

PACIFIC
ENVIRONMENTAL
GROUP, INC.

DEPARTMENT OF ECOLOGY NWRO/TCP TANK UNIT	
# 1642	
INTERIM CLEANUP REPORT	<input checked="" type="checkbox"/>
SITE CHARACTERIZATION	<input type="checkbox"/>
FINAL CLEANUP REPORT	<input type="checkbox"/>
OTHER _____	<input type="checkbox"/>
AFFECTED MEDIA: SOIL	<input checked="" type="checkbox"/>
OTHER _____ GW	<input checked="" type="checkbox"/>
INSPECTOR (INIT.) <u>WEM</u>	DATE <u>8-11-93</u>

Project 530-05.07
July 22, 1993

Mr. Kyle Christie
ARCO Products Company
P.O. Box 5811
San Mateo, California 94402

REC'D
7-26-93

Re: Quarterly Monitoring Report - June 17, 1993
ARCO Service Station No. 5207
401 Park Avenue at 4th Street NE
Renton, Washington

Dear Mr. Christie:

The following report presents the results of quarterly groundwater sampling performed by Pacific Environmental Group, Inc. (PACIFIC) at the site referenced above on June 17, 1993 (Figure 1). Quarterly groundwater sampling is being performed to monitor groundwater conditions at the site.

METHODS

The groundwater sampling procedure consisted of measuring the water level in each well using a Slope Indicator Model SI453 electronic water level indicator, and checking for the presence of separate-phase hydrocarbons using a clear polyethylene bailer. Well MW-3 contained an obstruction on June 17, 1993 and could not be sampled. The obstruction, composed of paper, has been cleared since the date of sampling and the well will be included in future sampling events. Groundwater monitoring Wells MW-1, MW-2, and MW-4 through MW-10 were purged of three casing volumes of water using a centrifugal pump. Purge water was placed into a 55-gallon drum and stored on site.

After the water level in each well recovered to within at least 60% of the initial measurement, a sample was collected using a disposable polyethylene bailer and was placed into appropriate EPA-approved containers. Information about each well including purge and recovery data were noted on the monitoring well field sheets presented in Attachment A. The samples were labeled, logged onto a chain-of-custody

INSPECTOR (INIT)	DATE
OTHER	ON
SELECTED MEDIC	SOI
OTHER	
FINAL OF XPS REPORT	
SITE OF INVESTIGATION	
INTERVIEW REPORT	

RECEIVED AND COLLECTED

document, and transported on ice to North Creek Analytical Laboratory in Bothell, Washington for analysis.

Nine groundwater samples were analyzed for total petroleum hydrocarbons calculated as gasoline (TPH-gasoline) by Washington Method WTPH-G, total lead by EPA Method 7421, and benzene, toluene, ethylbenzene, and xylene compounds (BTEX) by EPA Method 8020. The laboratory analytical methods, certified analytical report, and chain-of-custody document are included in Attachment B.

FINDINGS

Groundwater elevation contours could not be accurately interpolated because of the flat groundwater gradient observed on June 17, 1993. During recent environmental activities performed on site, a damaged monument box for Well MW-6 was replaced and the top of the casing for Well MW-6 was altered. Until Well MW-6 is resurveyed, an accurate groundwater elevation for this well is not obtainable. The regional groundwater migration direction is westward. A groundwater elevation map is presented on Figure 1.

Separate-phase hydrocarbons were not observed in any wells. Groundwater elevations and analytical results are presented on Table 1. TPH-gasoline and benzene concentrations are presented on Figure 2.

TPH-gasoline concentrations were detected in groundwater samples from Wells MW-1, MW-4, MW-6, MW-7, and MW-9 at concentrations ranging from 1,400 ppb to 6,600 ppb. BTEX compounds concentrations were detected in Wells MW-1, MW-4, MW-6, MW-7, and MW-9 at concentrations ranging from 2.2 ppb to 450 ppb. Total lead concentrations were detected in Wells MW-4, MW-6, and MW-9 at concentrations ranging from 2.1 ppb to 13 ppb.

CONCLUSIONS

The groundwater gradient on June 17, 1993 was relatively flat with groundwater elevations in Wells MW-1 through MW-7 ranging from 21.29 feet to 21.60 feet (based on mean sea level).

The analytical chemistry data indicates that groundwater from Wells MW-1, MW-4, MW-6, MW-7, and MW-9 contained TPH-gasoline and BTEX compound concentrations exceeding the Washington State Model Toxics Control Act (MTCA) Method A cleanup standards. Groundwater from Well MW-4 contained a total lead concentration exceeding the MTCA Method A groundwater cleanup standards.

Project 530-05.07

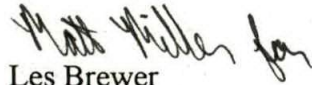
July 22, 1993

Page 3

PACIFIC appreciates the opportunity to be of continuing service to ARCO. Please call if you have any questions concerning the contents of this report.

Sincerely,

Pacific Environmental Group, Inc.



Les Brewer
Staff Geologist



Eric Larsen
Senior Geologist

Attachments: Table 1
Figures 1 and 2
Attachments A and B

cc: Mr. Wally Moon, Department of Ecology

TABLE 1
GROUNDWATER ANALYTICAL RESULTS
ARCO SERVICE STATION 5207

TPH as Gasoline - Washington Method WTPH-G
BTEX Compounds - EPA Method 8020
Total Lead - EPA Method 7421
Concentrations in ug/L (ppb)

Sample I.D.	Sample Date	Groundwater Elevation (1)	TPH-Gasoline	PARAMETER						Total Lead
				Benzene	Toluene	Ethyl Benzene	Xylenes			
MW-1	5/8/91	21.84	3,600	170	9.5	21	9.8	NA		
	5/14/92	20.86	1,900	3.8	4.1	8	5.9	150		
	12/30/92	21.05	3,100	1.8	1.7	4	3.5	2.7		
	3/16/93	20.37	1,300	5.6	ND	ND	ND	8.9		
	6/17/93	21.33	1,600	450	120	ND (4)	4.3	ND		
MW-2	5/8/91	21.87	90	ND	0.58	0.64	0.66	NA		
	5/14/92	20.87	67	ND	ND	ND	ND	19		
	12/30/92	21.07	ND	ND	ND	ND	ND	6.4		
	3/16/93	20.39	ND	ND	ND	ND	ND	5.4		
	6/17/93	21.37	ND	ND	ND	ND	ND	ND		
MW-3	5/8/91	21.81	3,400	140	8.2	64	17	NA		
	5/14/92	20.84	2,600	18	4.9	11	8.9	63		
	12/30/92	21.03	1,300	37	3.1	9.2	3.3	ND		
	3/16/93	20.37	570	6.5	1.6	3	1.9	7.1		
	6/17/93	-	NS (3)	NS	NS	NS	NS	NS		
MW-4 Duplicate	5/8/91	21.83	5,800	83	13	110	75	NA		
	5/14/92	20.84	10,000	130	65	140	94	82		
	12/30/92	21.03	10,000	68	19	130	86	4.2		
	12/30/92	-	8,800	64	18	120	78	NA		
	3/16/93	20.36	7,000	67	19	110	64	19		
MW-5	6/17/93	21.60	6,500	51	ND (5)	130	57	13		
	5/8/91	21.83	76	ND	ND	ND	ND	NA		
	5/15/92	20.83	ND	ND	ND	ND	ND	32		
	12/30/92	21.03	ND	ND	ND	ND	ND	ND		
	3/16/93	20.37	ND	ND	ND	ND	ND	8.1		
MW-6	6/17/93	21.31	ND	ND	ND	ND	ND	ND		
	5/8/91	21.82	9,800	680	40	560	240	NA		
	5/15/92	20.83	7,200	160	33	510	150	110		
	12/30/92	21.02	6,500	120	14	280	64	2.9		
	3/16/93	*	5,400	140	19	380	85	64		
	6/17/93	*	6,600	71	ND (6)	230	53	2.5		

(continued)

TABLE 1
GROUNDWATER ANALYTICAL RESULTS
ARCO SERVICE STATION 5207

TPH as Gasoline - Washington Method WTPH-G
BTEX Compounds - EPA Method 8020
Total Lead - EPA Method 7421
Concentrations in ug/L (ppb)

Sample L.D.	Sample Date	Groundwater Elevation (1)	PARAMETER					Total Lead
			TPH-Gasoline	Benzene	Toluene	Ethyl Benzene	Xylenes	
MW-7	5/8/91	20.86	14,000	44	24	500	120	NA
	5/15/92	20.86	3,200	ND	6.4	67	7	22
	12/30/92	21.04	3,900	ND	4.8	49	10	4.6
	3/16/93	20.39	3,300	9.1	5.3	83	10	5.3
	6/17/93	21.29	2,600	10	9.9	31	37	ND
MW-8	5/15/92	20.88	ND	ND	ND	ND	ND	33
	3/16/93	20.40	ND	ND	ND	ND	ND	19
	6/17/93	21.37	ND	ND	ND	ND	ND	ND
MW-9	5/15/92	20.77	1,700	12	3.3	6.3	20	62
	3/16/93	20.31	1,100	12	ND	ND	3	ND
	6/17/93	21.26	1,400	22	6.5	2.2	19	2.1
MW-10	5/15/92	20.82	ND	2	0.59	ND	ND	60
	3/16/93	20.39	3,300	9.1	5.3	83	10	5.3
	6/17/93	21.31	ND	ND	ND	ND	ND	ND
MTCA Cleanup Levels								
	-	-	1,000	5	40	30	20	5.0
Detection Limit								
	6/17/93	-	50	0.50	0.50	0.50	1.0	2.0

NOTES: ND - Not Detected

NS = Not Sampled

Well locations are shown on Figure 3

Analytical Reports are included in Attachment B

* Accurate groundwater elevation unavailable

(1) - Based on mean sea level

(2) - Pending new survey data

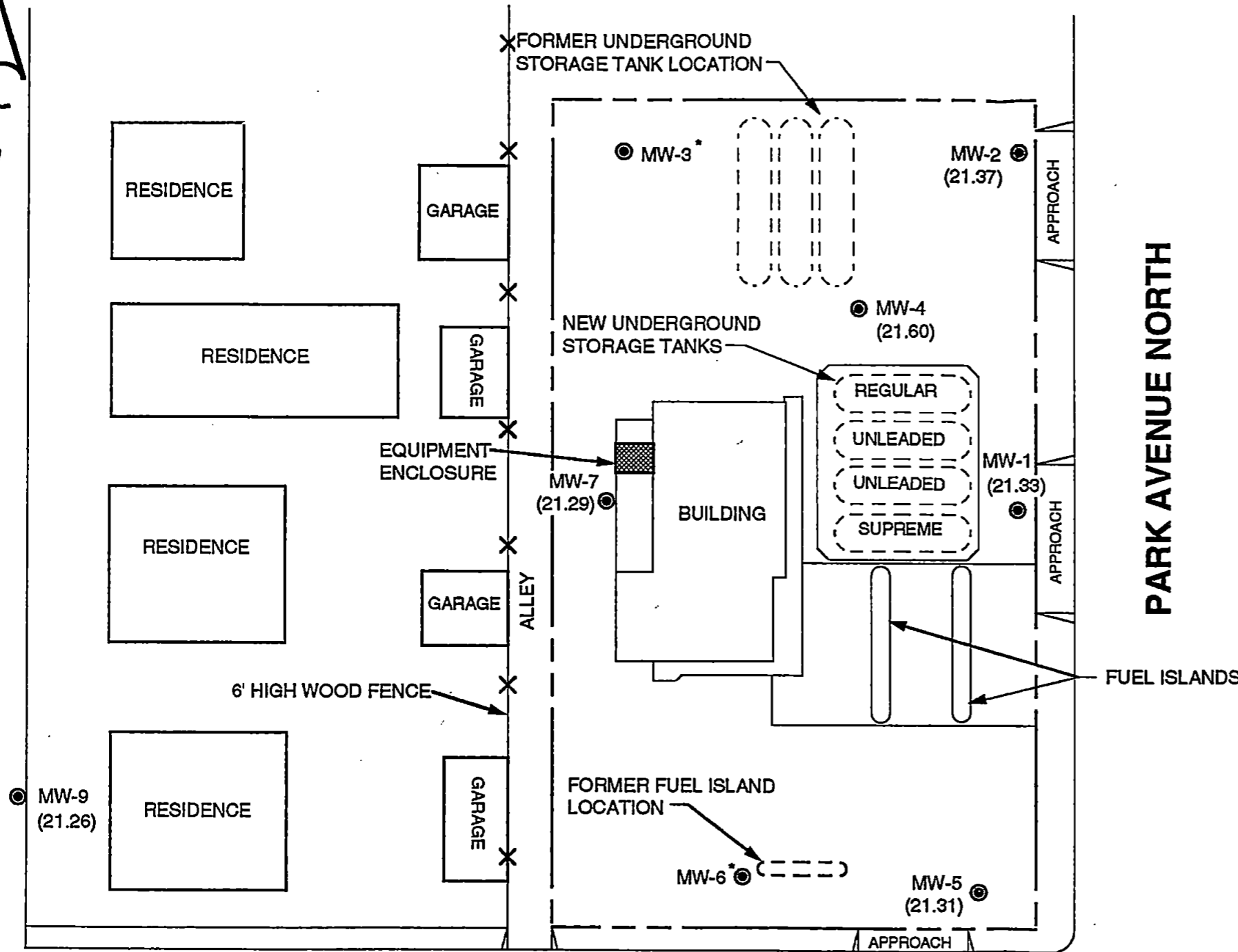
(3) Well not sampled due to obstruction in well

(4) Detection limit is 2.0 ug/L.

(5) Detection limit is 20 ug/L.

(6) Detection limit is 40 ug/L.

PELLEY AVENUE NORTH



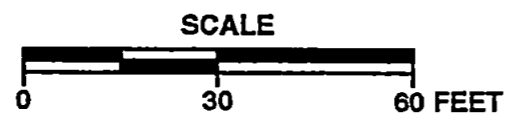
LEGEND

- MW-2 ● GROUNDWATER MONITORING WELL LOCATION AND DESIGNATION
- (21.31) GROUNDWATER ELEVATION IN FEET, MEAN SEA-LEVEL, 6-17-93
- * UNABLE TO OBTAIN ACCURATE GROUNDWATER ELEVATION ON 6-17-93

NORTH 4th STREET



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ENVIRONMENTAL
GROUP, INC.

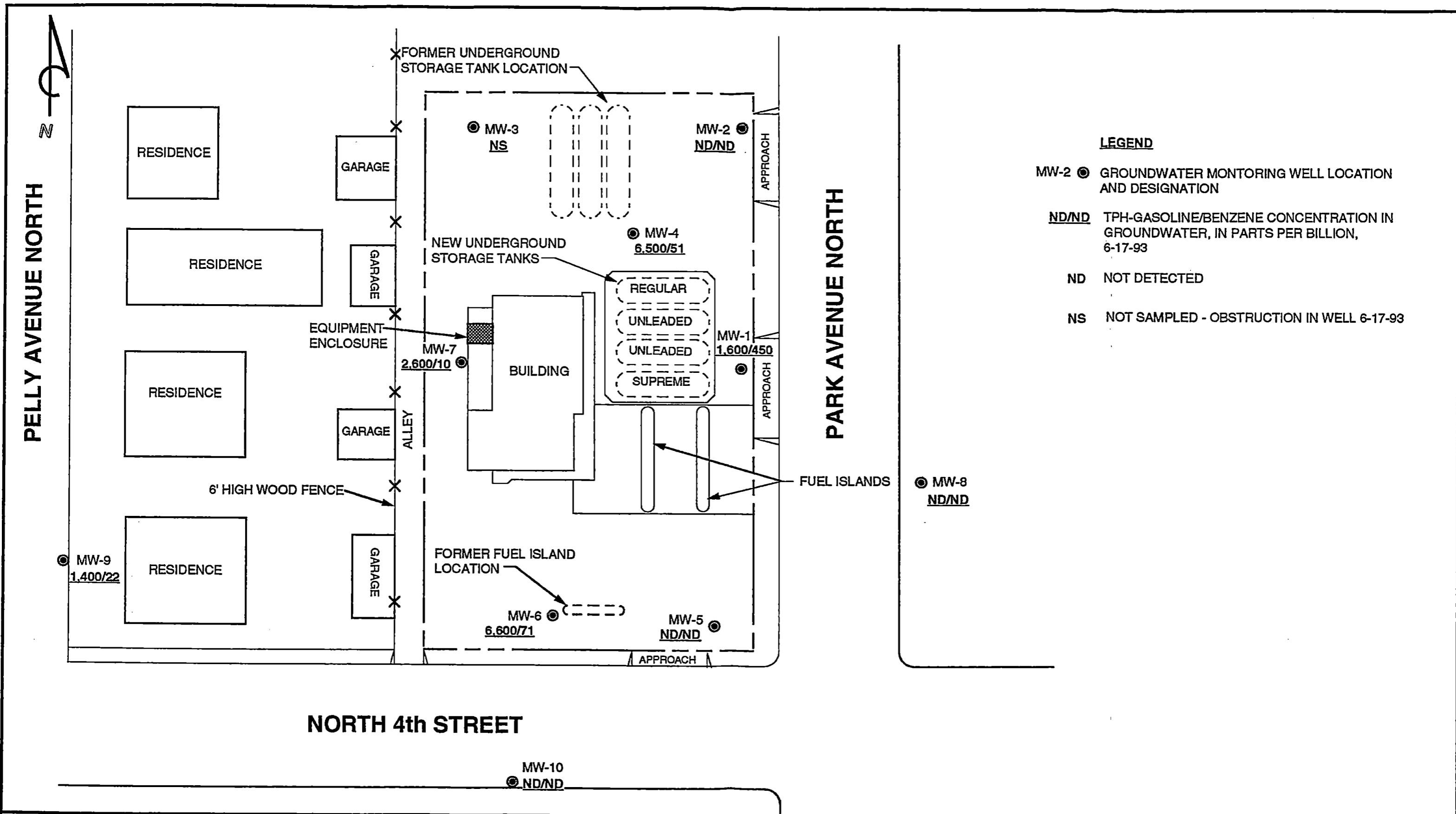


ARCO STATION #5207
401 Park Avenue North
Renton, Washington

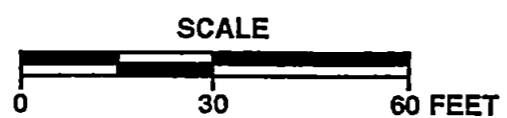
GROUNDWATER ELEVATION MAP

FIGURE:
1

PROJECT:
530-05.07



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GROUP, INC.



ARCO STATION #5207
401 Park Avenue North
Renton, Washington

TPH-GASOLINE/BENZENE CONCENTRATION MAP

FIGURE:
2
PROJECT:
530-05.07

ATTACHMENT A
WELL SAMPLING DATA SHEET

FIELD REPORT

DEPTH TO WATER / FLOATING PRODUCT SURVEY

530-05.07

530-05.07

PROJECT NO.: 530-31.01

LOCATION: 410 PARK AVE NORTH
RENTON, WA.

DATE: 6/17/93

CLIENT/STATION #: ARCO 5207

FIELD TECHNICIAN: John Blough

DAY OF WEEK: Thursday

DTW ORDER	WELL ID	SURFACE SEAL	LID SECURE	GASKET	LOCK	EXPANDING CAP	TOTAL DEPTH (Feet)	FIRST DEPTH TO WATER (Feet)	SECOND DEPTH TO WATER AT (Feet) Time of Sample	DEPTH TO FLOATING PRODUCT (Feet)	FLOATING PRODUCT THICKNESS (Feet)	COMMENTS
7	MW-1	✓	✓	✓		✓				—	—	
2	MW-2	✓	✓	✓		✓				—	—	
5	MW-3	✓	✓	✓		✓	—	—	—	—	—	Well is clogged at 7.5 feet
10	MW-4	✓	✓	✓	→	✓				—	—	Replaced Lock
4	MW-5	✓	✓	✓		✓				—	—	
9	MW-6	✓	✓	✓	→	✓				—	—	Replaced Lock
8	MW-7	✓	✓	✓	→	✓				—	—	Replaced Lock
1	MW-8	✓	✓	✓	→	✓				—	—	Replaced Expanding CAP & lock
6	MW-9	✓	✓	✓		✓				—	—	Replaced Lock VAULT Full of Bentonite - Removed.
3	MW-10	✓	✓	✓		✓				—	—	

GROUND WATER SAMPLE FIELD DATA SHEET

PROJECT NO: 530-31-01
CLIENT/STATION #: 5207

WELL ID: MW-1
ADDRESS: 410 PARK AVE North
RENTON, WA.

CASING DIAMETER (inches): 2 3 4 6 8 12 Other _____
GALLON/LINEAR FOOT: 0.17 0.38 0.66 1.5 2.6 5.8 Other _____
TD 15.24 - DTW 10.25 X $\frac{\text{GALLON}}{\text{LINEAR FT.}}$ 4.99 X $\frac{\text{CASING}}{\text{VOLUME}}$.51 = $\frac{\text{CALCULATED}}{\text{PURGE}}$ 2.54 ACTUAL PURGE 3

DATE PURGED: 6/17/97 START (2400 Hr) 14:25 END (2400 Hr) 14:30
DATE SAMPLED: 6/17/97 START (2400 Hr) 17:40 END (2400 Hr) 17:45

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (μmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
		<u>NOT REQUIRED</u> →				

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): NOT REQUIRED

PURGING EQUIPMENT

☐ 2" Bladder Pump ☐ Bailer (Teflon®)
☒ Centrifugal Pump ☐ Bailer (PVC)
☐ Submersible Pump ☐ Bailer (Stainless Steel)
☐ Dedicated
Other: _____

SAMPLING EQUIPMENT

☐ 2" Bladder Pump ☐ Bailer (Teflon®)
☐ DDL Sampler ☐ Bailer (Stainless Steel)
☐ Dipper ☐ Submersible Pump
☒ Bailer Disposable ☐ Dedicated
Other: _____

REMARKS: well was a vapor well.

DTW AT TIME OF SAMPLE: 10.25 PRINT NAME: John Blough
PAGE 1 OF 1 SIGNATURE: John Blough

GROUND WATER SAMPLE FIELD DATA SHEET

PROJECT NO: 530-31-01

WELL ID: MW-2

CLIENT/STATION #: 5207

ADDRESS: 410 PARK AVE NORTH
RENTON, WA.

CASING DIAMETER (inches): (2) 3 4 6 8 12 Other _____

GALLON/LINEAR FOOT: 0.17 0.38 0.66 1.5 2.6 5.8 Other _____

TD 17.90 - DTW 10.12 X $\frac{\text{GALLON}}{\text{LINEAR FT.}}$ 7.78 X $\frac{\text{CASING VOLUME}}{\text{VOLUME}}$.51 = $\frac{\text{CALCULATED PURGE}}$ 3.96 ACTUAL PURGE 3.5

DATE PURGED: 6/17/93 START (2400 Hr) 11:40 END (2400 Hr) 12:05
DATE SAMPLED: 6/17/93 START (2400 Hr) 16:45 END (2400 Hr) 16:50

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
		<u>NOT REQUIRED</u>				→

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): NOT REQUIRED

PURGING EQUIPMENT

☐ 2" Bladder Pump ☐ Bailer (Teflon®)
☒ Centrifugal Pump ☐ Bailer (PVC)
☐ Submersible Pump ☐ Bailer (Stainless Steel)
☐ Dedicated

Other: _____

SAMPLING EQUIPMENT

☐ 2" Bladder Pump ☐ Bailer (Teflon®)
☐ DDL Sampler ☐ Bailer (Stainless Steel)
☐ Dipper ☐ Submersible Pump
☒ Bailer Disposable ☐ Dedicated

Other: _____

REMARKS: well pumped dry after 2 gal. - let Recharge 15 min
Pumped dry after 1.5 more gal = 3.5 total

DTW AT TIME OF SAMPLE = 10.11 TPH/BTEX and total LEAD

PAGE 1 OF 1 PRINT NAME: John Blough

SIGNATURE: John Blough

GROUND WATER SAMPLE FIELD DATA SHEET

PROJECT NO: 530-31.01
 CLIENT/STATION #: 5207

WELL ID: MW-3
 ADDRESS: 410 PARK AVE N,
Renton

*Not Sampled.
 See Below.*

CASING DIAMETER (inches): (2) 3 4 6 8 12 Other _____
 GALLON/LINEAR FOOT: 0.17 0.38 0.66 1.5 2.6 5.8 Other _____
 TD _____ - DTW _____ X $\frac{\text{GALLON}}{\text{LINEAR FT.}}$ _____ X $\frac{\text{CASING}}{\text{VOLUME}}$ _____ = $\frac{\text{CALCULATED}}{\text{PURGE}}$ _____ **ACTUAL PURGE**

DATE PURGED: 6/17/93 START (2400 Hr) _____ END (2400 Hr) _____
 DATE SAMPLED: _____ START (2400 Hr) _____ END (2400 Hr) _____

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

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

PURGING EQUIPMENT

_____ 2" Bladder Pump _____ Bailer (Teflon®)
 _____ Centrifugal Pump _____ Bailer (PVC)
 _____ Submersible Pump _____ Bailer (Stainless Steel)
 _____ Dedicated
 Other: _____

SAMPLING EQUIPMENT

_____ 2" Bladder Pump _____ Bailer (Teflon®)
 _____ DDL Sampler _____ Bailer (Stainless Steel)
 _____ Dipper _____ Submersible Pump
 _____ Bailer Disposable _____ Dedicated
 Other: _____

REMARKS: Something in well at 7.5 feet. TRIED to dislodge it.
Appears to be soil - dirt clod from construction when well was
converted to vapor extraction well. unable to sample well.

PRINT NAME: John Brough
 SIGNATURE: John Brough

GROUND WATER SAMPLE FIELD DATA SHEET

PROJECT NO: 530-31-01
 CLIENT/STATION #: 5207

WELL ID: MW-4
 ADDRESS: 410 PARK AVE North
RENTON, WA.

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

TD 17.70 - DTW 10.59 X $\frac{\text{GALLON}}{\text{LINEAR FT.}}$ 7.11 X $\frac{\text{CASING VOLUME}}{\text{VOLUME}}$ 51 = $\frac{\text{CALCULATED PURGE}}$ 3.62

ACTUAL
PURGE

DATE PURGED: 6/17/93 START (2400 Hr) 15:30 END (2400 Hr) 19:40
 DATE SAMPLED: 6/17/93 START (2400 Hr) 18:40 END (2400 Hr) 19:45

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
		<u>NOT REQUIRED</u>				<u>→</u>

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): NOT REQUIRED

PURGING EQUIPMENT

☐ 2" Bladder Pump ☐ Bailer (Teflon®)
☒ Centrifugal Pump ☐ Bailer (PVC)
☐ Submersible Pump ☐ Bailer (Stainless Steel)
☐ Dedicated

Other: _____

SAMPLING EQUIPMENT

☐ 2" Bladder Pump ☐ Bailer (Teflon®)
☐ DDL Sampler ☐ Bailer (Stainless Steel)
☐ Dipper ☐ Submersible Pump
☒ Bailer Disposable ☐ Dedicated

Other: _____

REMARKS: Replaced lock.

DTW AT TIME OF SAMPLE: 10.71 PRINT NAME: John Blough
 PAGE 1 OF 1 SIGNATURE: John Blough
TPH/BTEX and total LEAD

GROUND WATER SAMPLE FIELD DATA SHEET

PROJECT NO: 530-31-01
CLIENT/STATION #: 5207

WELL ID: MW-5
ADDRESS: 410 PARK AVE NORTH
RENTON, WA.

CASING DIAMETER (inches): (2) 3 4 6 8 12 Other _____
GALLON/LINEAR FOOT: 0.17 0.38 0.66 1.5 2.6 5.8 Other _____
TD 16.54 - DTW 10.62 X $\frac{\text{GALLON}}{\text{LINEAR FT.}}$ 5.92 X $\frac{\text{CASING VOLUME}}{\text{VOLUME}}$.51 = $\frac{\text{CALCULATED PURGE}}$ 3.01 ACTUAL PURGE 3.5

DATE PURGED: 6/17/93 START (2400 Hr) 12:55 END (2400 Hr) 13:01
DATE SAMPLED: 6/17/93 START (2400 Hr) 17:15 END (2400 Hr) 17:20

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (μmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
		<u>NOT REQUIRED</u>				→

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): NOT REQUIRED

PURGING EQUIPMENT

☐ 2" Bladder Pump ☐ Bailer (Teflon®)
☒ Centrifugal Pump ☐ Bailer (PVC)
☐ Submersible Pump ☐ Bailer (Stainless Steel)
☐ Dedicated

Other: _____

SAMPLING EQUIPMENT

☐ 2" Bladder Pump ☐ Bailer (Teflon®)
☐ DDL Sampler ☐ Bailer (Stainless Steel)
☐ Dipper ☐ Submersible Pump
☒ Bailer Disposable ☐ Dedicated

Other: _____

REMARKS: _____

TPH/BTEX and total lead

DTW AT TIME OF SAMPLE: 10.58

PRINT NAME: John Blough

PAGE 1 OF 1

SIGNATURE: John Blough

GROUND WATER SAMPLE FIELD DATA SHEET

PROJECT NO: 530-31-01
CLIENT/STATION #: 5207

WELL ID: MW-6
ADDRESS: 410 PARK AVE NORTH
RENTON, WA.

CASING DIAMETER (inches): 2 3 4 6 8 12 Other _____
GALLON/LINEAR FOOT: 0.17 0.38 0.66 1.5 2.6 5.8 Other _____
TD 15.50 - DTW 10.42 X $\frac{\text{GALLON}}{\text{LINEAR FT.}}$ 5.08 X $\frac{\text{CASING VOLUME}}{\text{VOLUME}}$.51 = $\frac{\text{CALCULATED PURGE}}$ 2.59

ACTUAL PURGE	<u>3.5</u>
--------------	------------

DATE PURGED: 6/17/93 START (2400 Hr) 15:10 END (2400 Hr) 15:15
DATE SAMPLED: 6/17/93 START (2400 Hr) 18:15 END (2400 Hr) 18:20

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
		<u>NOT REQUIRED</u>				→

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): NOT REQUIRED

PURGING EQUIPMENT

☐ 2" Bladder Pump ☐ Bailer (Teflon®)
☒ Centrifugal Pump ☐ Bailer (PVC)
☐ Submersible Pump ☐ Bailer (Stainless Steel)
☐ Dedicated
Other: _____

SAMPLING EQUIPMENT

☐ 2" Bladder Pump ☐ Bailer (Teflon®)
☐ DDL Sampler ☐ Bailer (Stainless Steel)
☐ Dipper ☐ Submersible Pump
☒ Bailer Disposable ☐ Dedicated
Other: _____

REMARKS: Replaced Lock

DTW AT TIME OF SAMPLE: 10.40 PRINT NAME: John Blough
PAGE 1 OF 1 SIGNATURE: John Blough
TPH/BTEX and total LEAD

GROUND WATER SAMPLE FIELD DATA SHEET

PROJECT NO: 530-31-01
 CLIENT/STATION #: 5207

WELL ID: MW-7
 ADDRESS: 410 PARK AVE NORTH
RENTON, WA.

CASING DIAMETER (inches): (2) 3 4 6 8 12 Other _____
 GALLON/LINEAR FOOT: 0.17 0.38 0.66 1.5 2.6 5.8 Other _____
 TD 16.05 - DTW 10.55 X $\frac{\text{GALLON}}{\text{LINEAR FT.}}$ 5.5 X $\frac{\text{CASING VOLUME}}{\text{VOLUME}}$.51 = $\frac{\text{CALCULATED PURGE}}$ 2.80 ACTUAL PURGE 3.0

DATE PURGED: 6/17/93 START (2400 Hr) 14:50 END (2400 Hr) 15:00
 DATE SAMPLED: 6/17/93 START (2400 Hr) 17:35 END (2400 Hr) 18:00

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
		<u>NOT REQUIRED</u> →				

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): NOT REQUIRED

PURGING EQUIPMENT

☐ 2" Bladder Pump ☐ Bailor (Teflon®)
☒ Centrifugal Pump ☐ Bailor (PVC)
☐ Submersible Pump ☐ Bailor (Stainless Steel)
☐ Dedicated

Other: _____

SAMPLING EQUIPMENT

☐ 2" Bladder Pump ☐ Bailor (Teflon®)
☐ DDL Sampler ☐ Bailor (Stainless Steel)
☐ Dipper ☐ Submersible Pump
☒ Bailor Disposable ☐ Dedicated

Other: _____

REMARKS:

Replaced Lock

TPH/BTEX and total LEAD

DTW AT TIME OF SAMPLE: 10.55

PRINT NAME: John Blough

PAGE 1 OF 1

SIGNATURE: John Blough

GROUND WATER SAMPLE FIELD DATA SHEET

PROJECT NO: 530-31-01
 CLIENT/STATION #: 5207

WELL ID: MW-8
 ADDRESS: 410 PARK AVE North
RENTON, WA.

CASING DIAMETER (inches): (2) 3 4 6 8 12 Other _____
 GALLON/LINEAR FOOT: 0.17 0.38 0.66 1.5 2.6 5.8 Other _____
 TD 23.0 - DTW 10.53 X $\frac{\text{GALLON}}{\text{LINEAR FT.}}$ 12.47 X $\frac{\text{CASING VOLUME}}{\text{VOLUME}}$ 0.51 = $\frac{\text{CALCULATED PURGE}}$ 6.35 ACTUAL PURGE 6.5

DATE PURGED: 6/17/93 START (2400 Hr) 11:15 END (2400 Hr) 11:25
 DATE SAMPLED: 6/17/93 START (2400 Hr) 16:30 END (2400 Hr) 16:35

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
		<u>NOT REQUIRED</u>				→

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): NOT REQUIRED

PURGING EQUIPMENT

☐ 2" Bladder Pump ☐ Bailer (Teflon®)
☒ Centrifugal Pump ☐ Bailer (PVC)
☐ Submersible Pump ☐ Bailer (Stainless Steel)
☐ Dedicated
 Other: _____

SAMPLING EQUIPMENT

☐ 2" Bladder Pump ☐ Bailer (Teflon®)
☐ DDL Sampler ☐ Bailer (Stainless Steel)
☐ Dipper ☐ Submersible Pump
☒ Bailer Disposable ☐ Dedicated
 Other: _____

REMARKS: Replaced lock

TPH/BTEX and total LEAD

DTW AT TIME OF SAMPLE: 10.52 PRINT NAME: John Blough
 PAGE 1 OF 1 SIGNATURE: John Blough

GROUND WATER SAMPLE FIELD DATA SHEET

PROJECT NO: 530-31-01
CLIENT/STATION #: 5207

WELL ID: MW-9
ADDRESS: 410 PARK AVE NORTH
RENTON, WA.

CASING DIAMETER (inches): (2) 3 4 6 8 12 Other _____
GALLON/LINEAR FOOT: 0.17 0.38 0.66 1.5 2.6 5.8 Other _____
TD 22.60 - DTW 8.97 X $\frac{\text{GALLON}}{\text{LINEAR FT.}}$ 13.63 X $\frac{\text{CASING}}{\text{VOLUME}}$.51 = $\frac{\text{CALCULATED}}{\text{PURGE}}$ 6.95 ACTUAL PURGE 7.0

DATE PURGED: 6/17/93 START (2400 Hr) 13:45 END (2400 Hr) 13:55
DATE SAMPLED: 6/17/93 START (2400 Hr) 17:25 END (2400 Hr) 17:30

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. (µmhos/cm @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
		<u>NOT REQUIRED</u>				→

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): NOT REQUIRED

PURGING EQUIPMENT

☐ 2" Bladder Pump ☐ Bailer (Teflon®)
☒ Centrifugal Pump ☐ Bailer (PVC)
☐ Submersible Pump ☐ Bailer (Stainless Steel)
☐ Dedicated

Other: _____

SAMPLING EQUIPMENT

☐ 2" Bladder Pump ☐ Bailer (Teflon®)
☐ DDL Sampler ☐ Bailer (Stainless Steel)
☐ Dipper ☐ Submersible Pump
☒ Bailer Disposable ☐ Dedicated

Other: _____

REMARKS: VAULT BOX Full of BENTONITE
Replaced Lock

DTW AT TIME OF SAMPLE: 8.97

PAGE 1 OF 1

PRINT NAME: John Blough

SIGNATURE: John Blough

TPH/BTEX and total LEAD

GROUND WATER SAMPLE FIELD DATA SHEET

PROJECT NO: 530-31-01
 CLIENT/STATION #: 5207

WELL ID: mw-10
 ADDRESS: 410 PARK AVE NORTH
RENTON, WA.

CASING DIAMETER (inches): (2) 3 4 6 8 12 Other _____
 GALLON/LINEAR FOOT: 0.17 0.38 0.66 1.5 2.6 5.8 Other _____
 TD 22.67 - DTW 9.93 X $\frac{\text{GALLON}}{\text{LINEAR FT.}}$ 12.74 X $\frac{\text{CASING VOLUME}}{\text{VOLUME}}$.51 = $\frac{\text{CALCULATED PURGE}}$ 6.49 ACTUAL PURGE 7

DATE PURGED: 6/17/93 START (2400 Hr) 12:30 END (2400 Hr) 12:40
 DATE SAMPLED: 6/17/93 START (2400 Hr) 17:00 END (2400 Hr) 17:05

TIME (2400 Hr)	VOLUME (gal.)	pH (units)	E.C. ($\mu\text{mhos/cm}$ @ 25° C)	TEMPERATURE (°F)	COLOR (visual)	TURBIDITY (visual)
		<u>NOT REQUIRED</u>				→

FIELD QC SAMPLES COLLECTED AT THIS WELL (i.e. FB-1, XDUP-1): NOT REQUIRED

PURGING EQUIPMENT

☐ 2" Bladder Pump ☐ Bailer (Teflon®)
☒ Centrifugal Pump ☐ Bailer (PVC)
☐ Submersible Pump ☐ Bailer (Stainless Steel)
☐ Dedicated
 Other: _____

SAMPLING EQUIPMENT

☐ 2" Bladder Pump ☐ Bailer (Teflon®)
☐ DDL Sampler ☐ Bailer (Stainless Steel)
☐ Dipper ☐ Submersible Pump
☒ Bailer Disposable ☐ Dedicated
 Other: _____

REMARKS: _____

TPH/BTEX and total lead

DTW AT TIME OF SAMPLE: 9.93 PRINT NAME: John Blough
 PAGE 1 OF 1 SIGNATURE: John Blough

ATTACHMENT B
LABORATORY ANALYTICAL METHODS AND REPORTS
CHAIN-OF-CUSTODY DOCUMENTATION

ATTACHMENT B

Laboratory Analytical Methods

Analysis for TPH-gasoline was performed according to Washington Method WTPH-G. Benzene, toluene, ethylbenzene, and xylenes analysis was performed in accordance with EPA Method 8020/602. A methanol solvent extraction was used for the TPH analysis with final detection by gas chromatography using a flame-ionization detector. A headspace or purge and trap technique was utilized for BTEX analysis. Final detection was by gas chromatography using a photoionization detector.

Groundwater samples for total lead analysis were analyzed by atomic absorption according to EPA Method 7421.

Pacific Environmental Group	Client Project ID: ARCO Renton, #530-31.01	Sampled: Jun 17, 1993
4020 148th Avenue NE, #B	Sample Matrix: Water	Received: Jun 18, 1993
Redmond, WA 98052	Analysis Method: WTPH-G	Analyzed: Jun 28, 1993
Attention: Eric Larsen	First Sample #: 306-1024	Reported: Jun 29, 1993

TOTAL PETROLEUM HYDROCARBONS-GASOLINE RANGE

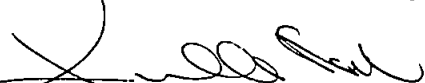
Sample Number	Sample Description	Sample Result $\mu\text{g/L}$ (ppb)	Surrogate Recovery %
306-1024	MW-1-10	1,600	124
306-1025	MW-2-10	N.D.	118
306-1026	MW-4-10	6,500	117
306-1027	MW-5-10	N.D.	108
306-1028	MW-6-10	6,600	114
306-1029	MW-7-10	2,600	113
306-1030	MW-8-10	N.D.	110
306-1031	MW-9-9	1,400	114
306-1032	MW-10-9	N.D.	103
306-1033	TRIP BLANK 6/4/93	N.D.	106

Reporting Limit:**50**

4-Bromofluorobenzene surrogate recovery control limits are 50 - 150 %.

Volatile Total Petroleum Hydrocarbons are quantitated as Gasoline Range Organics (toluene - dodecane).

Analytes reported as N.D. were not detected above the stated Reporting Limit.

NORTH CREEK ANALYTICAL Inc.Kimberle Stark
Project Manager

Pacific Environmental Group	Client Project ID:	ARCO Renton, #530-31.01	
4020 148th Avenue NE, #B	Sample Matrix:	Method Blank	
Redmond, WA 98052	Analysis Method:	WTPH-G	Analyzed: Jun 28, 1993
Attention: Eric Larsen	First Sample #:	BLK062893	Reported: Jun 29, 1993

TOTAL PETROLEUM HYDROCARBONS-GASOLINE RANGE

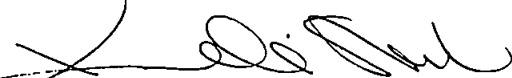
Sample Number	Sample Description	Sample Result $\mu\text{g/L}$ (ppb)	Surrogate Recovery %
BLK062893	Method Blank	N.D.	109

Reporting Limit:**50**

4-Bromofluorobenzene surrogate recovery control limits are 50 - 150 %.

Volatile Total Petroleum Hydrocarbons are quantitated as Gasoline Range Organics (toluene - dodecane).

Analytes reported as N.D. were not detected above the stated Reporting Limit.

NORTH CREEK ANALYTICAL Inc.Kimberle Stark
Project Manager

Pacific Environmental Group	Client Project ID: ARCO Renton, #530-31.01	Sampled: Jun 17, 1993
4020 148th Avenue NE, #B	Sample Matrix: Water	Received: Jun 18, 1993
Redmond, WA 98052	Analysis Method: EPA 8020	Analyzed: Jun 28, 1993
Attention: Eric Larsen	First Sample #: 306-1024	Reported: Jun 29, 1993

BTEX DISTINCTION

Sample Number	Sample Description	Benzene $\mu\text{g/L}$ (ppb)	Toluene $\mu\text{g/L}$ (ppb)	Ethyl Benzene $\mu\text{g/L}$ (ppb)	Xylenes $\mu\text{g/L}$ (ppb)	Surrogate Recovery %
306-1024	MW-1-10	450	120	N.D.	4.3	121
306-1025	MW-2-10	N.D.	N.D.	N.D.	N.D.	119
306-1026	MW-4-10	51	N.D.	130	57	126
306-1027	MW-5-10	N.D.	N.D.	N.D.	N.D.	119
306-1028	MW-6-10	71	N.D.	230	53	123
306-1029	MW-7-10	10	9.9	31	37	124
306-1030	MW-8-10	N.D.	N.D.	N.D.	N.D.	116
306-1031	MW-9-9	22	6.5	2.2	19	118
306-1032	MW-10-9	N.D.	N.D.	N.D.	N.D.	118
306-1033	TRIP BLANK 6/4/93	N.D.	N.D.	N.D.	N.D.	115

Reporting Limits:	0.50	0.50	0.50	1.0
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4-Bromofluorobenzene surrogate recovery control limits are 82 - 122 %.
Analytes reported as N.D. were not detected above the stated Reporting Limit.

NORTH CREEK ANALYTICAL Inc.

Please Note:

The Reporting Limit for Ethyl Benzene in #306-1024 = 2.0 $\mu\text{g/L}$.
The Reporting Limit for Toluene in #306-1026 = 20 $\mu\text{g/L}$.
The Reporting Limit for Toluene in 306-1028 = 40 $\mu\text{g/L}$.


Kimberle Stark
Project Manager

Pacific Environmental Group	Client Project ID:	ARCO Renton, #530-31.01	
4020 148th Avenue NE, #B	Sample Matrix:	Method Blank	
Redmond, WA 98052	Analysis Method:	EPA 8020	Analyzed: Jun 28, 1993
Attention: Eric Larsen	First Sample #:	BLK062893	Reported: Jun 29, 1993

BTEX DISTINCTION

Sample Number	Sample Description	Benzene $\mu\text{g/L}$ (ppb)	Toluene $\mu\text{g/L}$ (ppb)	Ethyl Benzene $\mu\text{g/L}$ (ppb)	Xylenes $\mu\text{g/L}$ (ppb)	Surrogate Recovery %
BLK062893	Method Blank	N.D.	N.D.	N.D.	N.D.	115

Reporting Limits:	0.50	0.50	0.50	1.0
--------------------------	-------------	-------------	-------------	------------

4-Bromofluorobenzene surrogate recovery control limits are 82 - 122 %.
Analytes reported as N.D. were not detected above the stated Reporting Limit.

NORTH CREEK ANALYTICAL Inc.
Kimberle Stark
Project Manager

Pacific Environmental Group
4020 148th Avenue NE, #B
Redmond, WA 98052
Attention: Eric Larsen

Client Project ID: ARCO Renton, #530-31.01

Sample Matrix: Water

Analysis Method: EPA 7421

First Sample #: 306-1024

Sampled: Jun 17, 1993

Received: Jun 18, 1993

Digested: Jun 21, 1993

Analyzed: Jun 22, 1993

Reported: Jun 29, 1993

METALS ANALYSIS FOR: TOTAL LEAD

Sample Number	Sample Description	Reporting Limit $\mu\text{g/L}$ (ppb)	Sample Result $\mu\text{g/L}$ (ppb)
306-1024	MW-1-10	2.0	N.D.
306-1025	MW-2-10	2.0	N.D.
306-1026	MW-4-10	2.0	13
306-1027	MW-5-10	2.0	N.D.
306-1028	MW-6-10	2.0	2.5
306-1029	MW-7-10	2.0	N.D.
306-1030	MW-8-10	2.0	N.D.
306-1031	MW-9-9	2.0	2.1
306-1032	MW-10-9	2.0	N.D.
BLK062193	Method Blank	2.0	N.D.

Analytes reported as N.D. were not detected above the stated Reporting Limit.

NORTH CREEK ANALYTICAL Inc.Kimberle Stark
Project Manager

Pacific Environmental Group
4020 148th Avenue NE, #B
Redmond, WA 98052
Attention: Eric LarsenClient Project ID: ARCO Renton, #530-31.01
Sample Matrix : Water
Units: µg/L (ppb)

Analyst: K. Ackerlund

Digested: Jun 21, 1993
Reported: Jun 29, 1993**METALS QUALITY CONTROL DATA REPORT****ANALYTE**

Lead

EPA Method: 7421
Date Analyzed: Jun 22, 1993

ACCURACY ASSESSMENT

LCS Spike
Conc. Added: 25

LCS Spike
Result: 27

LCS Spike
% Recovery: 108

Upper Control
Limit: 139

Lower Control
Limit: 77

Matrix Spike
Sample #: 306-0989

Matrix Spike
% Recovery: 93

PRECISION ASSESSMENT

Sample #: 306-0989

Original: 5.4

Duplicate: 5.2

Relative %
Difference: RPD values are not reported at sample concentration levels < 10 X the Reporting Limit.

NORTH CREEK ANALYTICAL Inc.


Kimberle Stark
Project Manager

Lab Control Sample	Conc. of L.C.S.	x 100
% Recovery:	L.C.S. Spike Conc. Added	
Relative % Difference:	Original Result - Duplicate Result	x 100
	(Original Result + Duplicate Result) / 2	

Pacific Environmental Group
4020 148th Avenue NE, #B
Redmond, WA 98052
Attention: Eric Larsen

Client Project ID: ARCO Renton, #530-31.01
Sample Matrix: Water
Analysis Method: EPA 8020
Units: $\mu\text{g/L}$ (ppb)
QC Sample #: 306-1024

Analyst: R. Lister
K. Wilke
F. Shino
Analyzed: Jun 28, 1993
Reported: Jun 29, 1993

MATRIX SPIKE QUALITY CONTROL DATA REPORT

ANALYTE	Benzene	Toluene	Ethyl Benzene	Xylenes
Sample Result:	N.D.	N.D.	N.D.	N.D.
Spike Conc. Added:	5.0	5.0	5.0	15
Spike Result:	5.2	5.2	5.4	16
Spike % Recovery:	104%	104%	108%	107%
Spike Dup. Result:	5.1	5.2	5.4	16
Spike Duplicate % Recovery:	102%	104%	108%	107%
Upper Control Limit %:	123	118	126	114
Lower Control Limit %:	87	89	88	92
Relative % Difference:	1.9%	0.0%	0.0%	0.0%
Maximum RPD:	8.3	7.9	8.0	12

NORTH CREEK ANALYTICAL Inc.

% Recovery:	$\frac{\text{Spike Result} - \text{Sample Result}}{\text{Spike Conc. Added}} \times 100$
Relative % Difference:	$\frac{\text{Spike Result} - \text{Spike Dup. Result}}{(\text{Spike Result} + \text{Spike Dup. Result}) / 2} \times 100$

Kimberle Stark
Project Manager

Pacific Environmental Group
4020 148th Avenue NE, #B
Redmond, WA 98052
Attention: Eric Larsen

Client Project ID: ARCO Renton, #530-31.01
Sample Matrix: Water
Analysis Method: WTPH-G
Units: µg/L (ppb)

Analyst: R. Lister
K. Wilke
F. Shino
Analyzed: Jun 28, 1993
Reported: Jun 29, 1993

HYDROCARBON QUALITY CONTROL DATA REPORT

ACCURACY ASSESSMENT Laboratory Control Sample

Gasoline

Spike Conc.
Added: 100

Spike
Result: 85

%
Recovery: 85

Upper Control
Limit %: 120

Lower Control
Limit %: 80

PRECISION ASSESSMENT Sample Duplicate

Gasoline Range
Organics

Sample
Number: 306-1024

Original
Result: 1,600

Duplicate
Result: 1,600

Relative
% Difference: 0.0

Maximum
RPD: 20

NORTH CREEK ANALYTICAL Inc.

% Recovery: $\frac{\text{Spike Result}}{\text{Spike Concentration Added}} \times 100$

Relative % Difference: $\frac{\text{Original Result} - \text{Duplicate Result}}{(\text{Original Result} + \text{Duplicate Result}) / 2} \times 100$

Kimberle Stark
Project Manager

Division of AtlanticRichfieldCompany

Task Order No. PEGGC-A93-SA

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Distribution: White copy — Laboratory; Canary copy — ARCO Environmental Engineering; Pink copy — Consultant
APPC-3292 (2-91)