

ARCO QUARTERLY GROUNDWATER MONITORING REPORT 3RD QUARTER 2001

01 SEP 24 AM 09

Facility No:	0855
Address:	4603 Ocean Beach Highway Longview, Washington
ARCO Environmental Engineer:	Mr. Chuck Hutchens
Consulting Co./Contact Person:	SECOR International Incorporated/Scott Miller
Consultant Project No.:	015.08921.703
Primary Agency:	Washington Department of Ecology (Ecology)
Ecology LUST File No:	5421

WORK PERFORMED 3RD QUARTER 2001:

1. Groundwater monitoring and sampling of wells MW-1 through MW-7 on July 17, 2001.

WORK PROPOSED FOR 4TH QUARTER 2001:

1. Quarterly groundwater monitoring and sampling.

Current Phase of Project:	Groundwater monitoring
Is Free Product (FP) Present On-Site:	No
FP Recovered this Quarter (gallons):	Not applicable (NA)
Cumulative FP Recovered to Date (gallons):	NA
Current Remediation Techniques:	NA
Approximate Depth to Groundwater (feet below top of casing):	5.08 (MW-2) to 7.50 (MW-4).
Groundwater Gradient (direction):	East
Groundwater Gradient (magnitude):	0.03 ft/ft

DISCUSSION:

Groundwater monitoring field activities conducted on July 17, 2001 included measuring the water levels and collecting groundwater samples from MW-1 through MW-7. The water samples collected from MW-1 through MW-7 were analyzed for benzene, toluene, ethylbenzene, and total xylenes (BTEX) by Environmental Protection Agency (EPA) Method 8021B and gasoline-range hydrocarbons (TPH-G) by NW TPH-Gx Method. The groundwater samples were collected under field procedures in accordance with SECOR's standard operating procedures for quality assurance and quality control. Samples were transported to the laboratory using strict chain-of-custody protocols.

Benzene was detected at concentrations above the laboratory method reporting limit (MRL) in monitoring wells MW-3, MW-4 and MW-5 at 10,100 micrograms per liter ($\mu\text{g/L}$), 1,610 $\mu\text{g/L}$, and 1.83 $\mu\text{g/L}$, respectively. TPH-G was detected above the laboratory MRL in all of the sampled wells at concentrations ranging from 275 $\mu\text{g/L}$ (MW-7) to 940,000 $\mu\text{g/L}$ (MW-3). Groundwater levels and concentrations found in monitoring wells are relatively consistent with previous monitoring events.

Based on a review of the laboratory reports, it appears that the submitted water samples were analyzed within the specified holding times, and that the appropriate quality assurance/quality control (QA/QC) procedures were followed during analysis. A summary of the laboratory analytical results is presented in Table 2 and Figure 2. A complete copy of the laboratory report and chain-of-custody documentation are also attached.

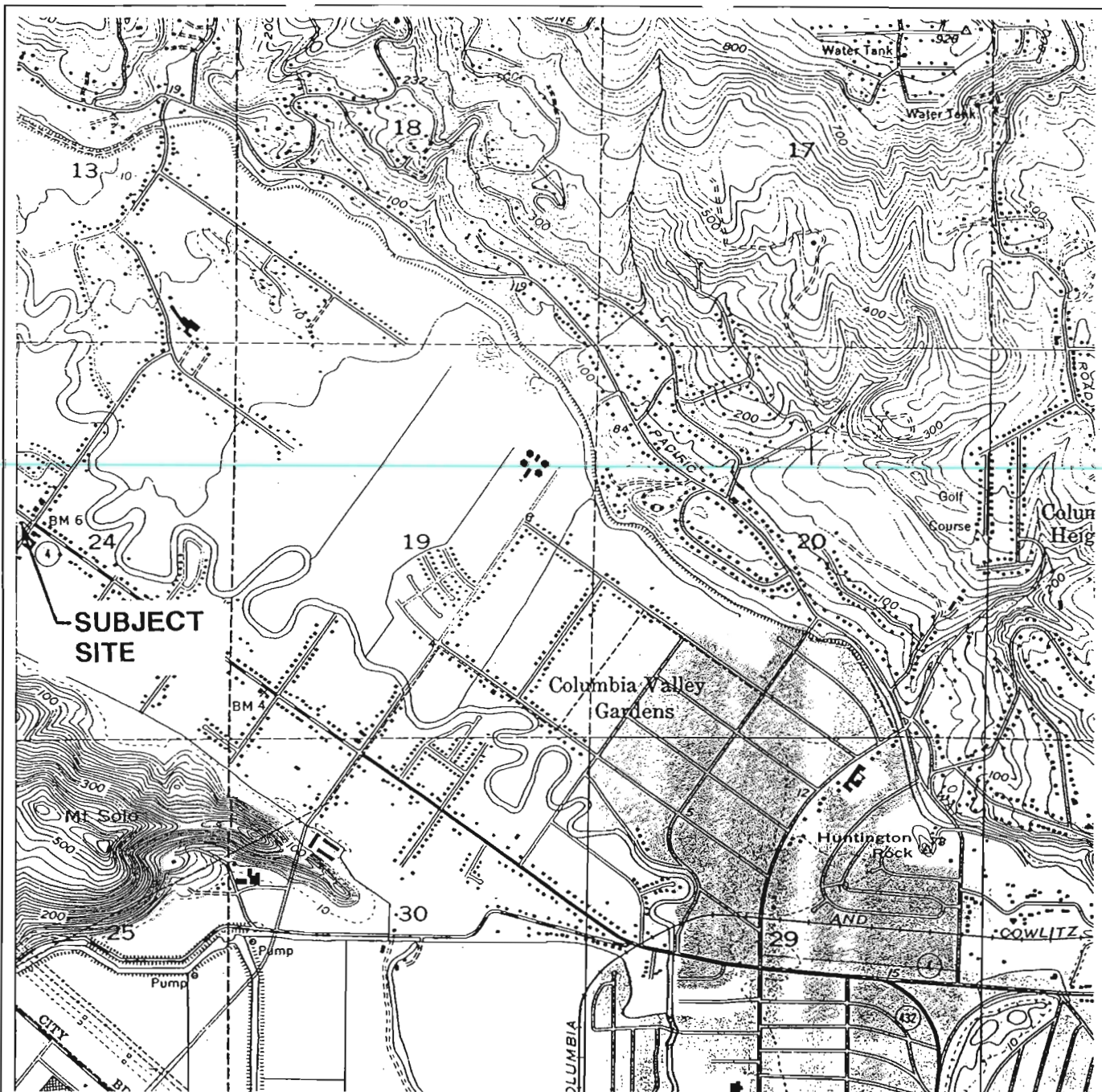
ATTACHMENTS:

- Figure 1: Site Location Map
- Figure 2: Groundwater Contour and Groundwater Analytical Results Map
- Table 1: Historical Water Sample Analyses
- Table 2: Historical Water Level Elevations
- Laboratory Report and Chain of Custody
- Groundwater Sampling Field Data Sheets

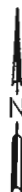
cc: Ms. Patty Martin, Washington Department of Ecology, Olympia, Washington
Mr. David McDowell, Attorney for Wakefield Trust, Vancouver, Washington



FIGURES



QUADRANGLE LOCATION



REFERENCE: USGS 7.5 MINUTE QUADRANGLE; KELSO, WASHINGTON; 1970

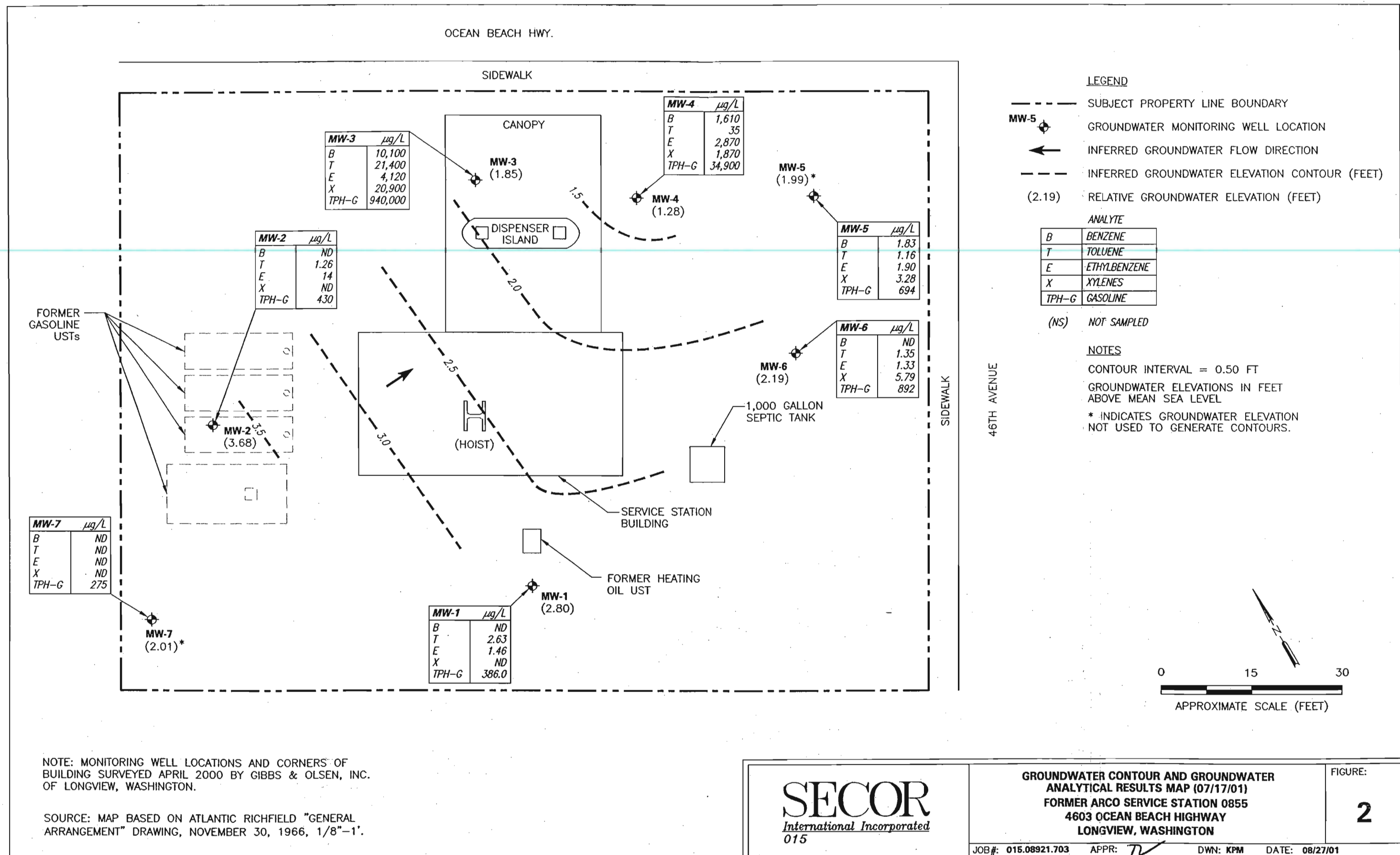
SECOR
International Incorporated
 015

SITE LOCATION MAP
FORMER ARCO SERVICE STATION 0855
4803 OCEAN BEACH HIGHWAY
LONGVIEW, WASHINGTON

FIGURE:

1

JOB#: 015.08698.702 APPR: CWG DWN: KPM DATE: 07/28/00



TABLES

Table 1. Historical Water Sample Analyses
Former ARCO Station No. 0855
4603 Ocean Beach Highway, Longview, Washington

Well Number	Sample Date	BTEX (µg/L)				VOCs (µg/L)				TPH-G (µg/L)	TPH-D (µg/L)	TPH-O (µg/L)
		Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	EDB	EDC	MTBE			
MW-1	03/27/00	ND	ND	ND	ND	—	—	—	—	ND	ND	ND
	05/23/00	ND	ND	ND	ND	—	—	—	—	ND	—	—
	07/20/00	ND	ND	ND	ND	—	—	—	—	ND	—	—
	10/18/00	ND	ND	1.61	ND	—	—	—	—	404	—	—
	01/18/01	ND	ND	ND	ND	ND	ND	ND	ND	95.6	—	—
	04/18/01	ND	ND	ND	ND	4.30	ND	ND	ND	—	—	—
	07/17/01	ND	2.63	1.46	ND	—	—	—	—	386.0	—	—
MW-2	03/27/00	6.89	49.5	599	2,490	—	—	—	—	17,100	ND	ND
	05/23/00	26.2	16.2	614	1,770	—	—	—	—	13,200	—	—
	07/20/00	11.9	11.8	304	330	—	—	—	—	7,220	—	—
	10/18/00	3.67	1.23	13.9	7.55	—	—	—	—	743	—	—
	01/18/01	ND	ND	41.1	5.62	ND	ND	ND	ND	691	—	—
	04/18/01	ND	ND	8.73	ND	ND	ND	ND	ND	—	—	—
	07/17/01	ND	1.26	14	ND	—	—	—	—	430	—	—
MW-3	03/27/00	7,520	12,900	2,780	14,500	—	—	—	—	93,700	ND	ND
	05/23/00	4,710	8,330	2,280	11,200	—	—	—	—	65,200	—	—
	07/20/00	10,700	22,600	3,160	17,400	—	—	—	—	145,000	—	—
	10/18/00	12,900	33,000	4,890	26,700	—	—	—	—	179,000	—	—
	01/18/01	9,380	17,200	3,940	20,230	607	ND	155	ND	121,000	—	—
	04/18/01	7,700	15,300	3,430	16,990	405	ND	101	ND	—	—	—
	07/17/01	10,100	21,400	4,120	20,900	—	—	—	—	940,000	—	—
MW-4	11/15/00 ^a	1,310	53.6	2,430	7,250	—	—	—	—	45,500	—	—
	01/18/01	1,130	ND	2,030	2,764	331	ND	ND	ND	29,400	—	—
	04/18/01	1,280	ND	1,700	2,591	289	ND	ND	ND	—	—	—
	07/17/01	1,610	35	2,870	1,870	—	—	—	—	34,900	—	—

Table 1. Historical Water Sample Analyses
Former ARCO Station No. 0855
4603 Ocean Beach Highway, Longview, Washington

Well Number	Sample Date	BTEX (µg/L)				VOCs (µg/L)				TPH-G (µg/L)	TPH-D (µg/L)	TPH-O (µg/L)
		Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	EDB	EDC	MTBE			
MW-5	11/15/00 ^a	ND	ND	ND	ND	—	—	—	—	ND	—	—
	01/18/01	ND	ND	ND	ND	2.44	ND	ND	ND	786	—	—
	04/18/01	9.42	ND	6.76	10.1	2.42	ND	ND	ND	—	—	—
	07/17/01	1.83	1.16	1.90	3.28	—	—	—	—	694	—	—
MW-6	11/15/00 ^a	ND	ND	ND	ND	—	—	—	—	131	—	—
	01/18/01	ND	ND	ND	ND	ND	ND	ND	ND	732	—	—
	04/18/01	ND	ND	ND	ND	ND	ND	ND	ND	—	—	—
	07/17/01	ND	1.35	1.33	5.79	—	—	—	—	892	—	—
MW-7	11/15/00 ^a	ND	ND	ND	1.35	—	—	—	—	113	—	—
	01/18/01	ND	ND	ND	ND	ND	ND	ND	ND	242	—	—
	04/18/01	ND	ND	ND	ND	ND	ND	ND	ND	—	—	—
	07/17/01	ND	ND	ND	ND	—	—	—	—	275	—	—
Current Laboratory MRLs		0.5	0.5	0.5	1.0	—	—	—	—	80	—	—

ND or < = Less than laboratory method reporting limit (MRL).

— = Not sampled or not available.

Benzene, toluene, ethylbenzene, and total xylenes (BTEX) analysis by EPA Method 8021B.

VOCs analyzed by EPA Method 8062B.

EDB = 1,2-dibromoethane and EDC = 1,2-dichloroethane.

Total petroleum hydrocarbons-gasoline range (TPH-G) analysis by Method NWTPH-Gx.

TPH-diesel range (TPH-D) and TPH-oil range (TPH-O) analysis by Method NWTPH-Dx.

^a Monitoring wells MW-4 through MW-7 were installed on October 24 and sampled on November 15, 2000.

Note: Results in micrograms per liter (µg/L), or approximately parts per billion (ppb).

Table 2. Historical Water Level Elevations
Former ARCO Service Station No. 0855
4603 Ocean Beach Highway, Longview, Washington

Well Number/ TOC Elevation ^a (feet)	Date Measured	Static Water Level (feet BTOC) ^b	Floating Product Thickness (feet)	Groundwater Elevation (feet) ^c	Change in Water Level Elevation (feet)
MW-1 8.34	03/27/00	4.36	0.00	3.98	— ^d
	05/23/00	5.20	0.00	3.14	-0.84
	07/20/00	5.55	0.00	2.79	-0.35
	10/18/00	5.41	0.00	2.93	0.14
	01/18/01	4.81	0.00	3.53	0.60
	04/18/01	4.58	0.00	3.76	0.23
	07/17/01	5.54	0.00	2.80	-0.96
MW-2 8.76	03/27/00	3.61	0.00	5.15	—
	05/23/00	4.64	0.00	4.12	-1.03
	07/20/00	5.06	0.00	3.70	-0.42
	10/18/00	5.19	0.00	3.57	-0.13
	01/18/01	3.96	0.00	4.80	1.23
	04/18/01	3.83	0.00	4.93	0.13
	07/17/01	5.08	0.00	3.68	-1.25
MW-3 8.78	03/27/00	5.61	0.00	3.17	—
	05/23/00	6.46	0.00	2.32	-0.85
	07/20/00	7.05	0.00	1.73	-0.59
	10/18/00	6.84	0.00	1.94	0.21
	01/18/01	6.37	0.00	2.41	0.47
	04/18/01	5.46	0.00	3.32	0.91
	07/17/01	6.93	0.00	1.85	-1.47
MW-4 8.78	11/15/00 ^e	6.88	0.00	1.90	—
	01/18/01	6.78	0.00	2.00	0.10
	04/18/01	6.90	0.00	1.88	-0.12
	07/17/01	7.50	0.00	1.28	-0.60
MW-5 8.78	11/15/00 ^e	6.54	0.00	2.24	—
	01/18/01	6.07	0.00	2.71	0.47
	04/18/01	5.46	0.00	3.32	0.61
	07/17/01	6.79	0.00	1.99	-1.33
MW-6 8.21	11/15/00 ^e	6.15	0.00	2.06	—
	01/18/01	5.85	0.00	2.36	0.30
	04/18/01	5.70	0.00	2.51	0.15
	07/17/01	6.02	0.00	2.19	-0.32

Table 2. Historical Water Level Elevations
Former ARCO Service Station No. 0855
4603 Ocean Beach Highway, Longview, Washington

Well Number/ TOC Elevation ^a (feet)	Date Measured	Static Water Level (feet BTOC) ^b	Floating Product Thickness (feet)	Groundwater Elevation (feet) ^c	Change in Water Level Elevation (feet)
MW-7 8.45	11/15/00 ^e	6.52	0.00	1.93	—
	01/18/01	6.24	0.00	2.21	0.28
	04/18/01	5.98	0.00	2.47	0.26
	07/17/01	6.44	0.00	2.01	-0.46

a Top of casing (TOC) elevations, NAVD, 1988

b Measurements in feet below top of well casing.

c Elevation relative to mean sea level. Static water level corrected if floating product thickness (FPT) is present; corrected water level elevation = TOC - Static Water Level + (FPT x 0.80).

d — = Data not applicable or not measured.

e Monitoring wells MW-4 through MW-7 were installed on October 24 and measured on November 15, 2000.

**LABORATORY REPORT AND
CHAIN OF CUSTODY**



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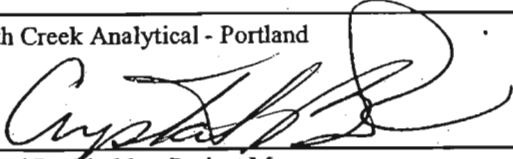
Project: ARCO #0855, Longview, WA
Project Number: 015.08921
Project Manager: Scott Miller

Reported:
07/24/01 09:42

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-1-0855	P1G0634-01	Water	07/17/01 10:26	07/18/01 17:50
MW-2-0855	P1G0634-02	Water	07/17/01 10:53	07/18/01 17:50
MW-3-0855	P1G0634-03	Water	07/17/01 11:08	07/18/01 17:50
MW-4-0855	P1G0634-04	Water	07/17/01 11:00	07/18/01 17:50
MW-5-0855	P1G0634-05	Water	07/17/01 10:47	07/18/01 17:50
MW-6-0855	P1G0634-06	Water	07/17/01 10:41	07/18/01 17:50
MW-7-0855	P1G0634-07	Water	07/17/01 10:34	07/18/01 17:50
TB	P1G0634-08	Water	07/17/01 12:00	07/18/01 17:50

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Crystal Burkholder, Project Manager

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Project: ARCO #0855, Longview, WA
Project Number: 015.08921
Project Manager: Scott Miller

Reported:
07/24/01 09:42

Gasoline Hydrocarbons per NW TPH-Gx Method and BTEX per EPA Method 8021B
North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
MW-1-0855 (P1G0634-01) Water						Sampled: 07/17/01 Received: 07/18/01			
Benzene	ND	0.500	ug/l	1	NW-G, 8021B	07/19/01	07/19/01	1071424	
Toluene	2.63	0.500	"	"	"	"	"	"	
Ethylbenzene	1.46	0.500	"	"	"	"	"	"	
Xylenes (total)	ND	1.00	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	386	80.0	"	"	"	"	"	"	
Surr: 4-BFB (FID)	104 %	50-150							
Surr: 4-BFB (PID)	111 %	75-120							
MW-2-0855 (P1G0634-02) Water						Sampled: 07/17/01 Received: 07/18/01			
Benzene	ND	0.500	ug/l	1	NW-G, 8021B	07/19/01	07/19/01	1071424	
Toluene	1.26	0.500	"	"	"	"	"	"	
Ethylbenzene	14.0	0.500	"	"	"	"	"	"	
Xylenes (total)	ND	1.00	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	430	80.0	"	"	"	"	"	"	
Surr: 4-BFB (FID)	107 %	50-150							
Surr: 4-BFB (PID)	105 %	75-120							
MW-3-0855 (P1G0634-03RE1) Water						Sampled: 07/17/01 Received: 07/18/01			
Benzene	10100	250	ug/l	500	NW-G, 8021B	07/20/01	07/21/01	1071470	
Toluene	21400	250	"	"	"	"	"	"	
Ethylbenzene	4120	250	"	"	"	"	"	"	
Xylenes (total)	20900	500	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	940000	40000	"	"	"	"	"	"	
Surr: 4-BFB (FID)	132 %	50-150							
Surr: 4-BFB (PID)	108 %	75-120							

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Project: ARCO #0855, Longview, WA
 Project Number: 015.08921
 Project Manager: Scott Miller

Reported:
 07/24/01 09:42

Gasoline Hydrocarbons per NW TPH-Gx Method and BTEX per EPA Method 8021B
North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
MW-4-0855 (P1G0634-04) Water						Sampled: 07/17/01 Received: 07/18/01			
Benzene	1610	25.0	ug/l	50	NW-G, 8021B	07/19/01	07/19/01	1071424	
Toluene	35.0	25.0	"	"	"	"	"	"	
Ethylbenzene	2870	25.0	"	"	"	"	"	"	
Xylenes (total)	1870	50.0	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	34900	4000	"	"	"	"	"	"	
Surr: 4-BFB (FID)	90.4 %	50-150							
Surr: 4-BFB (PID)	85.8 %	75-120							
MW-5-0855 (P1G0634-05) Water						Sampled: 07/17/01 Received: 07/18/01			
Benzene	1.83	0.500	ug/l	1	NW-G, 8021B	07/19/01	07/19/01	1071424	
Toluene	1.16	0.500	"	"	"	"	"	"	
Ethylbenzene	1.90	0.500	"	"	"	"	"	"	
Xylenes (total)	3.28	1.00	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	694	80.0	"	"	"	"	"	"	
Surr: 4-BFB (FID)	111 %	50-150							
Surr: 4-BFB (PID)	104 %	75-120							
MW-6-0855 (P1G0634-06) Water						Sampled: 07/17/01 Received: 07/18/01			
Benzene	ND	0.500	ug/l	1	NW-G, 8021B	07/19/01	07/19/01	1071424	
Toluene	1.35	0.500	"	"	"	"	"	"	
Ethylbenzene	1.33	0.500	"	"	"	"	"	"	
Xylenes (total)	5.79	1.00	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	892	80.0	"	"	"	"	"	"	
Surr: 4-BFB (FID)	121 %	50-150							
Surr: 4-BFB (PID)	108 %	75-120							

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Project: ARCO #0855, Longview, WA
Project Number: 015.08921
Project Manager: Scott Miller

Reported:
07/24/01 09:42

Gasoline Hydrocarbons per NW TPH-Gx Method and BTEX per EPA Method 8021B
North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Dilution	Method	Prepared	Analyzed	Batch	Notes
MW-7-0855 (P1G0634-07) Water						Sampled: 07/17/01 Received: 07/18/01			
Benzene	ND	0.500	ug/l	1	NW-G, 8021B	07/19/01	07/19/01	1071424	
Toluene	ND	0.500	"	"	"	"	"	"	
Ethylbenzene	ND	0.500	"	"	"	"	"	"	
Xylenes (total)	ND	1.00	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	275	80.0	"	"	"	"	"	"	
<i>Surr: 4-BFB (FID)</i>	<i>120 %</i>	<i>50-150</i>							
<i>Surr: 4-BFB (PID)</i>	<i>114 %</i>	<i>75-120</i>							
TB (P1G0634-08) Water						Sampled: 07/17/01 Received: 07/18/01			
Benzene	ND	0.500	ug/l	1	NW-G, 8021B	07/19/01	07/19/01	1071424	
Toluene	ND	0.500	"	"	"	"	"	"	
Ethylbenzene	ND	0.500	"	"	"	"	"	"	
Xylenes (total)	ND	1.00	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	ND	80.0	"	"	"	"	"	"	
<i>Surr: 4-BFB (FID)</i>	<i>121 %</i>	<i>50-150</i>							
<i>Surr: 4-BFB (PID)</i>	<i>116 %</i>	<i>75-120</i>							

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Reported:
07/24/01 09:42

Gasoline Hydrocarbons per NW TPH-Gx Method and BTEX per EPA Method 8021B - Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC %REC Limits	RPD	RPD Limit	Notes
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Batch 1071424 - EPA 5030B

Blank (1071424-BLK1)

Prepared & Analyzed: 07/19/01

Benzene	ND	0.500	ug/l						
Toluene	ND	0.500	"						
Ethylbenzene	ND	0.500	"						
Xylenes (total)	ND	1.00	"						
Gasoline Range Hydrocarbons	ND	80.0	"						
Surr: 4-BFB (FID)	43.0		"	50.0		86.0	50-150		
Surr: 4-BFB (PID)	42.4		"	50.0		84.8	75-120		

LCS (1071424-BS1)

Prepared & Analyzed: 07/19/01

Gasoline Range Hydrocarbons	1310	80.0	ug/l	1250		105	70-130		
Surr: 4-BFB (FID)	46.9		"	50.0		93.8	50-150		

(1071424-BS2)

Prepared & Analyzed: 07/19/01

Benzene	15.9	0.500	ug/l	20.0		79.5	70-130		
Toluene	23.6	0.500	"	20.0		118	70-130		
Ethylbenzene	19.5	0.500	"	20.0		97.5	70-130		
Xylenes (total)	60.1	1.00	"	60.0		100	70-130		
Surr: 4-BFB (PID)	41.6		"	50.0		83.2	75-120		

Duplicate (1071424-DUP1)

Source: P1G0634-03

Prepared & Analyzed: 07/19/01

Gasoline Range Hydrocarbons	187000	8000	ug/l		187000			0.00	50
Surr: 4-BFB (FID)	48.2		"	50.0		96.4	50-150		

Matrix Spike (1071424-MS1)

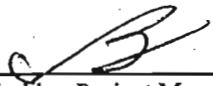
Source: P1G0634-04

Prepared & Analyzed: 07/19/01

Benzene	2460	25.0	ug/l	1000	1610	85.0	70-130		
Toluene	1350	25.0	"	1000	35.0	132	70-130		Q-01
Ethylbenzene	3450	25.0	"	1000	2870	58.0	70-130		Q-01
Xylenes (total)	4610	50.0	"	3000	1870	91.3	70-130		
Surr: 4-BFB (PID)	43.3		"	50.0		86.6	75-120		

North Creek Analytical - Portland

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Crystal Burkholder, Project Manager

North Creek Analytical, Inc.
Environmental Laboratory Network

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Bend 20332 Empire Avenue, Suite F-1, Bend, OR 97701-5711
541.383.9310 fax 541.382.7588

Secor
P.O. Box 1508
Tualatin, OR 97062

Project: ARCO #0855, Longview, WA
Project Number: 015.08921
Project Manager: Scott Miller

Reported:
07/24/01 09:42

Gasoline Hydrocarbons per NW TPH-Gx Method and BTEX per EPA Method 8021B-- Quality Control

North Creek Analytical - Portland

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch 1071424 - EPA 5030B

Matrix Spike Dup (1071424-MSD1)			Source: P1G0634-04		Prepared & Analyzed: 07/19/01					
Benzene	2280	25.0	ug/l	1000	1610	67.0	70-130	7.59	15	Q-01
Toluene	1380	25.0	"	1000	35.0	134	70-130	2.20	15	Q-01
Ethylbenzene	3790	25.0	"	1000	2870	92.0	70-130	9.39	15	
Xylenes (total)	5210	50.0	"	3000	1870	111	70-130	12.2	15	
Surr: 4-BFB (PID)	42.3		"	50.0		84.6	75-120			

Batch 1071470 - EPA 5030B

Blank (1071470-BLK1)			Prepared & Analyzed: 07/20/01							
Benzene	ND	0.500	ug/l							
Toluene	ND	0.500	"							
Ethylbenzene	ND	0.500	"							
Xylenes (total)	ND	1.00	"							
Gasoline Range Hydrocarbons	ND	80.0	"							
Surr: 4-BFB (FID)	42.4		"	50.0		84.8	50-150			
Surr: 4-BFB (PID)	46.1		"	50.0		92.2	75-120			

LCS (1071470-BS1)			Prepared & Analyzed: 07/20/01							
Gasoline Range Hydrocarbons	1140	80.0	ug/l	1250		91.2	70-130			
Surr: 4-BFB (FID)	53.6		"	50.0		107	50-150			

LCS (1071470-BS2)			Prepared & Analyzed: 07/20/01							
Benzene	20.0	0.500	ug/l	20.0		100	70-130			
Toluene	19.9	0.500	"	20.0		99.5	70-130			
Ethylbenzene	19.0	0.500	"	20.0		95.0	70-130			
Xylenes (total)	56.1	1.00	"	60.0		93.5	70-130			
Surr: 4-BFB (PID)	48.9		"	50.0		97.8	75-120			

North Creek Analytical - Portland

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Crystal Burkholder, Project Manager

North Creek Analytical, Inc.
Environmental Laboratory Network

6 of 7



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Bend 20332 Empire Avenue, Suite F-1, Bend, OR 97701-5711
541.383.9310 fax 541.382.7588

Secor
P.O. Box 1508
Tualatin, OR 97062

Project: ARCO #0855, Longview, WA
Project Number: 015.08921
Project Manager: Scott Miller

Reported:
07/24/01 09:42

Notes and Definitions

Q-01 The spike recovery, and/or RPD, for this QC sample is outside of established control limits. Review of associated batch QC indicates the recovery for this analyte does not represent an out-of-control condition for the batch.

DET Analyte DETECTED

ND Analyte NOT DETECTED at or above the reporting limit

NR Not Reported

dry Sample results reported on a dry weight basis. MRLs are adjusted if %Solids are less than 50%.

wet Sample results reported on a wet weight basis (as received)

RPD Relative Percent Difference

North Creek Analytical - Portland

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Crystal Burkholder, Project Manager

North Creek Analytical, Inc.
Environmental Laboratory Network

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**GROUNDWATER SAMPLING
FIELD DATA SHEETS**

OR

GROUNDWATER LEVEL DATA

PROJECT:
OGWM

SITE: ARCO Facility 0855

PROJECT #:

015.08921.050

CLIENT:
ARCO

RECORDED BY:

MEASURING DEVICE:

SITE LOCATION: 4603 Ocean Beach Hwy, Longview,
Washington

[illegible]

* All measurements from top of PVC casing unless noted.

SECOR
GROUNDWATER SAMPLING FIELD DATA SHEET

SECOR PN: 015.08921.050 DATE: 7/17/01 WELL NO. mw1
 FACILITY NAME: Longview Aero 0855 TEMPERATURE: 65 ° or °C
 FIELD PERSONNEL: A WEATHER: overcast

FIELD MEASUREMENTS:

A. Static Water Level (SWL) below top of casing/piezometer: 5.54 FT. or IN.
 B. Thickness of Free Product, if present: _____ Inches
 C. Total Depth of well (TD) from top of casing/piezometer: _____ FT. or IN.
 D. Height of Water Column in casing (h = TD - SWL): _____ FT. or IN.

E. Useful approximate Purge Volumes (PV) per foot of water column for common casing sizes:

	3 Well Vols.	5 Well Vols.				
2" diameter =	0.5 gals/ft	0.82 gals/ft	X feet of water	<u>1</u>	=	<u>1</u> PV (gallons)
4" diameter =	2.0 gals/ft	3.25 gals/ft	X feet of water	<u>1</u>	=	<u>1</u> PV (gallons)
6" diameter =	4.4 gals/ft	7.35 gals/ft	X feet of water	<u>1</u>	=	<u>1</u> PV (gallons)

PURGING METHOD: _____ DURATION: _____

OBSERVATIONS:

	Time	Turbidity	Color	Sheen	pH	Temp.	Conduct.	SWL
1st Volume:	_____	_____	_____	_____	_____	_____	_____	_____
2nd Volume:	_____	_____	_____	_____	_____	_____	_____	_____
3rd Volume:	_____	_____	_____	_____	_____	_____	_____	_____
4th Volume:	_____	_____	_____	_____	_____	_____	_____	_____
Addl. Volumes:	_____	_____	_____	_____	_____	_____	_____	_____

TOTAL VOLUME OF WATER PURGED FROM WELL: _____
 PURGE WATER STORED/DISPOSED OF WHERE/HOW: _____

SAMPLES COLLECTED: Depth to Water at time of sample collection: 5.54

Sample Number(s)	Time	Size/Number of Container(s)	Preservative
<u>mw1-0855</u>	<u>1026</u>	<u>3x40ml VOA</u>	<u>Hel</u>

COMMENTS:

Casing Capacities:

2-inch hole.....0.16 gal/lin ft.
 4-inch hole.....0.65 gal/lin ft.
 6.5-inch hole.....1.70 gal/lin ft.
 8-inch hole.....2.60 gal/lin ft.
 10-inch hole.....4.10 gal/lin ft.

Recharge Calculation at Time of Sample Collection:

Total Depth of Well: _____
 Original Water Column: _____ x 0.80 = -()
 Collect sample when Depth to Water measures
 Less than or equal to: _____

SECOR
GROUNDWATER SAMPLING FIELD DATA SHEET

SECOR PN: MS 08921-050 DATE: 7/17/01 WELL NO. MW 2
 FACILITY NAME: AWC 0855 TEMPERATURE: 65 (°F) or °C
 FIELD PERSONNEL: A WEATHER: overcast

FIELD MEASUREMENTS:

- A. Static Water Level (SWL) below top of casing/piezometer: 5.08 FT. or IN.
 B. Thickness of Free Product, if present: _____ Inches
 C. Total Depth of well (TD) from top of casing/piezometer: _____ FT. or IN.
 D. Height of Water Column in casing ($h = TD - SWL$): _____ FT. or IN.
 E. Useful approximate Purge Volumes (PV) per foot of water column for common casing sizes:
- | | 3 Well Vols. | 5 Well Vols. | | | |
|---------------|--------------|--------------|-----------------|---|--------------------|
| 2" diameter = | 0.5 gals/ft | 0.82 gals/ft | X feet of water | = | _____ PV (gallons) |
| 4" diameter = | 2.0 gals/ft | 3.25 gals/ft | X feet of water | = | _____ PV (gallons) |
| 6" diameter = | 4.4 gals/ft | 7.35 gals/ft | X feet of water | = | _____ PV (gallons) |

PURGING METHOD: _____ DURATION: _____

OBSERVATIONS:

	<u>Time</u>	<u>Turbidity</u>	<u>Color</u>	<u>Sheen</u>	<u>pH</u>	<u>Temp.</u>	<u>Conduct.</u>	<u>SWL</u>
1st Volume:	_____	_____	_____	_____	_____	_____	_____	_____
2nd Volume:	_____	<u>ND</u>	<u>Sampling</u>	_____	_____	_____	_____	_____
3rd Volume:	_____	_____	_____	_____	_____	_____	_____	_____
4th Volume:	_____	_____	_____	_____	_____	_____	_____	_____
Addl. Volumes:	_____	_____	_____	_____	_____	_____	_____	_____

TOTAL VOLUME OF WATER PURGED FROM WELL: _____
 PURGE WATER STORED/DISPOSED OF WHERE/HOW: _____

SAMPLES COLLECTED: Depth to Water at time of sample collection: _____

Sample Number(s)	Time	Size/Number of Container(s)	Preservative
<u>MW 2-0855</u>	<u>1053</u>	<u>300ml vial</u>	<u>HCl</u>

COMMENTS:

Casing Capacities:
 2-inch hole.....0.16 gal/in ft.
 4-inch hole.....0.65 gal/in ft.
 6.5-inch hole.....1.70 gal/in ft.
 8-inch hole.....2.60 gal/in ft.
 10-inch hole.....4.10 gal/in ft.

Recharge Calculation at Time of Sample Collection:

Total Depth of Well: _____
 Original Water Column: _____ x 0.80 = -()
 Collect sample when Depth to Water measures
 Less than or equal to: _____

SECOR
GROUNDWATER SAMPLING FIELD DATA SHEET

SECOR PN: 015-08521.050 DATE: 7/17/01 WELL NO. mw3

FACILITY NAME: Arco 0855 TEMPERATURE: 65 °F or °C

FIELD PERSONNEL: JE WEATHER: overcast

FIELD MEASUREMENTS:

A. Static Water Level (SWL) below top of casing/piezometer: 6.93 FT. or IN.

B. Thickness of Free Product, if present: _____ Inches

C. Total Depth of well (TD) from top of casing/piezometer: _____ FT. or IN.

D. Height of Water Column in casing (h = TD - SWL): _____ FT. or IN.

E. Useful approximate Purge Volumes (PV) per foot of water column for common casing sizes:

	3 Well Vols.	5 Well Vols.				
2" diameter =	0.5 gals/ft	0.82 gals/ft	X feet of water	=	_____	PV (gallons)
4" diameter =	2.0 gals/ft	3.25 gals/ft	X feet of water	=	_____	PV (gallons)
6" diameter =	4.4 gals/ft	7.35 gals/ft	X feet of water	=	_____	PV (gallons)

PURGING METHOD: _____ DURATION: _____

OBSERVATIONS:

	Time	Turbidity	Color	Sheen	pH	Temp.	Conduct.	SWL
1st Volume:	_____	_____	_____	_____	_____	_____	_____	_____
2nd Volume:	_____	<u>NP</u>	<u>Sampling</u>	_____	_____	_____	_____	_____
3rd Volume:	_____	_____	_____	_____	_____	_____	_____	_____
4th Volume:	_____	_____	_____	_____	_____	_____	_____	_____
Addl. Volumes:	_____	_____	_____	_____	_____	_____	_____	_____

TOTAL VOLUME OF WATER PURGED FROM WELL: _____

PURGE WATER STORED/DISPOSED OF WHERE/HOW: _____

SAMPLES COLLECTED: Depth to Water at time of sample collection: _____

Sample Number(s)	Time	Size/Number of Container(s)	Preservative
<u>MW3-0855</u>	<u>1108</u>	<u>3x40ml VOA</u>	<u>HO</u>

COMMENTS:

Sheen

Casing Capacities:

2-inch hole.....0.16 gal/lin ft.
4-inch hole.....0.65 gal/lin ft.
6.5-inch hole.....1.70 gal/lin ft.
8-inch hole.....2.60 gal/lin ft.
10-inch hole.....4.10 gal/lin ft.

Recharge Calculation at Time of Sample Collection:

Total Depth of Well: _____
Original Water Column: _____ x 0.80 = -()
Collect sample when Depth to Water measures
Less than or equal to: _____

SECOR
GROUNDWATER SAMPLING FIELD DATA SHEET

SECOR PN: 05-08924-050 DATE: 7/17/01 WELL NO. mw4

FACILITY NAME: Arco 0855 TEMPERATURE: 65 °F or °C

FIELD PERSONNEL: AE WEATHER: overcast

FIELD MEASUREMENTS:

A. Static Water Level (SWL) below top of casing/piezometer: 750 FT. or IN.

B. Thickness of Free Product, if present: _____ Inches

C. Total Depth of well (TD) from top of casing/piezometer: _____ FT. or IN.

D. Height of Water Column in casing ($h = TD - SWL$): _____ FT. or IN.

E. Useful approximate Purge Volumes (PV) per foot of water column for common casing sizes:

	<u>3 Well Vols.</u>	<u>5 Well Vols.</u>				
2" diameter =	0.5 gals/ft	0.82 gals/ft	X feet of water	=	_____	PV (gallons)
4" diameter =	2.0 gals/ft	3.25 gals/ft	X feet of water	=	_____	PV (gallons)
6" diameter =	4.4 gals/ft	7.35 gals/ft	X feet of water	=	_____	PV (gallons)

PURGING METHOD: _____ DURATION: _____

OBSERVATIONS:

	<u>Time</u>	<u>Turbidity</u>	<u>Color</u>	<u>Sheen</u>	<u>pH</u>	<u>Temp.</u>	<u>Conduct.</u>	<u>SWL</u>
1st Volume:	_____	_____	_____	_____	_____	_____	_____	_____
2nd Volume:	_____	_____	<u>NP</u>	<u>Sampling</u>	_____	_____	_____	_____
3rd Volume:	_____	_____	_____	_____	_____	_____	_____	_____
4th Volume:	_____	_____	_____	_____	_____	_____	_____	_____
Addl. Volumes:	_____	_____	_____	_____	_____	_____	_____	_____

TOTAL VOLUME OF WATER PURGED FROM WELL: _____

PURGE WATER STORED/DISPOSED OF WHERE/HOW: _____

SAMPLES COLLECTED: Depth to Water at time of sample collection: _____

<u>Sample Number(s)</u>	<u>Time</u>	<u>Size/Number of Container(s)</u>	<u>Preservative</u>
<u>mw4-0855</u>	<u>1100</u>	<u>3540ml VOA</u>	<u>H2O</u>

COMMENTS:

Casing Capacities:

2-inch hole.....0.16 gal/in ft.
4-inch hole.....0.65 gal/in ft.
6.5-inch hole.....1.70 gal/in ft.
8-inch hole.....2.60 gal/in ft.
10-inch hole.....4.10 gal/in ft.

Recharge Calculation at Time of Sample Collection:

Total Depth of Well: _____
Original Water Column: _____ x 0.80 = -()
Collect sample when Depth to Water measures
Less than or equal to: _____

SECOR
GROUNDWATER SAMPLING FIELD DATA SHEET

SECOR PN: 015-08924-050 DATE: 7/17/01 WELL NO. MWS

FACILITY NAME: Arco OES TEMPERATURE: 65 °F or °C

FIELD PERSONNEL: JK WEATHER: overcast

FIELD MEASUREMENTS:

A. Static Water Level (SWL) below top of casing/piezometer: 6.79 FT. or IN.

B. Thickness of Free Product, if present: _____ Inches

C. Total Depth of well (TD) from top of casing/piezometer: _____ FT. or IN.

D. Height of Water Column in casing ($h = TD - SWL$): _____ FT. or IN.

E. Useful approximate Purge Volumes (PV) per foot of water column for common casing sizes:

	3 Well Vols.	5 Well Vols.			
2" diameter =	0.5 gals/ft	0.82 gals/ft	X feet of water	=	_____ PV (gallons)
4" diameter =	2.0 gals/ft	3.25 gals/ft	X feet of water	=	_____ PV (gallons)
6" diameter =	4.4 gals/ft	7.35 gals/ft	X feet of water	=	_____ PV (gallons)

PURGING METHOD: _____ DURATION: _____

OBSERVATIONS:

	Time	Turbidity	Color	Sheen	pH	Temp.	Conduct.	SWL
1st Volume:	_____	_____	_____	_____	_____	_____	_____	_____
2nd Volume:	_____	_____	<u>NP</u>	<u>Sampling</u>	_____	_____	_____	_____
3rd Volume:	_____	_____	_____	_____	_____	_____	_____	_____
4th Volume:	_____	_____	_____	_____	_____	_____	_____	_____
Addl. Volumes:	_____	_____	_____	_____	_____	_____	_____	_____

TOTAL VOLUME OF WATER PURGED FROM WELL: _____

PURGE WATER STORED/DISPOSED OF WHERE/HOW: _____

SAMPLES COLLECTED: Depth to Water at time of sample collection: _____

Sample Number(s)	Time	Size/Number of Container(s)	Preservative
<u>MWS-0855</u>	<u>1047</u>	<u>3x40ml VOA</u>	<u>HAO</u>

COMMENTS:

Casing Capacities:

2-inch hole.....0.16 gal/in ft.
4-inch hole.....0.65 gal/in ft.
6.5-inch hole.....1.70 gal/in ft.
8-inch hole.....2.60 gal/in ft.
10-inch hole.....4.10 gal/in ft.

Recharge Calculation at Time of Sample Collection:

Total Depth of Well: _____
Original Water Column: _____ x 0.80 = -()
Collect sample when Depth to Water measures
Less than or equal to: _____

SECOR
GROUNDWATER SAMPLING FIELD DATA SHEET

SECOR PN: 015-08921-050 DATE: 7/17/01 WELL NO. MW6
 FACILITY NAME: Arco 0055 TEMPERATURE: 65 °F or °C
 FIELD PERSONNEL: AE WEATHER: overcast

FIELD MEASUREMENTS:

A. Static Water Level (SWL) below top of casing/piezometer: 6.02 FT. or IN.
 B. Thickness of Free Product, if present: _____ Inches
 C. Total Depth of well (TD) from top of casing/piezometer: _____ FT. or IN.
 D. Height of Water Column in casing ($h = TD - SWL$): _____ FT. or IN.

E. Useful approximate Purge Volumes (PV) per foot of water column for common casing sizes:

	3 Well Vols.	5 Well Vols.			
2" diameter =	0.5 gals/ft	0.82 gals/ft	X feet of water	=	_____ PV (gallons)
4" diameter =	2.0 gals/ft	3.25 gals/ft	X feet of water	=	_____ PV (gallons)
6" diameter =	4.4 gals/ft	7.35 gals/ft	X feet of water	=	_____ PV (gallons)

PURGING METHOD: _____ DURATION: _____

OBSERVATIONS:

	Time	Turbidity	Color	Sheen	pH	Temp.	Conduct.	SWL
1st Volume:	_____	_____	_____	_____	_____	_____	_____	_____
2nd Volume:	_____	<u>NP</u>	<u>Sampling</u>	_____	_____	_____	_____	_____
3rd Volume:	_____	_____	_____	_____	_____	_____	_____	_____
4th Volume:	_____	_____	_____	_____	_____	_____	_____	_____
Addl. Volumes:	_____	_____	_____	_____	_____	_____	_____	_____

TOTAL VOLUME OF WATER PURGED FROM WELL: _____
 PURGE WATER STORED/DISPOSED OF WHERE/HOW: _____

SAMPLES COLLECTED: Depth to Water at time of sample collection: _____

Sample Number(s)	Time	Size/Number of Container(s)	Preservative
<u>MW6-0855</u>	<u>1041</u>	<u>3x 90ml VOA</u>	<u>H₂O</u>

COMMENTS:

Casing Capacities:
 2-inch hole.....0.16 gal/in ft.
 4-inch hole.....0.65 gal/in ft.
 6.5-inch hole.....1.70 gal/in ft.
 8-inch hole.....2.60 gal/in ft.
 10-inch hole.....4.10 gal/in ft.

Recharge Calculation at Time of Sample Collection:

Total Depth of Well: _____
 Original Water Column: _____ x 0.80 = -()
 Collect sample when Depth to Water measures
 Less than or equal to: _____

SECOR
GROUNDWATER SAMPLING FIELD DATA SHEET

SECOR PN: 05.08921.050 DATE: 7/17/01 WELL NO. MW7
 FACILITY NAME: Arco 0855 TEMPERATURE: 65 °F or °C
 FIELD PERSONNEL: JA WEATHER: overcast

FIELD MEASUREMENTS:

A. Static Water Level (SWL) below top of casing/piezometer: 6.44 FT. or IN.
 B. Thickness of Free Product, if present: _____ Inches
 C. Total Depth of well (TD) from top of casing/piezometer: _____ FT. or IN.
 D. Height of Water Column in casing (h = TD - SWL): _____ FT. or IN.

E. Useful approximate Purge Volumes (PV) per foot of water column for common casing sizes:

	3 Well Vols.	5 Well Vols.				
2" diameter =	0.5 gals/ft	0.82 gals/ft	X feet of water	=	_____	PV (gallons)
4" diameter =	2.0 gals/ft	3.25 gals/ft	X feet of water	=	_____	PV (gallons)
6" diameter =	4.4 gals/ft	7.35 gals/ft	X feet of water	=	_____	PV (gallons)

PURGING METHOD: ✓ DURATION: _____

OBSERVATIONS:

	Time	Turbidity	Color	Sheen	pH	Temp.	Conduct.	SWL
1st Volume:	_____	_____	_____	_____	_____	_____	_____	_____
2nd Volume:	_____	<u>NR</u>	<u>Sampling</u>	_____	_____	_____	_____	_____
3rd Volume:	_____	_____	_____	_____	_____	_____	_____	_____
4th Volume:	_____	_____	_____	_____	_____	_____	_____	_____
Addl. Volumes:	_____	_____	_____	_____	_____	_____	_____	_____

TOTAL VOLUME OF WATER PURGED FROM WELL: _____
 PURGE WATER STORED/DISPOSED OF WHERE/HOW: _____

SAMPLES COLLECTED: Depth to Water at time of sample collection: ✓

Sample Number(s)	Time	Size/Number of Container(s)	Preservative
<u>MW7-0855</u>	<u>1034</u>	<u>3x40ml vials</u>	<u>HCl</u>

COMMENTS:

Casing Capacities:

2-inch hole.....0.16 gal/lin ft.
 4-inch hole.....0.65 gal/lin ft.
 6.5-inch hole.....1.70 gal/lin ft.
 8-inch hole.....2.60 gal/lin ft.
 10-inch hole.....4.10 gal/lin ft.

Recharge Calculation at Time of Sample Collection:

Total Depth of Well: _____
 Original Water Column: _____ x 0.80 = -()
 Collect sample when Depth to Water measures
 Less than or equal to: _____