyzed	Percent Recovery α,α,α-Trifluorotoluene
MW-1 (37)	02/25/93	104.
MW-3 (37)	02/25/93	107.
MW-4 (47)	02/25/93	103.
MW-5 (46)	02/25/93	103.
MW-6 (53)	02/26/93	105.
MW-8 (46)	02/25/93	101.
RW-1 (47)	02/25/93	103.
FB-1	02/25/93	104.
MS	02/25/93	104.
DMS	02/25/93	103.
Method Blank	02/25/93	98.
Method Blank	02/26/93	100.
CAS Acceptance Criteria		70-130

TPH Total Petroleum Hydrocarbons

Approved by: _____ Date: March 3, 1993

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-002.01
ARCO Facility No. 276

Date Received: 02/12/93
Service Request No.: SJ93-0204
Sample Matrix: Water

Matrix Spike/Duplicate Matrix Spike Summary
BTE
EPA Methods 5030/8020
µg/L (ppb)

Date Analyzed: 02/25/93

Analyte	Spike Level	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	CAS Acceptance Criteria
Benzene	1,000.	1,780.	2,720.	2,760.	94.	98.	39-150
Toluene	1,000.	1,190.	2,240.	2,250.	105.	106.	46-148
Ethylbenzene	1,000.	526.	1,630.	1,660.	110.	113.	32-160

Approved by: Keith Murphy Date: March 3, 1993

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-002.01
ARCO Facility No. 276

Date Received: 02/12/93
Service Request No.: SJ93-0204

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

Date Analyzed: 02/23/93

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Chloromethane	50	54.7	109.	70-130
Vinyl Chloride	50	57.0	114.	70-130
Bromomethane	50	53.8	108.	70-130
Chloroethane	50	56.5	113.	70-130
Acetone	50	44.2	88.	70-130
1,1-Dichloroethene	50	57.9	116.	70-130
Carbon Disulfide	50	57.3	115.	70-130
Methylene Chloride	50	47.3	95.	70-130
trans-1,2-Dichloroethene	50	55.9	112.	70-130
cis-1,2-Dichloroethene	50	51.6	103.	70-130
1,1-Dichloroethane	50	51.8	104.	70-130
Vinyl Acetate	50	43.8	88.	70-130
2-Butanone	50	27.0	54. *	70-130
Chloroform	50	51.6	103.	70-130
1,1,1-Trichloroethane (TCA)	50	55.4	111.	70-130
Carbon Tetrachloride	50	54.5	109.	70-130
Benzene	50	50.6	101.	70-130
1,2-Dichloroethane	50	48.2	96.	70-130
Trichloroethene (TCE)	50	48.9	98.	70-130
1,2-Dichloropropane	50	47.9	96.	70-130
Bromodichloromethane	50	47.8	96.	70-130
2-Chloroethyl Vinyl Ether	50	46.9	94.	70-130
2-Hexanone	50	48.1	96.	70-130
trans-1,3-Dichloropropene	50	46.2	92.	70-130
Toluene	50	52.2	104.	70-130
cis-1,3-Dichloropropene	50	47.2	94.	70-130
1,1,2-Trichloroethane	50	49.1	98.	70-130
Tetrachloroethene (PCE)	50	47.2	94.	70-130
Dibromochloromethane	50	46.2	92.	70-130
Chlorobenzene	50	49.7	99.	70-130
Ethylbenzene	50	51.9	104.	70-130
o Xylene	50	52.7	105.	70-130
Styrene	50	51.9	104.	70-130
Bromoform	50	42.4	85.	70-130
1,1,2,2-Tetrachloroethane	50	48.6	97.	70-130

* Recovery of 2-Butanone is below CAS Percent Recovery Acceptance Criteria. No 2-Butanone was found in the samples and EPA required calibration checks met their acceptance criteria.

Approved by: Kathy A Murphy Date: March 3, 1993

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-002.01
ARCO Facility No. 276

Date Received: 02/12/93
Service Request No.: SJ93-0204

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

Date Analyzed: 02/24/93

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Chloromethane	50	53.2	106.	70-130
Vinyl Chloride	50	52.7	105.	70-130
Bromomethane	50	52.4	105.	70-130
Chloroethane	50	52.9	106.	70-130
Acetone	50	43.1	86.	70-130
1,1-Dichloroethene	50	57.2	114.	70-130
Carbon Disulfide	50	55.1	110.	70-130
Methylene Chloride	50	51.6	103.	70-130
trans-1,2-Dichloroethene	50	57.3	115.	70-130
cis-1,2-Dichloroethene	50	52.8	106.	70-130
1,1-Dichloroethane	50	54.0	108.	70-130
Vinyl Acetate	50	42.1	84.	70-130
2-Butanone	50	28.0	56. *	70-130
Chloroform	50	54.0	108.	70-130
1,1,1-Trichloroethane (TCA)	50	55.5	111.	70-130
Carbon Tetrachloride	50	54.1	108.	70-130
Benzene	50	46.3	93.	70-130
1,2-Dichloroethane	50	50.0	100.	70-130
Trichloroethene (TCE)	50	45.6	91.	70-130
1,2-Dichloropropane	50	45.0	90.	70-130
Bromodichloromethane	50	43.9	88.	70-130
2-Chloroethyl Vinyl Ether	50	39.5	79.	70-130
2-Hexanone	50	39.2	78.	70-130
trans-1,3-Dichloropropene	50	42.3	85.	70-130
Toluene	50	47.2	94.	70-130
cis-1,3-Dichloropropene	50	43.2	86.	70-130
1,1,2-Trichloroethane	50	46.3	93.	70-130
Tetrachloroethene (PCE)	50	43.7	87.	70-130
Dibromochloromethane	50	42.8	86.	70-130
Chlorobenzene	50	47.5	95.	70-130
Ethylbenzene	50	48.1	96.	70-130
o Xylene	50	48.3	97.	70-130
Styrene	50	47.4	95.	70-130
Bromoform	50	37.1	74.	70-130
1,1,2,2-Tetrachloroethane	50	43.2	86.	70-130

* Recovery of 2-Butanone is below CAS Percent Recovery Acceptance Criteria. No 2-Butanone was found in the samples and EPA required calibration checks met their acceptance criteria.

Approved by: Kevin A Murphy Date: March 3, 1993

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-002.01
ARCO Facility No. 276

Date Received: 02/12/93
Service Request No.: SJ93-0204
Sample Matrix: Water

Surrogate Recovery Summary
Volatile Organic Compounds
EPA Method 624

Sample Name	Date Analyzed	Percent Recovery		
		1,2-Dichloroethane - D_4	Toluene - D_8	4-Bromofluorobenzene
MW-1 (37)	02/23/93	98.	101.	98.
MW-3 (37)	02/24/93	96.	99.	97.
MW-4 (47)	02/23/93	97.	100.	98.
MW-5 (46)	02/23/93	96.	100.	98.
MW-6 (53)	02/24/93	97.	100.	98.
MW-8 (46)	02/23/93	97.	102.	98.
RW-1 (47)	02/24/93	96.	100.	97.
FB-1	02/24/93	96.	102.	98.
Method Blank	02/23/93	100.	101.	100.
Method Blank	02/24/93	98.	102.	100.
	EPA Acceptance Criteria	76-114	88-110	86-115

Approved by: Kevin M Murphy Date: March 3, 1993

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COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Associates
Project: EMCON Project No. 0G70-002.01
ARCO Facility No. 276

Date Received: 02/12/93
Service Request No.: SJ93-0204
Sample Matrix: Water

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

Date Analyzed: 02/23/93

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	58.6	61.1	117.	122.	61-145	4.
Trichloroethene	50.	ND	45.9	48.6	92.	97.	71-120	6.
Chlorobenzene	50.	ND	44.8	48.0	90.	96.	75-130	7.
Toluene	50.	ND	47.6	50.3	95.	101.	76-125	6.
Benzene	50.	ND	47.1	50.5	94.	101.	76-127	7.

ND None Detected at or above the method reporting limit

Approved by: Lee M. Murphy Date: March 3, 1993

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APPENDIX B

CHAIN OF CUSTODY

1921 Ringwood Avenue • San Jose, California 95131 • Telephone 408/437-2400 • Fax 408/437-9356

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) JIM BUTERA	Laboratory name CAS
ARCO engineer Kyle Christie	Telephone no (ARCO) 571-2434	Telephone no (Consultant) 453-0719 / Fax no (Consultant) 453-0452	Contract number 07077
Consultant name EMCON ASSOCIATES		Address (Consultant) 1938 Junction Avenue San Jose	

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 ☐ 5520-C&F IR	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	4		X		X	HCl	2-12-93	0800		X					X						
~~MW-2( )~~		~~4~~									~~X~~					~~X~~			NO SAMPLE TAKEN			
MW-3(37)	5-8	4						2-12-93	0950		X					X						
MW-4(47)	9-16	8						2-12-93	1029		X		X			X						
MW-5(46)	17-20	4						2-12-93	0720		X					X						
MW-6(33)	21-24	4						2-12-93	0850		X					X						
~~MW-7(54)~~		~~4~~									~~X~~					~~X~~			NO SAMPLE TAKEN			
MW-8(46)	25-28	4						2-12-93	1030		X					X						
AW-1(47)	29-32	4						2-12-93	1125		X					X						
FB-1	33-36	4						2-12-93	1118		X					X						

Method of shipment: Sampler will deliver

Special detection Limit/reporting: Lowest Possible

Special QA/QC: As Normal

Remarks: 4-40 ml HCl VOA's
4-Liter HCl Glass

0G70-002.01

Lab number: SJ93-0204

Turnaround time
- Priority Rush 1 Business Day [ ]
- Rush 2 Business Days [ ]
- Expedited 5 Business Days [ ]
- Standard 10 Business Days [X]

Condition of sample: OKAY		Temperature received: COOL
Relinquished by sampler: Leslie Rate	Date 2-12-93 Time 1305	Received by
Relinquished by	Date Time	Received by
Relinquished by	Date Time	Received by laboratory: [signature] CAS/SJ Date 2/12/93 Time 1310

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

WATER SAMPLE FIELD DATA SHEET

Rev. 2. 5/91

EMCON ASSOCIATES

PROJECT NO: 0670-002.01 SAMPLE ID: MW-1 (37)

PURGED BY: IAN GRAHAM CLIENT NAME: ARCO # 276

SAMPLED BY: IAN GRAHAM LOCATION: OAKLAND, CA.

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.): 1.33

DEPTH TO WATER (feet) 30.65 CALCULATED PURGE (gal.): 3.99

DEPTH OF WELL (feet): 38.8 ~~38.5~~ ACTUAL PURGE VOL. (gal.): 4.5

DATE PURGED: 2-12-93 Start (2400 Hr) ~~0740~~ 0740 End (2400 Hr) 0756

DATE SAMPLED: 2-12-93 Start (2400 Hr) 0800 End (2400 Hr) 0800

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
0745	1.5	6.50	3400	56.9	CLOUDY	MODERATE
0750	3.0	6.53	3130	62.9	BROWN	HEAVY
0756	4.5	6.52	3050	63.7	"	"

D. O. (ppm): NR ODOR: ND COLOR: NR (COBALT 0 - 100) TURBIDITY: NR (NTU 0 - 200)

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): NONE

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

WELL INTEGRITY: OK LOCK #: 3259

REMARKS: ___

Meter Calibration: Date: 2-12-93 Time: 0645 Meter Serial #: 9105 Temperature °F: ___

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

Location of previous calibration: MW-5

Signature: ___ Reviewed By: MC Page 1 of 7

Rev. 2, 5/91

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 0270-002 [illegible]

PURGED BY: L Roth

SAMPLED BY: L Roth

SAMPLE ID: MW 2 (2-?)

CLIENT NAME: ARCO 276

LOCATION: 10600 MacArthur Bl Oak CA

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

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

CASING ELEVATION (feet/MSL): NR

DEPTH TO WATER (feet): 14.73

DEPTH OF WELL (feet): 25.6 10.87

VOLUME IN CASING (gal): 7.10

CALCULATED PURGE (gal.): 21.30

ACTUAL PURGE VOL. (gal.): 10.0

DATE PURGED: 2-12-93 Start (2400 Hr) 1100 End (2400 Hr) 1118

DATE SAMPLED: ~~2-12-93~~ 2-12 Start (2400 Hr) ___ End (2400 Hr) ___

TIME (2400 Hr)	VOLUME (gal)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
		NO SAMPLE TAKEN				

D. O. (ppm): NR ODOR: Strong 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)
___ 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: See Below LOCK #: NO LOCK

REMARKS: well Box lid is very difficult to open Product detected in purge water .005' of Product detected. 10 gal purge total NO sample TAKEN. Product in well

Meter Calibration: Date: 2-12-93 Time: 0915 Meter Serial #: 9111 Temperature °F: ___

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

Location of previous calibration: MW-3

Signature: [signature] Reviewed By: MA Page 2 of 7

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: CG7C-002.01 SAMPLE ID: MW-3 (35')

PURGED BY: L. RATH CLIENT NAME: ARCO 276

SAMPLED BY: L. RATH 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): NR VOLUME IN CASING (gal.): 1.28

DEPTH TO WATER (feet): 30.95 CALCULATED PURGE (gal.): 3.84

DEPTH OF WELL (feet): 38.8 (35) ACTUAL PURGE VOL. (gal.): 4.5

DATE PURGED: 2-12-93 Start (2400 Hr) 0930 End (2400 Hr) 0947

DATE SAMPLED: 2-12-93 Start (2400 Hr) 0950 End (2400 Hr) ___

TIME (2400 Hr)	VOLUME (gal)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
0934	1.5	6.58	1325	61.7	Brown	Heavy
0938	3.0	6.70	1297	62.9	Brown	Heavy
0942	4.5	6.71	1297	63.2	Brown	Heavy

D. O. (ppm): NR ODOR: NONE COLOR (COBALT 0 - 100): NR TURBIDITY (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 #: 3259

REMARKS: ___

Meter Calibration: Date: 2-12-93 Time: 0915 Meter Serial #: 9111 Temperature °F: ___

(EC 1000 994 / 1000) (DI 15.6) (pH 7 7.04 / 7.00) (pH 10 10.05 / 10.00) (pH 4 4.00 / ___)

Location of previous calibration: ___

Signature: [signature] Reviewed By: MA Page 3 of 9

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: CG70-002.01 SAMPLE ID: MW-4 (47)

PURGED BY: L. Ritt CLIENT NAME: ARCO 276

SAMPLED BY: L. Ritt LOCATION: 10600 MacArthur Blvd Oakland

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

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

CASING ELEVATION (feet/MSL): NR VOLUME IN CASING (gal.): 2.96

DEPTH TO WATER (feet): 30.35 CALCULATED PURGE (gal.): 2.89

DEPTH OF WELL (feet): 118.5 / 118.5 ACTUAL PURGE VOL. (gal.): 9.0

DATE PURGED: 2-12-93 Start (2400 Hr) 1000 End (2400 Hr) 1020

DATE SAMPLED: 2-12-93 Start (2400 Hr) 1029 End (2400 Hr) ___

TIME (2400 Hr)	VOLUME (gal)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1005	3	6.66	1238	59.0	Brown	Heavy
1015	6	7.04	1231	59.8	Brown	Heavy
1020	9	7.00	1241	60.3	Brown	Heavy

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

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

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): TOG (5520 C&F) Extra Duplicate

PURGING EQUIPMENT

___ 2" Bladder Pump ___ Bailer (Teflon®)

___ Centrifugal Pump X Bailer (PVC)

___ Submersible Pump ___ Bailer (Stainless Steel)

___ Well Wizard™ ___ Dedicated

Other: ___

SAMPLING EQUIPMENT

___ 2" Bladder Pump X Bailer (Teflon®)

___ DDL Sampler ___ Bailer (Stainless Steel)

___ Dipper ___ Submersible Pump

___ Well Wizard™ ___ Dedicated

Other: ___

WELL INTEGRITY: Good LOCK #: 3259

REMARKS: ___

Meter Calibration: Date: 2-12-93 Time: ___ Meter Serial #: Gilian Temperature °F: ___

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

Location of previous calibration: MW-3

Signature: Linda Ritt Reviewed By: MA Page 4 of 4

WATER SAMPLE FIELD DATA SHEET

Rev. 2, 5/91

EMCON ASSOCIATES

PROJECT NO: 0670-002.01 SAMPLE ID: MW-5 (46)

PURGED BY: IAN GRAHAM CLIENT NAME: ARCO # 276

SAMPLED BY: IAN GRAHAM LOCATION: OAKLAND, CA.

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 VOLUME IN CASING (gal.): 11.55

DEPTH TO WATER (feet): 29.41 CALCULATED PURGE (gal.): 34.67

DEPTH OF WELL (feet): 47.1 / 17.69 ACTUAL PURGE VOL. (gal.): 36.0

DATE PURGED: 2-12-93 Start (2400 Hr) 0645 End (2400 Hr) 0716

DATE SAMPLED: 2-12-93 Start (2400 Hr) 0720 End (2400 Hr) 0720

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
0655	12.0	7.00	590	57.6	CLEAR	LIGHT
0710	24.0	6.55	496	63.6	"	TRACE
0716	36.0	6.56	496	64.3	"	"

D. O. (ppm): NR ODOR: ND COLOR (COBALT 0 - 100): NR TURBIDITY (NTU 0 - 200): NR

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): NONE

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: OK LOCK #: 3499

REMARKS: ___

Meter Calibration: Date: 2-12-93 Time: 0645 Meter Serial #: 9105 Temperature °F: 45.0

(EC 1000 1070 / 1000) (DI 36.00) (pH 7 6.96 / 7.00) (pH 10 10.06 / 10.00) (pH 4 3.92 / ___)

Location of previous calibration: ___

Signature: ___ Reviewed By: MCL Page 5 of 9

Rev. 2 5/91

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 0670-002.01 SAMPLE ID: MW-6 (53)

PURGED BY: IAN GRAHAM CLIENT NAME: ARCO # 276

SAMPLED BY: IAN GRAHAM LOCATION: OAKLAND, CA.

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.): 3.03

DEPTH TO WATER (feet): 35.64 CALCULATED PURGE (gal.): 9.09

DEPTH OF WELL (feet): 54.2 / 18.56 ACTUAL PURGE VOL (gal.): 10.0

DATE PURGED: 2-12-93 Start (2400 Hr) 0823 End (2400 Hr) 0848

DATE SAMPLED: 2-12-93 Start (2400 Hr) 0850 End (2400 Hr) 0852

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
0830	3.5	6.91	1920	60.9	BROWN	HEAVY
0840	7.0	6.95	1860	63.0	"	"
0848	10.0	6.97	1870	63.0	"	"

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

COLOR (COBALT 0 - 100): NR

TURBIDITY (NTU 0 - 200): NR

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): NONE

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

WELL INTEGRITY: OK LOCK #: NONE

REMARKS: ___

Meter Calibration: Date: 2-12-93 Time: 0645 Meter Serial #: 9105 Temperature °F: ___

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

Location of previous calibration: MW-5

Signature: [signature] Reviewed By: [illegible] Page 6 of 9

WATER SAMPLE FIELD DATA SHEET

Rev 2, 5/91

EMCON ASSOCIATES

PROJECT NO: CG70-002.01 SAMPLE ID: MW-7 (5")

PURGED BY: L RATH CLIENT NAME: ARCO 276

SAMPLED BY: L RATH LOCATION: 10660 MacArthur Oak CA

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.): ___

DEPTH TO WATER (feet): 18.31 CALCULATED PURGE (gal.): NR

DEPTH OF WELL (feet): ≈ 50.0 ACTUAL PURGE VOL. (gal.): ___

DATE PURGED: 2-12-93 Start (2400 Hr) 1200 End (2400 Hr) NR

DATE SAMPLED: NA Start (2400 Hr) NA End (2400 Hr) NA

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
			NR			

D. O. (ppm): NR ODOR: NONE COLOR (COBALT 0 - 100): NR TURBIDITY (NTU 0 - 200): NR

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

PURGING EQUIPMENT

___ 2" Bladder Pump ___ Bailer (Teflon®)
___ Centrifugal Pump ___ Bailer (PVC)
___ 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: Good LOCK #: 3256

REMARKS: 0.04' of Product in well
NO SAMPLE TAKEN

Meter Calibration: Date: 2-12-93 Time: 0915 Meter Serial #: 9111 Temperature °F: ___

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

Location of previous calibration: MW-3

Signature: Lorie Rath Reviewed By: ___ Page 7 of 9

WATER SAMPLE FIELD DATA SHEET

EMCON ASSOCIATES

PROJECT NO: 0670-002.01 | SAMPLE ID: MW-8 (46)
PURGED BY: IAN GRAHAM | CLIENT NAME: ARCO # 276
SAMPLED BY: IAN GRAHAM | LOCATION: OAKLAND, CA.

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): 27.56
DEPTH OF WELL (feet): 47.8 / 20.24
VOLUME IN CASING (gal.): 13.21
CALCULATED PURGE (gal.): 79.30
ACTUAL PURGE VOL. (gal.): 46.0

DATE PURGED: 2-12-93 Start (2400 Hr) 0925 End (2400 Hr) 1010
DATE SAMPLED: 2-12-93 Start (2400 Hr) 1030 End (2400 Hr) 1030

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
0935	13.5	6.75	490	62.5	GREY	HEAVY
0946	27.0	6.84	491	66.5	BROWN	"
1005	40.0	6.82	459	66.0	"	"
1010	WELL DRIED @ 1010 @ 46.0 GAL.					

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): NONE

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

WELL INTEGRITY: OK LOCK #: NONE

REMARKS: ___

Meter Calibration: Date: 2-12-93 Time: 0645 Meter Serial #: 9105 Temperature °F: ___
(EC 1000 ___ / ___) (DI ___) (pH 7 ___ / ___) (pH 10 ___ / ___) (pH 4 ___ / ___)
Location of previous calibration: MW-5

Signature: [signature] Reviewed By: [signature] Page 8 of 9

WATER SAMPLE FIELD DATA SHEET

Rev. 2: 3/91

EMCON ASSOCIATES

PROJECT NO: 0670-002.01 | SAMPLE ID: RW-1 (47)

PURGED BY: IAN GRAHAM | CLIENT NAME: ARCO # 276

SAMPLED BY: IAN GRAHAM | LOCATION: OAKLAND, CA.

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

DEPTH TO WATER (feet): 30.65

DEPTH OF WELL (feet): 48.9 / 18.25

VOLUME IN CASING (gal.): 26.82

CALCULATED PURGE (gal.): 80.48

ACTUAL PURGE VOL (gal.): 81.0

DATE PURGED: 2-12-93 | Start (2400 Hr) 1030 | End (2400 Hr) 1120

DATE SAMPLED: 2-12-93 | Start (2400 Hr) 1125 | End (2400 Hr) 1125

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
1095	27.0	7.00	829	62.0	CLEAR	LIGHT
1102	54.0	6.95	817	66.5	"	"
1120	81.0	6.95	815	66.8	"	TRACE

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): NONE

PURGING EQUIPMENT

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

SAMPLING EQUIPMENT

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

WELL INTEGRITY: OK | LOCK #: NONE

REMARKS: ___

Meter Calibration: Date: 2-12-93 Time: 1025 Meter Serial #: 9105 Temperature °F: 61.0

(EC 1000 951 / 1000) (DI 28.00) (pH 7 7.08 / 7.00) (pH 10 10.15 / 10.00) (pH 4 3.90 / ___)

Location of previous calibration: ___

Signature: [signature] | Reviewed By: MC | Page 9 of 9

emcon Associates
1938 Junction Avenue • San Jose California 95131-2102 • **(408) 453-0719** • Fax (408) 453-0452

MAR 1 1993

Date March 9, 1993
Project 0G70-002.01

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

We are enclosing:

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

For your: X Information Sent by: X Mail

Comments:
Enclosed is the revised summary from the fourth quarter 1992 monitoring event at ARCO service station 276, 10600 MacArthur Boulevard, Oakland, CA. Please call if you have any questions: (408) 453-2266.

Jim Butera

Summary of Analytical Results
Volatile Organic Compounds by EPA[1] Methods 624
Fourth Quarter 1992
ARCO Service Station 276
10600 MacArthur Boulevard, Oakland, California
micrograms per liter (µg/l) or parts per billion (ppb)

Well ID and Sample Depth	Sampling Date	Benzene (ppb)	PCE[2] (ppb)
MW-1(38)	11/20/92	<1.	2.
MW-2	11/20/92	FP.[3]	FP.
MW-3(38)	11/20/92	<10.	690.
MW-4(38)	11/20/92	<10.	1,700.
MW-5(47)	11/20/92	<1.	93.
MW-6	11/20/92	IW.[4]	IW.
MW-7	11/20/92	FP.	FP.
MW-8(47)	11/20/92	<1.	2.
RW-1(48)	11/20/92	<10.	1,500.
FB-1[5]	11/20/92	<1.	<1.

1. EPA = United States Environmental Protection Agency
2. PCE = Tetrachloroethene
3. FP. = Floating product detected in well, no samples were taken
4. IW. = Inaccessable well, no samples were taken
5. FB = Field blank