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TRANSMITTAL

TO: Ms. Susan Hogo
ACHCSA, Dept. of Env. Health
80 Swan Way, Room 200
Oakland, California 94621

DATE: June 9, 1994
PROJECT NUMBER: 69028.15
SUBJECT: ARCO Station 6113
785 East Stanley Boulevard, Livermore,
California

FROM: Mary E. Rysdale
TITLE: Geologic Technician

WE ARE SENDING YOU:

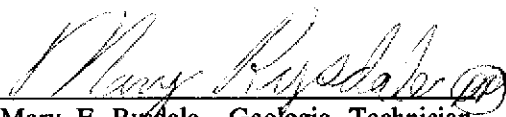
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Mary E. Rysdale, Geologic Technician

RESNA
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LETTER REPORT
QUARTERLY GROUNDWATER MONITORING
First Quarter 1994

ARCO Station 6113
785 East Stanley Boulevard
Livermore, California

69028.15

42501 Albrae Street, Suite 100
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June 7, 1994

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

Subject: Letter Report, Quarterly Groundwater Monitoring, First Quarter 1994
ARCO Station 6113
785 East Stanley Boulevard, Livermore, California

Mr. Whelan:

As requested by ARCO Products Company (ARCO), RESNA Industries Inc. (RESNA) presents this letter report summarizing the results of First Quarter 1994 Groundwater Monitoring performed by ARCO's contractor, Integrated Wastestream Management, Inc. (IWM), of Milpitas, California, at the subject site (Plate 1). RESNA's scope of work was to interpret field and laboratory analytical data, which included evaluating trends in hydrocarbon concentrations in the local groundwater, the groundwater gradient, and direction of groundwater flow beneath the site. Evaluation and warrant of IWM's groundwater monitoring field procedures and protocols is beyond RESNA's scope of work. Previous environmental work at the site is summarized in RESNA's reports cited in the References section.

ARCO installed a vapor extraction system (VES) at the site between November 1993 and January 1994. System startup is scheduled to begin during second quarter 1994.

GROUNDWATER MONITORING

Field Work

A representative of IWM was onsite on March 25, 1994, to measure depth-to-water (DTW) levels, to perform subjective analysis for the presence of product in groundwater in wells MW-1 through MW-12, and to perform quarterly groundwater sampling.

Laboratory Analyses

Water samples from wells MW-1 through MW-12 were analyzed by Columbia Analytical Services, Inc. in San Jose, California (Hazardous Waste Testing Laboratory Certification 1426) for benzene, toluene, ethylbenzene, and total xylenes (BTEX) and total petroleum hydrocarbons as gasoline (TPHg) using Environmental Protection Agency (EPA) Methods 5030/8020/California DHS LUFT Method. The groundwater sample from monitoring well MW-1 was also analyzed for total oil and grease (TOG) using EPA Method 418.1. The Certified Analytical Reports and Chain of Custody Records are included in Appendix A.

Results of Groundwater Monitoring

Since last quarter, groundwater elevations rose an average of approximately 3.06 feet in all the wells. Based on March 25, 1994, DTW data, groundwater flows toward the north with a gradient of approximately 0.02 ft/ft (Plate 3). Groundwater monitoring data from this and previous quarters are presented in Table 1. The results of IWM's field work on the site are presented in Appendix A.

Floating product was not observed in the samples from the wells. Results of analyses indicated TPHg and benzene were not detected in wells: MW-1, MW-2, MW-3, and MW-7 through MW-12. However TPHg was detected in wells MW-4, MW-5 and MW-6, and benzene was detected in wells MW-4 and MW-5. The highest TPHg and benzene concentrations in groundwater appear to be adjacent and immediately downgradient (west and north) of the existing gasoline underground storage tanks in the northeastern portion of the site. Cumulative analytical results of water samples are presented in Table 2.

TOG was not detected in well MW-1 above the method detection limit of 600 parts per billion. Results of these and previous water analyses are summarized in Table 3.

INTERIM SOIL AND GROUNDWATER REMEDIATION SYSTEM

ARCO installed a vapor extraction system (VES) at the site between November 1993 and January 1994. The VES will use vapor extraction wells VW-1 through VW-4 and groundwater monitoring well MW-5 to extract hydrocarbon-bearing vapors from soils onsite. Once the system is started up, the extracted vapors will be treated by a 250 standard cubic feet per minute (scfm) thermal/catalytic oxidizer, located in the remediation compound (Plate 2). Treated off-gas will be discharged through a 2-foot by 2-foot square exhaust stack to the atmosphere per Bay Area Air Quality Management District Permit Requirements. System startup is scheduled for second quarter of 1994.

PREVIOUS AND FUTURE WORK

First Quarter 1994

- Submitted Letter Report, Quarterly Groundwater Monitoring, Fourth Quarter 1993 to ARCO and regulatory agencies.
- Performed First Quarter 1994 Groundwater Monitoring.
- Design of phase converter for the Vapor Extraction System.

Second Quarter 1994

- Perform Second Quarter 1994 Groundwater Monitoring and Sampling.
- Submit Letter Report, Quarterly Groundwater Monitoring, First Quarter 1994.
- Install phase converter and initiate system startup of the Vapor Extraction System.

REPORTING REQUIREMENTS

RESNA recommends that copies of this report be forwarded to:

Ms. Susan Hugo
Alameda County Health Care Services Agency
Department of Environmental Health
80 Swan Way, Room 200
Oakland, California 94621

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

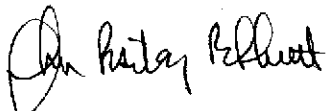
Ms. Danielle Stefani
Livermore Fire Department
4550 East Avenue
Livermore, California 94550

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

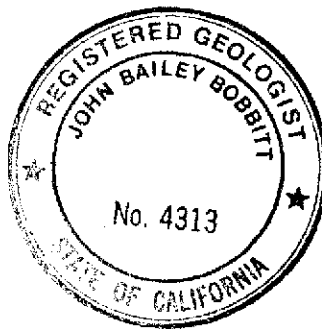
Sincerely,
RESNA Industries Inc.



Mary E. Rysdale
Geologic Technician



John B. Bobbitt, R.G. 4313
Senior Project Geologist



Attachments:

References

Plate 1: Site Vicinity Map
Plate 2: Generalized Site Plan
Plate 3: Groundwater Gradient Map
Plate 4: TPHg Concentrations in Groundwater
Plate 5: Benzene Concentrations in Groundwater

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

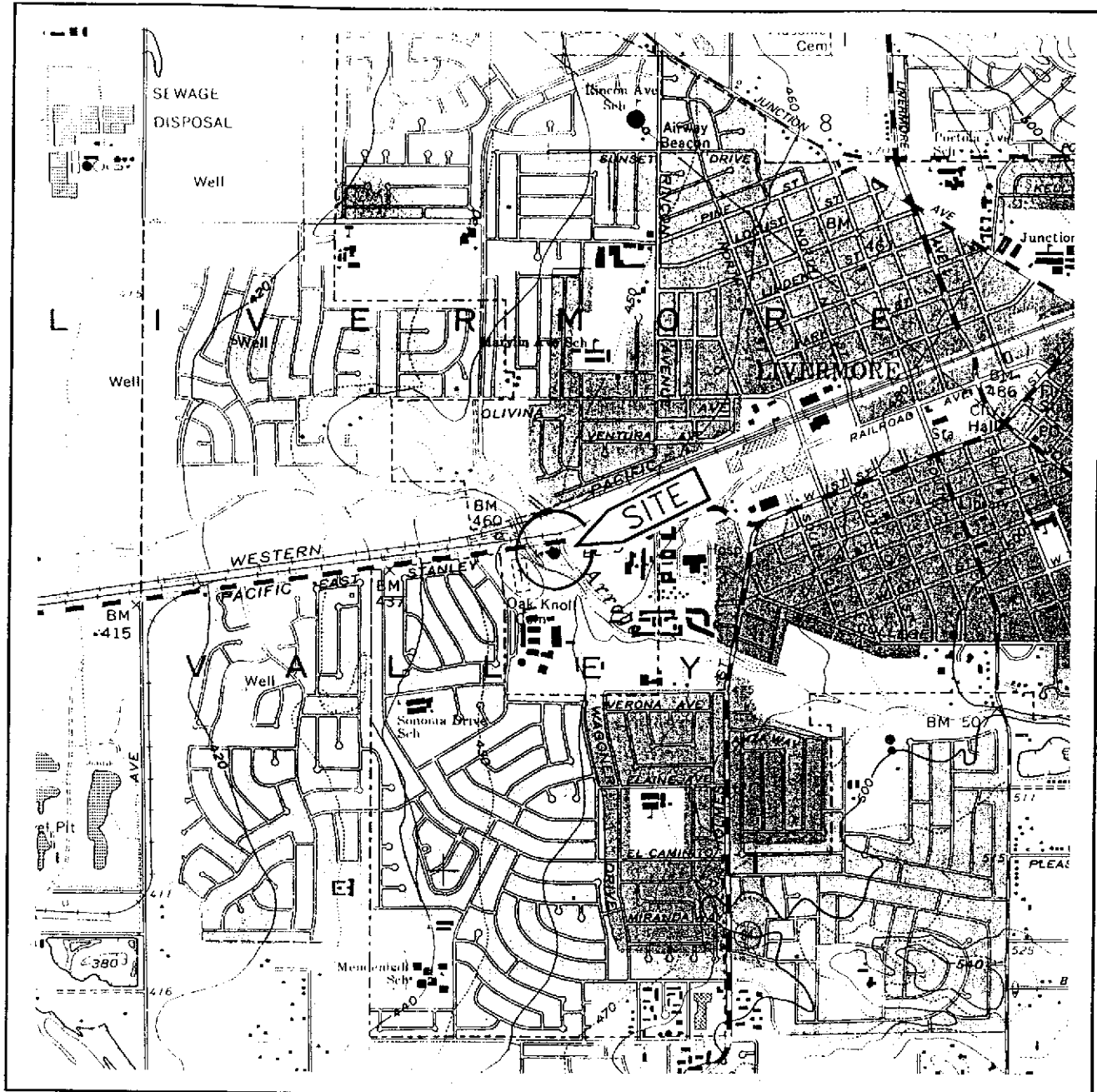
Appendix A: IWM's Summary of Groundwater Sample Analyses, Field Reports, and Certified Analytical Reports with Chain-of-Custody Record

REFERENCES

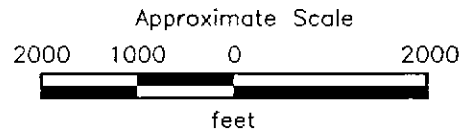
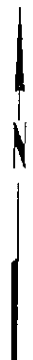
RESNA Industries Inc. December 21, 1992. Additional Subsurface Investigation and Vapor Extraction Test at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. 69028.07

RESNA Industries Inc. December 29, 1992. Addendum to Work Plan for Initial Offsite and Additional Onsite Subsurface Investigation and Aquifer Pumping Test at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. 69028.11

RESNA Industries Inc. March 3, 1994. Letter Report, Quarterly Groundwater Monitoring, Fourth Quarter 1993, at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. 69028.08



Source: U.S. Geological Survey
 7.5-Minute Quadrangle
 Livermore, California
 Photorevised 1980

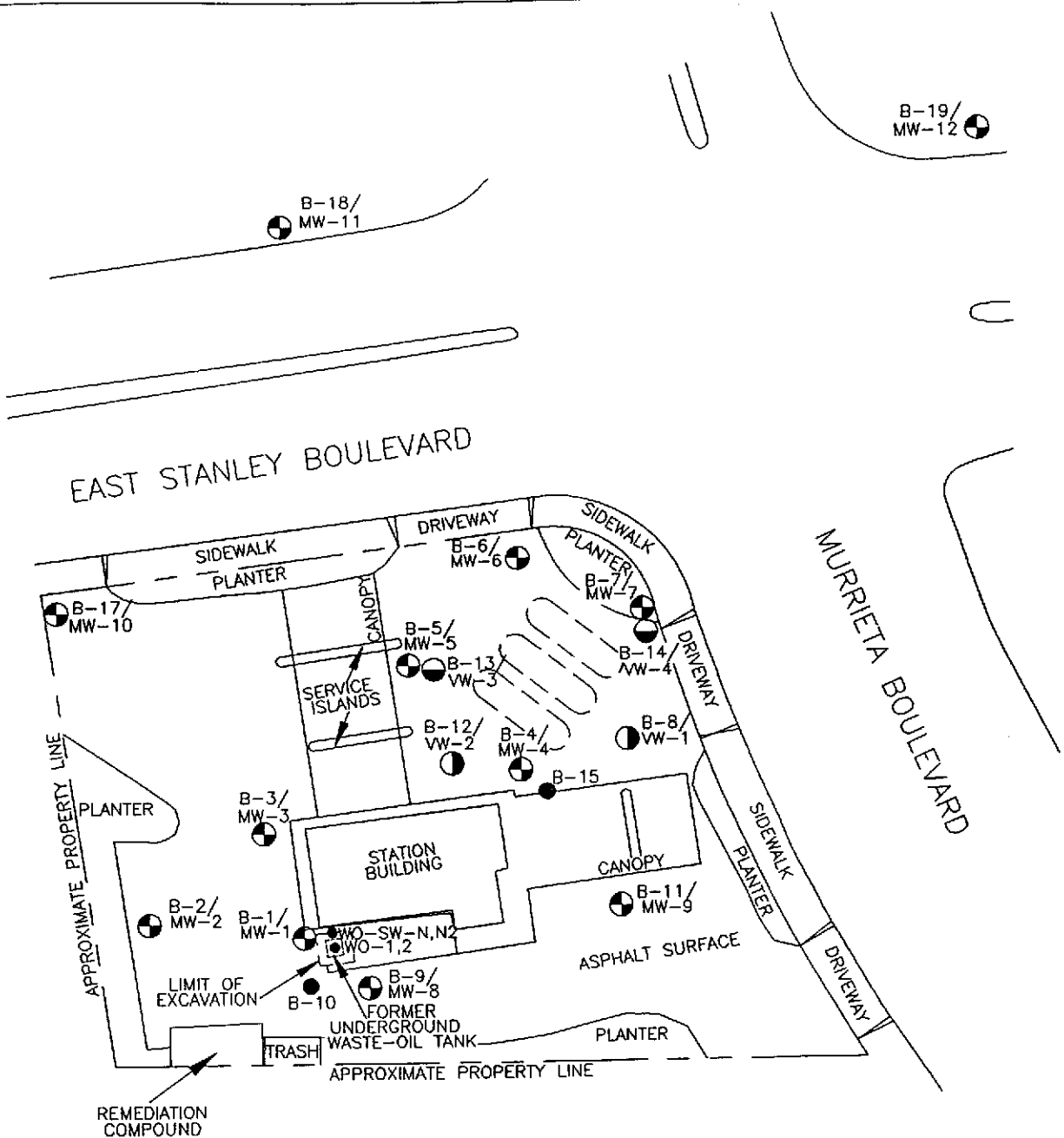


RESNA
 Working to Restore Nature

PROJECT 69028.15

SITE VICINITY MAP
 ARCO Station 6113
 785 East Stanley Boulevard
 Livermore, California

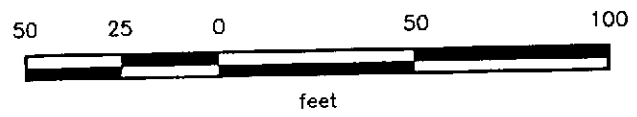
PLATE
 1



EXPLANATION

- B-9/
MW-12 ● = Boring/monitoring well
(RESNA, 09/89, 02/91, 06/92 and 03/93)
- B-12/
VW-2 ● = Boring/vapor extraction well
(RESNA, 06/92 and 08/92)
- B-15 ● = Boring
(RESNA, 06/92, 07/93)
- B-14/
VW-4 ● = Boring/vapor extraction well
(RESNA, 07/93)
- WO-SW-N,N2 ● = Soil sample collected by Pacific (1989)
- = Existing underground gasoline storage tanks

Approximate Scale



Source: Modified from plan supplied by Ron Archer, Civil Engineer Inc., Feb. 1991; and John Koch Land Surveyor, June 1992 and April 1993.

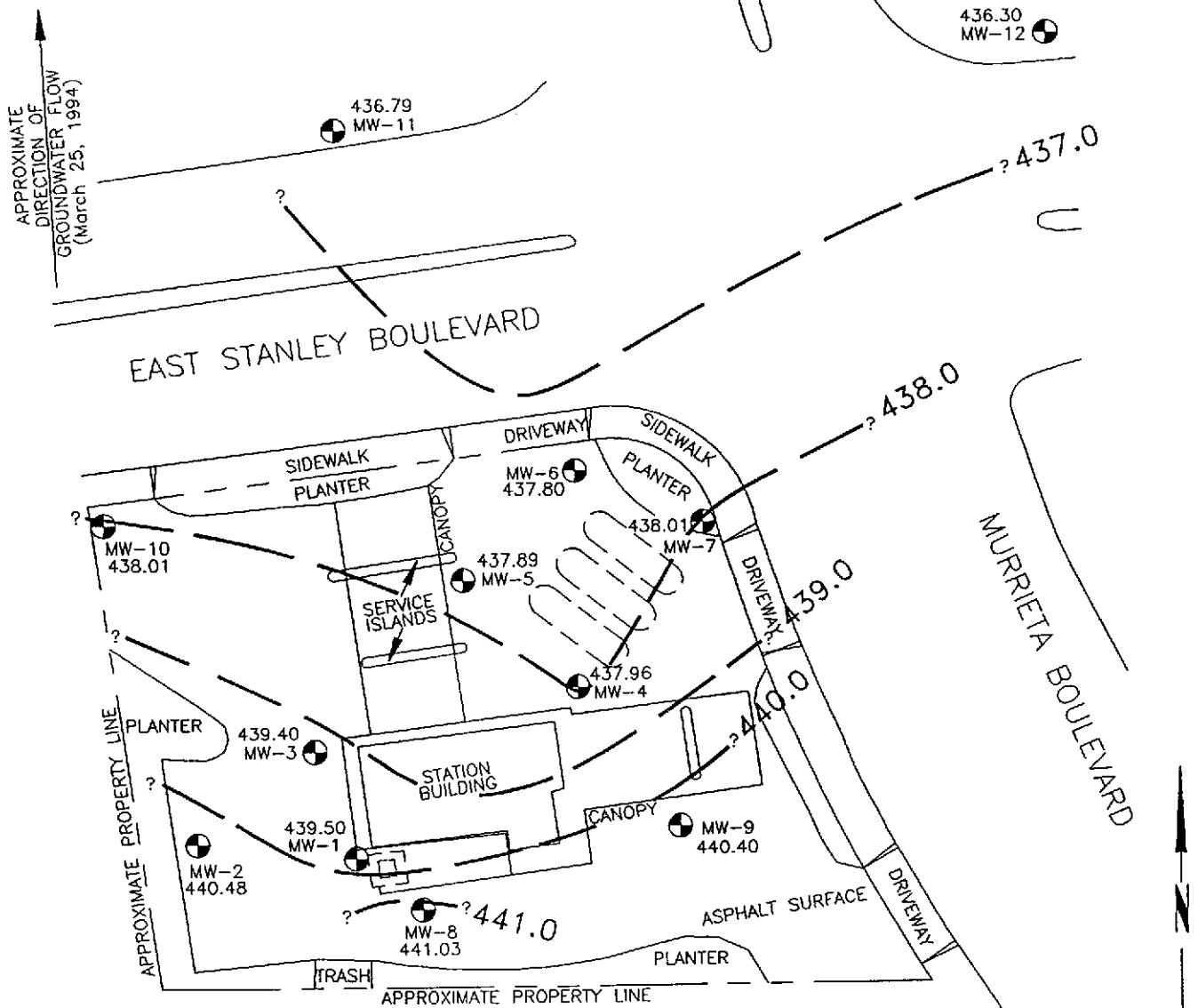


GENERALIZED SITE PLAN
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California

PLATE

2

PROJECT: 69028.15 69028156



EXPLANATION

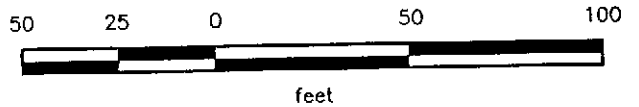
MW-12 = Monitoring well (RESNA, 09/89, 02/91, 06/92 and 03/93)

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

441.03 = Elevation of groundwater in feet above MSL, March 25, 1994

= Existing underground gasoline storage tanks

Approximate Scale



Source: Modified from plan supplied by Ron Archer, Civil Engineer Inc., Feb. 1991; and John Koch Land Surveyor, June 1992 and April 1993.

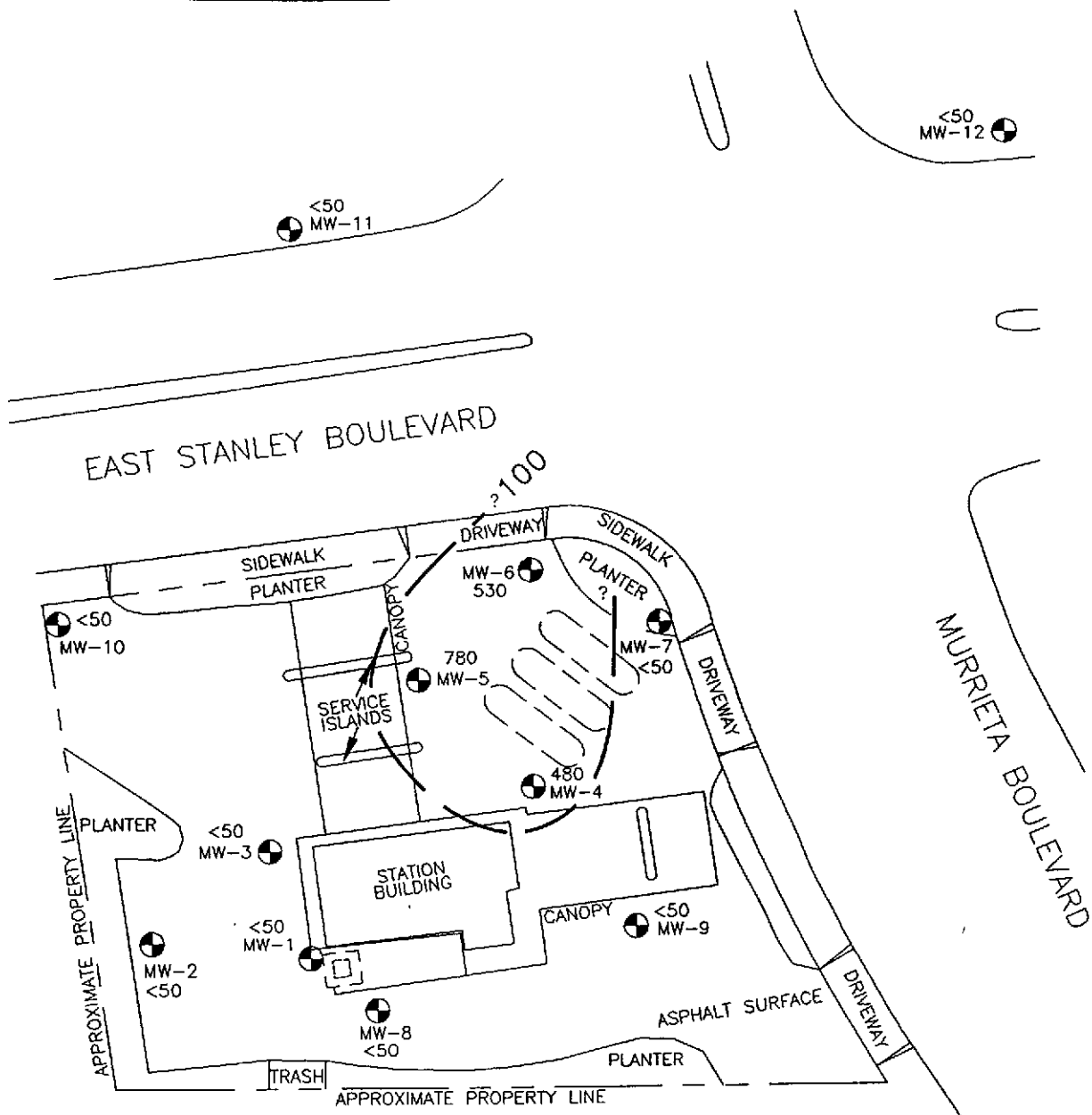


GROUNDWATER GRADIENT MAP
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California

PLATE

3

PROJECT: 69028.15



EXPLANATION

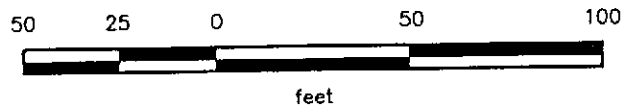
MW-12 = Monitoring well (RESNA, 09/89, 02/91, 06/92 and 03/93)

100 = Line of equal concentration of TPHg in groundwater in parts per billion (ppb)

780 = Concentration of TPHg in groundwater in ppb, March 25, 1994

= Existing underground gasoline storage tanks

Approximate Scale



Source: Modified from plan supplied by Ron Archer, Civil Engineer Inc., Feb. 1991; and John Koch Land Surveyor, June 1992 and April 1993.

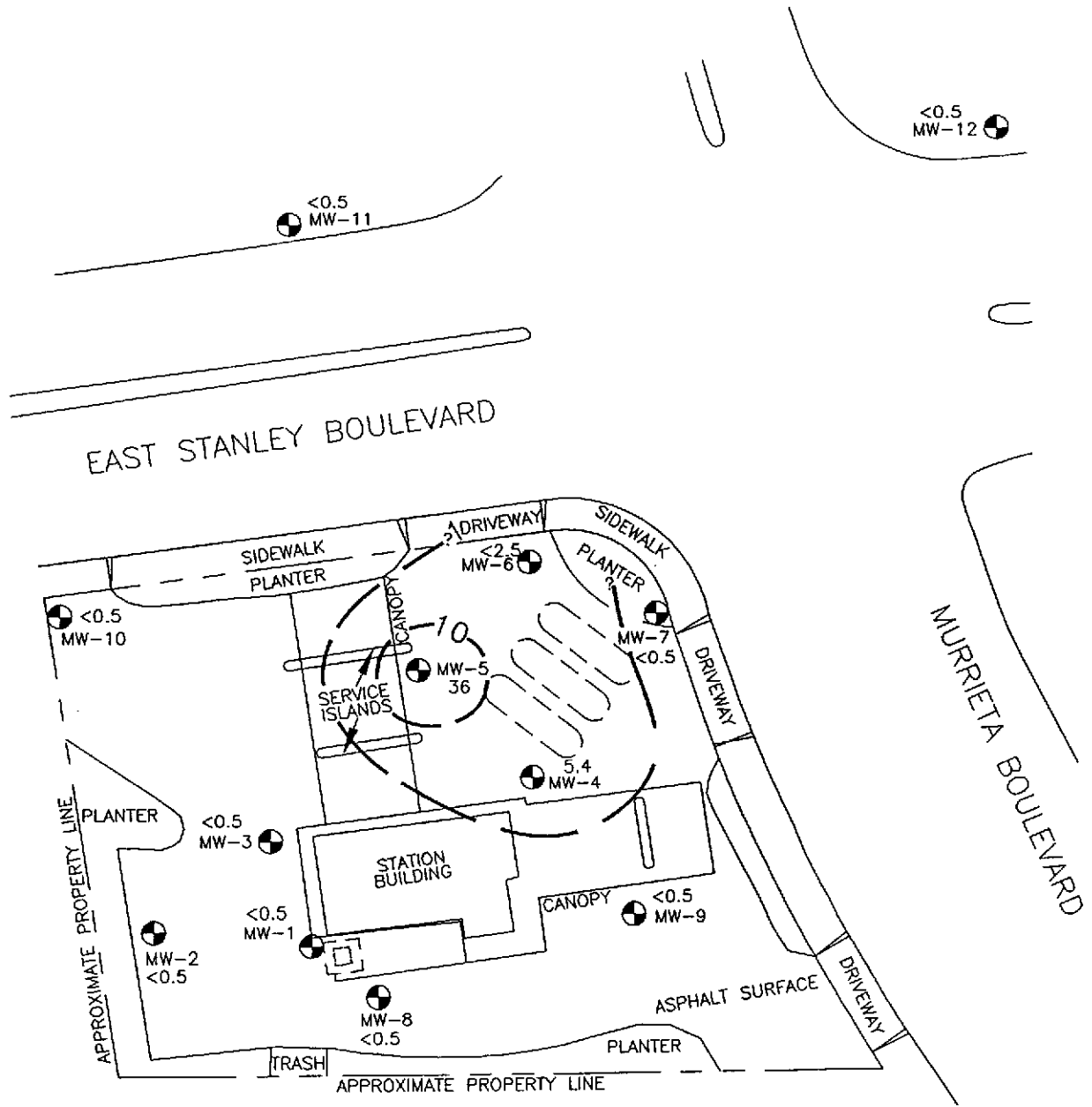


PROJECT: 69028.15

TPHg CONCENTRATIONS
IN GROUNDWATER
ARCO Station 613
785 East Stanley Boulevard
Livermore, California

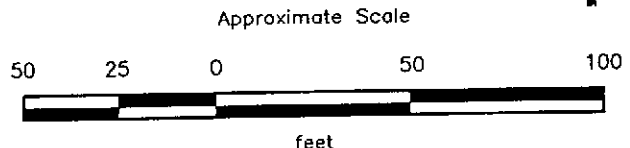
PLATE

4



EXPLANATION

- MW-12 = Monitoring well (RESNA, 09/89, 02/91, 06/92 and 03/93)
- 10 = Line of equal concentration of benzene in groundwater in parts per billion (ppb)
- 36 = Concentration of benzene in groundwater in ppb, March 25, 1994
- = Existing underground gasoline storage tanks



Source: Modified from plan supplied by Ron Archer, Civil Engineer Inc., Feb. 1991; and John Koch Land Surveyor, June 1992 and April 1993.



**BENZENE CONCENTRATIONS
IN GROUNDWATER**
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California

**PLATE
5**

PROJECT: 69028.15

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California
(Page 1 of 8)

Well Date	Elevation of Wellhead	Depth-to-Water	Elevation of Groundwater	Floating Product
<u>MW-1</u>				
09/20/89	457.04	21.03	436.01	None
10/12/89		19.64	437.40	None
06/21/90		21.72	435.32	None
09/20/90		19.79	437.25	None
12/18/90		19.28	437.76	None
02/21/91		22.45	434.59	None
03/20/91		19.87	437.17	None
04/10/91		19.42	437.62	None
05/20/91		25.95	431.09	None
06/20/91		32.55	424.49	None
07/25/91		38.22	418.82	None
08/13/91		40.74	416.30	None
09/12/91		43.16	413.88	None
10/22/91		Dry	Dry	None
11/13/91		Dry	Dry	None
12/21/91		Dry	Dry	None
01/18/92		Dry	Dry	None
02/21/92		Dry	Dry	None
03/19/92		36.16	420.88	None
04/24/92		38.14	418.90	None
05/20/92		40.74	416.30	None
06/29/92		43.80*	-	None
07/28/92		Dry	Dry	None
08/26/92		Dry	Dry	None
09/11/92		Dry	Dry	None
10/29/92		Dry	Dry	None
11/11/92		Dry	Dry	None
12/14/92	Not monitored due to construction activities			
01/27/93		30.10	426.94	None
02/26/93		24.72	432.32	None
03/30/93		20.87	436.17	None
04/30/93		19.46	437.58	None
05/14/93		19.27	437.77	None
06/17/93		19.21	437.83	None
07/27/93		19.95	437.09	None
08/30/93		20.72	436.32	None
11/04/93		20.61	436.43	None
03/25/94		17.54	439.50	None

See notes on page 8 of 8.

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California
(Page 2 of 8)

Well Date	Elevation of Wellhead	Depth-to-Water	Elevation of Groundwater	Floating Product
<u>MW-2</u>				
09/20/89	457.74	20.67	437.07	None
10/12/89		18.98	438.76	None
06/21/90		21.88	435.86	None
09/20/90		19.90	437.84	None
12/18/90		19.32	438.42	None
02/21/91		23.02	434.72	None
03/20/91		20.01	437.73	None
04/10/91		19.81	437.93	None
05/20/91		26.62	431.12	None
06/20/91		33.15	424.59	None
07/25/91		37.10	420.64	None
08/13/91		37.20	420.54	None
09/12/91		37.44*	—	None
10/22/91		37.38*	—	None
11/13/91		37.39*	—	None
12/21/91		Dry	Dry	None
01/18/92		37.65*	—	None
02/21/92		37.75*	—	None
03/19/92		35.82	421.92	None
04/24/92		36.64	421.10	None
05/20/92		37.23	420.51	None
06/29/92		37.67*	—	None
07/28/92		38.36*	—	None
08/26/92		38.26*	—	None
09/11/92		38.37*	—	None
10/29/92		Dry	Dry	None
11/11/92		Dry	Dry	None
12/14/92	Not monitored due to construction activities			
01/27/93		32.87	424.87	None
02/26/93	Not monitored due to construction activities			
03/30/93		20.47	437.27	None
04/30/93		19.02	438.72	None
05/14/93		18.65	439.09	None
06/17/93		18.21	439.53	None
07/27/93		17.95	439.79	None
08/30/93		18.43	439.31	None
11/04/93		19.73	438.01	None
03/25/94		17.26	440.48	None

See notes on page 8 of 8.

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California
(Page 3 of 8)

<u>Well</u> <u>Date</u>	<u>Elevation</u> <u>of Wellhead</u>	<u>Depth-</u> <u>to-Water</u>	<u>Elevation of</u> <u>Groundwater</u>	<u>Floating</u> <u>Product</u>
<u>MW-3</u>				
09/20/89	456.97	20.98	435.99	None
10/12/89		19.66	437.31	None
06/21/90		21.72	435.25	None
09/20/90		19.72	437.25	None
12/18/90		19.21	437.76	None
02/21/91		22.36	434.61	None
03/20/91		19.79	437.18	None
04/10/91		19.35	437.62	None
05/20/91		25.86	431.11	None
06/20/91		32.45	424.52	None
07/25/91		38.06	418.91	None
08/13/91		38.40	418.57	None
09/12/91		Dry	Dry	None
10/22/91		Dry	Dry	None
11/13/91		Dry	Dry	None
12/21/92		Dry	Dry	None
01/18/92		38.90*	—	None
02/21/92		38.88*	—	None
03/19/92		36.03	420.94	None
04/24/92		37.92	419.05	None
05/20/92		38.57*	—	None
06/29/92		38.70*	—	None
07/28/92		39.05*	—	None
08/26/92		39.03*	—	None
09/11/92		39.02*	—	None
10/29/92		Dry	Dry	None
11/11/92		Dry	Dry	None
12/14/92	Not monitored due to construction activities			
01/27/93		30.36	426.61	None
02/26/93		24.96	432.01	None
03/30/93		21.45	435.52	None
04/30/93		19.43	437.54	None
05/14/93		19.37	437.60	None
06/17/93		19.38	437.59	None
07/27/93		20.10	436.87	None
08/30/93		20.98	435.99	None
11/04/93		20.91	436.06	None
03/25/94		17.57	439.40	None

See notes on page 8 of 8.

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California
(Page 4 of 8)

Well Date	Elevation of Wellhead	Depth-to-Water	Elevation of Groundwater	Floating Product
<u>MW-4</u>				
02/21/91	456.55	22.01	434.96	None
03/20/91		20.31	436.66	None
04/10/91		19.55	437.42	None
05/20/91		25.24	431.73	None
06/20/91		Dry	Dry	None
07/25/91		Dry	Dry	None
08/13/91		Dry	Dry	None
09/12/91		Dry	Dry	None
10/22/91		Dry	Dry	None
11/13/91		Dry	Dry	None
12/21/92		Dry	Dry	None
01/18/92		Dry	Dry	None
02/21/92		Dry	Dry	None
03/19/92		Dry	Dry	None
04/24/92		Dry	Dry	None
05/20/92		Dry	Dry	None
06/29/92		Dry	Dry	None
07/28/92		Dry	Dry	None
08/26/92		Dry	Dry	None
09/11/92		Dry	Dry	None
10/29/92		Dry	Dry	None
11/11/92		Dry	Dry	None
12/14/92	Not monitored due to construction activities			None
01/27/93		Dry	Dry	None
02/26/93		23.60	432.95	None
03/30/93		20.87	435.68	None
04/30/93		19.73	436.82	None
05/14/93		19.75	436.80	None
06/17/93		19.69	436.86	None
07/27/93		20.40	436.15	None
08/30/93		21.10	435.45	None
11/04/93		21.60	434.95	None
03/25/94		18.59	437.96	None
<u>MW-5</u>				
06/29/92	455.84	50.53	405.31	None
07/28/92		54.92	400.92	None
08/26/92		59.58	396.26	None
09/11/92		60.88	394.96	None
10/29/92		61.86*	—	None

See notes on page 8 of 8.

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California
(Page 5 of 8)

Well Date	Elevation of Wellhead	Depth- to-Water	Elevation of Groundwater	Floating Product
<u>MW-5 cont.</u>	455.84			
11/11/92		62.53*	—	None
12/14/92		Not monitored due to construction activities		
01/27/93		29.08	426.76	None
02/26/93		23.56	432.28	None
03/30/93		20.32	435.52	None
04/30/93		19.57	436.27	None
05/14/93		19.29	436.55	None
06/17/93		18.66	437.18	None
07/27/93		20.16	435.68	None
07/27/93		20.16	435.68	None
08/30/93		—	—	—
11/04/93		21.05	434.79	None
03/25/94		17.95	437.89	None
<u>MW-6</u>	454.93			
06/29/92		49.72	405.21	None
07/28/92		54.63	400.30	None
08/26/92		59.45	395.48	None
09/11/92		60.73**	394.20**	0.04
10/29/92		62.14	392.79	None
11/11/92		62.42**	392.51**	0.03
12/14/92		Not monitored due to construction activities		
01/27/93		Not monitored due to construction activities		
02/26/93		22.73	432.20	None
03/30/93		19.53	435.40	None
04/30/93		18.76	436.17	None
05/14/93		19.19**	435.74**	0.01
06/17/93		18.54	436.39	None
06/17/93		18.54	436.39	None
07/27/93		19.47	435.46	None
08/30/93		20.33**	434.60**	0.01
11/04/93		20.33**	434.60**	0.01
03/25/94		17.13	437.80	None
<u>MW-7</u>	454.92			
06/29/92		49.57	405.35	None
07/28/92		54.60	400.32	None
08/26/92		59.60	395.32	None
09/11/92		60.74	394.18	None
10/29/92		62.23	392.69	None

See notes on page 8 of 8.

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California
(Page 6 of 8)

Well Date	Elevation of Wellhead	Depth-to-Water	Elevation of Groundwater	Floating Product
<u>MW-7 cont.</u>	454.92			
11/11/92		62.69	392.23	None
12/14/92		Not monitored due to construction activities		
01/27/93		27.97	426.95	None
02/26/93		22.57	432.35	None
03/30/93		19.29	435.63	None
04/30/93		18.79	436.13	None
05/14/93		18.35	436.57	None
06/17/93		18.36	436.56	None
07/27/93		19.49	435.43	None
08/30/93		20.26	434.66	None
11/04/93		20.33	434.59	None
03/25/94		16.91	438.01	None
<u>MW-8</u>	456.97			
06/29/92		50.40	406.57	None
07/28/92		55.79	401.18	None
08/28/92		60.79	396.18	None
09/11/92		61.97	395.00	None
10/29/92		63.51	393.46	None
11/11/92		64.21	392.76	None
12/14/92		Not monitored due to construction activities		
01/27/93		25.57	431.40	None
02/26/93		19.86	437.11	None
03/30/93		16.69	440.28	None
04/30/93		15.83	441.14	None
05/14/93		15.79	441.18	None
06/17/93		15.79	441.18	None
07/27/93		16.80	440.17	None
08/30/93		17.37	439.60	None
11/04/93		17.60	439.37	None
03/25/94		15.04	441.93	None
<u>MW-9</u>	456.18			
06/29/92		50.29	405.89	None
07/28/92		55.53	400.65	None
08/26/92		60.62	395.56	None
09/11/92		61.67	394.51	None
10/29/92		63.17	393.01	None
11/11/92		63.68	392.50	None
12/14/92		Not monitored due to construction activities		

See notes on page 8 of 8.

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California
(Page 7 of 8)

Well Date	Elevation of Wellhead	Depth-to-Water	Elevation of Groundwater	Floating Product
<u>MW-9 cont.</u>	456.18			
01/27/93		26.48	429.70	None
02/26/93		Not monitored due to construction activities		
03/30/93		17.77	438.41	None
04/30/93		17.01	439.17	None
05/14/93		16.55	439.63	None
06/17/93		16.68	439.50	None
07/27/93		17.77	438.41	None
08/30/93		18.74	437.44	None
11/04/93		18.72	437.46	None
03/25/94		15.78	440.40	None
<u>MW-10</u>	456.85			
03/30/93		21.33	435.52	None
04/30/93		20.51	436.34	None
05/14/93		20.26	436.59	None
06/17/93		20.30	436.55	None
07/27/93		20.29	436.56	None
03/30/93		21.33	435.52	None
04/30/93		20.51	436.34	None
05/14/93		20.26	436.59	None
06/17/93		20.30	436.55	None
07/27/93		20.29	436.56	None
08/30/93		22.19	434.66	None
11/04/93		22.11	434.74	None
03/25/94		18.84	438.01	None
<u>MW-11</u>	455.07			
03/30/93		20.78	434.29	None
04/30/93		20.71	434.36	None
05/14/93		20.01	435.06	None
06/17/93		20.18	434.89	None
07/27/93		21.31	433.76	None
08/30/93		21.09	434.98	None
11/04/93		21.40	433.67	None
03/25/94		18.28	436.79	None

See notes on page 8 of 8.

TABLE 1
CUMULATIVE GROUNDWATER MONITORING DATA
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California
(Page 8 of 8)

Well Date	Elevation of Wellhead	Depth- to-Water	Elevation of Groundwater	Floating Product
MW-12				
03/30/93	455.04	21.33	433.71	None
04/30/93		20.23	434.81	None
05/14/93		19.97	435.07	None
06/17/93		20.00	435.04	None
07/27/93		20.94	434.10	None
08/30/93		21.79	433.25	None
11/04/93		21.95	433.09	None
03/25/94		18.74	436.30	None

Notes:

Measurements in feet.

- For MW-1 through MW-3 (surveyed by Ron Archer in October 1988) and MW-4 (surveyed by Ron Archer in February 1991) wellhead elevation based on benchmark: Top of pin set in concrete in the most westerly monument at the intersection of East Stanley Boulevard and Fenton Avenue. Elevation taken as 455.896 mean sea level. City of Livermore Datum.
- For MW-4 through MW-9 (surveyed by John Koch in June 1992) and MW-10 through MW-12 (surveyed by John Koch in April 1993) wellhead elevation based on benchmark: Top of pin in standard monument at intersection of El Rancho Drive and Albatross Ave. Elevation taken as 448.218'. City of Livermore Datum.
- *: Residual water.
- ** : Adjusted water level due to product. The recorded thickness of the floating product was 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 as the corrected depth to water. These calculated groundwater depths were subtracted from surveyed wellhead elevations to obtain the differences in groundwater elevations.

TABLE 2
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES -- TPHg and BTEX
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California
(Page 1 of 4)

Well Date	TPHg	Benzene	Toluene	Ethyl- benzene	Total Xylenes
<u>MW-1</u>					
09/20/89	80	3.0	1.0	0.7	1
06/21/90	<20	<0.50	0.66	<0.50	<0.50
09/20/90	<50	<0.5	1.0	<0.5	1.8
12/18/90	<50	<0.5	1.8	<0.5	1.7
02/21/91	<50	1.2	2.3	<0.5	2.2
05/20/91	<30	<0.30	<0.30	<0.30	<0.30
08/13/91		Not sampled--dry			
11/13/91		Not sampled--dry			
03/19/92	400	<3.5*	<1.2*	<0.8*	<1.0*
06/29/92		Not sampled--residual water only			
09/11/92		Not sampled--dry			
11/12/92		Not sampled--dry			
03/30/93	<50	<0.5	<0.5	<0.5	<0.5
05/14/93	<50	<0.5	<0.5	<0.5	<0.5
08/30/93	<50	<0.5	<0.5	<0.5	<0.5
11/04/93	<50	<0.5	<0.5	<0.5	<0.5
03/25/94	<50	<0.5	<0.5	<0.5	<0.5
<u>MW-2</u>					
09/20/89	<50	<0.5	<0.5	<0.5	<1
06/21/90	<20	<0.50	<0.50	<0.50	<0.50
09/20/90	<50	<0.5	0.7	<0.5	1.4
12/18/90	<50	0.6	1.5	<0.5	1.9
02/21/91	<50	<0.5	<0.5	<0.5	<0.5
05/20/91	<30	<0.30	<0.30	<0.30	<0.30
08/13/91		Not sampled--dry			
11/13/91		Not sampled--dry			
03/19/92	<50	<0.5	<0.5	<0.5	<0.5
06/29/92	<50	<0.5	<0.5	<0.5	<0.5
09/11/92		Not sampled--residual water only			
11/12/92		Not sampled--dry			
03/30/93	<50	<0.5	<0.5	<0.5	<0.5
05/14/93	<50	<0.5	<0.5	<0.5	<0.5
08/30/93	<50	<0.5	<0.5	<0.5	<0.5
11/04/93	<50	<0.5	<0.5	<0.5	<0.5
03/25/94	<50	<0.5	<0.5	<0.5	<0.5

See notes on page 4 of 4.

TABLE 2
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES – TPHg and BTEX
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California
(Page 2 of 4)

Well Date	TPHg	Benzene	Toluene	Ethyl- benzene	Total Xylenes
<u>MW-3</u>					
09/20/89	170	8.9	0.6	1.1	<1
06/21/90	<20	<0.50	1.0	<0.50	<0.50
09/20/90	<50	<0.5	1.0	<0.5	1.9
12/18/90	<50	<0.5	1.7	<0.5	2.0
02/21/91	<50	<0.5	<0.5	<0.5	<0.5
05/20/91	97	1.3	1.1	6.2	8.4
08/13/91		Not sampled--dry			
11/13/91		Not sampled--dry			
03/19/92	220	<1.1*	<1.9	<0.6*	<0.8*
06/29/92		Not sampled --residual water only			
09/11/92		Not sampled --residual water only			
11/12/92		Not sampled--dry			
03/30/93	200**	<4.0*	<0.5	<0.5	<0.5
05/14/93	72**	<3.0*	<0.5	<0.5	<0.5
08/30/93	<50	<0.5	<0.5	<0.5	<0.5
11/04/93	<50	<0.5	<0.5	<0.5	<0.5
03/25/94	<50	<0.5	<0.5	<0.5	<0.5
<u>MW-4</u>					
02/21/91	3,500	410	7.6	30	47
05/20/91	1,400	150	6.0	4.4	3.1
08/13/91		Not sampled--dry			
11/13/91		Not sampled--dry			
03/19/92		Not sampled--dry			
06/29/92		Not sampled--dry			
09/11/92		Not sampled--dry			
11/12/92		Not sampled--dry			
03/31/93	680	110	5.2	3.0	7.4
05/14/93	1,200	200	6.2	15	9.2
08/30/93	620	22	0.9	3.6	2.1
11/04/93	320	11	<0.5	1.3	0.9
03/25/94	480	5.4	<0.5	1.6	1.7
<u>MW-5</u>					
06/29/92	8,900	1,700	640	310	1,100
09/11/92	13,000	2,200	1,500	130	930
11/12/92		Not sampled--residual water only			
03/31/93	9,700	1,700	430	220	880

See notes on page 4 of 4.

TABLE 2
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES -- TPHg and BTEX
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California
(Page 3 of 4)

Well Date	TPHg	Benzene	Toluene	Ethylbenzene	Total Xylenes
<u>MW-5 cont.</u>					
05/14/93	9,800	1,300	820	270	1,100
08/30/93		Not sampled--well inaccessible			
11/04/93	41,000	3,500	3,100	890	5,400
03/25/94	780	36	1.5	4.8	5.7
<u>MW-6</u>					
06/29/92	8,600	1,800	460	52	450
09/11/92		Not sampled--floating product			
11/12/92		Not sampled--floating product			
03/31/93		Not sampled--floating product			
05/14/93		Not sampled--floating product			
08/30/93		Not sampled--floating product			
11/04/93		Not sampled--floating product			
03/25/94	530	<2.5*	<2.5*	<2.5*	4.6
<u>MW-7</u>					
06/29/92	270	38	3.7	1.1	4.4
09/11/92	420	20	0.7	<0.5	<0.5
11/12/92	470	31	1.0	<0.5	0.8
03/31/93	190	20	1.0	<0.5	<0.5
05/14/93	170	17	0.6	<0.5	0.5
08/30/93	<50	1.8	<0.5	<0.5	0.5
11/04/93	<50	6.6	<0.5	<0.5	0.8
03/25/94	<50	<0.5	<0.5	<0.5	<0.5
<u>MW-8</u>					
6/29/92	<50	<0.5	<0.5	<0.5	<0.5
09/11/92	<50	<0.5	<0.5	<0.5	<0.5
11/12/92	<50	<0.5	<0.5	<0.5	<0.5
03/30/93	<50	<0.5	<0.5	<0.5	<0.5
05/14/93	<50	<0.5	<0.5	<0.5	<0.5
08/30/93	<50	<0.5	<0.5	<0.5	<0.5
11/04/93	<50	<0.5	<0.5	<0.5	<0.5
03/25/94	<50	<0.5	<0.5	<0.5	<0.5
<u>MW-9</u>					
06/29/92	<50	<0.5	<0.5	<0.5	<0.5
09/11/92	<50	<0.5	<0.5	<0.5	<0.5
11/12/92	<50	<0.5	<0.5	<0.5	<0.5

See notes on page 4 of 4.

TABLE 2
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES -- TPHg and BTEX
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California
(Page 4 of 4)

Well Date	TPHg	Benzene	Toluene	Ethyl- benzene	Total Xylenes
<u>MW-9 cont.</u>					
03/31/93	<50	<0.5	<0.5	<0.5	<0.5
05/14/93	<50	<0.5	<0.5	<0.5	<0.5
08/30/93	<50	<0.5	<0.5	<0.5	<0.5
11/04/93	<50	<0.5	<0.5	<0.5	<0.5
03/25/94	<50	<0.5	<0.5	<0.5	<0.5
<u>MW-10</u>					
03/31/93	230**	<0.5	<0.5	<1.0*	0.6
05/14/93	440**	<10*	<0.6*	<0.9*	<0.5
08/30/93	280**	<4*	<0.5	<1.3*	0.6
11/04/93	<50	<0.5	<0.5	<0.5	<0.5
03/25/94	<50	<0.5	<0.5	<0.5	<0.5
<u>MW-11</u>					
03/31/93	<50	<0.5	<0.5	<0.5	<0.5
05/14/93	<50	<0.5	<0.5	<0.5	<0.5
08/30/93	<50	<0.5	<0.5	<0.5	<0.5
11/04/93	<50	<0.5	<0.5	<0.5	<0.5
03/25/94	<50	<0.5	<0.5	<0.5	<0.5
<u>MW-12</u>					
03/31/93	150	20	<0.5	<0.5	<0.5
05/14/93	<50	<0.5	<0.5	<0.5	<0.5
08/30/93	<50	<0.5	<0.5	<0.5	<0.5
11/04/93	<50	<0.5	<0.5	<0.5	<0.5
03/25/94	<50	<0.5	<0.5	<0.5	<0.5
MCLs	None	1.0	None	680	1,750
DWAL	None	None	100	None	None

Notes:

Results in parts per billion (ppb).

BTEX = Benzene, Toluene, Ethylbenzene and total Xylenes analyzed using EPA Method 5030/8020/DHS LUFT Method.

TPHg = Total petroleum hydrocarbons as gasoline analyzed using EPA Method 5030/8020/DHS LUFT Method.

< = Less than the detection limits shown.

MCLs = Adopted Maximum Contaminant Levels in Drinking Water, DHS (October 1990)

DWAL = Recommended Drinking Water Action Level, DHS (October 1990)

* = Laboratory reportedly raised detection limit due to matrix interference.

** = The sample contains components eluting in the gasoline range that were quantitated as gasoline. The chromatogram does not match the typical gasoline fingerprint.

TABLE 3
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES – VOCs, TPHd, TOG, and Metals
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California
(Page 1 of 3)

Well Date	VOCs	TPHd	TOG	Cd	Cr	Pb	Zn	Ni
<u>MW-1</u>								
09/20/89	NA	<50	<5,000	NA	NA	NA	NA	NA
06/21/90	NA	<100	13,000	NA	NA	NA	NA	NA
09/20/90	NA	<50	<5,000	NA	NA	NA	NA	NA
12/18/90	NA	<5,000	NA	NA	NA	NA	NA	NA
02/21/91	NA	<5,000	NA	NA	NA	NA	NA	NA
05/20/91	NA	<75,000	NA	NA	NA	NA	NA	NA
08/13/91	NS	NS	NS	NS	NS	NS	NS	NS
11/13/91	NS	NS	NS	NS	NS	NS	NS	NS
03/19/92	NA	NA	NA	NA	NA	NA	NA	NA
06/29/92	NS	NS	NS	NS	NS	NS	NS	NS
09/11/92	NS	NS	NS	NS	NS	NS	NS	NS
11/12/92	NS	NS	NS	NS	NS	NS	NS	NS
03/30/93	NA	NA	NA	NA	NA	NA	NA	NA
05/14/93	NA	NA	120,000	NA	NA	NA	NA	NA
08/30/93	NA	NA	900/700	NA	NA	NA	NA	NA
11/04/93	NA	NA	2,900/2,800	NA	NA	NA	NA	NA
03/25/94	NA	NA	<600	NA	NA	NA	NA	NA
<u>MW-2</u>								
09/20/89	NA	<50	<5,000	NA	NA	NA	NA	NA
06/21/90	NA	<100	<5,000	NA	NA	NA	NA	NA
09/20/90	NA	<50	<5,000	NA	NA	NA	NA	NA
12/18/90	NA	NA	<5,000	NA	NA	NA	NA	NA
02/21/91	NA	NA	<5,000	NA	NA	NA	NA	NA
05/20/91	NA	NA	<75,000	NA	NA	NA	NA	NA
08/13/91	NS	NS	NS	NS	NS	NS	NS	NS
11/13/91	NS	NS	NS	NS	NS	NS	NS	NS
03/19/92	NA	NA	NA	NA	NA	NA	NA	NA
06/29/92	NA	NA	NA	NA	NA	NA	NA	NA
09/11/92	NS	NS	NS	NS	NS	NS	NS	NS
11/12/92	NS	NS	NS	NS	NS	NS	NS	NS
03/30/93	NA	NA	NA	NA	NA	NA	NA	NA
05/14/93	NA	NA	NA	NA	NA	NA	NA	NA
<u>MW-3</u>								
09/20/89	NA	<50	<5,000	NA	NA	NA	NA	NA
06/21/90	NA	<100	10,000	NA	NA	NA	NA	NA
09/20/90	NA	<50	<5,000	NA	NA	NA	NA	NA
12/18/90	NA	NA	<5,000	NA	NA	NA	NA	NA
02/21/91	NA	NA	<5,000	NA	NA	NA	NA	NA
05/20/91	NA	NA	<75,000	NA	NA	NA	NA	NA

See notes on page 3 of 3.

TABLE 3
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES -- VOCs, TPHd, TOG, and Metals
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California
(Page 2 of 3)

Well Date	VOCs	TPHd	TOG	Cd	Cr	Pb	Zn	Ni
<u>MW-3 cont.</u>								
08/13/91	NS	NS	NS	NS	NS	NS	NS	NS
11/13/91	NS	NS	NS	NS	NS	NS	NS	NS
03/19/92	NA	<50	<5,000	NA	NA	NA	NA	NA
06/29/92	NS	NS	NS	NS	NS	NS	NS	NS
09/11/92	NS	NS	NS	NS	NS	NS	NS	NS
11/12/92	NS	NS	NS	NS	NS	NS	NS	NS
03/30/93	NA	NA	NA	NA	NA	NA	NA	NA
05/14/93	NA	NA	NA	NA	NA	NA	NA	NA
<u>MW-4</u>								
02/21/91	NA	NA	<5,000	NA	NA	NA	NA	NA
05/20/91	NA	NA	<75,000	NA	NA	NA	NA	NA
08/13/91	NS	NS	NS	NS	NS	NS	NS	NS
11/13/91	NS	NS	NS	NS	NS	NS	NS	NS
03/19/92	NS	NS	NS	NS	NS	NS	NS	NS
06/29/92	NS	NS	NS	NS	NS	NS	NS	NS
09/29/92	NS	NS	NS	NS	NS	NS	NS	NS
11/12/92	NS	NS	NS	NS	NS	NS	NS	NS
03/31/93	NA	NA	NA	NA	NA	NA	NA	NA
05/14/93	NA	NA	NA	NA	NA	NA	NA	NA
<u>MW-8</u>								
06/29/92	ND*	<50	<500	<3	1,780	143	1,310	5,100
09/11/92	NA	<50	<500	13	3,580	308	2,620	10,300
11/12/92	NA	NA	NA	28	3,440	221	2,550	9,840
03/31/93	NA	NA	NA	NA	NA	NA	NA	NA
05/14/93	NA	NA	NA	NA	NA	NA	NA	NA
<u>MW-9</u>								
11/12/92	NA	NA	NA	10	1,080	101	859	3,070
03/31/93	NA	NA	NA	NA	NA	NA	NA	NA
05/14/93	NA	NA	NA	NA	NA	NA	NA	NA
MCL:	Varies	—	—	10	50	50	5,000	—

See notes on page 3 of 3.

TABLE 3
CUMULATIVE RESULTS OF LABORATORY ANALYSES OF GROUNDWATER SAMPLES – VOCs, TPHd, TOG, and Metals
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California
(Page 3 of 3)

Notes:

Results in micrograms per liter (ug/L) = parts per billion (ppb).

- VOCs: Halogenated volatile organic compounds by EPA Method 5030/601.
 - TPHd: Total petroleum hydrocarbons as diesel by EPA Methods 3510/California DHS LUFT Method.
 - TOG: Total oil and grease measured by EPA Method 5520 C&F.
 - Cd: Cadmium by EPA Method 6010.
 - Cr: Chromium by EPA Method 6010.
 - Ni: Nickel by EPA Method 6010.
 - Zn: Zinc by EPA Method 6010.
 - Pb: Lead by EPA Method 7421.
 - NA: Not analyzed.
 - <: Results reported as less than the detection limit.
 - NS: Well not sampled.
 - ND: Not detected.
 - *: 31 compounds tested were nondetectable.
 - MCL: Adopted Maximum Contaminant Levels in Drinking Water (October 1990)
-

APPENDIX A

**IWM'S SUMMARY OF GROUNDWATER
SAMPLE ANALYSES, FIELD REPORTS,
AND CERTIFIED ANALYTICAL REPORTS
WITH CHAIN-OF-CUSTODY RECORD**

I NTEGRATED
W ASTESTREAM
M ANAGEMENT, INC.

April 14, 1994

Mr. John Young
RESNA Industries
3315 Almaden Expressway
Suite 34
San Jose, CA. 95118

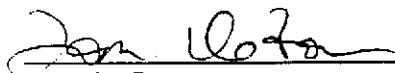
Dear Mr. Young:

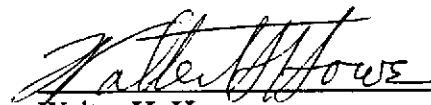
Attached are the field data sheets and analytical results for quarterly ground water sampling at ARCO Facility No. 6113 in Livermore, California. Integrated Wastestream Management measured the depth to water and collected samples from wells at this site on March 25, 1994.

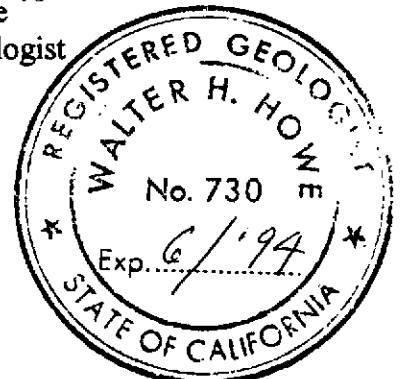
Sampling was carried out in accordance with the protocols described in the "Request for Bid for Quarterly Sampling at ARCO Facilities in Northern California".

Please call us if you have any questions.

Sincerely,
Integrated Wastestream Management


Tom DeLon
Project Manager


Walter H. Howe
Registered Geologist



Summary of Ground Water Sample Analyses for ARCO Facility A-6113, Livermore, California

WELL NUMBER	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	MW-11	MW-12
DATE SAMPLED	3/25/94	3/25/94	3/25/94	3/25/94	3/25/94	3/25/94	3/25/94	3/25/94	3/25/94	3/25/94	3/25/94	3/25/94
DEPTH TO WATER	17.54	17.26	17.57	18.59	17.95	17.13	16.91	15.04	15.78	18.84	18.28	18.74
SHEEN	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
PRODUCT THICKNESS	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TPHg	ND	ND	ND	480	780	530	ND	ND	ND	ND	ND	ND
BTEX												
BENZENE	ND	ND	ND	5.4	36	<2.5	ND	ND	ND	ND	ND	ND
TOLUENE	ND	ND	ND	ND	1.5	<2.5	ND	ND	ND	ND	ND	ND
ETHYLBENZENE	ND	ND	ND	1.6	4.8	<2.5	ND	ND	ND	ND	ND	ND
XYLENES	ND	ND	ND	1.7	5.7	4.6	ND	ND	ND	ND	ND	ND
EPA 413.1/413.2												
OIL & GREASE	<0.6											

FOOTNOTES:

Concentrations reported in ug/L (ppb).

TPHg = Total Purgeable Petroleum Hydrocarbons (USEPA Method 8015 Modified)

BTEX Distinction (USEPA Method 8020)

PCE = Tetrachloroethene (USEPA Method 8010)

DCE = cis-1, 2-Dichloroethene (USEPA Method 8010)

TCE = Trichloroethene (USEPA Method 8010)

ND = Not Detected.

NA = Not applicable.

FIELD REPORT

Depth To Water / Floating Product Survey

Site Arrival Time: 1030

Site Departure Time: _____

Weather Conditions: _____

DTW: Well Box or Well Casing (circle one)

Project No.: _____

Location: 785 E. Stanley Blvd. Lew

Date: 3.25.94

Client / Station#: ATCO 6113

Field Technician: Vince/Cisco

Day of Week: Friday

DTW ORDER	WELL ID	SURFACE SEAL	LID SECURE	GASKET	LOCK	EXPANDING CAP	TOTAL DEPTH (Feet)	FIRST DEPTH TO WATER (Feet)	SECOND DEPTH TO WATER (Feet)	DEPTH TO FLOATING PRODUCT (Feet)	FLOATING PRODUCT THICKNESS (Feet)	SHEEN (Y= YES, N=NO)	COMMENTS	MATERIALS
01	MW-1	OK	yes	OK	OK	OK	43.0	17.54	17.54	N/A	N/A	N	2" casing cut below Ann. Seal	flex
02	MW-2	OK	yes	OK	OK	OK	37.8	17.26	17.26	N/A	N/A	N	2"	flex
03	MW-3	OK	yes	OK	OK	OK	25.0	17.57	17.57	N/A	N/A	N	3" casing cut below Ann Seal	flex
04	MW-4	OK	yes	OK	OK	OK	26.8	18.59	18.59	N/A	N/A	N	4"	
05	MW-5	OK	yes	OK	OK	OK	62.5	17.95	17.95	N/A	N/A	N	4" 2x2 grading area good	
06	MW-6	OK	yes	OK	OK	OK	60.4	17.13	17.13	N/A	N/A	N	4" NO sheen observed product puddles	
07	MW-7	OK	yes	OK	OK	OK	67.0	16.91	16.90+	N/A	N/A	N	4"	
08	MW-8	OK	yes	OK	OK	OK	55.0	15.04	15.04	N/A	N/A	N	4"	
09	MW-9	OK	yes	OK	OK	OK	68.0	15.78	15.78	N/A	N/A	N	4"	
10	MW-10	OK	yes	OK	OK	OK	51.0	18.84	18.84	N/A	N/A	N	4"	
11	MW-11	OK	yes	OK	OK	OK	44.5	18.28	18.28	N/A	N/A	N	2"	
12	MW-12	OK	yes	OK	OK	OK	33.0	18.74	18.74	N/A	N/A	N	2"	

WELL ID: MW-10 TD 51.0 DTW 18.84 X 0.46 X 3 - 63.67
Linear Ft. Volume Purge

DATE PURGED: 3-25-94 START (2400 HR): 1653 END (2400 HR): 1716
 DATE SAMPLED: 3-25-94 TIME (2400 HR): 1718 DTW: 20

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	E.C. (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
<u>1655</u>	<u>2</u>	<u>7.04</u>	<u>0.43</u>	<u>62.9</u>	<u>clear</u>
<u>1702</u>	<u>20</u>	<u>7.08</u>	<u>0.43</u>	<u>62.4</u>	<u>clear</u>
<u>1708</u>	<u>40</u>	<u>7.10</u>	<u>0.43</u>	<u>62.2</u>	<u>clear</u>
<u>1716</u>	<u>64</u>	<u>7.10</u>	<u>0.43</u>	<u>62.1</u>	<u>clear</u>

Total purge: 64
 PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP.: Bailer Disp.
 REMARKS: _____

WELL ID: MW-9 TD 68.0 DTW 15.78 X 0.46 X 3 - 103.39
Linear Ft. Volume Purge

DATE PURGED: 3-25-94 START (2400 HR): 1731 END (2400 HR): 1818
 DATE SAMPLED: 3-25-94 TIME (2400 HR): 1821 DTW: 17

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	E.C. (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
<u>1732</u>	<u>2</u>	<u>7.13</u>	<u>0.52</u>	<u>60.8</u>	<u>clear</u>
<u>1742</u>	<u>35</u>	<u>7.12</u>	<u>0.56</u>	<u>60.9</u>	<u>clear</u>
<u>1802</u>	<u>70</u>	<u>7.13</u>	<u>0.54</u>	<u>60.5</u>	<u>clear</u>
<u>1818</u>	<u>100</u>	<u>7.08</u>	<u>0.52</u>	<u>60.2</u>	<u>clear</u>

Total purge: 100
 PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP.: Bailer Disp.
 REMARKS: _____

WELL ID: ~~_____~~ TD _____ DTW _____ X _____ X _____ - _____
Linear Ft. Volume Purge

DATE PURGED: _____ START (2400 HR): _____ END (2400 HR): _____
 DATE SAMPLED: _____ TIME (2400 HR): _____ DTW: _____

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	E.C. (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)

Total purge: _____
 PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP.: Bailer Disp.
 REMARKS: _____

WELL ID: _____ TD _____ DTW _____ X _____ X _____ - _____
Linear Ft. Volume Purge

DATE PURGED: _____ START (2400 HR): _____ END (2400 HR): _____
 DATE SAMPLED: _____ TIME (2400 HR): _____ DTW: _____

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	E.C. (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)

Total purge: _____
 PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP.: Bailer Disp.
 REMARKS: _____

PRINT NAME: _____ SIGNATURE: _____

CASING DIAMETER (inches): 2 3 4 6 8 12 Other: _____
 GALLON/LINEAR FOOT: 0.17 0.38 0.66 1.5 2.6 5.8 Other: _____

WELL ID: MW-1 TD 430 DTW 17.54 x 0.17 Gal. x 3 Casing - 12.98 Calculated Purge
Linear Ft. Volume

DATE PURGED: 3-25-94 START (2400 HR): 1448 END (2400 HR) 1451
 DATE SAMPLED: 3-25-94 TIME (2400 HR): 1456 DTW: 22

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	E.C. (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
<u>1449</u>	<u>3</u>	<u>7.05</u>	<u>0.51</u>	<u>63.5</u>	<u>clean</u>
<u>1451</u>	<u>6</u>	<u>6.80</u>	<u>0.51</u>	<u>63.4</u>	<u>clean</u>
<u>1452</u>	<u>9</u>	<u>6.74</u>	<u>0.48</u>	<u>63.0</u>	<u>clean</u>
<u>1454</u>	<u>13</u>	<u>6.74</u>	<u>0.49</u>	<u>62.8</u>	<u>clean</u>

Total purge: 13
 PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP.: Bailer Disp.
 REMARKS:

WELL ID: MW-2 TD 373 DTW 17.26 x 0.17 Gal. x 3 Casing - 10.47 Calculated Purge
Linear Ft. Volume

DATE PURGED: 3-25-94 START (2400 HR): 1519 END (2400 HR) 1523
 DATE SAMPLED: 3-25-94 TIME (2400 HR): 1525 DTW: 18

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	E.C. (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
<u>1520</u>	<u>2</u>	<u>6.92</u>	<u>0.62</u>	<u>65.0</u>	<u>clean</u>
<u>1521</u>	<u>5</u>	<u>7.08</u>	<u>0.51</u>	<u>63.3</u>	<u>clean</u>
<u>1522</u>	<u>8</u>	<u>7.03</u>	<u>0.49</u>	<u>63.4</u>	<u>clean</u>
<u>1523</u>	<u>11</u>	<u>6.99</u>	<u>0.49</u>	<u>63.1</u>	<u>clean</u>

Total purge: 11
 PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP.: Bailer Disp.
 REMARKS:

WELL ID: MW-3 TD 250 DTW 17.57 x 0.17 Gal. x 3 Casing - 3.78 Calculated Purge
Linear Ft. Volume

DATE PURGED: 3-25-94 START (2400 HR): 1534 END (2400 HR) 1549
 DATE SAMPLED: 3-25-94 TIME (2400 HR): 1551 DTW: 18

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	E.C. (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
<u>1</u>	<u>1537</u>	<u>7.01</u>	<u>0.45</u>	<u>62.5</u>	<u>clean</u>
<u>2</u>	<u>1543</u>	<u>7.06</u>	<u>0.47</u>	<u>62.1</u>	<u>clean</u>
<u>4</u>	<u>1549</u>	<u>7.07</u>	<u>0.46</u>	<u>62.3</u>	<u>clean</u>

Total purge:
 PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP.: Bailer Disp.
 REMARKS:

WELL ID: MW-8 TD 550 DTW 154 x 0.66 Gal. x 3 Casing - 78.46 Calculated Purge
Linear Ft. Volume

DATE PURGED: 3-25-94 START (2400 HR): 1607 END (2400 HR) 1639
 DATE SAMPLED: 3-25-94 TIME (2400 HR): 1644 DTW: 19.5

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	E.C. (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
<u>1609</u>	<u>2</u>	<u>7.16</u>	<u>0.57</u>	<u>61.9</u>	<u>clean</u>
<u>1615</u>	<u>20</u>	<u>7.08</u>	<u>0.56</u>	<u>62.3</u>	<u>clean</u>
<u>1627</u>	<u>45</u>	<u>7.03</u>	<u>0.56</u>	<u>62.4</u>	<u>clean</u>
<u>1639</u>	<u>78</u>	<u>7.01</u>	<u>0.56</u>	<u>62.1</u>	<u>clean</u>

Total purge: 78
 PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP.: Bailer Disp.
 REMARKS:

PRINT NAME: Vince Jaldes SIGNATURE: [Signature]

- CASING DIAMETER (inches): 2 3 4 6 8 12 Other:
 GALLON/LINEAR FOOT: 0.17 0.38 0.66 1.5 2.6 5.8 Other:

WELL ID: MW-7 TD 67.0 DTW 16.90 x 0.66 Gal. x 3 Casing - 99.9 Calculated
Linear Ft. Volume Purge

DATE PURGED: 3-25-94 START (2400 HR): 1520 END (2400 HR): 1538
 DATE SAMPLED: 3-25-94 TIME (2400 HR): 1610 DTW: 19

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	E.C. (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
<u>1520</u>	<u>3</u>	<u>7.19</u>	<u>0.76</u>	<u>67.8</u>	<u>CLEAR</u>
<u>1534</u>	<u>30</u>	<u>7.15</u>	<u>0.69</u>	<u>68.6</u>	<u>CLEAR</u>
<u>1544</u>	<u>65</u>	<u>7.09</u>	<u>0.70</u>	<u>68.2</u>	<u>CLEAR</u>
<u>1558</u>	<u>100</u>	<u>6.95</u>	<u>0.70</u>	<u>68.0</u>	<u>CLEAR</u>
Total purge: <u>100</u>					

PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP.: Bailer Disp.
 REMARKS:

WELL ID: MW-4 TD 26.3 DTW 18.59 x 0.66 Gal. x 3 Casing - 16.25 Calculated
Linear Ft. Volume Purge

DATE PURGED: 3-25-94 START (2400 HR): 1640 END (2400 HR): 1645
 DATE SAMPLED: 3-25-94 TIME (2400 HR): 1650 DTW: 19.3

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	E.C. (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
<u>1641</u>	<u>3</u>	<u>6.97</u>	<u>0.84</u>	<u>66.1</u>	<u>CLEAR</u>
<u>1642</u>	<u>9</u>	<u>6.66</u>	<u>0.88</u>	<u>67.8</u>	<u>CLEAR</u>
<u>1645</u>	<u>17</u>	<u>6.54</u>	<u>0.97</u>	<u>67.2</u>	<u>CLEAR</u>
Total purge: <u>17</u>					

PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP.: Bailer Disp.
 REMARKS:

WELL ID: MW-5 TD 65 DTW 17.95 x 0.66 Gal. x 3 Casing - 28.20 Calculated
Linear Ft. Volume Purge

DATE PURGED: 3-25-94 START (2400 HR): 1710 END (2400 HR): 1825
 DATE SAMPLED: 3-25-94 TIME (2400 HR): 1830 DTW: 21

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	E.C. (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
<u>1712</u>	<u>5</u>	<u>7.22</u>	<u>0.78</u>	<u>66.5</u>	<u>CLEAR</u>
<u>1720</u>	<u>27</u>	<u>7.42</u>	<u>0.83</u>	<u>68.1</u>	<u>CLEAR</u>
<u>1748</u>	<u>65</u>	<u>7.32</u>	<u>0.83</u>	<u>68.0</u>	<u>CLEAR</u>
<u>1825</u>	<u>89</u>	<u>7.34</u>	<u>0.85</u>	<u>67.8</u>	<u>CLEAR</u>
Total purge: <u>89</u>					

PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP.: Bailer Disp.
 REMARKS:

WELL ID: MW-6 TD 66.4 DTW 17.13 x 0.66 Gal. x 3 Casing - 97.55 Calculated
Linear Ft. Volume Purge

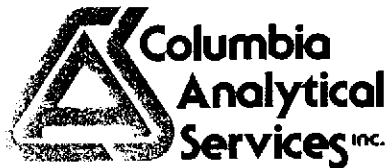
DATE PURGED: 3-25-94 START (2400 HR): 1900 END (2400 HR): 1947
 DATE SAMPLED: 3-25-94 TIME (2400 HR): 1955 DTW: 19

TIME (2400 HR)	VOLUME (GAL)	pH (UNITS)	E.C. (UMHOS/CM@25 C)	TEMP. (F)	COLOR (VISUAL)
<u>1902</u>	<u>5</u>	<u>7.31</u>	<u>0.63</u>	<u>65.4</u>	<u>CLEAR</u>
<u>1911</u>	<u>30</u>	<u>7.27</u>	<u>0.69</u>	<u>66.6</u>	<u>CLEAR</u>
<u>1930</u>	<u>65</u>	<u>7.14</u>	<u>0.64</u>	<u>65.4</u>	<u>CLEAR</u>
<u>1947</u>	<u>98</u>	<u>7.23</u>	<u>0.67</u>	<u>65.3</u>	<u>CLEAR</u>
Total purge: <u>98</u>					

PURGING EQUIP.: Centrifugal Pump Bailer Disp. SAMPLING EQUIP.: Bailer Disp.
 REMARKS:

PRINT NAME: Francisco Abundant SIGNATURE: Francisco Abundant

CASING DIAMETER (inches):	<u>2</u>	<u>3</u>	<u>4</u>	<u>6</u>	<u>8</u>	<u>12</u>	Other: <u> </u>
GALLON/LINEAR FOOT:	<u>0.17</u>	<u>0.38</u>	<u>0.66</u>	<u>1.5</u>	<u>2.6</u>	<u>5.8</u>	Other: <u> </u>



April 11, 1994

Service Request No. SJ94-0372

Gina Austin
Tom DeLon
IWM
950 Ames Avenue
Milpitas, CA 95035

Re: **ARCO Facility No. 6113**

Dear Ms. Austin/Mr. DeLon:

Attached are the results of the water samples submitted to our lab on March 28, 1994. For your reference, these analyses have been assigned our service request number SJ94-0372.

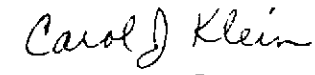
All analyses were performed consistent with our laboratory's quality assurance program. All results are intended to be considered in their entirety, and CAS is not responsible for use of less than the complete report. Results apply only to the samples analyzed.

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/drf

COLUMBIA ANALYTICAL SERVICES, Inc.

Acronyms

ASTM	American Society for Testing and Materials
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MRL	Method Reporting Limit
NA	Not Applicable
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected at or above the MRL
NR	Not Requested
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
VPH	Volatile Petroleum Hydrocarbons

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: IWM
Project: ARCO Facility No. 6113
Sample Matrix: Water

Date Collected: 3/25/94
Date Received: 3/28/94
Date Extracted: 4/5/94
Date Analyzed: 4/8/94
Service Request: SJ94-0372

Oil and Grease
EPA Method 413.1/413.2
Units: $\mu\text{g/L}$ (ppb) *M*

Sample Name	Lab Code	MRL	Result
MW-1 (19)	SJ940372-2	0.5	<0.6 *
Method Blank	SJ940405-WMB	0.5	ND

* Raised MRL due to insufficient sample volume

Approved By *K. DeWitt* Date *April 11, 1994*

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: IWM
Project: ARCO Facility No. 6113
Sample Matrix: Water

Dates Collected: 3/25/94
Date Received: 3/28/94
Date Extracted: N/A
Date Analyzed: 4/4, 5/94
Service Request: SJ94-0372

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

Analyte:	Benzene	Toluene	Ethyl- benzene	Total Xylenes	TPH as Gasoline
Units:	µg/L (ppb)	µg/L (ppb)	µg/L (ppb)	µg/L (ppb)	µg/L (ppb)
Method Reporting Limit:	0.5	0.5	0.5	0.5	50

<u>Sample Name</u>	<u>Lab Code</u>					
MW-1 (19)	SJ940372-2	ND	ND	ND	ND	ND
MW-2 (18)	SJ940372-3	ND	ND	ND	ND	ND
MW-3 (18)	SJ940372-4	ND	ND	ND	ND	ND
MW-4 (19.3)	SJ940372-5	5.4	ND	1.6	1.7	480.
MW-5 (21)	SJ940372-6	36.	1.5	4.8	5.7	780.
MW-6 (19)	SJ940372-7	<2.5 *	<2.5 *	<2.5 *	4.6	530.
MW-7 (19)	SJ940372-8	ND	ND	ND	ND	ND
MW-8 (19.5)	SJ940372-9	ND	ND	ND	ND	ND
MW-9 (17)	SJ940372-10	ND	ND	ND	ND	ND
MW-10 (20)	SJ940372-11	ND	ND	ND	ND	ND
MW-11 (19)	SJ940372-12	ND	ND	ND	ND	ND
MW-12 (19)	SJ940372-13	ND	ND	ND	ND	ND
Method Blank	SJ940405-WMB	ND	ND	ND	ND	ND
Method Blank	SJ940406-WMB	ND	ND	ND	ND	ND

* Raised MRL due to high analyte concentration requiring sample dilution.

Approved By:

K. O. Murphy

Date:

April 11, 1994

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IWM
Project: ARCO Facility No. 6113
Sample Matrix: Water

Date Collected: 3/25/94
Date Received: 3/28/94
Date Extracted: 4/5/94
Date Analyzed: 4/8/94
Service Request: SJ94-0372

Matrix Spike/Duplicate Matrix Spike Summary
EPA Methods 9071/418.1
Units: µg/L (ppb)

Sample Name:

<u>Analyte</u>	<u>Spike Level</u>	<u>Sample Result</u>	<u>Spike Result</u>		<u>Percent Recovery</u>		<u>Acceptance Criteria</u>
			<u>MS</u>	<u>DMS</u>	<u>MS</u>	<u>DMS</u>	
Hydrocarbon Mix	8.0	ND	8.5	7.7	98.	88.	57-127

SM Standard Methods for the Examination of Water and Wastewater, 18th Ed., 1993.

Approved By: K. O. Murphy

Date: April 11, 1994

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IWM
 Project: ARCO Facility No. 6113
 Sample Matrix: Water

Dates Collected: 3/25/94
 Date Received: 3/28/94
 Date Extracted: N/A
 Date Analyzed: 4/4, 5/94
 Service Request: SJ94-0372

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

<u>Sample Name</u>	<u>Lab Code</u>	<u>Percent Recovery</u> a,a,a-Trifluorotoluene
MW-1 (19)	SJ940372-2	82.
MW-2 (18)	SJ940372-3	83.
MW-3 (18)	SJ940372-4	74.
MW-4 (19.3)	SJ940372-5	94.
MW-5 (21)	SJ940372-6	95.
MW-6 (19)	SJ940372-7	94.
MW-7 (19)	SJ940372-8	81.
MW-8 (19.5)	SJ940372-9	75.
MW-9 (17)	SJ940372-10	81.
MW-10 (20)	SJ940372-11	73.
MW-11 (19)	SJ940372-12	93.
MW-12 (19)	SJ940372-13	74.
MW-1 (19) MS	SJ940372-2MS	85.
MW-1 (19) DMS	SJ940372-2DMS	79.
Method Blank	SJ940405-WMB	87.
Method Blank	SJ940406-WMB	87.

CAS Acceptance Limits: 62-112

Approved By: *Robert Murphy*

Date: *April 11, 1994*

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IWM
Project: ARCO Facility No. 6113
Sample Matrix: Water

Dates Collected: 3/25/94
Date Received: 3/28/94
Date Extracted: N/A
Date Analyzed: 4/4/94
Service Request: SJ94-0372

Initial Calibration Verification
BTEX and TPH as Gasoline
EPA Methods 5030/8020/California DHS LUFT Method
Units: µg/L (ppb)

<u>Analyte</u>	<u>True Value</u>	<u>Result</u>	<u>Percent Recovery</u>	<u>CAS Acceptance Criteria</u>
Benzene	25.	24.8	99.	85-115
Toluene	25.	24.7	99.	85-115
Ethylbenzene	25.	24.5	98.	85-115
Total Xylenes	75.	74.9	100.	85-115
TPH as Gasoline	250.	258.	103.	90-110

Approved By:

K. O. Murphy

Date:

April 11, 1994

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IWM
Project: ARCO Facility No. 6113
Sample Matrix: Water

Dates Collected: 3/25/94
Date Received: 3/28/94
Date Extracted: N/A
Date Analyzed: 4/4/94
Service Request: SJ94-0372

Matrix Spike/Duplicate Matrix Spike Summary
TPH as Gasoline
EPA Methods 5030/California DHS LUFT Method
Units: µg/L (ppb)

Sample Name:

<u>Analyte</u>	<u>Spike Level</u>	<u>Sample Result</u>	<u>Percent Recovery</u>				<u>CAS Acceptance Criteria</u>
			<u>MS</u>	<u>DMS</u>	<u>MS</u>	<u>DMS</u>	
TPH as Gasoline	250.	ND	239.	246.	96.	98.	67-121

Approved By:

K. O. Murphy

Date:

April 11, 1994

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: IWM
Project: ARCO Facility No. 6113
Sample Matrix: Water

Dates Collected: 3/25/94
Date Received: 3/28/94
Date Extracted: N/A
Date Analyzed: 4/4/94
Service Request: SJ94-0372

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

Sample Name:

Percent Recovery

CAS

Acceptance

<u>Analyte</u>	<u>Spike Level</u>	<u>Sample Result</u>	<u>Spike Result</u>		<u>Percent Recovery</u>		<u>Acceptance Criteria</u>
			<u>MS</u>	<u>DMS</u>	<u>MS</u>	<u>DMS</u>	
Benzene	25.	ND	25.8	26.5	103.	106.	75-135
Toluene	25.	ND	25.4	26.3	102.	105.	73-136
Ethylbenzene	25.	ND	25.3	25.9	101.	104.	69-142

Approved By:

K. O. Murphy

Date:

April 11, 1994

