Texaco Refining and Marketing Inc
Pacific Northwest Division

P O Box 2969
10602 NE 38th Place
Kirkland WA 98083-2969
206 827 0761

November 25, 1991

Washington State Department of Ecology
Attn: Joe Hickey
3190 160th Avenue S.E.
Bellevue, WA 98008

Re: Texaco Station
8701 Greenwood
Seattle, WA

Dear Mr. Hickey:

Enclosed please find two copies of a Quarterly Update Report for the above Texaco Station. This assessment was performed during the period of August - October, 1991, and is being performed in connection with a release that occurred on the property on 7/24/91.

If you should have problems or questions with any of the above information, please contact me at (206)-889-3253.

Sincerely,

TEXACO REFINING AND MARKETING INC

Robin L. Lane
Environmental Analyst

Encl.

cc: MWC, ARC, RJM, File

#2298

QUARTERLY UPDATE REPORT
AUGUST - OCTOBER, 1991

TEXACO STA # 63232-037
Texaco Service Station
8701 Greenwood Avenue North
Seattle, Washington INTERIM GW JS 12/16/91

November 15, 1991

Prepared by:

Michael W. Condon
Project Manager

Approved by:

Anita M. Burke
Supervisor, Pacific Northwest

Texaco Environmental Services
3400 188th Street S.W., Suite 630
Lynnwood, WA 98037

PR: 505

TEXACO STA # 63232-037

QUARTERLY TESTING REPORT OF ONSITE MONITORING WELLS.

ALL FOUR WELLS HAVE GW CONTAMINATION. LEVELS INCREASED SINCE LAST SAMPLING EVENT IN AGW1 & AGW2.

SPILL TO SOIL IN JULY, 1991.

INTERIM MONITORING

INTRODUCTION

This report presents the results of ground water sampling and monitoring activities from August 15 - October 17, 1991 at the Texaco service station at 8701 Greenwood Avenue North in Seattle (Fig 1). Included are updated tables and maps summarizing ground water sampling results, depth to ground water, and ground water gradient direction.

Ground water monitoring wells were installed on the subject site in March, 1991 as part of a pre-sale site assessment to determine the type and extent of any contamination that may be present. A report discussing the procedures and findings of the assessment, entitled "Report on Initial Site Assessment", was prepared by Texaco Environmental Services (TES) and forwarded to the Washington State Department of Ecology in August, 1991. Since August, TES has been conducting a program of monthly monitoring of ground water elevations and quarterly ground water sampling.

MONITORING PROGRAM

Four ground water monitoring wells, AGW1, AGW2, AGW4, and AGW5, are located on the site (Fig. 2). Depth to ground water was measured in each well on August 15, September 20, and October 17, 1991. The August monitoring episode took place immediately prior to collection of ground water samples. An electronic interface probe was used to measure the depth to water to the nearest 0.01 foot. The results of all depth to water measurements to date, along with calculated ground water elevations, are presented in Table 1. These data were used to construct water table contour maps, depicting the relative elevation of the ground water surface, and the ground water gradient direction (Figs. 3A - 3C). As shown on the contour maps, the apparent ground water flow direction has consistently been to the southwest. Ground water gradient has ranged from .023 to .033 ft/ft, with a slight decrease in gradient seen between August and October.

No free product was observed or detected by the interface probe during any of the monitoring episode. A froth with what appeared to be an oily sheen was noted on the water in each of the wells during the October monitoring episode.

GROUND WATER SAMPLING PROGRAM

Procedures and Analyses

On August 15, 1991, ground water samples were collected from the four existing wells at the subject site. Prior to sampling, each well was visually checked for the presence of free-floating petroleum product using a clear PVC bailer. No floating product or sheen was observed in any of the wells at the time of sampling.

Prior to purging, depth to water was measured to the nearest .01 foot in each well using an electronic interface probe. These readings were recorded on the field sampling data sheets (Appendix A). Ground water samples were then collected in each well and submitted to Columbia Analytical Service (CAS) of Bothell, WA for laboratory analysis of BTEX by EPA Method 602, Total Petroleum Hydrocarbons-as-gasoline (TPH-G) by EPA Method 8015M, and total lead by EPA Method 7421. The sample from well AGW4 was also analyzed for TPH-as-diesel (TPH-D) by EPA Method 8015M.

Each monitoring well was purged before sampling using a bailer. A minimum of three pore volumes of water was purged from wells AGW1 and AGW2, until Ph, temperature, and conductivity stabilized. AGW4 and AGW5 were bailed dry after purging two pore volumes. These two wells were allowed to recover before sampling. Purge water was contained on-site in sealed, labelled 55-gallon drums pending proper disposal.

Ground water samples were collected using disposable bailers. Braided nylon cord was used to lower the bailer in each well, with new cord and a new bailer used for each well. Samples were transferred to 40 ml vials with Teflon septa (TPH-G and BTEX analysis), 16 ounce plastic bottles (lead analysis), or one-liter amber glass bottles (TPH-D analysis). Hydrochloric and nitric acid were used as preservatives. No headspace was present in the vials. Samples were labelled, placed in an iced cooler, and delivered to CAS as noted on the Field Sampling Data Sheets (Appendix A). A field blank (AGW8) and duplicate (AGW7) were also submitted for analysis to test quality control procedures.

Results of Ground Water Analyses

Results of the ground water analyses, including those of all previous sampling episodes, are presented in Table 2. A copy of the laboratory report and chain-of-custody documentation from the August sampling episode are included in Appendix B.

Benzene was present in all four wells, ranging from 9.4 to 1400 ppb. This exceeds the Washington State Model Toxics Control Act (MTCA) Method A Ground Water Cleanup Level for benzene of 5 ppb. The MTCA cleanup levels were also exceeded for toluene and ethylbenzene in AGW1, xylenes in AGW1 and AGW2, and total TPH in AGW1, AGW2, and AGW4. Lead was detected only in the water sample from AGW4 at 4 ppb, below the MTCA Cleanup level of 5 ppb. Figure 4 is a map showing benzene levels in ground water for all sampling episodes to date.

A comparison of BTEX concentrations in ground water samples collected in August with those collected in April and May show a marked increase in contaminants present in wells AGW1 and AGW2. Contaminant levels in AGW4 have decreased slightly, while a marked decrease was noted in AGW5. This is the first time that ground water samples collected from this site have been analyzed for TPH, thus no comparison of TPH concentrations can be made.

The increase in contamination seen in wells AGW1 and AGW2, located downgradient from the tank pit, was probably due to a leak in the vicinity of the pump turbine for the unleaded product tank in July, 1991. This leak was reported to the Department of Ecology. Since the discovery of the spill, the existing tank pit dewatering well has not been used.

FUTURE ACTIVITIES

The program of monthly monitoring and quarterly sampling of ground water will continue. The possibility of drilling a well across the street to the southwest, to determine the extent of any off-site migration of contaminants, is being pursued. Options for remediation, including utilizing the existing tank pit dewatering well, are being studied.

TEXACO ENVIRONMENTAL SERVICES

FIGURES AND TABLES

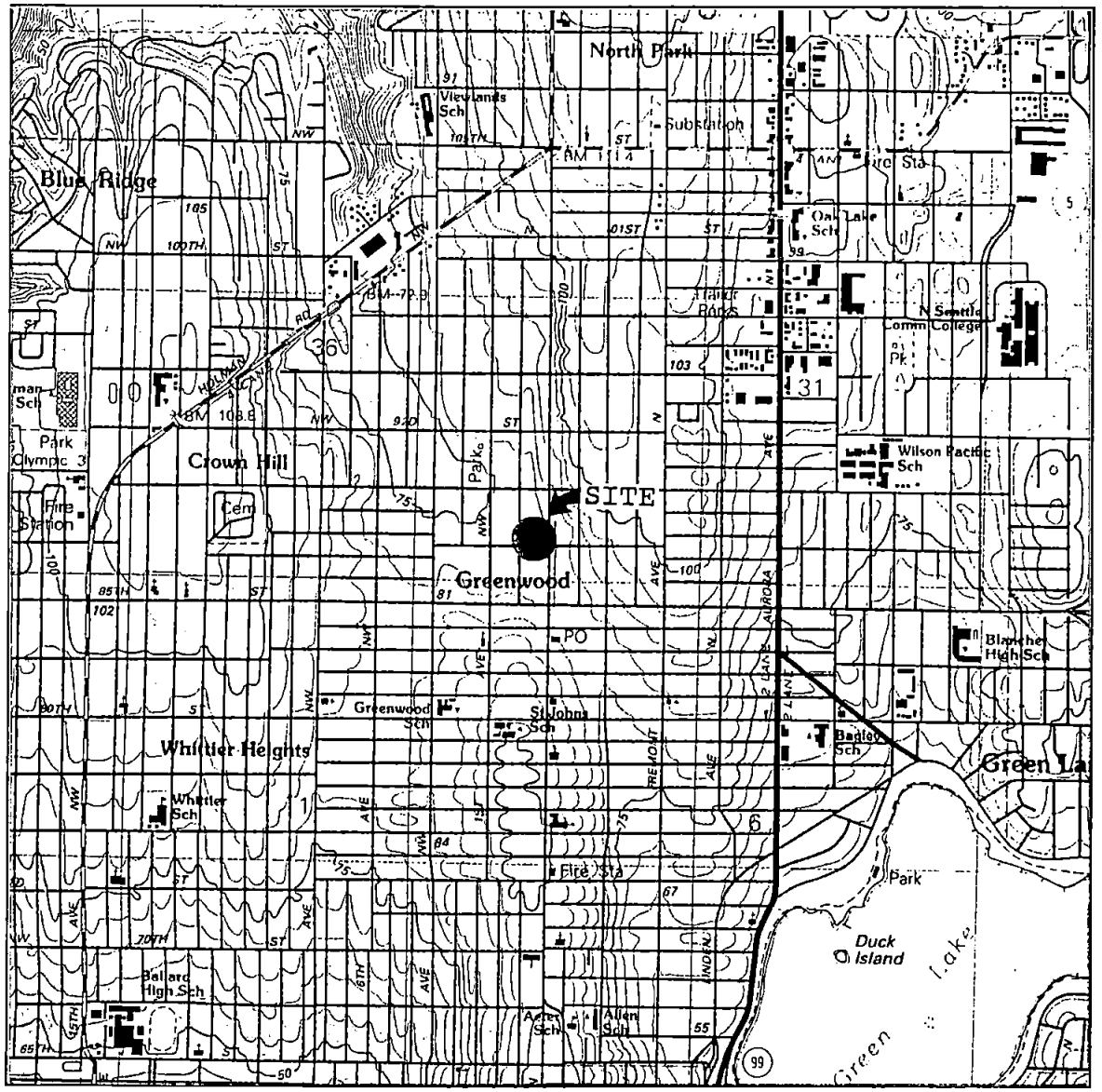


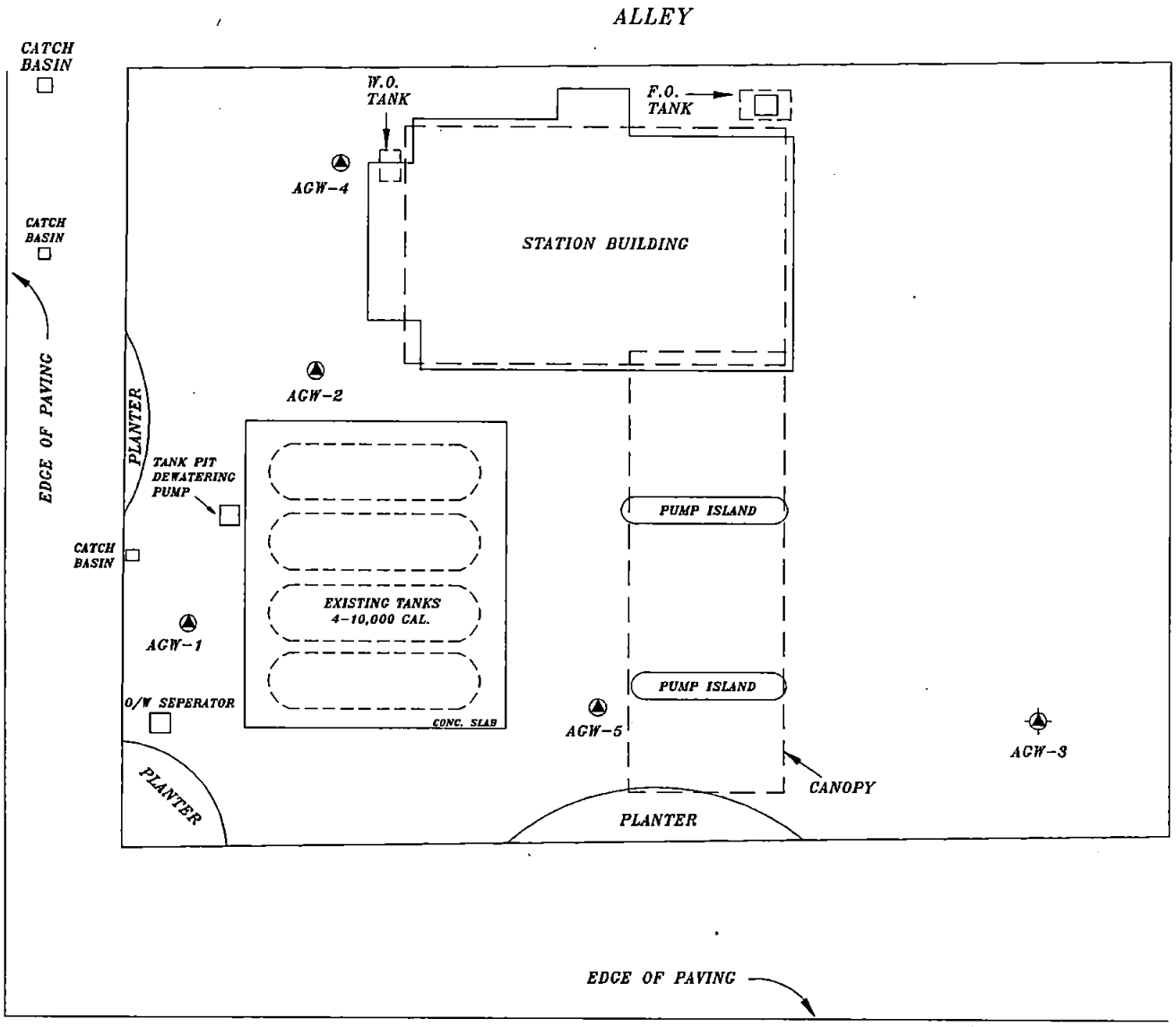
FIGURE 1

SITE LOCATION MAP
TEXACO SERVICE STATION
8701 GREENWOOD AVENUE NORTH
SEATTLE, WA

N

2000'

Base Map From: 7.5' x 15' USGS Seattle North, WA quad.



N

0 25

FEET

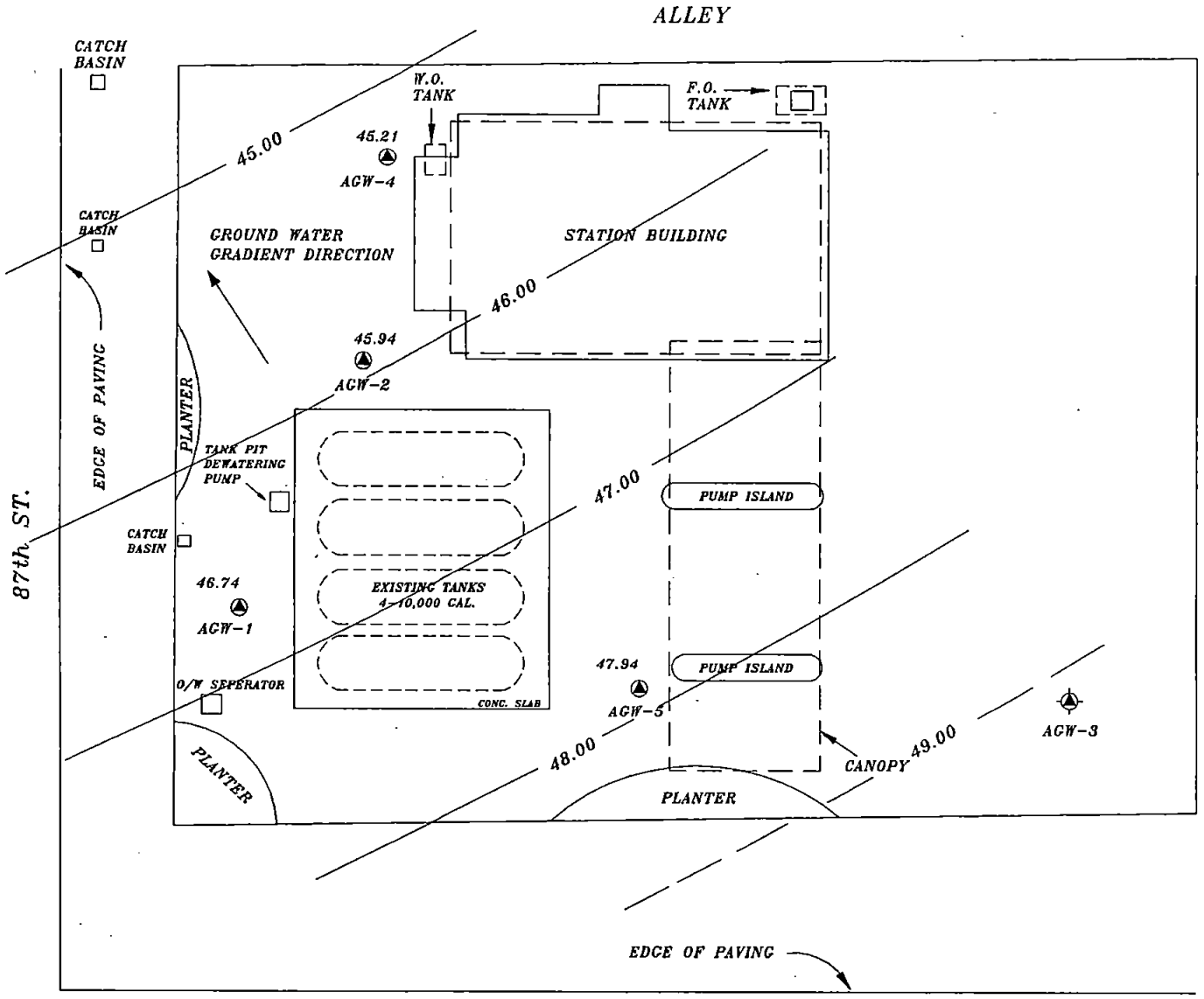
AGW-1 MONITORING WELL LOCATION, AND WELL NUMBER

AGW-3 ABANDONED MONITORING WELL LOCATION, AND WELL NUMBER

TEXACO
REFINING AND MARKETING, INC.
ENVIRONMENTAL SERVICES

FIGURE 2
STATION PLAT
87th ST. & GREENWOOD AVE. NO., SEATTLE, WASHINGTON

SCALE 1"=25'-0"	JOB NO.		APPROVED
DRAWN BY AMA	DATE 6/19/91		APPROVED
CHECKED BY MWC	DATE 11/13/91	SHEET 1 OF 1	
DRAWING NO. (SEATTLE) 87-GW-ST			



N

0 25

FEET

49.00 GROUND WATER ELEVATION (Referenced to on-site benchmark assigned arbitrary elevation of 50.00 feet)

AGW-1 MONITORING WELL LOCATION, AND WELL NUMBER

AGW-3 ABANDONED MONITORING WELL LOCATION, AND WELL NUMBER

TEXACO
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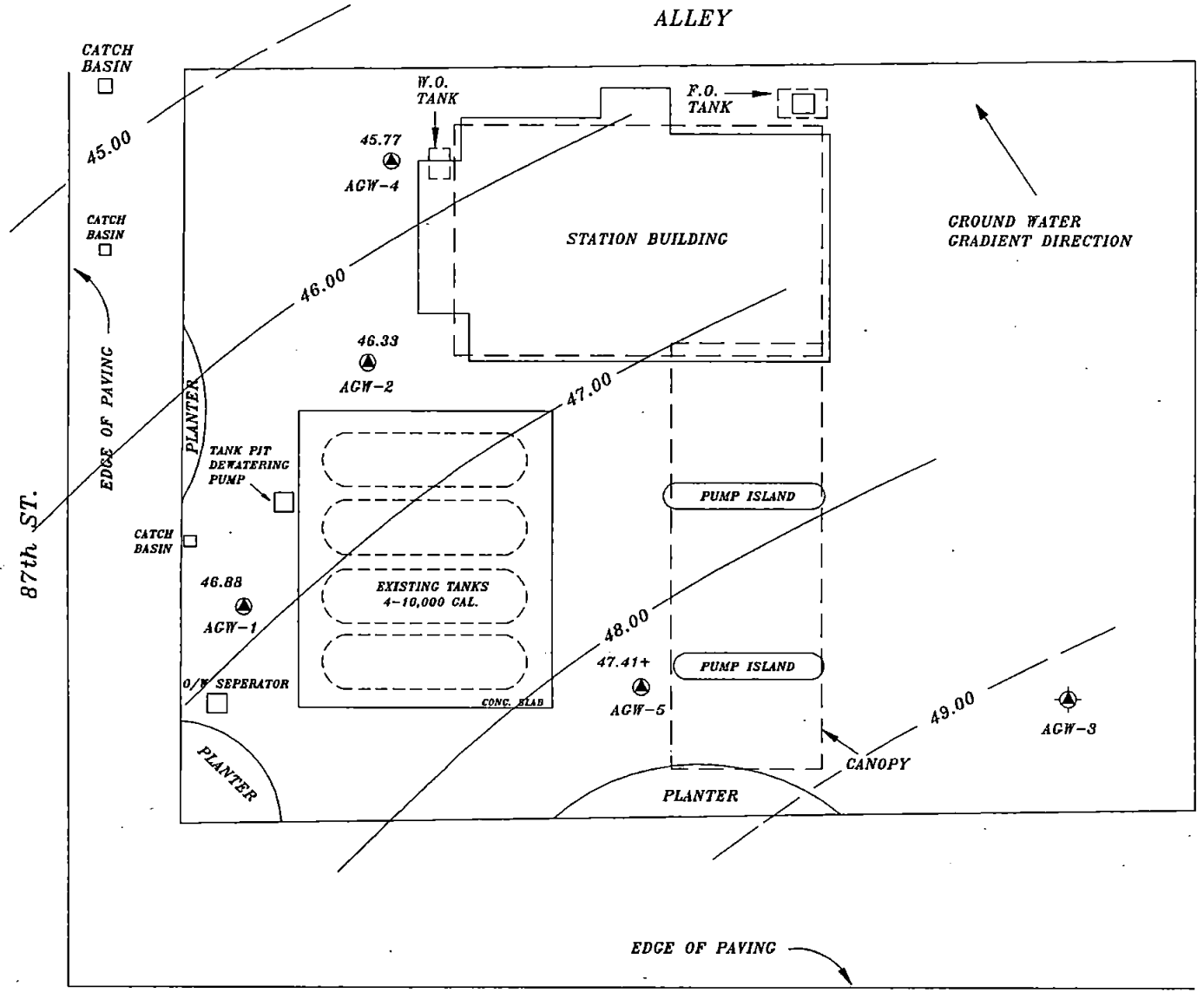
ENVIRONMENTAL SERVICES

FIGURE 3A

GROUND WATER ELEVATION CONTOURS, 8/15/91
87th ST. & GREENWOOD AVE. NO.,
SEATTLE, WASHINGTON

SCALE 1"=25'-0"	JOB NO.	APPROVED	
DRAWN BY AMA	DATE 6/19/91	APPROVED	
CHECKED BY MWC	DATE 11/13/91	SHEET 1 OF 1	
DRAWING NO. (SEATTLE) 87-GW-ST			



49.00 GROUND WATER ELEVATION (Referenced to on-site benchmark assigned arbitrary elevation of 50.00 feet)

AGW-1 MONITORING WELL LOCATION, AND WELL NUMBER

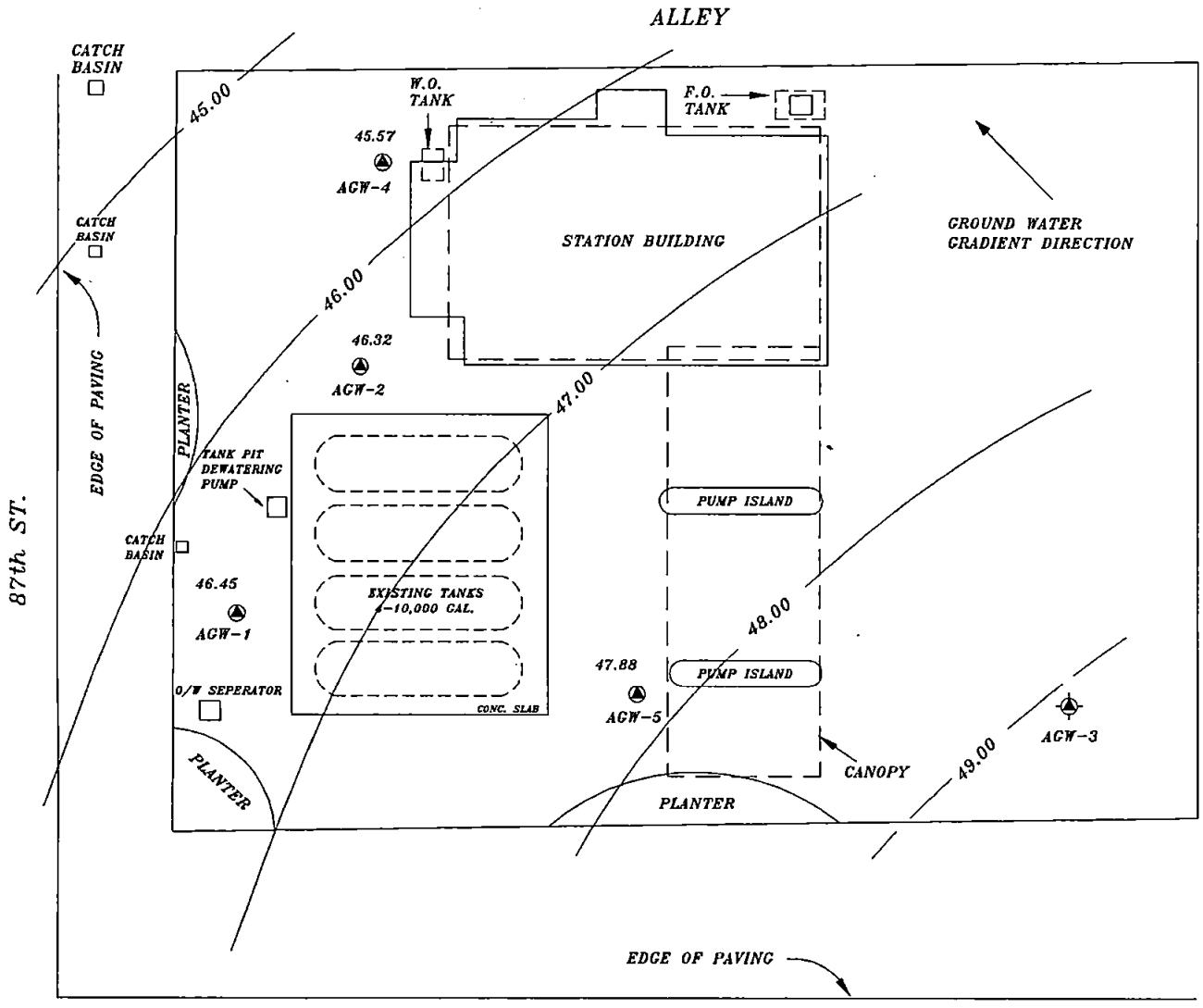
AGW-3 ABANDONED MONITORING WELL LOCATION, AND WELL NUMBER

TEXACO
REFINING AND MARKETING,INC.
ENVIRONMENTAL SERVICES

FIGURE 3B

GROUND WATER ELEVATION CONTOURS, 9/20/91
87th ST. & GREENWOOD AVE. NO.,
SEATTLE, WASHINGTON

SCALE 1"=25'-0"	JOB NO.		APPROVED
DRAWN BY AMA	DATE 6/19/91		APPROVED
CHECKED BY MWC	DATE 11/13/91	SHEET 1 OF 1	
DRAWING NO. (SEATTLE) 87-GW-ST			



49.00 GROUND WATER ELEVATION (Referenced to on-site benchmark assigned arbitrary elevation of 50.00 feet)

AGW-1 MONITORING WELL LOCATION, AND WELL NUMBER

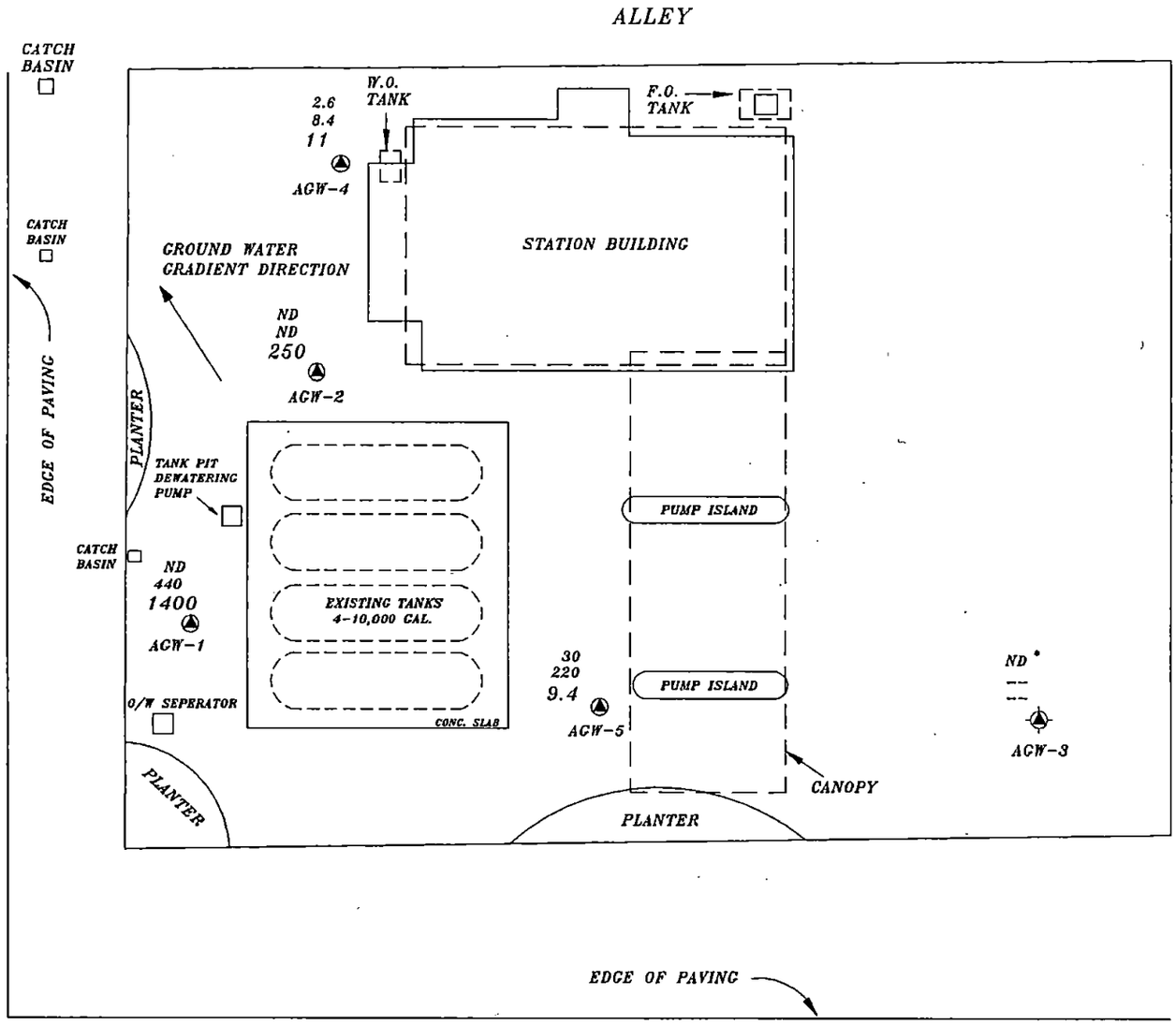
AGW-3 ABANDONED MONITORING WELL LOCATION, AND WELL NUMBER

TEXACO
REFINING AND MARKETING,INC.
ENVIRONMENTAL SERVICES

FIGURE 3C

GROUND WATER ELEVATION CONTOURS, 10/17/91
87th ST. & GREENWOOD AVE. NO.,
SEATTLE, WASHINGTON

SCALE 1"=25'-0"	JOB NO.		APPROVED
DRAWN BY AMA	DATE 6/19/91		APPROVED
CHECKED BY MWC	DATE 11/13/91	SHEET 1 OF 1	
DRAWING NO. (SEATTLE) 87-GW-ST			



30 – PPB BENZENE, 4/3/91
220 – PPB BENZENE, 5/15/91
250 – PPB BENZENE, 8/15/91
• – sampled 3/29/91, prior to abandonment

N

0 25

FEET

AGW-1 MONITORING WELL LOCATION, AND WELL NUMBER

AGW-3 ABANDONED MONITORING WELL LOCATION, AND WELL NUMBER

TEXACO
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ENVIRONMENTAL SERVICES

FIGURE 4
BENZENE IN GROUND WATER, PPB
87th ST. & GREENWOOD AVE. NO.,
SEATTLE, WASHINGTON

SCALE 1"=25'-0"	JOB NO.	APPROVED
DRAWN BY AMA	DATE 6/19/91	APPROVED
CHECKED BY MWC	DATE 11/13/91	SHEET 1 OF 1
DRAWING NO. (SEATTLE) 87-GW-ST		

TABLE 1

SURVEY AND GROUND WATER ELEVATION SUMMARY
Texaco Service Station
8701 Greenwood Avenue North, Seattle

Well	Elevation at Top PVC (ft)	Date Monitored	Depth to Water (ft)	Ground Water Elevation (ft)
AGW-1	47.36	4/3/91	3.18	44.18
		8/15/91	0.62	46.74
		9/20/91	0.48	46.88
		10/17/91	0.91	46.45
AGW-2	47.59	4/3/91	3.43	44.16
		8/15/91	1.65	45.94
		9/20/91	1.26	46.33
		10/17/91	1.27	46.32
AGW-3	49.10	(abnd'd)	(flowing)	(49.10+)
AGW-4	47.97	4/3/91	4.61	43.36
		8/15/91	2.76	45.21
		9/20/91	2.20	45.77
		10/17/91	2.40	45.57
AGW-5	49.47	4/3/91	2.78	46.69
		8/15/91	1.53	47.94
		9/20/91	<2.06*	47.41+
		10/17/91	1.59	47.88

note: Elevations are referenced to an on-site benchmark location. The benchmark was assigned an arbitrary elevation of 50.00 ft

* - Water level continued to rise after 1 hr. This is last reading and represents a minimum ground water elevation

TABLE 2
WATER SAMPLE LABORATORY RESULTS
Texaco Service Station
8701 Greenwood Avenue North, Seattle

SAMPLE # COLLECTION DATE	BENZENE EPA 602 ug/L (ppb)	TOLUENE EPA 602 ug/L (ppb)	E-BENZENE EPA 602 ug/L (ppb)	XYLENE EPA 602 ug/L (ppb)	TPH-G EPA 8015M mg/L (ppm)	TPH-D EPA 8015M mg/L (ppm)	TOTAL LEAD EPA 7421 ug/L (ppb)	HALOGENATED VOLATILES EPA 8010 ug/L (ppb)
AGW-1								
4/3/91	ND(0.5)	ND(1.0)	ND(1.0)	ND(1.0)	--	--	--	ND(v)
5/15/91	440	1000	92	670	--	--	--	ND(v)
8/15/91	1400	7400	1000	8100	361	--	ND(2)	--
AGW-2								
4/3/91	ND(0.5)	ND(1.0)	ND(1.0)	ND(1.0)	--	--	--	ND(v)
5/15/91	ND(0.5)	ND(1.0)	ND(1.0)	ND(1.0)	--	--	--	ND(v)
8/15/91	250	220	15	86	1.03	--	ND(2)	--
AGW3								
3/29/91	ND(0.5)	ND(1.0)	ND(1.0)	ND(1.0)	--	--	--	ND(v)
abnd'd 3/29	--	--	--	--	--	--	--	--
AGW4								
4/3/91	2.6	20	2.7	31	--	--	--	ND(v)
5/15/91	8.4	19	2.4	20	--	ND(0.5)*	--	ND(v)
8/15/91	11	4	1	7	12	3260	4	--
AGW5								
4/3/91	30	10	5	7	--	--	--	ND(v)
5/15/91	220	53	3.5	12	--	--	--	ND(v)
8/15/91	9.4	ND(1.0)	ND(1.0)	ND(1.0)	0.10	--	ND(2)	--

ND = not detected (at detection level shown in parentheses, v = various)
-- = not anlyzed
* = Analysis by EPA Method 418.1
shaded/bold = above MTCA Method A Cleanup Levels for groundwater (during latest sampling episode)

APPENDICES

APPENDIX A

Field Sampling Data Sheets

Client Ref: 038MWX

Sweet-Edwards/EMCON, Inc.
18912 North Creek Parkway, Suite 210 • Bothell, WA 98011
Office (206) 485-5000 • FAX (206) 486-9766

Field Sampling Data

LOCATION/ADDRESS 8701 Greenwood Ave 13
PROJECT NAME Texaco Greenwood #U68Y2.01
CLIENT/CONTACT Mike Condin

Well or Surface Site Number AGW-1
Sample Designation AGW-1
Date, Time 8-15-91, 18:06
Weather sunny, hot

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method Used (M-Scope Number or Other)
0.62'		8-15-91; 17:03	SOLINST (KSV)

WELL EVACUATION: PV = 12.75 gallons

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
38.25	3+	disposable bailer		8-15-91

Surface Water Flow Speed _____ Measurement Method _____ Date, Time _____

SAMPLING:

Sample	Date, Time	Method	Volume (ml)	Container Type	Depth Taken (feet)	Field Filtered (yes,no)	Preservative	Iced (yes,no)	Sampler Cleaning Method
8020/8015M	8-15-91	disp. bailer	2x40ml	VOA		no	HCl	Y	Non-Phosphatic detergent wash H2O rinse MeOH rinse Distilled H2O rinse
TOTAL LEAD	18:06		16oz.	poly.		no	HNO_3	Y	

FIELD WATER QUALITY TESTS: Measured with a Corning Check-Mate pH/Conductivity/Temp. meter (KSV)

Pore Vol. Number	pH	Conductivity µS	Temp	Eh	Time:
1	6.86	342	19.5		17:18
2	6.85	380	19.2		17:34
3	6.79	395	18.4		17:57

NOTES:

Sample appeared slightly cloudy, off-white/beige in color, slight sewer-like odor. AGW-1 recovers very well.

Total # of Bottles: 3

Signature: Kim S. Vik

Client Ref: 038 MWC

Sweet-Edwards/EMCON, Inc.

18912 North Creek Parkway, Suite 210 • Bothell, WA 98011
Office (206) 485-5000 • FAX (206) 486-9766

Field Sampling Data

<DUPLICATE>

KSV

Well or Surface Site Number ~~AGW-5~~ ~~AGW-6~~ AGW-7
Sample Designation AGW-7
Date, Time 8-15-91 , 18:15
Weather sunny, hot

LOCATION/ADDRESS 8701 Greenwood Ave
PROJECT NAME Texaco Greenwood # 068813.01
CLIENT/CONTACT Mike Condin

HYDROLOGY MEASUREMENTS: N/A

(Nearest .01 ft.)	Elevation	Date, Time	Method Used (M-Scope Number or Other)
0.62		8-15-91, 17:03	SOUNST (KSV).

WELL EVACUATION: PV = 12.75

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
38.25 ~~X~~	3+	disposable bailer		8-15-91

Surface Water Flow Speed _____ Measurement Method _____ Date, Time _____

SAMPLING:

Sample	Date, Time	Method	Volume (ml)	Container Type	Depth Taken (feet)	Field Filtered (yes,no)	Preservative	Iced (yes,no)	Sampler Cleaning Method
8020/8015M	8-15-91	disp. bailer	2x40ml	VOA	X	no	HCl	y	Non-Phosphatic detergent wash H2O rinse MeOH rinse Distilled H2O rinse
TOTAL LEAD	18:15		16oz.	poly		no	HNO3	y	

FIELD WATER QUALITY TESTS:

Pore Vol. Number	pH	Conductivity	Temp °C	Eh	time	
1	6.86	342 µS	19.5		17:18	This is AGW-1 Data
2	6.85	350	19.2		17:34	
3	6.79	395	18.4		17:57	

NOTES:

<see AGW-1 data sheet>

Total # of Bottles: 3

Signature: Kim S. Vik

SEA-400-01

Client: 039 MWC

Sweet-Edwards/EMCON, Inc.
18912 North Creek Parkway, Suite 210 • Bothell, WA 98011
Office (206) 485-5000 • FAX (206) 486-9766

Field Sampling Data

LOCATION/ADDRESS 8701 Greenwood Ave
PROJECT NAME Texaco Greenwood # 0681301
CLIENT/CONTACT Mike Condin

Well or Surface Site Number AGW-2
Sample Designation AGW-2
Date, Time 8-15-91, 16:03
Weather Sunny, hot

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method Used (M-Scope Number or Other)
1.65		8-15-91, 15:05	SOLINST (KSV)

WELL EVACUATION: PV=12 gallons

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
36	3+	disposable bailer		8-15-91

Surface Water Flow Speed _____ Measurement Method _____ Date, Time _____

SAMPLING:

Sample	Date, Time	Method	Volume (ml)	Container Type	Depth Taken (feet)	Field Filtered (yes,no)	Preservative	Iced (yes,no)
20/8015M	8-15-91	disp. bailer	2x40ml	VOA	X	no	HCl	Y
TOTAL LEAD	16:03		1602.	poly.	X	no	HNO3	Y

Sampler Cleaning Method: Non-Phosphatic detergent wash, H2O rinse, MeOH rinse, Distilled H2O rinse

FIELD WATER QUALITY TESTS: Measured with a Corning Check-Mate pH/Conductivity/temp. meter (KSV)

Pore Vol. Number	pH	Conductivity µS	Temp °C	Eh	time			
1	6.41	798	22.8		15:36			
2	6.52	569	18.8		15:45			
3	6.65	531	19.1		16:00			

NOTES:

Sample appeared slightly cloudy, beige in color, with a slight hydrocarbon-like odor. Well has good recovery.

Total # of Bottles: 3

Signature: Kim S. Vik

SEA-400-01

Client Ref: 038 MWC

Sweet-Edwards/EMCON, Inc.
18912 North Creek Parkway, Suite 210 • Bothell, WA 98011
Office (206) 485-5000 • FAX (206) 486-9766

Field Sampling Data

LOCATION/ADDRESS 8701 Greenwood Ave.
PROJECT NAME Texaco Greenwood # 606130
CLIENT/CONTACT Mike Condin

Well or Surface Site Number AGW-4
Sample Designation AGW-4
Date, Time 8-15-91, 16:10
Weather sunny, hot

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method Used (M-Scope Number or Other)
2.76'		8-15-91, 13:35	SOLINST (KSV)

WELL EVACUATION: PV= 10.3 gallons

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
15	1.5	disposable bailer		8-15-91

Surface Water Flow Speed _____ Measurement Method _____ Date, Time _____

SAMPLING:

Sample	Date, Time	Method	Volume (ml)	Container Type	Depth Taken (feet)	Field Filtered (yes,no)	Preservative	Iced (yes,no)	Sampler Cleaning Method
8020/8015M	8-15-91	disp bailer	2x40ml	VOA		no	HCl	y	Non-Phosphatic detergent wash H2O rinse MeOH rinse Distilled H2O rinse
8015M	16:10		1l	Amberglass		no	HCl	y	
TOTAL LEAD			1602.	poly.		no	HNO3	y	

FIELD WATER QUALITY TESTS: Measured with a Corning Check-Mate pH/cond/temp meter (KSV)

Pore Vol. Number	pH	Conductivity µS	Temp °C	Eh	time
1	6.64	326	22.9		14:19
1.5	6.57	335	21.6		14:35
FINAL	6.59	346	22.5		16:05

NOTES:

Water was found inside the monument, but below top of PVC. This water was bailed out. AGW-4 went dry after 1.5 pore volumes (approx. 15 gallons purged). Well was allowed to recover. A final parameters measurement was taken prior to sampling. AGW-4 has very poor recovery. Sample appeared cloudy, tan-brown, with no noticeable odor.

Total # of Bottles: 4 Signature: Kim S. Vik

SEA-400-01

Client Ref: 038MWC

Sweet-Edwards/EMCON, Inc.
18912 North Creek Parkway, Suite 210 • Bothell, WA 98011
Office (206) 485-5000 • FAX (206) 486-9766

Field Sampling Data

LOCATION/ADDRESS 8701 Greenwood Ave
PROJECT NAME Texaco Greenwood # 06813.01
CLIENT/CONTACT Mike Condin

Well or Surface Site Number AGW-5
Sample Designation AGW-5
Date, Time 8-15-91, 13:44
Weather Sunny, hot

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method Used (M-Scope Number or Other)
1.53'		8-15-91, 11:21	SOLINST (KSV)

WELL EVACUATION: PV = 12 gal

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
24	2	disposable bailer		8-15-91

Surface Water Flow Speed _____ Measurement Method _____ Date, Time _____

SAMPLING:

Sample	Date, Time	Method	Volume (ml)	Container Type	Depth Taken (feet)	Field Filtered (yes,no)	Preservative	Iced (yes,no)
20/80SM	8-15-91	disp. bailer	2x40ml	VOA		no	HCl	y
TOTAL LEAD	13:44		160z.	poly.		no	HNO3	y

Sampler Cleaning Method: Non-Phosphatic detergent wash, H2O rinse, MeOH rinse, Distilled H2O rinse

FIELD WATER QUALITY TESTS: measured with a Corning Check-Mate pH/conductivity & temp. meter (KSV)

Pore Vol. Number	pH	Conductivity µS	Temp °C	Eh	time:
1	6.77	423	21.6		11:58
2	6.82	284	22.6		12:13
Final	6.91	268	21.5		13:43

NOTES: Water was found above top of PVC & bentonite had swelled to top of PVC. Water was bailed & bentonite was scooped out to 1.5 in to 2 in below PVC well went dry after 2 pore volumes (~24 gallons purged). Sample appeared cloudy, trace of fine sand grains, tan-brown in color with no noticeable odor, except a slight sewer-like odor was noticed after 2nd pore volume. AGW-5 was allowed to recover before sampling. A final parameters measurement was taken prior to sampling. Final sample appeared clear with no noticeable odor.

Total # of Bottles: 3 Signature: Kevin S. Vick

Client Ref: 038 MWC

Sweet-Edwards/EMCON, Inc.

18912 North Creek Parkway, Suite 210 • Bothell, WA 98011
Office (206) 485-5000 • FAX (206) 486-9766

Field Sampling Data

FIELD BLANK

LOCATION/ADDRESS 8701 Greenwood Ave.
PROJECT NAME Texaco Greenwood # 6081301
CLIENT/CONTACT Mike Condin

Well or Surface Site Number n/a
Sample Designation AGW-8
Date, Time 8-15-91, 16:47
Weather Sunny, hot

HYDROLOGY MEASUREMENTS: n/a

(Nearest .01 ft.)	Elevation	Date, Time	Method Used (M-Scope Number or Other)
n/a		8-15-91	SOLINST (TAG)

WELL EVACUATION: n/a

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
		disposable		

Surface Water Flow Speed _____ Measurement Method _____ Date, Time _____

SAMPLING:

Sample	Date, Time	Method	Volume (ml)	Container Type	Depth Taken (feet)	Field Filtered (yes,no)	Preserva-tive	Iced (yes,no)	Sampler Cleaning Method
080/8015M	8-15-91	disp bailer	2x40ml	VOA	X	no	HCl	y	Non-Phosphatic detergent wash H2O rinse MeOH rinse Distilled H2O rinse
TOTAL LEAD	16:47		16oz	poly		no	HNO3	y	

FIELD WATER QUALITY TESTS: n/a

Pore Vol. Number	pH	Conductivity	Temp	Eh				

NOTES:

Rinsed clean disposable bailer 3 times with deionized water, then filled bailer with deionized water & filled sample containers.

Total # of Bottles: _____ Signature: _____

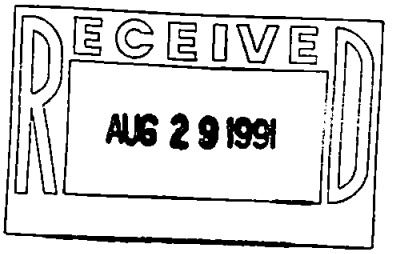
SEA-400-01

APPENDIX B

Laboratory Results and
Chain-of-Custody Documentation

Columbia Analytical Services INC.

August 27, 1991



Mike Condin
Sweet-Edwards/EMCON, Inc.
18912 N Creek Parkway
Suite 210
Bothell, WA 98011

Re: **Texaco - Greenwood/Project #U68-13.01**

Dear Mike:

Enclosed are the results of the samples submitted to our lab on August 16, 1991. For your reference, our service request number for this work is B914653.

All analyses were performed in accordance with our laboratory's quality assurance program.

Please call if you have any questions.

Respectfully submitted,

Columbia Analytical Services, Inc.

Charles Morrow

Colin B. Elliott ← for
Senior Project Chemist

CBE/das

1317 South 13th Avenue • P.O. Box 479 • Kelso, Washington 98626 • Telephone 206/577-7222 • Fax 206/636-1068

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	08/16/91
Project:	Texaco - Greenwood	**Date Extracted:**	08/16/91
Sample Matrix:	Water	**Date Analyzed:**	08/16/91
		Work Order #:	B914653

Hydrocarbon Scan
EPA Methods 3510/Modified 8015
µg/L (ppb)

Sample Name	Lab Code	MRL	Diesel	Other♦
AGW-4	B4653-3	50	*3,260	ND
Method Blank	B4653-MB	50	ND	ND

MRL Method Reporting Limit
♦ Quantitated using hydraulic oil as a standard. The MRL for this product is four times the listed MRL.
* The sample does not resemble the diesel fingerprint, yet falls within the diesel range and is therefore calculated "as diesel".
ND None Detected at or above the method reporting limit

Approved by Charles Morrow Date 8/27/91

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	08/16/91
Project:	Texaco - Greenwood	**Work Order #:**	B914653
Sample Matrix:	Water		

BTEX and TPH as Gasoline
EPA Methods 5030/8020/Modified 8015

Sample Name:			AGW-1	AGW-2	AGW-4
Lab Code:			B4653-1	B4653-2	B4653-3
Date Analyzed:			08/18/91	08/18/91	08/18/91
Analyte	**Unit**	**MRL**			
Benzene	µg/L (ppb)	0.5	1,400	250	11
Toluene	µg/L (ppb)	1	7,400	220	4
Ethylbenzene	µg/L (ppb)	1	1,000	15	1
Total Xylenes	µg/L (ppb)	1	8,100	86	7
TPH as Gasoline	mg/L (ppm)	0.05	361	1.03	12

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Charles Morrow Date 8/27/91

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COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	08/16/91
Project:	Texaco - Greenwood	**Work Order #:**	B914653
Sample Matrix:	Water		

BTEX and TPH as Gasoline
EPA Methods 5030/8020/Modified 8015

Sample Name:			AGW-5	AGW-7	AGW-8
Lab Code:			B4653-4	B4653-5	B4653-6
Date Analyzed:			08/18/91	08/18/91	08/18/91
Analyte	**Unit**	**MRL**			
Benzene	µg/L (ppb)	0.5	9.4	1,300	ND
Toluene	µg/L (ppb)	1	ND	6,900	ND
Ethylbenzene	µg/L (ppb)	1	ND	930	ND
Total Xylenes	µg/L (ppb)	1	ND	7,500	ND
TPH as Gasoline	mg/L (ppm)	0.05	0.10	340	ND

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Charles Morrow Date 8/27/91

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	08/16/91
Project:	Texaco - Greenwood	**Work Order #:**	B914653
Sample Matrix:	Water		

BTEX and TPH as Gasoline
EPA Methods 5030/8020/Modified 8015

Sample Name:			Trip Blank	Method Blank
Lab Code:			B4653-7	B4653-MB
Date Analyzed:			08/18/91	08/18/91
Analyte	**Unit**	**MRL**		
Benzene	µg/L (ppb)	0.5	ND	ND
Toluene	µg/L (ppb)	1	ND	ND
Ethylbenzene	µg/L (ppb)	1	ND	ND
Total Xylenes	µg/L (ppb)	1	ND	ND
TPH as Gasoline	mg/L (ppm)	0.05	ND	ND

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Charles Mosso Date 8/27/91

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	08/16/91
Project:	Texaco - Greenwood	**Date Analyzed:**	08/20/91
Sample Matrix:	Water	**Work Order #:**	B914653

Total Lead
EPA Method 7421
mg/L (ppm)

Sample Name	Lab Code	MRL	Result
AGW-1	B4653-1	0.002	ND
AGW-2	B4653-2	0.002	ND
AGW-4	B4653-3	0.002	0.004
AGW-5	B4653-4	0.002	ND
AGW-7	B4653-5	0.002	ND
AGW-8	B4653-6	0.002	ND
Method Blank	B4653-MB	0.002	ND

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Charles Mossow Date 8/27/91

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COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Extracted:**	08/16/91
Project:	Texaco - Greenwood	**Date Analyzed:**	08/16/91
Sample Matrix:	Water	**Work Order #:**	B914653

QA/QC Report
Laboratory Control Sample/Duplicate Laboratory Control Sample Summary
Hydrocarbon Scan
EPA Methods 3510/Modified 8015
µg/L (ppb)

Sample Name: Laboratory Control Sample

	Spike Level		Spike Result		Percent Recovery			
Analyte	LCS	DLCS	LCS	DLCS	LCS	DLCS	CAS Acceptance Criteria	**Relative Percent Difference**
Diesel	1.00	1.00	0.648	0.729	64.8	72.9	55-110	11.8

Approved by Charles Morrow Date 8/27/91

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	08/16/91
Project:	Texaco - Greenwood	**Date Analyzed:**	08/17,18/91
Sample Matrix:	Water	**Work Order #:**	B914653

QA/QC Report
Surrogate Recovery Summary
BTEX and TPHD as Gasoline
EPA Methods 5030/8020/Modified 8015

Sample Name	Lab Code	Percent Recovery 4-Bromofluorobenzene
AGW-1	B4653-1	100
AGW-2	B4653-2	99.4
AGW-4	B4653-3	99.8
AGW-5	B4653-4	100
AGW-7	B4653-5	100
AGW-8	B4653-6	100
Trip Blank	B4653-7	100
Laboratory Control Sample	B4653-LCS	99.8
Laboratory Control Sample	B4653-DLCS	99.6
Method Blank	B4653-MB	100
	CAS Acceptance Criteria	60-120

TPH Total Petroleum Hydrocarbons

Approved by Charles Morris Date 8/27/91

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COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	08/16/91
Project:	Texaco - Greenwood	**Date Extracted:**	08/16/91
Sample Matrix:	Water	**Date Analyzed:**	08/16/91
		Work Order #:	B914653

QA/QC Report
Surrogate Recovery Summary
Hydrocarbon Scan
EPA Methods 3510/Modified 8015

Sample Name	Lab Code	Percent Recovery *p*-Terphenyl
AGW-4	B4653-3	87.5
Laboratory Control Sample	B4653-LCS	88.7
Laboratory Control Sample	B4653-DLCS	91.0
Method Blank	B4653-MB	82.7
	CAS Acceptance Criteria	66-120

Approved by Charles Morrow Date 8/27/91

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COLUMBIA ANALYTICAL SERVICES, INC.

Client: Sweet-Edwards/EMCON, Inc.
Project: Texaco - Greenwood
Sample Matrix: Water

Date Analyzed: 08/17/91
Work Order #: B914653

QA/QC Report
Laboratory Control Sample/Duplicate Laboratory Control Sample Summary
BTEX and TPH as Gasoline
EPA Methods 5030/8020/Modified 8015

Sample Name: Laboratory Control Sample

Analyte	Spike Level LCS	Spike Level DLCS	Spike Result LCS	Spike Result DLCS	Percent Recovery LCS	Percent Recovery DLCS	CAS Acceptance Criteria	Relative Percent Difference
Benzene	0.100	0.100	0.100	0.100	100	100	39-150	<1
Toluene	0.100	0.100	0.101	0.101	101	101	46-148	<1
Ethyl Benzene	0.100	0.100	0.099	0.100	99	100	32-160	<1

Approved by Charles Mosrow Date 8/27/91

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	08/16/91
Project:	Texaco - Greenwood	**Date Analyzed:**	08/20/91
Sample Matrix:	Water	**Work Order #:**	B914653

QA/QC Report
Matrix Spike Summary
Total Lead
EPA Method 7421
mg/L (ppm)

Sample Name	Lab Code	MRL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
AGW-1	K4653-1	0.002	0.02	ND	0.021	105	75-125

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Charles Morris Date 8/27/91

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COLUMBIA ANALYTICAL SERVICES, INC.

Client:	Sweet-Edwards/EMCON, Inc.	**Date Received:**	08/16/91
Project:	Texaco - Greenwood	**Date Analyzed:**	08/20/91
Sample Matrix:	Water	**Work Order #:**	B914653

QA/QC Report
Duplicate Summary
Total Lead
EPA Method 7421
mg/L (ppm)

Sample Name	Lab Code	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
AGW-1	K4653-1	0.002	ND	ND	ND	--

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit

Approved by Charles Monroe Date 8/27/91

Sweet-Edwards / EMCON, Inc.
Kelso, WA (206) 423-3580
Bothell, WA (206) 485-5000

Chain of [redacted]stody / Laboratory Analysis Request

Client Ref: 038MWC/052MWC

DATE 8-15-91 PAGE ____ OF ____

PROJECT TEXACO/GREENWOOD #0468-13.01
CLIENT INFO.
CONTACT Mike Condin (Texaco)
ADDRESS
TELEPHONE#
SAMPLERS NAME KIM VIK (SE/E) PHONE# 485-5000
SAMPLERS SIGNATURE Kim S. Vik

ANALYSIS REQUESTED — GENERAL CHEMISTRY (Specify) — OTHER (Specify)

SAMPLE I.D.	DATE	TIME	LAB I.D.	TYPE	BASE/NEU/ACID ORGAN. GC/MS/625/8270	VOLATILE ORGANICS GC/MS/624/8240	HALOGENATED VOLATILE ORGANICS 601/8010	PHENOLICS 604/8040	POLYNUCLEAR AROMATIC 610/8310	TOTAL ORGANIC CARBON (TOC) 415/9060	TOTAL ORGANIC HALIDE (TOX) 9020	EP TOX/TCLP METALS (Circle One)	METALS (TOTAL) (See Special Inst.)	TCLP ORGANICS	pH, COND ALK	NO_3/NO_2, Cl SO_4	Ca, Mg, Na, K	8020/8015M GAS-BETX	TOTAL LEAD	8015M TPH-DIESEL				NUMBER OF CONTAINERS
1. AGW-1	8-15-91	18:06		WATER														X	X					3
2. AGW-2	8-15-91	16:03		WATER														X	X					3
3. AGW-4	8-15-91	16:10		WATER														X	X	X				4
4. AGW-5	8-15-91	13:44		WATER														X	X					3
5. AGW-7	8-15-91	10:15		WATER														X	X					3
6. AGW-8	8-15-91	16:47		WATER														X	X					3
7. TRIP BLANK	8-15-91			WATER														X						1
8.																								

Relinquished By Sweet, Edwards & Assoc.	Relinquished By	Relinquished By
Kim S. Vik — Signature	Signature	Signature
KIM S. VIK — Printed Name	Printed Name	Printed Name
SE/E — Firm	Firm	Firm
8-16-91, 8:05 — Date/Time	Date/Time	Date/Time
Received By	**Received By**	**Received By**
[signature] — Signature	Signature	Signature
David Jones — Printed Name	Printed Name	Printed Name
CAS — Firm	Firm	Firm
8-16-91 8:05A — Date/Time	Date/Time	Date/Time

PROJECT INFORMATION
Shipping I.D. No.
VIA
Project

SAMPLE RECEIPT
Total No. of Containers
Chain of Custody Seals
Received in good condition
LAB NO.

SPECIAL INSTRUCTIONS/COMMENTS

DISTRIBUTION: WHITE - return to originator; YELLOW - lab; PINK - retained by originator.

S-E/E 400-05