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TRANSMITTAL

TO: MS. SUSAN HUGO
ACDOEH
80 SWAN WAY, ROOM 200
OAKLAND, CALIFORNIA 94621

DATE: 3/6/92
PROJECT NUMBER: 69028.05
SUBJECT: ARCO STATION 6113,
100 WEST SUMMIT BOULEVARD,
LIVERMORE, CALIFORNIA.

FROM: JOEL COFFMAN
TITLE: PROJECT GEOLOGIST

WE ARE SENDING YOU Attached Under separate cover via _____ the following items:
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1	3/6/92		FINAL-LETTER REPORT ON FOURTH QUARTER 1991
			GROUNDWATER MONITORING REPORT FOR THE ABOVE
			SUBJECT SITE.

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REMARKS: A COPY OF THIS REPORT HAS BEEN FORWARDED TO YOU AT
THE REQUEST OF MR. CHUCK CARMEL, ARCO PRODUCTS COMPANY.

Copies: 1 to project file no. 69028.05

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LETTER REPORT
QUARTERLY GROUNDWATER MONITORING
Fourth Quarter 1991
at
ARCO Station 6113
785 East Stanley Boulevard
Livermore, California

69028.05



January 14, 1992

92 JAN 15 PM 2:17

Mr. Edgar Howell
Alameda County Department of Environmental Health
80 Swan Way
Oakland, California 94621

ARCO Products Company Facilities in Alameda County

Dear Mr. Howell:

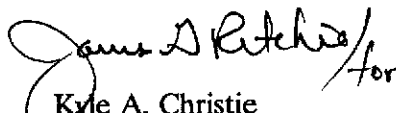
Please find attached, Quarterly Summary Reports (QSRs) for ARCO Products Company Service Stations in Alameda County. The QSRs summarize activities conducted by ARCO at the respective sites during the fourth quarter of 1991; also included are projected site activities for the first quarter of 1992 and a bibliography of reports submitted for each location.

The QSRs are classified by city and address within Alameda County. We are submitting this document and attached QSRs as agreed. Please note that we are forwarding copies of the QSRs to the Regional Water Quality Control Board (RWQCB).

Please note that ARCO Products Company has reviewed the RWQCB's February 19, 1991 printout of ARCO fuel leak sites. We have evaluated each site with respect to ARCO's responsibility for investigation, monitoring, and/or remediation. Those locations for which ARCO is not responsible were listed and described in the QSR package delivered to you on July 15, 1991. The attached QSRs therefore represent only those locations for which ARCO is responsible.

ARCO is planning a subsequent comprehensive QSR submittal for ARCO sites on April 15, 1992. Please do not hesitate to contact us with any questions regarding this submittal.

Sincerely yours,


for
Kyle A. Christie
Environmental Engineer

Attachments: ARCO Facility QSRs

REPORTDATECONSULTANT

Fourth Quarter 1991 Groundwater
Monitoring Report
69028.05

11/20/91

RESNA

Third Quarter 1991 Groundwater
Monitoring Report
69028.05

10/18/91

RESNA/Applied
GeoSystems

Work Plan for Additional Subsurface
Investigation and Vapor Extraction
Test
69028.06

10/17/91

RESNA

Letter Report Quarterly Ground-Water
Monitoring Second Quarter 1991
69028.03

7/11/91

RESNA

Letter Report Quarterly Ground-Water
Monitoring First Quarter 1991
69028.05

4/23/91

RESNA

Site Safety Plan for ARCO Station 6113
AGS 69028-4S

2/14/91

Applied GeoSystems

Letter Report, Quarterly Ground-Water
Monitoring Fourth Quarter 1990
AGS Report 69028-3

1/27/91

Applied GeoSystems

Addendum to Work Plan
for ARCO Station 6113
AGS 69028-4

12/16/90

Applied GeoSystems

Letter Report, Quarterly Ground-Water
Monitoring Third Quarter 1990
AGS Report 69028-3

11/2/90

Applied GeoSystems

Letter Report, Quarterly Ground-Water
Monitoring Second Quarter 1990
AGS Report 69028-3

8/29/90

Applied GeoSystems

Limited Subsurface Environmental
Investigation
AGS Report 69028-2

12/6/89

Applied GeoSystems

Work Plan - Limited Subsurface
Environmental Investigation
AGS Report 69028-1W

7/18/89

Applied GeoSystems

ARCO Station 6113, 785 E. Stanley
Boulevard, Livermore, California
Project 330-53.01

4/25/89

Pacific Environmental
Group



A RESNA Company

RESNA

Working To Restore Nature

3315 Almaden Expressway, Suite 34
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Phone: (408) 264-7723
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March 6, 1992
0305ccar
69028.05

Mr. Chuck Carmel
Environmental Engineer
ARCO Products Company
P.O. Box 5811
San Mateo, California 94402

Subject: Fourth Quarter 1991 Groundwater Monitoring Report for ARCO Station
6113, 785 East Stanley Boulevard, Livermore, California.

Mr. Carmel:

As requested by ARCO Products Company (ARCO), this letter report summarizes the methods and results of fourth quarter 1991 groundwater monitoring performed by RESNA Industries, Inc. (formerly Applied GeoSystems [AGS]) at the above-referenced site. The station is on the southwestern corner of the intersection of East Stanley and Murrieta Boulevards in Livermore, California, as shown on the Site Vicinity Map, Plate 1. ARCO has contracted with RESNA to perform monthly water level measurements and quarterly groundwater sampling and analyses to monitor fluctuations in the groundwater gradient and petroleum hydrocarbon concentrations in groundwater at the site, and to evaluate trends related to fluctuations over time.

Prior to the present monitoring, Pacific Environmental Group (Pacific) and RESNA performed limited subsurface environmental investigations related to the former underground waste-oil storage tank at the site. Pacific performed soil sampling and observation during removal of the waste-oil tank in January 1989 (Pacific, April 1989). Work by RESNA included installation of three groundwater monitoring wells (MW-1, MW-2, and MW-3) in September 1989 (AGS, December 1989) and installation of one groundwater monitoring well (MW-4) downgradient of the former waste-oil tank in February 1991 (AGS, April 16, 1991). Quarterly groundwater sampling of wells MW-1 through MW-3 was initiated in June 1990; quarterly groundwater sampling of well MW-4 was initiated in February 1991. The results of these investigations are presented in the reports listed in the references attached to this letter report. The locations of the groundwater monitoring wells and pertinent site features are shown on the Generalized Site Plan, Plate 2.

Groundwater Sampling and Gradient Evaluation

RESNA personnel performed monthly water level measurements on October 22 and November 13, 1991, and quarterly groundwater monitoring on November 13, 1991. Field work consisted of measuring depth-to-water (DTW) levels in wells MW-1 through MW-4 and subjectively analyzing water from these wells for the presence of sheen and floating product. Purging and sampling of wells MW-1, MW-2, and MW-4 was not performed because the wells were dry; well MW-2 was not purged and sampled because it contained only residual water (0.2 gallon) and would not provide a representative groundwater sample.

Groundwater elevations and gradient could not be determined from this quarter's groundwater monitoring data because wells MW-1, MW-3, and MW-4 were dry and well MW-2 contained only residual water, which did not provide accurate data for determining groundwater elevation. The DTW measurements, wellhead elevations, and groundwater elevations of present and prior groundwater monitoring episodes are presented in Table 1, Cumulative Groundwater Monitoring Data. The decrease in groundwater elevations may be the result of the abnormally dry seasonal conditions or localized pumping of groundwater.

No subjective evidence of floating product or product sheen was observed in any of the wells this quarter. Cumulative results of subjective analyses are presented in Table 1.

Conclusions and Recommendations

Groundwater levels have continued to decrease, possibly due to the abnormally dry seasonal conditions or localized pumping. RESNA recommends monthly monitoring of groundwater elevations and quarterly sampling of the groundwater when feasible. When groundwater elevations rise to sufficient levels to sample the wells, water samples will be collected once each quarter and submitted to a laboratory for analyses of total petroleum hydrocarbons-gasoline (TPHg) and benzene, toluene, ethylbenzene, and xylenes (BTEX) by Environmental Protection Agency (EPA) Methods 5030/8015/602 and total oil and grease (TOG) by Standard Method 5520 B/F. Routine well maintenance and quality control will be performed as necessary during these visits. Reports of monitoring will be submitted each quarter. A work plan for an additional subsurface investigation and vapor extraction test (VET) was submitted to Alameda County Health Care Services Agency (ACHCSA) and the California Regional Water Quality Control Board (RWQCB) on October 17, 1991. An addendum to the work plan was submitted to the ACHCSA per Ms. Susan Hugo's request on March 3, 1992. Work on the site will be scheduled upon approval of the work plan and addendum.

Schedule

At ARCO's request, RESNA will continue the quarterly groundwater monitoring at this site to evaluate trends in petroleum hydrocarbon concentrations and monthly DTW monitoring to evaluate changes in the groundwater gradient with time. Routine well maintenance and quality control will be performed as necessary during these site visits. The next quarterly monitoring episode is scheduled for February 1992.

Copies of this report should be forwarded to:

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

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

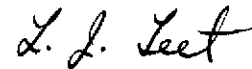
Ms. Danielle Stefani
Livermore Fire Department
4550 East Avenue
Livermore, California 94550

Quarterly Groundwater Monitoring
ARCO Station 6113, 785 East Stanley Boulevard, Livermore, CA

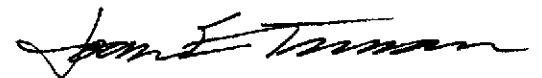
March 6, 1992
69028.05

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

Sincerely,
RESNA



Lou Leet
Geologic Technician



Joan E. Tiernan
Registered Civil Engineer
No. 044600

Enclosures: References

Plate 1, Site Vicinity Map
Plate 2, Generalized Site Plan

Table 1, Cumulative Groundwater Monitoring Data
Table 2, Cumulative Results of Groundwater Laboratory Analyses

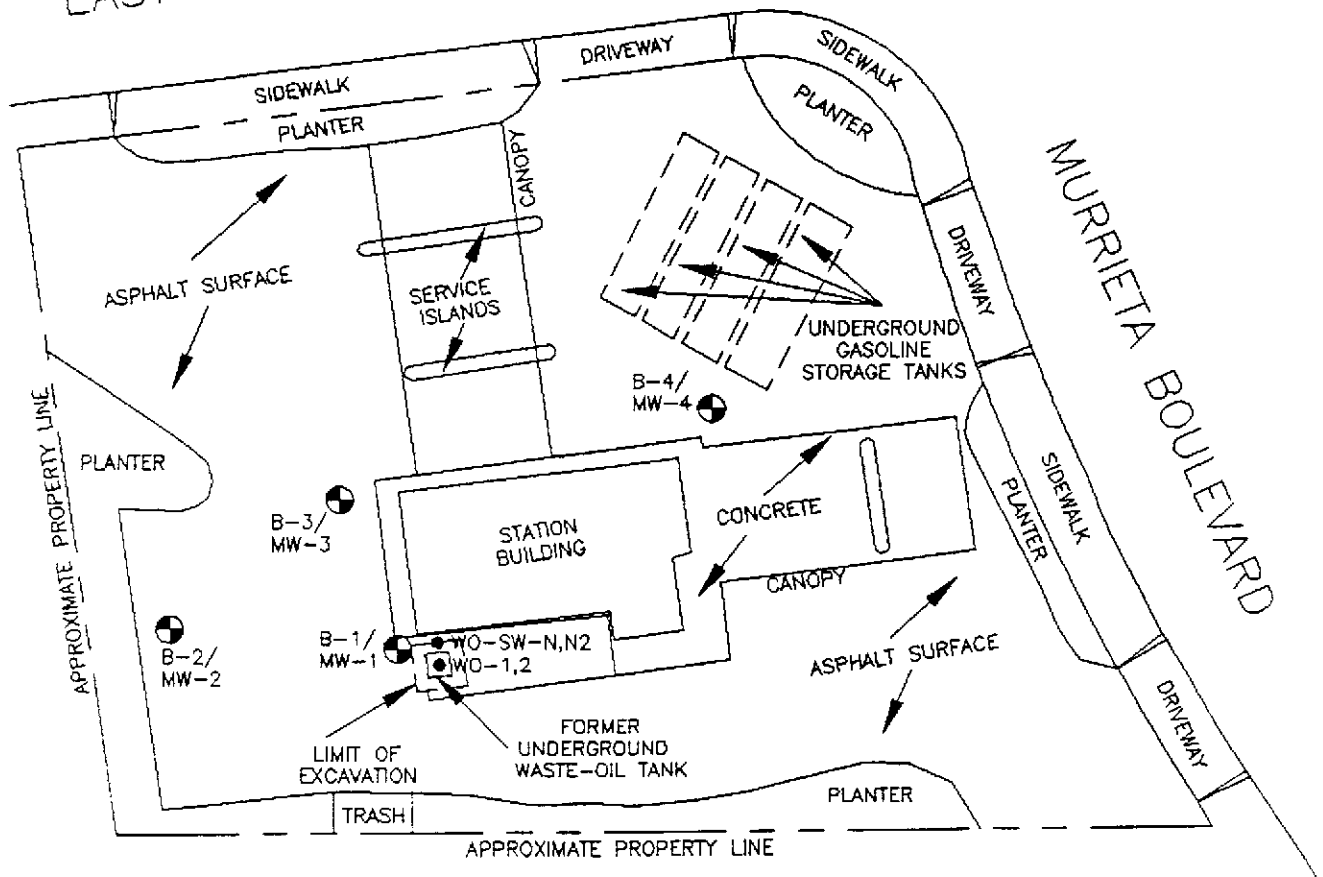
Appendix A, Groundwater Sampling Protocol

cc: H.C. Winsor, ARCO Products Company

REFERENCES

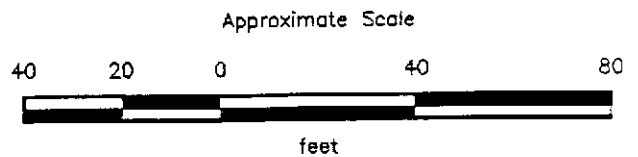
- Applied GeoSystems. July 11, 1991. Letter Report, Quarterly Ground-Water Monitoring Second Quarter 1991 at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. AGS Report 69028-5.
- Applied GeoSystems. April 24, 1991. Letter Report, Quarterly Ground-Water Monitoring First Quarter 1991 at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. AGS Report 69028-3.
- Applied GeoSystems. April 16, 1991. Limited Subsurface Environmental Investigation Related to the Former Waste-Oil Tank at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. AGS Report 69028-4.
- Applied GeoSystems. January 27, 1991. Letter Report, Quarterly Ground-Water Monitoring Fourth Quarter 1990 at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. AGS Report 69028-3.
- Applied GeoSystems. November 2, 1990. Letter Report, Quarterly Ground-Water Monitoring Third Quarter 1990 at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. AGS Report 69028-3.
- Applied GeoSystems. August 29, 1990. Letter Report, Quarterly Ground-Water Monitoring Second Quarter 1990 at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. AGS Report 69028-3.
- Applied GeoSystems. December 6, 1989. Limited Subsurface Environmental Investigation at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. AGS Report 69028-2.
- California Department of Health Services, Office of Drinking Water, October 22, 1990, "Summary of California Drinking Water Standards", Berkeley, California.
- Pacific Environmental Group. April 25, 1989. ARCO Station 6113, 785 E. Stanley Boulevard, Livermore, California. Project 330-53.01
- RESNA. October 18, 1991. Letter Report, Quarterly Groundwater Monitoring at ARCO Station 6113, 785 East Stanley Boulevard, Livermore, California. 69028.05

EAST STANLEY BOULEVARD



EXPLANATION

- WO-SW-N,N2 ● = Soil sample collected by Pacific (1989)
- B-4/MW-4 ⊕ = Boring/monitoring well (Applied GeoSystems, September 1989 and February 1991)



Source: Modified from plan supplied by Ron Archer, Civil Engineer Inc., February 1991

RESNA

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

PLATE

2

PROJECT: 69028.05

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

<u>Well</u> 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
<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
<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

See notes on Page 2 of 2.

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

Well Date	Elevation of Wellhead	Depth to Water	Elevation of Groundwater	Floating Product
<u>MW-3 Continued</u>				
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
<u>MW-4</u>				
02/21/91	456.97	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		37.93	419.04	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

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.

Depth-to-water measurements in feet below the top of the well casing.

* Residual water.

TABLE 2
 CUMULATIVE RESULTS OF GROUNDWATER LABORATORY ANALYSES
 ARCO Station 6113
 785 East Stanley Boulevard
 Livermore, California
 (Page 1 of 2)

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			
<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			
<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			
<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			
<u>Jan. 1990</u>					
MCLs	None	1.0	None	680	1,750
ALs	None	--	100	None	None

See Notes on Page 2 of 2

TABLE 2
 CUMULATIVE RESULTS OF GROUNDWATER LABORATORY ANALYSES
 ARCO Station 6113
 785 East Stanley Boulevard
 Livermore, California
 (Page 2 of 2)

Well	TPHd	TOG
Date		
<u>MW-1</u>		
09/20/89	<50	<5,000
06/21/90	<100	13,000
09/20/90	<50	<5,000
12/18/90	NA	<5,000
02/21/91	NA	<5,000
05/20/91	NA	<75,000
08/13/91	NS	NS
11/13/91	NS	NS
<u>MW-2</u>		
09/20/89	<50	<5,000
06/21/90	<100	<5,000
09/20/90	<50	<5,000
12/18/90	NA	<5,000
02/21/91	NA	<5,000
05/20/91	NA	<75,000
08/13/91	NS	NS
11/13/91	NS	NS
<u>MW-3</u>		
09/20/89	<50	<5,000
06/21/90	<100	10,000
09/20/90	<50	<5,000
12/18/90	NA	<5,000
02/21/91	NA	<5,000
05/20/91	NA	<75,000
08/13/91	NS	NS
11/13/91	NS	NS
<u>MW-4</u>		
02/21/91	NA	<5,000
05/20/91	NA	<75,000
08/13/91	NS	NS
11/13/91	NS	NS

Results in parts per billion (ppb).

TPHg = Total petroleum hydrocarbons as gasoline

TPHd = Total petroleum hydrocarbons as diesel

TOG = Total Oil and Grease

< = Less than the detection limits shown.

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

Als = Recommended Drinking Water Action Levels, DHS (October 1990)

NA = Not Analyzed

NS = Not Sampled Due to Lack of Water in Well

GROUNDWATER SAMPLING PROTOCOL

The static water level in each well was measured with a Solinist® water level indicator; this instrument is accurate to the nearest 0.01 foot. These groundwater depths were subtracted from wellhead elevations measured in February 1991 by Ron Archer, Civil Engineer, Inc., of Pleasanton, California, a licensed land surveyor, to calculate the differences in groundwater elevations.

Water samples collected for subjective evaluation were collected (when possible) by gently lowering approximately half the length of a new, disposable bailer past the air-water interface and collecting a sample from near the surface to the water in the well. The samples were checked for measurable floating hydrocarbon product.