509011

Date: February 13, 2002

ARCO QUARTERLY GROUNDWATER MONITORING REPORT – 1ST QUARTER 2002

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.:	015.08921.701
Primary Agency:	Washington Department of Ecology (Ecology)
Ecology LUST File No:	5421

WORK PERFORMED 1ST QUARTER 2002:

1. Groundwater monitoring and sampling of wells MW-1 through MW-7 on January 16, 2002.

WORK PROPOSED FOR 3RD QUARTER 2002:

1. Next semi-annual groundwater sampling event is scheduled for 3rd Quarter 2002.

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):	3.71 (MW-2) to 6.31 (MW-7).
Groundwater Gradient (direction):	East (Varies across the site).
Groundwater Gradient (magnitude):	0.03 ft/ft

DISCUSSION:

Groundwater monitoring field activities conducted on January 16, 2002 included measuring the water levels and collecting groundwater samples from MW-1 through MW-7 (No-purge method) using clean, new disposible bailers. 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-2 through MW-5 at concentrations ranging from 1.16 micrograms per liter (µg/L) in MW-2 to 13,600 µg/L in MW-3. TPH-G was detected above the laboratory MRL in monitoring wells MW-1 through MW-7 at concentrations ranging from 104 µg/L (MW-1) to 177,000 µg/L (MW-3). Groundwater levels and concentrations found in monitoring wells are relatively consistent with previous monitoring events.

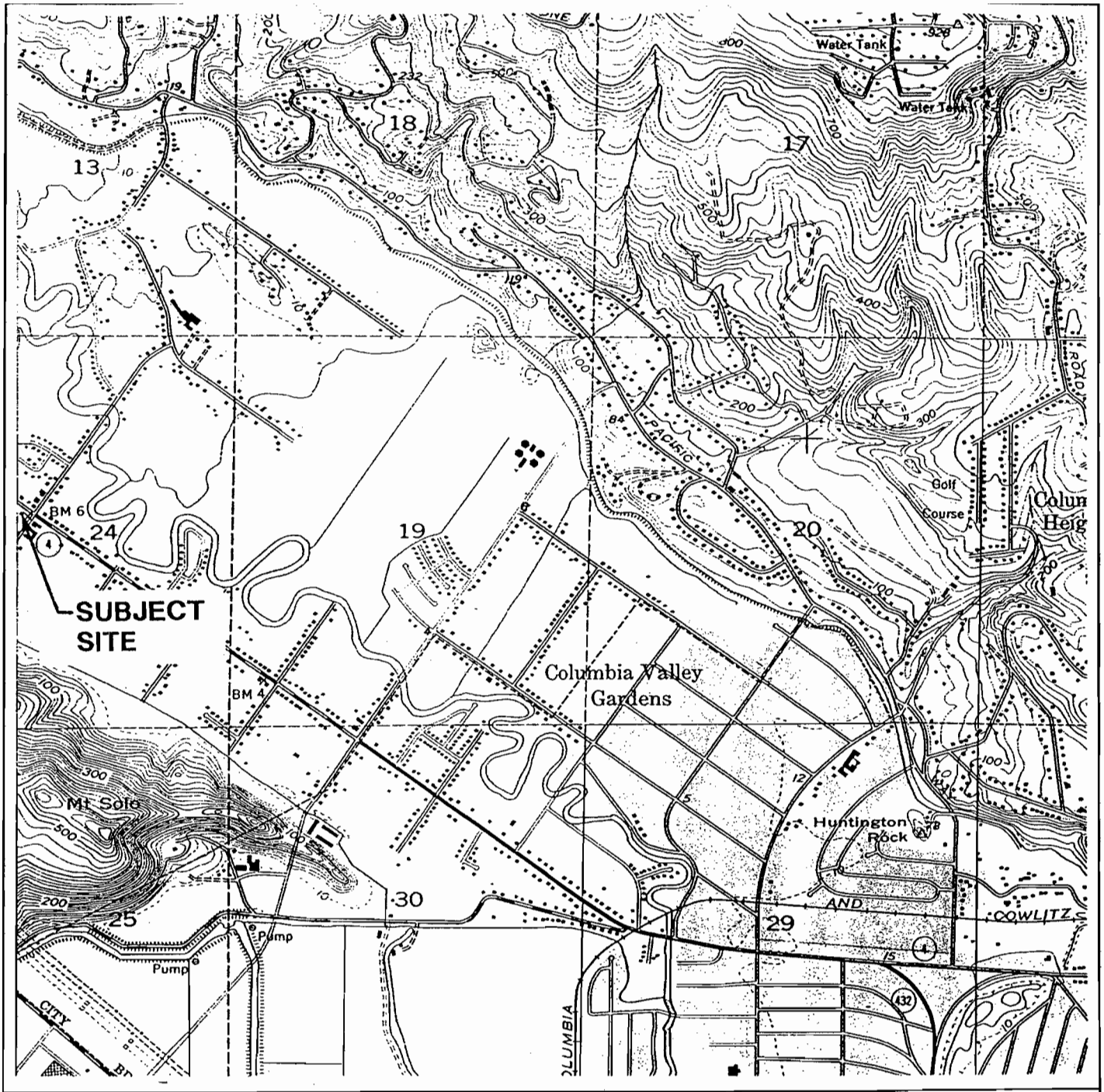
Based on a review of the laboratory reports, it appears that the submitted water samples were analyzed within the specified holding times, and that the appropriate quality assurance/quality control (QA/QC) procedures were followed during analysis. A summary of the laboratory analytical results is presented in Table 1 and Figure 2. A complete copy of the laboratory report and chain-of-custody documentation are also attached.

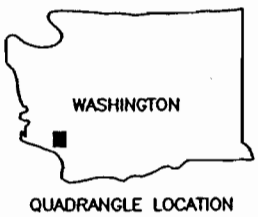
ATTACHMENTS:

- 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, Law Office of Jerome F. Eline II, Vancouver, Washington

FIGURES





QUADRANGLE LOCATION

N

0 1/2 1

SCALE (MILES)

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

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International Incorporated
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SITE LOCATION MAP

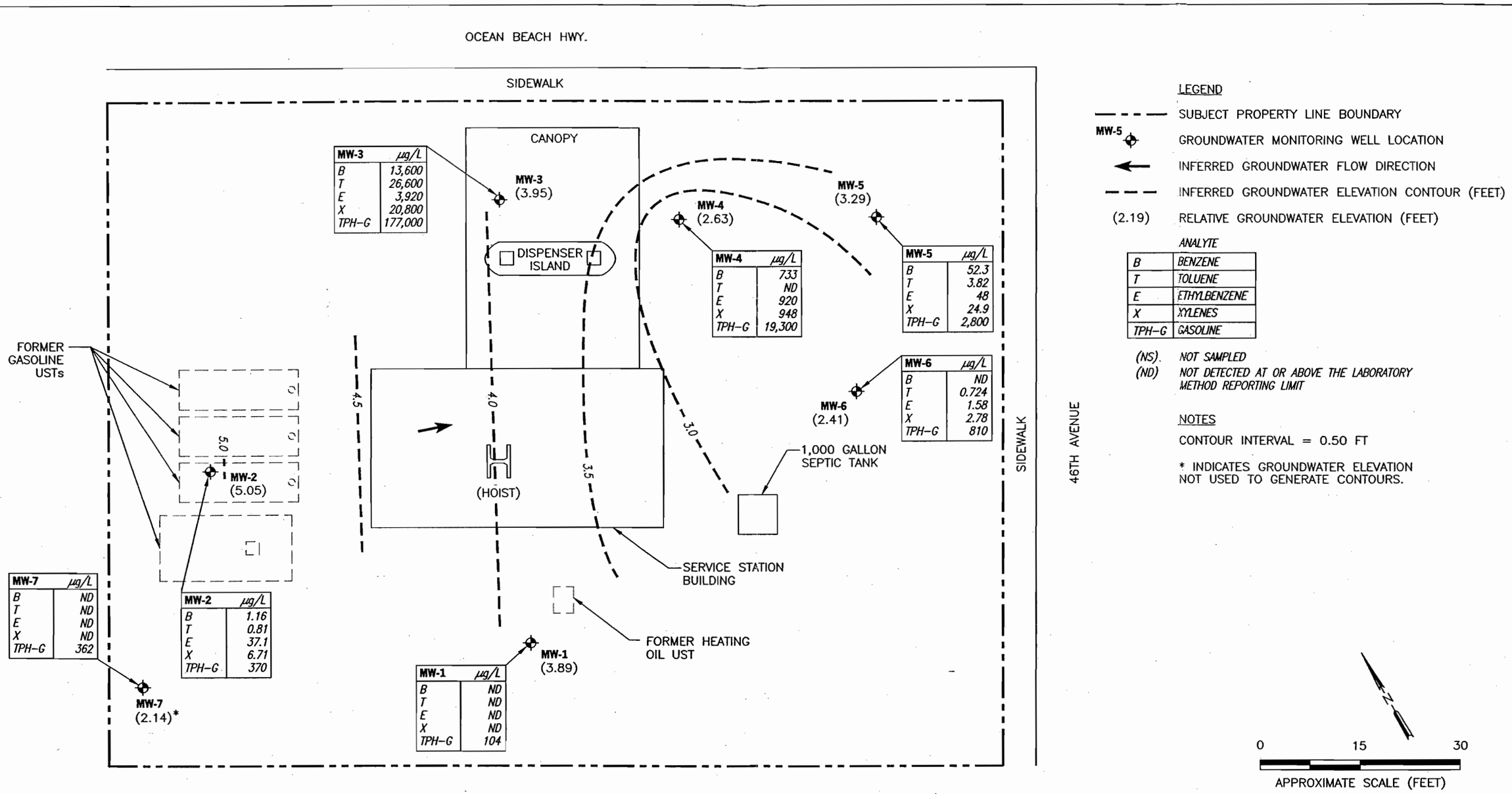
FORMER ARCO SERVICE STATION 0855
4603 OCEAN BEACH HIGHWAY
LONGVIEW, WASHINGTON

FIGURE: **1**

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

F:/FILES/PORTLAND/ARCO/855/08698

DWG: 15-8698-7(1)



NOTE: MONITORING WELL LOCATIONS AND CORNERS OF BUILDING SURVEYED APRIL 2000 BY GIBBS & OLSEN, INC. OF LONGVIEW, WASHINGTON.

SOURCE: MAP BASED ON ATLANTIC RICHFIELD "GENERAL ARRANGEMENT" DRAWING, NOVEMBER 30, 1966, 1/8"–1'.

SECOR International Incorporated
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GROUNDWATER CONTOUR AND GROUNDWATER ANALYTICAL RESULTS MAP (01/16/02)
FORMER ARCO SERVICE STATION 0855
4603 OCEAN BEACH HIGHWAY
LONGVIEW, WASHINGTON

FIGURE: **2**

JOB#: 015.08921.701 APPR: DWN: KPM DATE: 02/01/02

N:/ARCO/WASHINGTON/0855

DWG: 15-08921-7012-0102

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	Ethyl-benzene	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	—	—
	10/18/01	ND	ND	ND	ND	—	—	—	—	ND	—	—
	01/16/02	ND	ND	ND	ND	—	—	—	—	104	—	—
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	—	—
	10/18/01	2.11	ND	3.64	ND	—	—	—	—	304	—	—
	01/16/02	1.16	0.81	37.1	6.71	—	—	—	—	370	—	—
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	—	—
	10/18/01	7,200	19,700	3,340	17,300	—	—	—	—	138,000	—	—
	01/16/02	13,600	26,600	3,920	20,800	—	—	—	—	177,000	—	—

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	Ethyl-benzene	Total Xylenes	Naphthalene	EDB	EDC	MTBE			
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	—	—
	10/18/01	1,040	ND	2,300	1,320	—	—	—	—	33,000	—	—
	01/16/02	733	ND	920	948	—	—	—	—	19,300	—	—
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	—	—
	10/18/01	3.05	1.39	1.48	1.45	—	—	—	—	647	—	—
	01/16/02	52.3	3.82	48	24.9	—	—	—	—	2,800	—	—
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	—	—
	10/18/01	ND	ND	2.60	5.48	—	—	—	—	1,000	—	—
	01/16/02	ND	0.724	1.58	2.78	—	—	—	—	810	—	—

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	Ethyl-benzene	Total Xylenes	Naphthalene	EDB	EDC	MTBE			
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	—	—
	10/18/01	ND	ND	ND	ND	—	—	—	—	286	—	—
	01/16/02	ND	ND	ND	ND	—	—	—	—	362	—	—

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
	10/18/01	5.26	0.00	3.08	0.28
	01/16/02	4.45	0.00	3.89	0.81
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
	10/18/01	4.83	0.00	3.93	0.25
	01/16/02	3.71	0.00	5.05	1.12
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
	10/18/01	6.47	0.00	2.31	0.46
	01/16/02	4.83	0.00	3.95	1.64
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
	10/18/01	6.92	0.00	1.86	0.58
	01/16/02	6.15	0.00	2.63	0.77

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-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
	10/18/01	6.50	0.00	2.28	0.29
	01/16/02	5.49	0.00	3.29	1.01
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
	10/18/01	6.03	0.00	2.18	-0.01
	01/16/02	5.80	0.00	2.41	0.23
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
	10/18/01	6.39	0.00	2.06	0.05
	01/16/02	6.31	0.00	2.14	0.08

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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Se...	Project: ARCO #0855, Longview, WA	
P.O. Box 1508	Project Number: 015.08921	**Reported:**
Tualatin, OR 97062	Project Manager: Scott Miller	01/22/02 09:45

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-1	P2A0463-01	Water	01/16/02 11:29	01/18/02 10:25
MW-2	P2A0463-02	Water	01/16/02 11:18	01/18/02 10:25
MW-3	P2A0463-03	Water	01/16/02 11:59	01/18/02 10:25
MW-4	P2A0463-04	Water	01/16/02 11:52	01/18/02 10:25
MW-5	P2A0463-05	Water	01/16/02 11:47	01/18/02 10:25
MW-6	P2A0463-06	Water	01/16/02 11:34	01/18/02 10:25
MW-7	P2A0463-07	Water	01/16/02 11:23	01/18/02 10:25

North Creek Analytical - Portland

Crystal Burkholder, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

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or	Project: ARCO #0855, Longview, WA	
P.O. Box 1508	Project Number: 015.08921	**Reported:**
Tualatin, OR 97062	Project Manager: Scott Miller	01/22/02 09:45

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 (P2A0463-01) Water						Sampled: 01/16/02	Received: 01/18/02		
Benzene	ND	0.500	ug/l	1	NW-G, 8021B	01/18/02	01/18/02	2010535	
Toluene	ND	0.500	"	"	"	"	"	"	
Ethylbenzene	ND	0.500	"	"	"	"	"	"	
Xylenes (total)	ND	1.00	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	**104**	80.0	"	"	"	"	"	"	
Surr: 4-BFB (FID)	*105 %*	*50-150*							
Surr: 4-BFB (PID)	*104 %*	*75-120*							
MW-2 (P2A0463-02) Water						Sampled: 01/16/02	Received: 01/18/02		
Benzene	**1.16**	0.500	ug/l	1	NW-G, 8021B	01/18/02	01/18/02	2010535	
Toluene	**0.810**	0.500	"	"	"	"	"	"	
Ethylbenzene	**37.1**	0.500	"	"	"	"	"	"	
Xylenes (total)	**6.71**	1.00	"	"	"	"	"	"	
ine Range Hydrocarbons	**370**	80.0	"	"	"	"	"	"	
4-BFB (FID)	*110 %*	*50-150*							
Surr: 4-BFB (PID)	*106 %*	*75-120*							
MW-3 (P2A0463-03) Water						Sampled: 01/16/02	Received: 01/18/02		
Benzene	**13600**	250	ug/l	500	NW-G, 8021B	01/18/02	01/18/02	2010535	
Toluene	**26600**	250	"	"	"	"	"	"	
Ethylbenzene	**3920**	250	"	"	"	"	"	"	
Xylenes (total)	**20800**	500	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	**177000**	40000	"	"	"	"	"	"	
Surr: 4-BFB (FID)	*97.2 %*	*50-150*							
Surr: 4-BFB (PID)	*96.0 %*	*75-120*							

North Creek Analytical - Portland

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Crystal Burkholder, Project Manager

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...or	Project: ARCO #0855, Longview, WA	
P.O. Box 1508	Project Number: 015.08921	**Reported:**
Tualatin, OR 97062	Project Manager: Scott Miller	01/22/02 09:45

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 (P2A0463-04RE1) Water						Sampled: 01/16/02	Received: 01/18/02		
Benzene	**733**	10.0	ug/l	20	NW-G, 8021B	01/21/02	01/21/02	2010578	
Toluene	ND	10.0	"	"	"	"	"	"	
Ethylbenzene	**920**	10.0	"	"	"	"	"	"	
Xylenes (total)	**948**	20.0	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	**19300**	1600	"	"	"	"	"	"	
Surr: 4-BFB (FID)	*99.8 %*	*50-150*							
Surr: 4-BFB (PID)	*78.6 %*	*75-120*							
MW-5 (P2A0463-05) Water						Sampled: 01/16/02	Received: 01/18/02		
Benzene	**52.3**	0.500	ug/l	1	NW-G, 8021B	01/18/02	01/18/02	2010535	
Toluene	**3.82**	0.500	"	"	"	"	"	"	
Ethylbenzene	**48.0**	0.500	"	"	"	"	"	"	
Xylenes (total)	**24.9**	1.00	"	"	"	"	"	"	
...line Range Hydrocarbons	**2800**	80.0	"	"	"	"	"	"	
...4-BFB (FID)	*NR*	*50-150*							*S-09*
Su... 4-BFB (PID)	*190 %*	*75-120*							*S-09*
MW-6 (P2A0463-06) Water						Sampled: 01/16/02	Received: 01/18/02		
Benzene	ND	0.500	ug/l	1	NW-G, 8021B	01/18/02	01/18/02	2010535	
Toluene	**0.724**	0.500	"	"	"	"	"	"	
Ethylbenzene	**1.58**	0.500	"	"	"	"	"	"	
Xylenes (total)	**2.78**	1.00	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	**810**	80.0	"	"	"	"	"	"	
Surr: 4-BFB (FID)	*141 %*	*50-150*							
Surr: 4-BFB (PID)	*114 %*	*75-120*							

North Creek Analytical - Portland

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Crystal Burkholder, Project Manager

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Secor	Project: ARCO #0855, Longview, WA	
P.O. Box 1508	Project Number: 015.08921	**Reported:**
Tualatin, OR 97062	Project Manager: Scott Miller	01/22/02 09:45

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 (P2A0463-07) Water					Sampled: 01/16/02 Received: 01/18/02				
Benzene	ND	0.500	ug/l	1	NW-G, 8021B	01/18/02	01/19/02	2010535	
Toluene	ND	0.500	"	"	"	"	"	"	
Ethylbenzene	ND	0.500	"	"	"	"	"	"	
Xylenes (total)	ND	1.00	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	**362**	80.0	"	"	"	"	"	"	
Surr: 4-BFB (FID)	*115 %*	*50-150*							
Surr: 4-BFB (PID)	*104 %*	*75-120*							

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[illegible]	Project: ARCO #0855, Longview, WA	
P.O. Box 1508	Project Number: 015.08921	**Reported:**
Tualatin, OR 97062	Project Manager: Scott Miller	01/22/02 09:45

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
Batch 2010535 - EPA 5030B										
Blank (2010535-BLK1)				Prepared & Analyzed: 01/18/02						
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)	*45.3*		"	*50.0*		*90.6*	*50-150*			
Surr: 4-BFB (PID)	*44.2*		"	*50.0*		*88.4*	*75-120*			
LCS (2010535-BS1)				Prepared & Analyzed: 01/18/02						
Gasoline Range Hydrocarbons	1260	80.0	ug/l	1250		101	70-130			
Surr: 4-BFB (FID)	*56.3*		"	*50.0*		*113*	*50-150*			
LC[illegible] (2010535-BS2)				Prepared & Analyzed: 01/18/02						
B[illegible]	22.4	0.500	ug/l	20.0		112	70-130			
To[illegible]	25.1	0.500	"	20.0		126	70-130			
Ethylbenzene	21.0	0.500	"	20.0		105	70-130			
Xylenes (total)	64.8	1.00	"	60.0		108	70-130			
Surr: 4-BFB (PID)	*49.8*		"	*50.0*		*99.6*	*75-120*			
Duplicate (2010535-DUP1)	**Source: P2A0463-03**			Prepared & Analyzed: 01/18/02						
Gasoline Range Hydrocarbons	181000	40000	ug/l		177000			2.23	50	
Surr: 4-BFB (FID)	*49.4*		"	*50.0*		*98.8*	*50-150*			
Matrix Spike (2010535-MS1)	**Source: P2A0463-03**			Prepared & Analyzed: 01/18/02						
Benzene	26300	250	ug/l	10000	13600	127	70-130			
Toluene	41200	250	"	10000	26600	146	70-130			Q-01
Ethylbenzene	15100	250	"	10000	3920	112	70-130			
Xylenes (total)	54900	500	"	30000	20800	114	70-130			
Surr: 4-BFB (PID)	*51.1*		"	*50.0*		*102*	*75-120*			

North Creek Analytical - Portland

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[illegible]	Project: ARCO #0855, Longview, WA	
P.O. Box 1508	Project Number: 015.08921	**Reported:**
Tualatin, OR 97062	Project Manager: Scott Miller	01/22/02 09:45

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
Batch 2010535 - EPA 5030B										
Matrix Spike Dup (2010535-MSD1)		**Source: P2A0463-03**		Prepared & Analyzed: 01/18/02						
Benzene	26900	250	ug/l	10000	13600	133	70-130	2.26	15	Q-01
Toluene	42100	250	"	10000	26600	155	70-130	2.16	15	Q-01
Ethylbenzene	15200	250	"	10000	3920	113	70-130	0.660	15	
Xylenes (total)	55700	500	"	30000	20800	116	70-130	1.45	15	
Surr: 4-BFB (PID)	*52.2*		"	*50.0*		*104*	*75-120*			
Batch 2010578 - EPA 5030B										
Blank (2010578-BLK1)				Prepared & Analyzed: 01/21/02						
Benzene	ND	0.500	ug/l							
Toluene	ND	0.500	"							
Ethylbenzene	ND	0.500	"							
Xylenes (total)	ND	1.00	"							
[illegible]e Range Hydrocarbons	ND	80.0	"							
Surr: 4-BFB (FID)	*49.8*		"	*50.0*		*99.6*	*50-150*			
Surr: 4-BFB (PID)	*40.9*		"	*50.0*		*81.8*	*75-120*			
LCS (2010578-BS1)				Prepared & Analyzed: 01/21/02						
Gasoline Range Hydrocarbons	1010	80.0	ug/l	1000		101	70-130			
Surr: 4-BFB (FID)	*61.0*		"	*50.0*		*122*	*50-150*			
LCS (2010578-BS2)				Prepared & Analyzed: 01/21/02						
Benzene	19.4	0.500	ug/l	20.0		97.0	70-130			
Toluene	19.0	0.500	"	20.0		95.0	70-130			
Ethylbenzene	19.5	0.500	"	20.0		97.5	70-130			
Xylenes (total)	55.5	1.00	"	60.0		92.5	70-130			
Surr: 4-BFB (PID)	*43.9*		"	*50.0*		*87.8*	*75-120*			

North Creek Analytical - Portland

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P.O. Box 1508	Project: ARCO #0855, Longview, WA	
Tualatin, OR 97062	Project Number: 015.08921	**Reported:**
	Project Manager: Scott Miller	01/22/02 09:45

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
Batch 2010578 - EPA 5030B										
Duplicate (2010578-DUP1)		**Source: P2A0475-02**		Prepared & Analyzed: 01/21/02						
Gasoline Range Hydrocarbons	124	80.0	ug/l		115			7.53	50	
Surr: 4-BFB (FID)	*50.3*		"	*50.0*		*101*	*50-150*			
Matrix Spike (2010578-MS1)		**Source: P2A0475-03**		Prepared & Analyzed: 01/21/02						**Q-01**
Benzene	4100	100	ug/l	4000	10800	NR	70-130			
Toluene	4350	100	"	4000	3580	19.2	70-130			
Ethylbenzene	7500	100	"	4000	34100	NR	70-130			
Xylenes (total)	37300	200	"	12000	165000	NR	70-130			
Surr: 4-BFB (PID)	*48.2*		"	*50.0*		*96.4*	*75-120*			
Matrix Spike Dup (2010578-MSD1)		**Source: P2A0475-03**		Prepared & Analyzed: 01/21/02						**Q-01**
Benzene	4270	100	ug/l	4000	10800	NR	70-130	4.06	15	
Toluene	4420	100	"	4000	3580	21.0	70-130	1.60	15	
Ethylbenzene	7770	100	"	4000	34100	NR	70-130	3.54	15	
Xylenes (total)	39400	200	"	12000	165000	NR	70-130	5.48	15	
Surr: 4-BFB (PID)	*59.7*		"	*50.0*		*119*	*75-120*			

North Creek Analytical - Portland

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[illegible]	Project: ARCO #0855, Longview, WA	
P.O. Box 1508	Project Number: 015.08921	**Reported:**
Tualatin, OR 97062	Project Manager: Scott Miller	01/22/02 09:45

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.
S-09	Surrogate recovery is outside control limits due to matrix interference.
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

GROUNDWATER SAMPLING
FIELD DATA SHEETS

SE[illegible]
7730 SW MOHAWK ST
TUALATIN, OREGON 97062

GROUNDWATER LEVEL DATA

PROJECT: QGWM

SITE: ARCO Facility 0855

PROJECT #: 015.08921.050

CLIENT: ARCO

RECORDED BY: KPF

MEASURING DEVICE: DTW Indicator

SITE LOCATION: 4603 Ocean Beach Hwy, Longview, Washington

WELL ID	DATE	TIME	TOP OF CASING ELEVATION	DEPTH TO WATER*	DEPTH TO PRODUCT	GROUNDWATER ELEVATION	APPARENT PRODUCT THICKNESS	DEPTH TO BOTTOM	ODOR/ SHEEN	COMMENTS
MW-1	01-16-02	1050		4.15				20.4		2" – No purge sampling
MW-2	↓	1102		3.78				19.4		2" – No purge sampling
MW-3		[illegible]		4.83				20.0		2" – No purge sampling
MW-4		[illegible]		6.15				20.0		2" – No purge sampling
MW-5		1056		5.49				20.0		2" – No purge sampling No lock
MW-6		1059		5.80				20.0		2" – No purge sampling No lock, [illegible]
MW-7	↓	1053		6.31				20.0		2" – No purge sampling No lock

* All measurements from top of PVC casing unless noted.

SECOR
GROUNDWATER SAMPLING FIELD DATA SHEET

SECOR PN: 015.08921.050 DATE: 01.16.2002 WELL NO. MW-1

ACILITY NAME: Arco 0855, Longview, Washington TEMPERATURE: 50 (F) or °C

FIELD PERSONNEL: KPF WEATHER: cloudy

FIELD MEASUREMENTS:

A. Static Water Level (SWL) below top of casing/piezometer: 4.45 FT.
B. Thickness of Free Product, if present: _____ Inches _____ FT.
C. Total Depth of well (TD) from top of casing/piezometer: _____ FT.
D. Height of Water Column in casing (h = TD - SWL): _____ FT.
E. Casing Size (in.): _____
F. Calculated Purge Volume (3 Well Volumes): _____ gal

PURGING METHOD: _____ DURATION: _____

OBSERVATIONS:

	Time	Turbidity	Color	Sheen	pH	Temp.	Conduct.	SWL
1st Volume:								
2nd Volume:								
3rd Volume:		No purge Sampling						
4th Volume:								
Addl. Volumes:								

TOTAL VOLUME OF WATER PURGED FROM WELL: _____

PURGE WATER STORED/DISPOSED OF WHERE/HOW: ARCO 5893, Vancouver, Washington

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

Sample Number(s)	Time	Size/Number of Container(s)	Preservative
MW1-0855	1129	3 x 40mL Voas	HCl

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:

Signature: _____

Gwsample.wpd

SECOR
GROUNDWATER SAMPLING FIELD DATA SHEET

SECOR PN: 015.08921.050 DATE: 01.16.2002 WELL NO. MW-2

FACILITY NAME: Arco 0855, Longview, Washington TEMPERATURE: 50 (°F) or °C

FIELD PERSONNEL: KPF WEATHER: cloudy

FIELD MEASUREMENTS:

A. Static Water Level (SWL) below top of casing/piezometer: 3.71 FT.
B. Thickness of Free Product, if present: _____ Inches _____ FT.
C. Total Depth of well (TD) from top of casing/piezometer: _____ FT.
D. Height of Water Column in casing (h = TD - SWL): _____ FT.
E. Casing Size (in.): _____
F. Calculated Purge Volume (3 Well Volumes): _____ gal

PURGING METHOD: _____ DURATION: _____

OBSERVATIONS:

	Time	Turbidity	Color	Sheen	pH	Temp.	Conduct.	SWL
1st Volume:								
2nd Volume:		No purge		Sampling				
3rd Volume:								
4th Volume:								
Addl. Volumes:								

TOTAL VOLUME OF WATER PURGED FROM WELL: _____

PURGE WATER STORED/DISPOSED OF WHERE/HOW: ARCO 5893, Vancouver, Washington

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

Sample Number(s)	Time	Size/Number of Container(s)	Preservative
MW2-0154	1118	3 x 40mL Voas	HCl

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:

Signature: _____

Gwsample.wpd

SECOR
GROUNDWATER SAMPLING FIELD DATA SHEET

SECOR PN: 015.08921.050 DATE: 01.16.2002 WELL NO. MW-3

ACILITY NAME: Arco 0855, Longview, Washington TEMPERATURE: 50 °F or °C

FIELD PERSONNEL: KPF WEATHER: cloudy

FIELD MEASUREMENTS:

A. Static Water Level (SWL) below top of casing/piezometer: 4.83 FT.
B. Thickness of Free Product, if present: _____ Inches _____ FT.
C. Total Depth of well (TD) from top of casing/piezometer: _____ FT.
D. Height of Water Column in casing (h = TD - SWL): _____ FT.
E. Casing Size (in.): _____
F. Calculated Purge Volume (3 Well Volumes): _____ gal

PURGING METHOD: _____ DURATION: _____

OBSERVATIONS:

	Time	Turbidity	Color	Sheen	pH	Temp.	Conduct.	SWL
1st Volume:								
2nd Volume:								
3rd Volume:		No Purge		Sampling				
4th Volume:								
Addl. Volumes:								

TOTAL VOLUME OF WATER PURGED FROM WELL: _____

PURGE WATER STORED/DISPOSED OF WHERE/HOW: ARCO 5893, Vancouver, Washington

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

Sample Number(s)	Time	Size/Number of Container(s)	Preservative
MW3-855	1159	3 x 40mL Voas	HCl

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:

Signature: _____

SECOR
GROUNDWATER SAMPLING FIELD DATA SHEET

SECOR PN: 015.08921.050 DATE: 01.16.2002 WELL NO. MW-4

FACILITY NAME: Arco 0855, Longview, Washington TEMPERATURE: 50 °F or °C

FIELD PERSONNEL: KPF WEATHER: cloudy

FIELD MEASUREMENTS:

A. Static Water Level (SWL) below top of casing/piezometer: 6.15 FT.
B. Thickness of Free Product, if present: _____ Inches _____ FT.
C. Total Depth of well (TD) from top of casing/piezometer: _____ FT.
D. Height of Water Column in casing (h = TD - SWL): _____ FT.
E. Casing Size (in.): _____
F. Calculated Purge Volume (3 Well Volumes): _____ gal

PURGING METHOD: _____ DURATION: _____

OBSERVATIONS:

	Time	Turbidity	Color	Sheen	pH	Temp.	Conduct.	SWL
1st Volume:								
2nd Volume:		No Purge Sampling						
3rd Volume:								
4th Volume:								
Addl. Volumes:								

TOTAL VOLUME OF WATER PURGED FROM WELL: _____

PURGE WATER STORED/DISPOSED OF WHERE/HOW: ARCO 5893, Vancouver, Washington

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

Sample Number(s)	Time	Size/Number of Container(s)	Preservative
MW4-855	1152	3 x 40mL Voas	HCl

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:

Signature: _____

Gwsample.wpd

SECOR
GROUNDWATER SAMPLING FIELD DATA SHEET

SECOR PN: 015.08921.050 DATE: 01.16.2002 WELL NO. MW-5

FACILITY NAME: Arco 0855, Longview, Washington TEMPERATURE: 50 °F or °C

FIELD PERSONNEL: KPF WEATHER: cloudy

FIELD MEASUREMENTS:

A. Static Water Level (SWL) below top of casing/piezometer: 5.49 FT.
B. Thickness of Free Product, if present: _____ Inches _____ FT.
C. Total Depth of well (TD) from top of casing/piezometer: _____ FT.
D. Height of Water Column in casing (h = TD - SWL): _____ FT.
E. Casing Size (in.):
F. Calculated Purge Volume (3 Well Volumes): _____ gal

PURGING METHOD: _____ DURATION: _____

OBSERVATIONS:

	Time	Turbidity	Color	Sheen	pH	Temp.	Conduct.	SWL
1st Volume:								
2nd Volume:		No	Purge	Sampling:				
3rd Volume:								
4th Volume:								
Addl. Volumes:								

TOTAL VOLUME OF WATER PURGED FROM WELL: _____

PURGE WATER STORED/DISPOSED OF WHERE/HOW: ARCO 5893, Vancouver, Washington

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

Sample Number(s)	Time	Size/Number of Container(s)	Preservative
MW5-855	1147	3 x 40mL Voas	HCl

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:

Signature: _____

SECOR
GROUNDWATER SAMPLING FIELD DATA SHEET

SECOR PN: 015.08921.050 DATE: 01.16.2002 WELL NO. MW-6

FACILITY NAME: Arco 0855, Longview, Washington TEMPERATURE: 50 °F or °C

FIELD PERSONNEL: KPF WEATHER: cloudy

FIELD MEASUREMENTS:

A. Static Water Level (SWL) below top of casing/piezometer: 5.80 FT.
B. Thickness of Free Product, if present: _____ Inches _____ FT.
C. Total Depth of well (TD) from top of casing/piezometer: _____ FT.
D. Height of Water Column in casing (h = TD - SWL): _____ FT.
E. Casing Size (in.):
F. Calculated Purge Volume (3 Well Volumes): _____ gal

PURGING METHOD: _____ DURATION: _____

OBSERVATIONS:

	Time	Turbidity	Color	Sheen	pH	Temp.	Conduct.	SWL
1st Volume:								
2nd Volume:		No Purge Sampling						
3rd Volume:								
4th Volume:								
Addl. Volumes:								

TOTAL VOLUME OF WATER PURGED FROM WELL: _____

PURGE WATER STORED/DISPOSED OF WHERE/HOW: ARCO 5893, Vancouver, Washington

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

Sample Number(s)	Time	Size/Number of Container(s)	Preservative
MW6-855	1134	3 x 40mL Voas	HCl

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:

Signature: _____

SECOR
GROUNDWATER SAMPLING FIELD DATA SHEET

SECOR PN: 015.08921.050 DATE: 01.16.2002 WELL NO. MW-7

ACILITY NAME: Arco 0855, Longview, Washington TEMPERATURE: 50 °F or °C

FIELD PERSONNEL: KPF WEATHER: cloudy

FIELD MEASUREMENTS:

A. Static Water Level (SWL) below top of casing/piezometer: 0.31 FT.
B. Thickness of Free Product, if present: _____ Inches _____ FT.
C. Total Depth of well (TD) from top of casing/piezometer: _____ FT.
D. Height of Water Column in casing (h = TD - SWL): _____ FT.
E. Casing Size (in.):
F. Calculated Purge Volume (3 Well Volumes): _____ gal

PURGING METHOD: _____ DURATION: _____

OBSERVATIONS:

	Time	Turbidity	Color	Sheen	pH	Temp.	Conduct.	SWL
1st Volume:								
2nd Volume:		No Purge Sampling						
3rd Volume:								
4th Volume:								
Addl. Volumes:								

TOTAL VOLUME OF WATER PURGED FROM WELL: _____

PURGE WATER STORED/DISPOSED OF WHERE/HOW: ARCO 5893, Vancouver, Washington

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

Sample Number(s)	Time	Size/Number of Container(s)	Preservative
MW7-855	1123	3 x 40mL Voas	HCl

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:

Signature: _____

2001

509011

Date: February 13, 2002

ARCO QUARTERLY GROUNDWATER MONITORING REPORT – 1ST QUARTER 2002

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.:	015.08921.701
Primary Agency:	Washington Department of Ecology (Ecology)
Ecology LUST File No:	5421

WORK PERFORMED 1ST QUARTER 2002:

1. Groundwater monitoring and sampling of wells MW-1 through MW-7 on January 16, 2002.

WORK PROPOSED FOR 3RD QUARTER 2002:

1. Next semi-annual groundwater sampling event is scheduled for 3rd Quarter 2002.

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):	3.71 (MW-2) to 6.31 (MW-7).
Groundwater Gradient (direction):	East (Varies across the site).
Groundwater Gradient (magnitude):	0.03 ft/ft

DISCUSSION:

Groundwater monitoring field activities conducted on January 16, 2002 included measuring the water levels and collecting groundwater samples from MW-1 through MW-7 (No-purge method) using clean, new disposible bailers. 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-2 through MW-5 at concentrations ranging from 1.16 micrograms per liter (µg/L) in MW-2 to 13,600 µg/L in MW-3. TPH-G was detected above the laboratory MRL in monitoring wells MW-1 through MW-7 at concentrations ranging from 104 µg/L (MW-1) to 177,000 µg/L (MW-3). Groundwater levels and concentrations found in monitoring wells are relatively consistent with previous monitoring events.

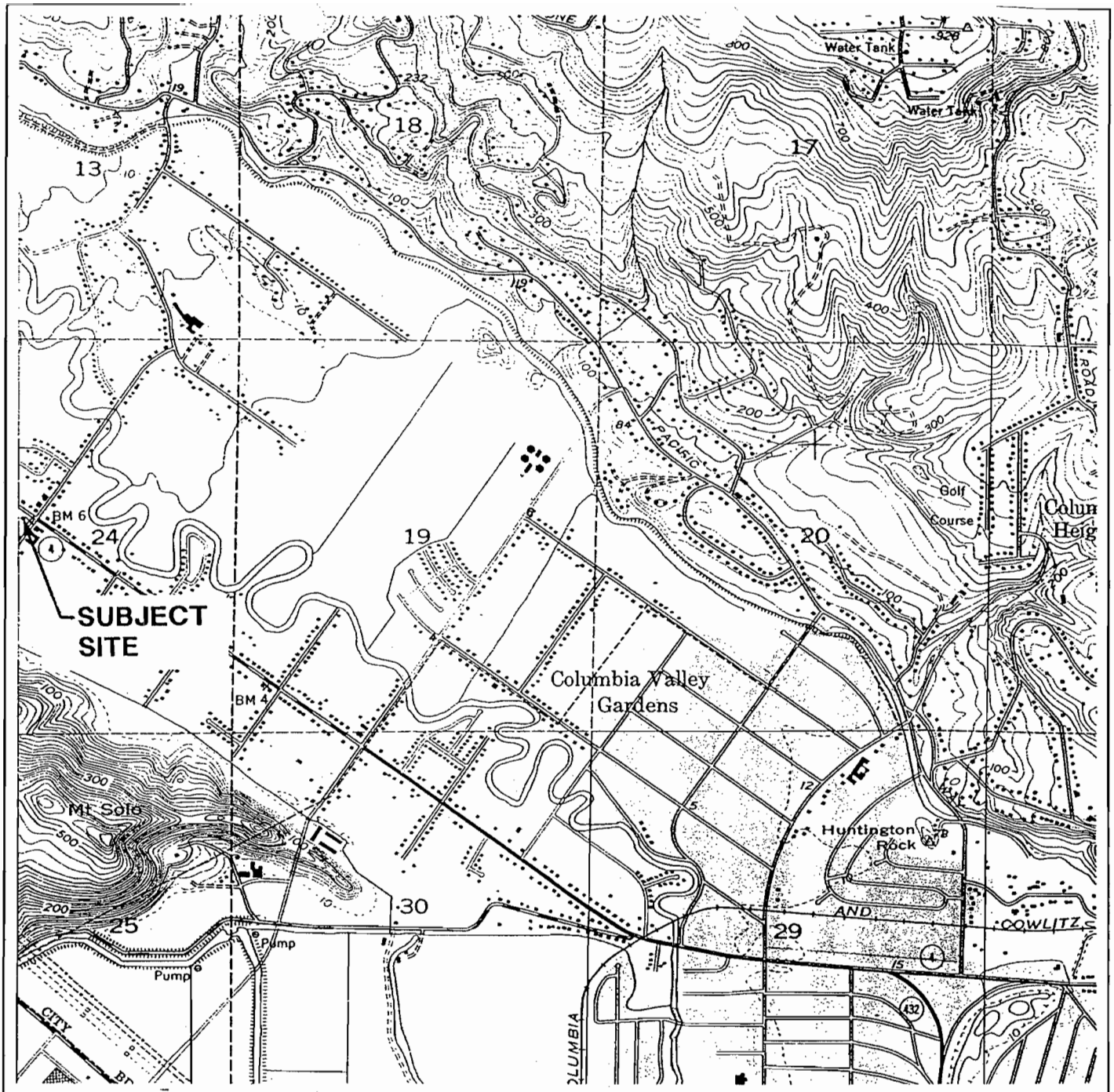
Based on a review of the laboratory reports, it appears that the submitted water samples were analyzed within the specified holding times, and that the appropriate quality assurance/quality control (QA/QC) procedures were followed during analysis. A summary of the laboratory analytical results is presented in Table 1 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, Law Office of Jerome F. Eline II, Vancouver, Washington

FIGURES



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

SECOR
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SITE LOCATION MAP

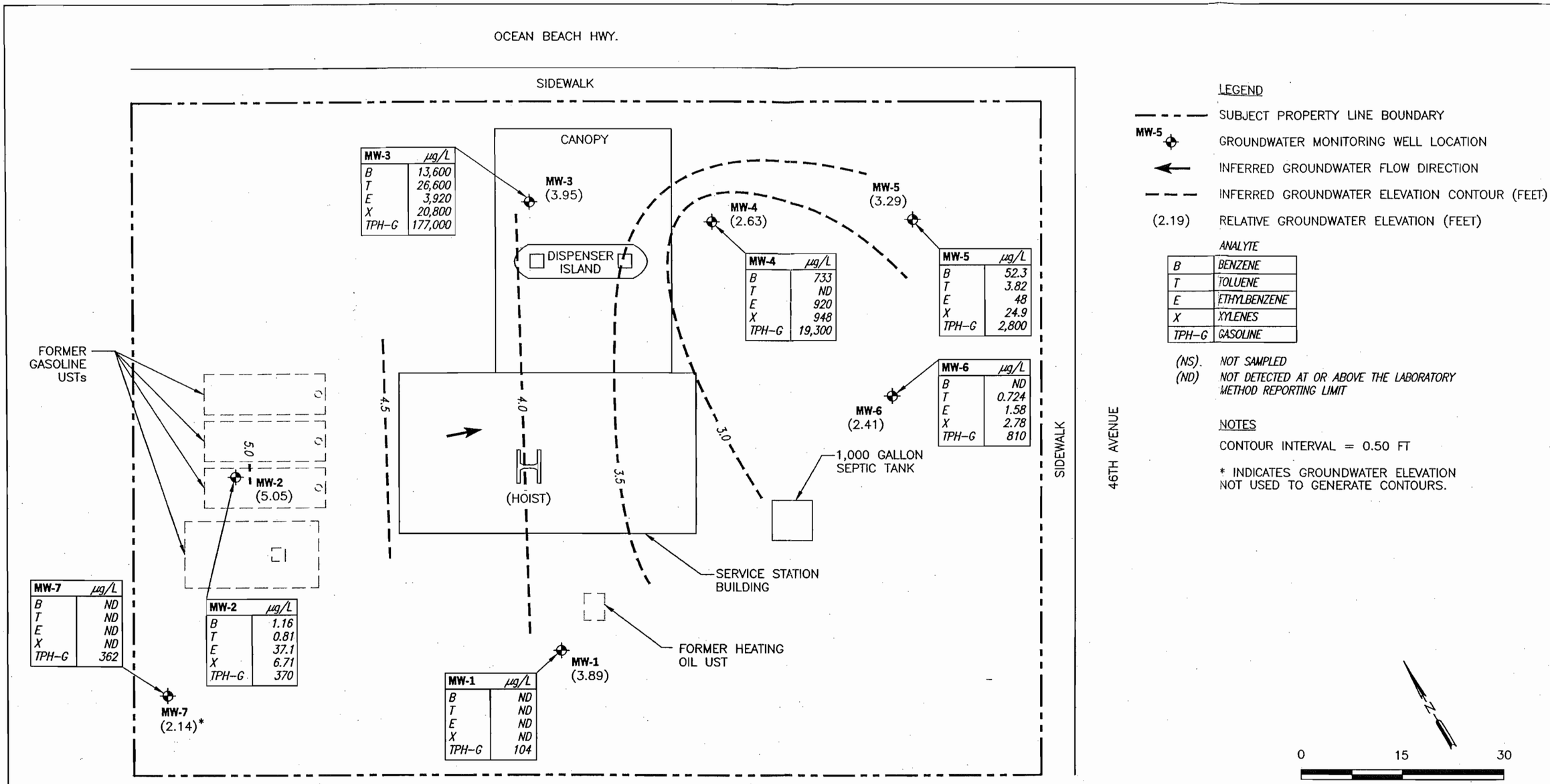
FORMER ARCO SERVICE STATION 0855
4603 OCEAN BEACH HIGHWAY
LONGVIEW, WASHINGTON

FIGURE: 1

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

F:/FILES/PORTLAND/ARCO/855/08698

DWG: 15-8698-7(1)



NOTE: MONITORING WELL LOCATIONS AND CORNERS OF BUILDING SURVEYED APRIL 2000 BY GIBBS & OLSEN, INC. OF LONGVIEW, WASHINGTON.

SOURCE: MAP BASED ON ATLANTIC RICHFIELD "GENERAL ARRANGEMENT" DRAWING, NOVEMBER 30, 1966, 1/8"=1'.

SECOR
International Incorporated
015

GROUNDWATER CONTOUR AND GROUNDWATER ANALYTICAL RESULTS MAP (01/16/02)
FORMER ARCO SERVICE STATION 0855
4603 OCEAN BEACH HIGHWAY
LONGVIEW, WASHINGTON

FIGURE: **2**

JOB#: 015.08921.701 APPR: DKH DWN: KPM DATE: 02/01/02

N:/ARCO/WASHINGTON/0855

DWG: 15-08921-7012-0102

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	Ethyl-benzene	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	—	—
	10/18/01	ND	ND	ND	ND	—	—	—	—	ND	—	—
	01/16/02	ND	ND	ND	ND	—	—	—	—	104	—	—
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	—	—
	10/18/01	2.11	ND	3.64	ND	—	—	—	—	304	—	—
	01/16/02	1.16	0.81	37.1	6.71	—	—	—	—	370	—	—
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	—	—
	10/18/01	7,200	19,700	3,340	17,300	—	—	—	—	138,000	—	—
	01/16/02	13,600	26,600	3,920	20,800	—	—	—	—	177,000	—	—

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	Ethyl-benzene	Total Xylenes	Naphthalene	EDB	EDC	MTBE			
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	—	—
	10/18/01	1,040	ND	2,300	1,320	—	—	—	—	33,000	—	—
	01/16/02	733	ND	920	948	—	—	—	—	19,300	—	—
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	—	—
	10/18/01	3.05	1.39	1.48	1.45	—	—	—	—	647	—	—
	01/16/02	52.3	3.82	48	24.9	—	—	—	—	2,800	—	—
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	—	—
	10/18/01	ND	ND	2.60	5.48	—	—	—	—	1,000	—	—
	01/16/02	ND	0.724	1.58	2.78	—	—	—	—	810	—	—

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	Ethyl-benzene	Total Xylenes	Naphthalene	EDB	EDC	MTBE			
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	—	—
	10/18/01	ND	ND	ND	ND	—	—	—	—	286	—	—
	01/16/02	ND	ND	ND	ND	—	—	—	—	362	—	—

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
	10/18/01	5.26	0.00	3.08	0.28
	01/16/02	4.45	0.00	3.89	0.81
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
	10/18/01	4.83	0.00	3.93	0.25
	01/16/02	3.71	0.00	5.05	1.12
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
	10/18/01	6.47	0.00	2.31	0.46
	01/16/02	4.83	0.00	3.95	1.64
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
	10/18/01	6.92	0.00	1.86	0.58
	01/16/02	6.15	0.00	2.63	0.77

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-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
	10/18/01	6.50	0.00	2.28	0.29
	01/16/02	5.49	0.00	3.29	1.01
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
	10/18/01	6.03	0.00	2.18	-0.01
	01/16/02	5.80	0.00	2.41	0.23
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
	10/18/01	6.39	0.00	2.06	0.05
	01/16/02	6.31	0.00	2.14	0.08

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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Se[illegible]	Project: ARCO #0855, Longview, WA	
P.O. Box 1508	Project Number: 015.08921	**Reported:**
Tualatin, OR 97062	Project Manager: Scott Miller	01/22/02 09:45

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-1	P2A0463-01	Water	01/16/02 11:29	01/18/02 10:25
MW-2	P2A0463-02	Water	01/16/02 11:18	01/18/02 10:25
MW-3	P2A0463-03	Water	01/16/02 11:59	01/18/02 10:25
MW-4	P2A0463-04	Water	01/16/02 11:52	01/18/02 10:25
MW-5	P2A0463-05	Water	01/16/02 11:47	01/18/02 10:25
MW-6	P2A0463-06	Water	01/16/02 11:34	01/18/02 10:25
MW-7	P2A0463-07	Water	01/16/02 11:23	01/18/02 10:25

North Creek Analytical - Portland

Crystal Burkholder, Project Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

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or	Project: ARCO #0855, Longview, WA	
P.O. Box 1508	Project Number: 015.08921	**Reported:**
Tualatin, OR 97062	Project Manager: Scott Miller	01/22/02 09:45

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 (P2A0463-01) Water						Sampled: 01/16/02	Received: 01/18/02		
Benzene	ND	0.500	ug/l	1	NW-G, 8021B	01/18/02	01/18/02	2010535	
Toluene	ND	0.500	"	"	"	"	"	"	
Ethylbenzene	ND	0.500	"	"	"	"	"	"	
Xylenes (total)	ND	1.00	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	**104**	80.0	"	"	"	"	"	"	
Surr: 4-BFB (FID)	*105 %*	*50-150*							
Surr: 4-BFB (PID)	*104 %*	*75-120*							
MW-2 (P2A0463-02) Water						Sampled: 01/16/02	Received: 01/18/02		
Benzene	**1.16**	0.500	ug/l	1	NW-G, 8021B	01/18/02	01/18/02	2010535	
Toluene	**0.810**	0.500	"	"	"	"	"	"	
Ethylbenzene	**37.1**	0.500	"	"	"	"	"	"	
Xylenes (total)	**6.71**	1.00	"	"	"	"	"	"	
ine Range Hydrocarbons	**370**	80.0	"	"	"	"	"	"	
4-BFB (FID)	*110 %*	*50-150*							
Surr: 4-BFB (PID)	*106 %*	*75-120*							
MW-3 (P2A0463-03) Water						Sampled: 01/16/02	Received: 01/18/02		
Benzene	**13600**	250	ug/l	500	NW-G, 8021B	01/18/02	01/18/02	2010535	
Toluene	**26600**	250	"	"	"	"	"	"	
Ethylbenzene	**3920**	250	"	"	"	"	"	"	
Xylenes (total)	**20800**	500	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	**177000**	40000	"	"	"	"	"	"	
Surr: 4-BFB (FID)	*97.2 %*	*50-150*							
Surr: 4-BFB (PID)	*96.0 %*	*75-120*							

North Creek Analytical - Portland

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Crystal Burkholder, Project Manager

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...or	Project: ARCO #0855, Longview, WA	
P.O. Box 1508	Project Number: 015.08921	**Reported:**
Tualatin, OR 97062	Project Manager: Scott Miller	01/22/02 09:45

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 (P2A0463-04RE1) Water					Sampled: 01/16/02 Received: 01/18/02				
Benzene	**733**	10.0	ug/l	20	NW-G, 8021B	01/21/02	01/21/02	2010578	
Toluene	ND	10.0	"	"	"	"	"	"	
Ethylbenzene	**920**	10.0	"	"	"	"	"	"	
Xylenes (total)	**948**	20.0	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	**19300**	1600	"	"	"	"	"	"	
Surr: 4-BFB (FID)	*99.8 %*	*50-150*							
Surr: 4-BFB (PID)	*78.6 %*	*75-120*							
MW-5 (P2A0463-05) Water					Sampled: 01/16/02 Received: 01/18/02				
Benzene	**52.3**	0.500	ug/l	1	NW-G, 8021B	01/18/02	01/18/02	2010535	
Toluene	**3.82**	0.500	"	"	"	"	"	"	
Ethylbenzene	**48.0**	0.500	"	"	"	"	"	"	
Xylenes (total)	**24.9**	1.00	"	"	"	"	"	"	
...line Range Hydrocarbons	**2800**	80.0	"	"	"	"	"	"	
...4-BFB (FID)	*NR*	*50-150*							*S-09*
Su... 4-BFB (PID)	*190 %*	*75-120*							*S-09*
MW-6 (P2A0463-06) Water					Sampled: 01/16/02 Received: 01/18/02				
Benzene	ND	0.500	ug/l	1	NW-G, 8021B	01/18/02	01/18/02	2010535	
Toluene	**0.724**	0.500	"	"	"	"	"	"	
Ethylbenzene	**1.58**	0.500	"	"	"	"	"	"	
Xylenes (total)	**2.78**	1.00	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	**810**	80.0	"	"	"	"	"	"	
Surr: 4-BFB (FID)	*141 %*	*50-150*							
Surr: 4-BFB (PID)	*114 %*	*75-120*							

North Creek Analytical - Portland

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Crystal Burkholder, Project Manager

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Secor	Project: ARCO #0855, Longview, WA	
P.O. Box 1508	Project Number: 015.08921	**Reported:**
Tualatin, OR 97062	Project Manager: Scott Miller	01/22/02 09:45

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 (P2A0463-07) Water					Sampled: 01/16/02 Received: 01/18/02				
Benzene	ND	0.500	ug/l	1	NW-G, 8021B	01/18/02	01/19/02	2010535	
Toluene	ND	0.500	"	"	"	"	"	"	
Ethylbenzene	ND	0.500	"	"	"	"	"	"	
Xylenes (total)	ND	1.00	"	"	"	"	"	"	
Gasoline Range Hydrocarbons	**362**	80.0	"	"	"	"	"	"	
Surr: 4-BFB (FID)	*115 %*	*50-150*							
Surr: 4-BFB (PID)	*104 %*	*75-120*							

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P.O. Box 1508	Project: ARCO #0855, Longview, WA	
Tualatin, OR 97062	Project Number: 015.08921	**Reported:**
	Project Manager: Scott Miller	01/22/02 09:45

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
Batch 2010535 - EPA 5030B										
Blank (2010535-BLK1)				Prepared & Analyzed: 01/18/02						
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)	*45.3*		"	*50.0*		*90.6*	*50-150*			
Surr: 4-BFB (PID)	*44.2*		"	*50.0*		*88.4*	*75-120*			
LCS (2010535-BS1)				Prepared & Analyzed: 01/18/02						
Gasoline Range Hydrocarbons	1260	80.0	ug/l	1250		101	70-130			
Surr: 4-BFB (FID)	*56.3*		"	*50.0*		*113*	*50-150*			
LC[illegible] (2010535-BS2)				Prepared & Analyzed: 01/18/02						
B[illegible]	22.4	0.500	ug/l	20.0		112	70-130			
To[illegible]	25.1	0.500	"	20.0		126	70-130			
Ethylbenzene	21.0	0.500	"	20.0		105	70-130			
Xylenes (total)	64.8	1.00	"	60.0		108	70-130			
Surr: 4-BFB (PID)	*49.8*		"	*50.0*		*99.6*	*75-120*			
Duplicate (2010535-DUP1)	**Source: P2A0463-03**			Prepared & Analyzed: 01/18/02						
Gasoline Range Hydrocarbons	181000	40000	ug/l		177000			2.23	50	
Surr: 4-BFB (FID)	*49.4*		"	*50.0*		*98.8*	*50-150*			
Matrix Spike (2010535-MS1)	**Source: P2A0463-03**			Prepared & Analyzed: 01/18/02						
Benzene	26300	250	ug/l	10000	13600	127	70-130			
Toluene	41200	250	"	10000	26600	146	70-130			Q-01
Ethylbenzene	15100	250	"	10000	3920	112	70-130			
Xylenes (total)	54900	500	"	30000	20800	114	70-130			
Surr: 4-BFB (PID)	*51.1*		"	*50.0*		*102*	*75-120*			

North Creek Analytical - Portland

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Crystal Burkholder, Project Manager

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[illegible]	Project: ARCO #0855, Longview, WA	
P.O. Box 1508	Project Number: 015.08921	**Reported:**
Tualatin, OR 97062	Project Manager: Scott Miller	01/22/02 09:45

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
Batch 2010535 - EPA 5030B										
Matrix Spike Dup (2010535-MSD1)	**Source: P2A0463-03**			Prepared & Analyzed: 01/18/02						
Benzene	26900	250	ug/l	10000	13600	133	70-130	2.26	15	Q-01
Toluene	42100	250	"	10000	26600	155	70-130	2.16	15	Q-01
Ethylbenzene	15200	250	"	10000	3920	113	70-130	0.660	15	
Xylenes (total)	55700	500	"	30000	20800	116	70-130	1.45	15	
Surr: 4-BFB (PID)	*52.2*		"	*50.0*		*104*	*75-120*			
Batch 2010578 - EPA 5030B										
Blank (2010578-BLK1)				Prepared & Analyzed: 01/21/02						
Benzene	ND	0.500	ug/l							
Toluene	ND	0.500	"							
Ethylbenzene	ND	0.500	"							
X[illegible]es (total)	ND	1.00	"							
[illegible]e Range Hydrocarbons	ND	80.0	"							
Surr: 4-BFB (FID)	*49.8*		"	*50.0*		*99.6*	*50-150*			
Surr: 4-BFB (PID)	*40.9*		"	*50.0*		*81.8*	*75-120*			
LCS (2010578-BS1)				Prepared & Analyzed: 01/21/02						
Gasoline Range Hydrocarbons	1010	80.0	ug/l	1000		101	70-130			
Surr: 4-BFB (FID)	*61.0*		"	*50.0*		*122*	*50-150*			
LCS (2010578-BS2)				Prepared & Analyzed: 01/21/02						
Benzene	19.4	0.500	ug/l	20.0		97.0	70-130			
Toluene	19.0	0.500	"	20.0		95.0	70-130			
Ethylbenzene	19.5	0.500	"	20.0		97.5	70-130			
Xylenes (total)	55.5	1.00	"	60.0		92.5	70-130			
Surr: 4-BFB (PID)	*43.9*		"	*50.0*		*87.8*	*75-120*			

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P.O. Box 1508	Project: ARCO #0855, Longview, WA	
Tualatin, OR 97062	Project Number: 015.08921	**Reported:**
	Project Manager: Scott Miller	01/22/02 09:45

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
Batch 2010578 - EPA 5030B										
Duplicate (2010578-DUP1)		**Source: P2A0475-02**		Prepared & Analyzed: 01/21/02						
Gasoline Range Hydrocarbons	124	80.0	ug/l		115			7.53	50	
Surr: 4-BFB (FID)	*50.3*		"	*50.0*		*101*	*50-150*			
Matrix Spike (2010578-MS1)		**Source: P2A0475-03**		Prepared & Analyzed: 01/21/02						**Q-01**
Benzene	4100	100	ug/l	4000	10800	NR	70-130			
Toluene	4350	100	"	4000	3580	19.2	70-130			
Ethylbenzene	7500	100	"	4000	34100	NR	70-130			
Xylenes (total)	37300	200	"	12000	165000	NR	70-130			
Surr: 4-BFB (PID)	*48.2*		"	*50.0*		*96.4*	*75-120*			
Matrix Spike Dup (2010578-MSD1)		**Source: P2A0475-03**		Prepared & Analyzed: 01/21/02						**Q-01**
Benzene	4270	100	ug/l	4000	10800	NR	70-130	4.06	15	
To[illegible]e	4420	100	"	4000	3580	21.0	70-130	1.60	15	
E[illegible]nzene	7770	100	"	4000	34100	NR	70-130	3.54	15	
Xy[illegible]s (total)	39400	200	"	12000	165000	NR	70-130	5.48	15	
Surr: 4-BFB (PID)	*59.7*		"	*50.0*		*119*	*75-120*			

North Creek Analytical - Portland

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[illegible]	Project: ARCO #0855, Longview, WA	
P.O. Box 1508	Project Number: 015.08921	**Reported:**
Tualatin, OR 97062	Project Manager: Scott Miller	01/22/02 09:45

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.
S-09	Surrogate recovery is outside control limits due to matrix interference.
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

GROUNDWATER SAMPLING
FIELD DATA SHEETS

SE[illegible]
7730 SW MOHAWK ST
TUALATIN, OREGON 97062

GROUNDWATER LEVEL DATA

PROJECT: QGWM

SITE: ARCO Facility 0855

PROJECT #: 015.08921.050

CLIENT: ARCO

RECORDED BY: KPF

MEASURING DEVICE: DTW Indicator

SITE LOCATION: 4603 Ocean Beach Hwy, Longview, Washington

WELL ID	DATE	TIME	TOP OF CASING ELEVATION	DEPTH TO WATER*	DEPTH TO PRODUCT	GROUNDWATER ELEVATION	APPARENT PRODUCT THICKNESS	DEPTH TO BOTTOM	ODOR/ SHEEN	COMMENTS
MW-1	01-16-02	1050		4.15				20.4		2" – No purge sampling
MW-2		1102		3.78				19.4		2" – No purge sampling
MW-3		[illegible]		4.83				20.0		2" – No purge sampling
MW-4		[illegible]		6.15				20.0		2" – No purge sampling
MW-5		1056		5.49				20.0		2" – No purge sampling No lock
MW-6		1059		5.80				20.0		2" – No purge sampling No lock, Grit/sediments
MW-7	↓	1053		4.31				20.0		2" – No purge sampling No lock

* All measurements from top of PVC casing unless noted.

SECOR
GROUNDWATER SAMPLING FIELD DATA SHEET

SECOR PN: 015.08921.050 DATE: 01.16.2002 WELL NO. MW-1

FACILITY NAME: Arco 0855, Longview, Washington TEMPERATURE: 50 °F or °C

FIELD PERSONNEL: KPF WEATHER: cloudy

FIELD MEASUREMENTS:

A. Static Water Level (SWL) below top of casing/piezometer: 4.45 FT.
B. Thickness of Free Product, if present: _____ Inches _____ FT.
C. Total Depth of well (TD) from top of casing/piezometer: _____ FT.
D. Height of Water Column in casing (h = TD - SWL): _____ FT.
E. Casing Size (in.): _____
F. Calculated Purge Volume (3 Well Volumes): _____ gal

PURGING METHOD: _____ DURATION: _____

OBSERVATIONS:

	Time	Turbidity	Color	Sheen	pH	Temp.	Conduct.	SWL
1st Volume:								
2nd Volume:								
3rd Volume:		No purge sampling						
4th Volume:								
Addl. Volumes:								

TOTAL VOLUME OF WATER PURGED FROM WELL: _____

PURGE WATER STORED/DISPOSED OF WHERE/HOW: ARCO 5893, Vancouver, Washington

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

Sample Number(s)	Time	Size/Number of Container(s)	Preservative
MW1-0855	1129	3 x 40mL Voas	HCl

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:

Signature: _____

SECOR
GROUNDWATER SAMPLING FIELD DATA SHEET

SECOR PN: 015.08921.050 DATE: 01.16.2002 WELL NO. MW-2

FACILITY NAME: Arco 0855, Longview, Washington TEMPERATURE: 50 °F or °C

FIELD PERSONNEL: KPF WEATHER: cloudy

FIELD MEASUREMENTS:

A. Static Water Level (SWL) below top of casing/piezometer: 3.71 FT.
B. Thickness of Free Product, if present: _____ Inches _____ FT.
C. Total Depth of well (TD) from top of casing/piezometer: _____ FT.
D. Height of Water Column in casing (h = TD - SWL): _____ FT.
E. Casing Size (in.): _____
F. Calculated Purge Volume (3 Well Volumes): _____ gal

PURGING METHOD: _____ DURATION: _____

OBSERVATIONS:

	Time	Turbidity	Color	Sheen	pH	Temp.	Conduct.	SWL
1st Volume:								
2nd Volume:		No purge sampling						
3rd Volume:								
4th Volume:								
Addl. Volumes:								

TOTAL VOLUME OF WATER PURGED FROM WELL: _____

PURGE WATER STORED/DISPOSED OF WHERE/HOW: ARCO 5893, Vancouver, Washington

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

Sample Number(s)	Time	Size/Number of Container(s)	Preservative
MW2-855	1118	3 x 40mL Voas	HCl

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:

Signature: _____

SECOR
GROUNDWATER SAMPLING FIELD DATA SHEET

SECOR PN: 015.08921.050 DATE: 01.16.2002 WELL NO. MW-3

ACILITY NAME: Arco 0855, Longview, Washington TEMPERATURE: 50 °F or °C

FIELD PERSONNEL: KPF WEATHER: cloudy

FIELD MEASUREMENTS:

A. Static Water Level (SWL) below top of casing/piezometer: 4.83 FT.
B. Thickness of Free Product, if present: _____ Inches _____ FT.
C. Total Depth of well (TD) from top of casing/piezometer: _____ FT.
D. Height of Water Column in casing (h = TD - SWL): _____ FT.
E. Casing Size (in.): _____
F. Calculated Purge Volume (3 Well Volumes): _____ gal

PURGING METHOD: _____ DURATION: _____

OBSERVATIONS:

	Time	Turbidity	Color	Sheen	pH	Temp.	Conduct.	SWL
1st Volume:								
2nd Volume:		No Purge Sampling						
3rd Volume:								
4th Volume:								
Addl. Volumes:								

TOTAL VOLUME OF WATER PURGED FROM WELL: _____

PURGE WATER STORED/DISPOSED OF WHERE/HOW: ARCO 5893, Vancouver, Washington

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

Sample Number(s)	Time	Size/Number of Container(s)	Preservative
MW3-855	1159	3 x 40mL Voas	HCl

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:

Signature: _____

SECOR
GROUNDWATER SAMPLING FIELD DATA SHEET

SECOR PN: 015.08921.050 DATE: 01.16.2002 WELL NO. MW-4

FACILITY NAME: Arco 0855, Longview, Washington TEMPERATURE: 50 °F or °C

FIELD PERSONNEL: KPF WEATHER: cloudy

FIELD MEASUREMENTS:

A. Static Water Level (SWL) below top of casing/piezometer: 6.15 FT.
B. Thickness of Free Product, if present: _____ Inches _____ FT.
C. Total Depth of well (TD) from top of casing/piezometer: _____ FT.
D. Height of Water Column in casing (h = TD - SWL): _____ FT.
E. Casing Size (in.):
F. Calculated Purge Volume (3 Well Volumes): _____ gal

PURGING METHOD: _____ DURATION: _____

OBSERVATIONS:

	Time	Turbidity	Color	Sheen	pH	Temp.	Conduct.	SWL
1st Volume:								
2nd Volume:		No Purge Sampling						
3rd Volume:								
4th Volume:								
Addl. Volumes:								

TOTAL VOLUME OF WATER PURGED FROM WELL: _____

PURGE WATER STORED/DISPOSED OF WHERE/HOW: ARCO 5893, Vancouver, Washington

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

Sample Number(s)	Time	Size/Number of Container(s)	Preservative
MW4-855	1152	3 x 40mL Voas	HCl

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:

Signature: _____

SECOR
GROUNDWATER SAMPLING FIELD DATA SHEET

SECOR PN: 015.08921.050 DATE: 01.16.2002 WELL NO. MW-5

FACILITY NAME: Arco 0855, Longview, Washington TEMPERATURE: 50 °F or °C

FIELD PERSONNEL: KPF WEATHER: cloudy

FIELD MEASUREMENTS:

A. Static Water Level (SWL) below top of casing/piezometer: 5.49 FT.
B. Thickness of Free Product, if present: _____ Inches _____ FT.
C. Total Depth of well (TD) from top of casing/piezometer: _____ FT.
D. Height of Water Column in casing (h = TD - SWL): _____ FT.
E. Casing Size (in.): _____
F. Calculated Purge Volume (3 Well Volumes): _____ gal

PURGING METHOD: _____ DURATION: _____

OBSERVATIONS:

	Time	Turbidity	Color	Sheen	pH	Temp.	Conduct.	SWL
1st Volume:								
2nd Volume:								
3rd Volume:		No	Purge	Sampling				
4th Volume:								
Addl. Volumes:								

TOTAL VOLUME OF WATER PURGED FROM WELL: _____

PURGE WATER STORED/DISPOSED OF WHERE/HOW: ARCO 5893, Vancouver, Washington

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

Sample Number(s)	Time	Size/Number of Container(s)	Preservative
MW5-855	1147	3 x 40mL Voas	HCl

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:

Signature: _____

SECOR
GROUNDWATER SAMPLING FIELD DATA SHEET

SECOR PN: 015.08921.050 DATE: 01.16.2002 WELL NO. MW-6

FACILITY NAME: Arco 0855, Longview, Washington TEMPERATURE: 50 °F or °C

FIELD PERSONNEL: KPF WEATHER: cloudy

FIELD MEASUREMENTS:

A. Static Water Level (SWL) below top of casing/piezometer: 5.80 FT.
B. Thickness of Free Product, if present: _____ Inches _____ FT.
C. Total Depth of well (TD) from top of casing/piezometer: _____ FT.
D. Height of Water Column in casing (h = TD - SWL): _____ FT.
E. Casing Size (in.):
F. Calculated Purge Volume (3 Well Volumes): _____ gal

PURGING METHOD: _____ DURATION: _____

OBSERVATIONS:

	Time	Turbidity	Color	Sheen	pH	Temp.	Conduct.	SWL
1st Volume:								
2nd Volume:		No Purge Sampling						
3rd Volume:								
4th Volume:								
Addl. Volumes:								

TOTAL VOLUME OF WATER PURGED FROM WELL: _____

PURGE WATER STORED/DISPOSED OF WHERE/HOW: ARCO 5893, Vancouver, Washington

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

Sample Number(s)	Time	Size/Number of Container(s)	Preservative
MW6-855	1134	3 x 40mL Voas	HCl

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:

Signature: _____

SECOR
GROUNDWATER SAMPLING FIELD DATA SHEET

SECOR PN: 015.08921.050 DATE: 01.16.2002 WELL NO. MW-7

FACILITY NAME: Arco 0855, Longview, Washington TEMPERATURE: 50 °F or °C

FIELD PERSONNEL: KPF WEATHER: cloudy

FIELD MEASUREMENTS:

A. Static Water Level (SWL) below top of casing/piezometer: 0.31 FT.
B. Thickness of Free Product, if present: _____ Inches _____ FT.
C. Total Depth of well (TD) from top of casing/piezometer: _____ FT.
D. Height of Water Column in casing (h = TD - SWL): _____ FT.
E. Casing Size (in.): _____
F. Calculated Purge Volume (3 Well Volumes): _____ gal

PURGING METHOD: _____ DURATION: _____

OBSERVATIONS:

	Time	Turbidity	Color	Sheen	pH	Temp.	Conduct.	SWL
1st Volume:								
2nd Volume:		No Purge Sampling						
3rd Volume:								
4th Volume:								
Addl. Volumes:								

TOTAL VOLUME OF WATER PURGED FROM WELL: _____

PURGE WATER STORED/DISPOSED OF WHERE/HOW: ARCO 5893, Vancouver, Washington

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

Sample Number(s)	Time	Size/Number of Container(s)	Preservative
MW7-855	1123	3 x 40mL Voas	HCl

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:

Signature: _____

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