Texaco Station #63232 0032
King Co/Seattle
LUST # 2298

EMCON Northwest, Inc.

18912 North Creek Parkway • Suite 100 • Bothell, Washington 98011-8016 • (206) 485-5000 • Fax (206) 486-9766

Rec. 3/5/96
RV

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July 1, 1993
Project 0368-013.03

SR 4/22/96 RV

DEPARTMENT OF ECOLOGY
NWRO/TCP TANK UNIT

INTERIM CLEANUP REPORT ☑
SITE CHARACTERIZATION ☐
FINAL CLEANUP REPORT ☐
OTHER GW Monitoring ☑
AFFECTED MEDIA: SOIL ☑
OTHER ______ GW ☑
INSPECTOR (INIT.) RV DATE 3/6/96

Mr. Mike Condon
Texaco Environmental Services
3400 188th Street SW, Suite 630
Lynnwood, Washington 98037

Re: Groundwater Sampling Report
Texaco Service Station
8701 Greenwood Avenue North
Seattle, Washington

Dear Mr. Condon:

EMCON Northwest, Inc., is pleased to present the results of the groundwater sampling and monitoring activities conducted March 26, 1993, at the Texaco service station at 8701 Greenwood Avenue North in Seattle, Washington. All work was performed in accord with our March 15, 1993, proposal for groundwater monitoring.

BACKGROUND

The site is an active gasoline service station at 8701 Greenwood Avenue North in Seattle, Washington (Figure 1). Groundwater monitoring wells were installed on the subject site in March 1991. A site plan is included as Figure 2.

This report presents the findings of the March 26, 1993, groundwater sampling event. A copy of the spreadsheet recording historical groundwater analytical results and depth to water information is included in Appendix A.

GROUNDWATER CONDITIONS

Depth to groundwater was measured in each well on March 26, 1993. Depth-to-groundwater measurements were converted to relative groundwater elevations using previous survey data for the top of each well casing. Depth-to-groundwater measurements and relative groundwater elevation data are provided on Table 1. A relative groundwater elevation (potentiometric) map is included as Figure 2.

Previous boring log data indicate groundwater beneath the site is confined beneath a peat and silt layer that extends to a maximum depth of approximately 10 to 15 feet below ground surface. The groundwater gradient direction was generally toward the west on March 26, 1993. Although the general flow direction is toward the west, possible mounding of groundwater could occur in the tank basin.

GROUNDWATER SAMPLING

Groundwater samples were collected from monitoring wells AGW-1, AGW-2, AGW-4, and AGW-5 on March 26, 1993. Prior to sampling, the depth-to-groundwater was measured to the nearest 0.01 foot in each well using an oil-water interface probe. No floating product was detected in any of the wells at the time of sampling.

At least three casing volumes of groundwater were purged with a suction pump before collecting groundwater samples from monitoring wells AGW-1 and AGW-2. Because groundwater recovery in monitoring wells AGW-4 and AGW-5 was slow, samples were collected after 1.6 and 2.9 purged casing volumes, respectively.

Groundwater temperature, pH, and specific conductance were measured after each purged casing volume. These data, recorded on Field Sampling Data Sheets, are provided in Appendix A. Groundwater samples from monitoring wells AGW-1 and AGW-2 were collected when these parameters were within ± 10 percent of the previous reading. These parameters did not stabilize in monitoring wells AGW-4 and AGW-5. Due to slow groundwater recovery in these wells, groundwater samples were collected after 1.6 and 2.9 purged casing volumes, respectively.

Groundwater samples were collected using disposable PVC bailers. Nylon line was used to lower the bailer, and new line and a new bailer were used for each well. Samples were transferred to laboratory-supplied containers, stored in a chilled cooler, and transported under standard chain-of-custody procedures to Columbia Analytical Services, Inc., in Bothell, Washington, for analyses.

LABORATORY ANALYSES

Groundwater samples from all wells were submitted for analyses for total petroleum hydrocarbons (TPH) as gasoline by Washington State Department of Ecology Method WTPH-G, for benzene, toluene, ethylbenzene, and total xylenes (BTEX) by EPA Methods 5030/8020, and for total lead by EPA Method 7421. Duplicate and field blank samples were submitted for analyses for TPH as gasoline and BTEX. In addition, groundwater samples from AGW-2 and AGW-4 were analyzed for total petroleum hydrocarbons as diesel and oil by Washington State Department of Ecology Method WTPH-D (extended).

LABORATORY ANALYSES RESULTS

A review of laboratory analytical data indicates that groundwater samples collected from AGW-1, AGW-2, and AGW-4 contained benzene, ethylbenzene and total xylenes concentrations that exceeded MTCA Method A Cleanup Levels[1]. TPH as gasoline concentrations exceeded the MTCA Method A Cleanup Levels in samples collected from AGW-1 and AGW-2. Total lead was not detected in any of the groundwater samples collected from the four monitoring wells. TPH as diesel concentrations were below MTCA Method A Cleanup Levels in the sample collected from AGW-2. While the individual concentrations of TPH as gasoline and TPH as diesel were below the MTCA Method A Cleanup Level in AGW-4, the combined concentrations of TPH exceeded the MTCA Method A Cleanup Level for TPH (total). TPH as oil concentrations were not detected above method reporting limits in samples collected from AGW-2 and AGW-4.

Groundwater analytical results are presented in Table 2. Copies of the laboratory report and chain-of-custody form for the current sampling event are included in Appendix B.

CONCLUSIONS

BTEX concentrations in groundwater samples collected from AGW-1, AGW-2, AGW-4, and AGW-5 in March 1993 have continuously declined compared to the concentrations reported for the August and November 1991 sampling events. Time versus concentration plots for benzene in AGW-1, AGW-2, AGW-4, and AGW-5 are presented in Figures 3, 4, 5, and 6, respectively. In March 1993, benzene, ethylbenzene, and xylenes exceeded the MTCA Method A Cleanup Levels in groundwater samples collected from AGW-1, AGW-2, and AGW-4. TPH as gasoline concentrations were detected above the MTCA Method A Cleanup Levels in samples collected from AGW-1 and AGW-2. The combined concentration of TPH as gasoline and TPH as diesel in the sample collected from AGW-4 exceeded the MTCA Method A Cleanup Level for TPH (total). TPH as gasoline and BTEX were not detected above the method reporting limit in the groundwater sample collected from AGW-5.

AGW-1, AGW-2, and AGW-4 are located hydraulically downgradient of the existing underground storage tanks. In July 1991, a leak is reported to have occurred in the turbine associated with the unleaded gasoline underground storage tank. It is likely that the BTEX and TPH as gasoline detected in groundwater samples beneath the site are associated with the turbine leak. The turbine was repaired, and no subsequent leaks were reported to have occurred.

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[1] Chapter 173-340 WAC, *The Model Toxics Control Act Cleanup Regulation; Method A Cleanup Levels.* Amended February 1991.

LIMITATIONS

The services described in this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This report is solely for the use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

Opinions and recommendations contained in this report apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, nor the use of segregated portions of this report.

We appreciate the opportunity to be of assistance to you on this project. If you have any questions or if we can be of further assistance to you, please call.

Sincerely,

EMCON Northwest, Inc.

Patrick Brooks

Patrick Brooks
Project Manager

Kevin G. Rattue, R.G., C.P.G.
Director, Petroleum Hydrocarbon Services

Tom Bodle
Staff Geologist

Enclosures Table 1 — Survey and Groundwater Elevation Data
Table 2 — Groundwater Sample Chemical Analyses
Figure 1 — Site Location Map
Figure 2 — Potentiometric Surface Map (03/26/93)
Figure 3 — Benzene Concentration in AGW-1
Figure 4 — Benzene Concentration in AGW-2
Figure 5 — Benzene Concentration in AGW-4
Figure 6 — Benzene Concentration in AGW-5
Appendix A — Historical Groundwater Quality Data and Field Sampling Data
Appendix B — Laboratory Reports and Chain-of-Custody Forms

Table 1

Survey and Groundwater Elevation
March 26, 1993
Texaco Service Station
8701 Greenwood Avenue North
Seattle, Washington

Well	Elevation at Top PVC (ft)	Date Monitored	Depth to Water (ft)	Groundwater Elevation (ft)
AGW-1	47.36	03/26/93	0.49	46.87
AGW-2	47.59	03/26/93	1.18	46.41
AGW-4	47.97	03/26/93	3.03	44.94
AGW-5	49.47	03/26/93	2.05	47.42

NOTE: Elevations are referenced to an on-site benchmark location; the benchmark was assigned an arbitrary elevation of 50 feet.

Table 2

Groundwater Sample Chemical Analyses
March 26, 1993
Texaco Service Station
8701 Greenwood Avenue North
Seattle, Washington

Sample Location	Sample Date	Sample ID	BTEX Compounds[a] (ppb)				Total Petroleum Hydrocarbons[b] (ppm)			Total Lead[c] (ppb)
			Benzene	Toluene	Ethyl-benzene	Total Xylenes	Gasoline	Diesel	Oil	
MTCA Method A Cleanup Levels[d]			5	40	30	20	1	1	1	5
AGW-1	03/26/93	01-03-26-93	42.8	27	397	1,450	18.4	—	—	ND
AGW-2	03/26/93	02-03-26-93	113	33	149	642	3.39	0.34	ND	ND
AGW-4	03/26/93	04-03-26-93	31.8	35	51	246	0.99*	0.48*	ND	ND
AGW-5	03/26/93	05-03-26-93	ND	ND	ND	ND	ND	—	—	ND
AGW-5 (dup)	03/26/93	03-03-26-93	ND	ND	ND	ND	ND	—	—	ND
Field Blank	03/26/93	06-03-26-93	ND	ND	ND	ND	ND	—	—	—

NOTE:
- ND — No detection.
- — — Not analyzed.
- Dup — Duplicate sample.
- Shaded cells — Shaded cells indicate that values exceed MTCA Method A Cleanup Levels.
- * — The combined concentrations of total petroleum hydrocarbons as gasoline and diesel exceed the MTCA Method A Cleanup Level.
- MTCA — Model Toxics Control Act, Chapter 173-340 WAC, adopted February 1991.

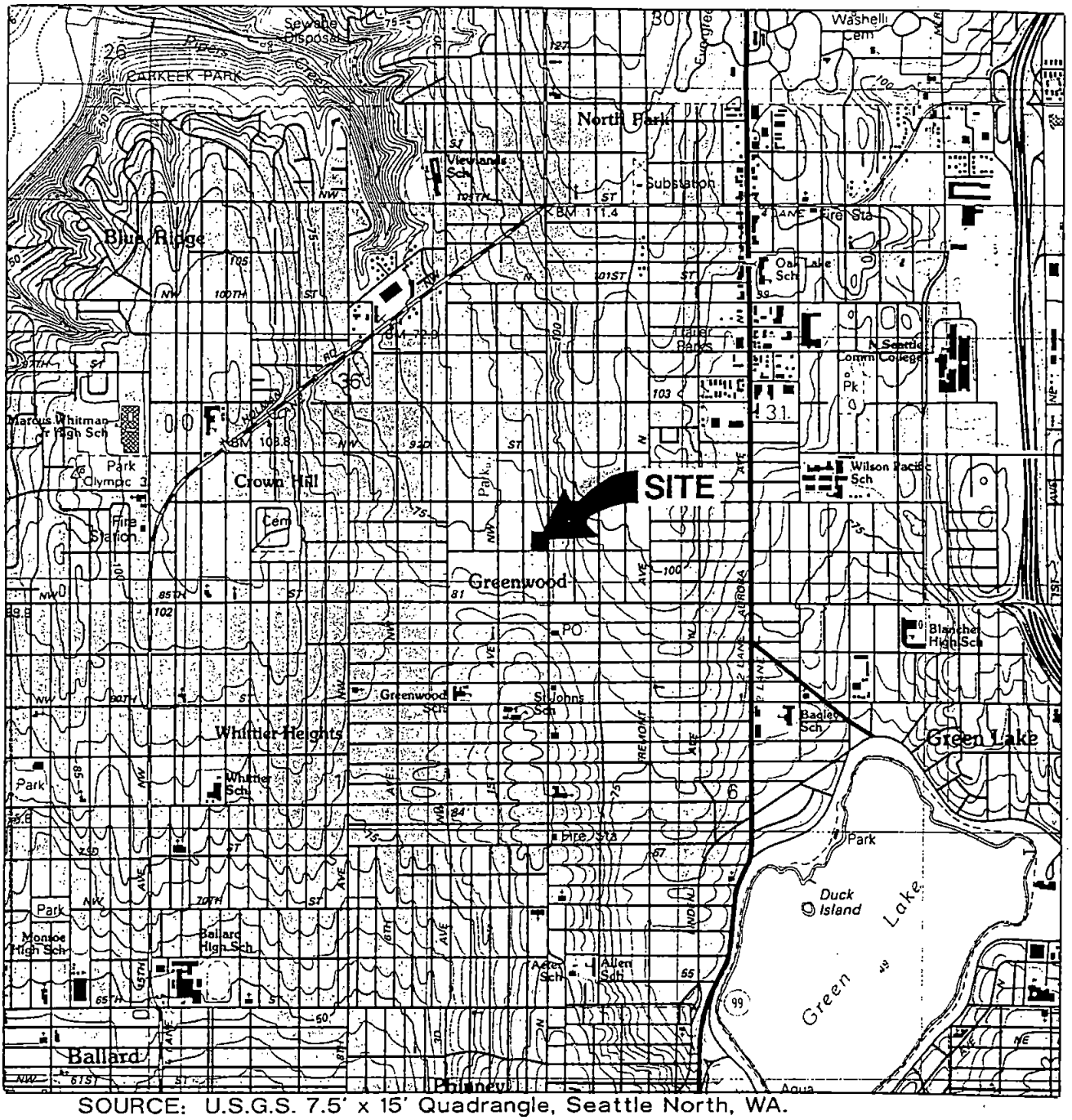
[a] Results for analyses of groundwater samples for BTEX were obtained using EPA Methods 5030/8020 and reported as µg/L (ppb).

[b] Results for analyses of groundwater samples for total petroleum hydrocarbons as gasoline, diesel, and oil were obtained using Washington State Department of Ecology Methods WTPH-G and WTPH-D, respectively, reported as µg/L (ppb), and presented here in ppm.

[c] Results for analyses of groundwater samples for total lead were obtained using EPA Method 7421 and reported as µg/L (ppb).

[d] Chapter 173-340 WAC, *The Model Toxics Control Act Cleanup Regulations, Method A Cleanup Levels.* Amended February 1991.

142322



SOURCE: U.S.G.S. 7.5' x 15' Quadrangle, Seattle North, WA.

WASHINGTON

N

0 2000 4000

SCALE (ft)

EMCON Northwest, Inc.

DATE 4/92
DWN. JA
APPR. PB
REVIS.
PROJECT NO. 0368-013.03

Figure 1
TEXACO SERVICE STATION
8701 GREENWOOD AVENUE NORTH
SEATTLE, WASHINGTON

SITE LOCATION MAP

Appendix A

HISTORICAL GROUNDWATER QUALITY DATA AND FIELD SAMPLING DATA

GROUNDWATER QUALITY SUMMARY
TEXACO SERVICE STATION 63-232-0037
8701 GREENWOOD AVENUE NORTH
SEATTLE, WASHINGTON

WELL NO./ DATE	BENZENE (PPB)	TOLUENE (PPB)	ETHYLBENZENE (PPB)	XYLENES (PPB)	TPH-G (PPM)	TPH-D (PPM)	TPH-OIL (PPM)	LEAD (PPB)	DEPTH TO WATER (FT)
AGW-1									
04-03-91	ND	ND	ND	ND	ND	–	–	–	3.18
05-15-91	440	1000	92	670	–	–	–	–	–
08-15-91	1400	7400	1000	8100	361	–	–	ND	0.62
11-21-91	680	6400	2000	13000	47	ND	ND	–	0.70
03-06-92	710	3200	1400	8700	48	ND	ND	ND	0.47
11-06-92	95.1	260	1400	8200	37	–	–	ND	0.46
03-26-93	42.8	27	397	1450	18.4	–	–	ND	0.49
AGW-2									
04-03-91	ND	ND	ND	ND	–	–	–	–	3.43
05-15-91	ND	ND	ND	ND	–	–	–	–	–
08-15-91	250	220	15	86	1.03	–	–	ND	1.65
11-21-91	910	1300	260	1200	7.3	ND	1.2	–	1.30
03-06-92	870	3700	760	4900	24	ND	1.1	ND	1.14
11-06-92	152	98	175	804	3.23	–	–	ND	1.18
03-26-93	113	33	149	642	3.39	0.34	ND	ND	1.18
AGW-3									
03-29-91	ND	ND	ND	ND	–	–	–	–	–
Well decommissioned									
AGW-4									
04-03-91	2.6	20	2.7	31	–	–	–	–	4.61
05-15-91	8.4	19	2.4	20	–	–	–	–	–
08-15-91	11	4	1	7	12	3.26	–	4	2.76
11-21-91	660	700	21	133	3.5	ND	2.04	–	2.45
03-06-92	139	182	3	18	ND	ND	0.8	ND	2.45
11-06-92	20.9	13	4	17	0.09	–	–	ND	3.21
03-26-93	31.8	35	51	246	0.99	0.48	ND	ND	3.03
AGW-5									
04-03-91	30	10	5	7	–	–	–	–	2.78
05-15-91	220	53	3.5	12	–	–	–	–	–
08-15-91	9.4	ND	ND	ND	0.1	–	–	ND	1.53
11-21-91	2.5	ND	ND	ND	ND	ND	ND	–	2.40
03-06-92	0.9	ND	ND	ND	ND	ND	ND	ND	1.45
11-06-92	ND	ND	ND	ND	ND	–	–	ND	2.27
03-26-93	ND	ND	ND	ND	ND	–	–	ND	2.05

Job Number: 0368-013.02

EMCON Northwest, Inc.
18912 Northcreek Parkway #100
Bothell, Washington 98011-8016

Field Report Number: -

Page: 1 of 1

FIELD REPORT

Date: 11-6-92

PROJECT: Texaco Greenwood
8701 Greenwood Ave N.

ARRIVAL TIME: 09:35

LOCATION: Seattle, WA

DEPARTURE TIME: 16:37

CLIENT: Texaco

WEATHER: cloudy, rain, 50's

PURPOSE OF WORK/OBSERVATIONS: collect ground water measurements, samples; well maintenance

EMCON REPRESENTATIVE: Tom Bodle

EMCON PROJECT MANAGER: Pat Brooks

Any conclusions and/or recommendations in this field report are subject to review by the EMCON Project Manager

COMMENTS: Measured depth to water, pH, conductivity, temperature in monitoring wells AGW-1, AGW-2, AGW-4, AGW-5. Collected ground water samples from same wells, delivered, on ice, to CAS lab in Bothell for analyses: ① TPH-G, BTEX for all wells, trip blank, field blank "06-11-06-92" and duplicate of AGW-1 as "06-11-06-92"; ② total lead for all wells and duplicate, ③ ethylene glycol for wells AGW-4, AGW-5 and ④ total coliform for well AGW-4.

Used ARO Pump with compressor to purge all wells of combined total of 135.5 gallons ground water, stored in 3 labeled 55 gallon drums, n.w. corner of site.

Observed sheen in AGW-1, AGW-2.

Replaced well cap and lock on AGW-2, AGW-4. Observed monument cover bolt housing missing (x1) on AGW-1, AGW-2

Chain of custody, field sampling data sheets attached.

Polyethylene tubing left in all wells for future purge pump efficiency

By: Tom Bodle
EMCON Representative

Reviewed By: Pat Brooks
EMCON Project Manager

Pink – Field Copy Yellow – Project Manager White – Project Files

EMCON
Northwest, 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 N., Seattle WA
PROJECT NAME: Texaco Greenwood #0368 013 02 task2
CLIENT/CONTACT:

Well or Surface Site Number: AGW-1
Sample Designation: 01-11-06-92
Date, Time: 11-6-92 12:50
Weather: cloudy, mist 50's

HYDROLOGY MEASUREMENTS: 4"

(Nearest .01 ft.)	Elevation	Date, Time	Method Used (M-Scope Number or Other)
dtw = 5.5" = .46'	top = 47.36	11-6-92 10:49	Solinst #2
dtb = 19.40 (5-6-92)	rel = 46.90		
Δ = 18.94			

WELL EVACUATION: 1pv = 12.37 gallon

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
37.5	3+	pump	N/A	11-6-92 12:37

Surface Water Flow Speed: ______ Measurement Method: N/A Date, Time: N/A

SAMPLING:

Sample	Date, Time	Method	Volume (ml)	Container Type	Depth Taken (feet)	Field Filtered (yes,no)	Preservative	Iced (yes,no)
TPH	11-6-92	d.b = disposable bailer	3x40	VOA	N/A	N	HCl	Y
BTEX								
Total Pb	"	"	16oz/pint	plastic	"	"	HNO3	"

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

FIELD WATER QUALITY TESTS: Corning Check mate 90

Pore Vol. Number	pH	Conductivity	Temp	~~Eh~~ time
1	6.48	303uS	14.6°C	12:18
2	6.79	367	14.9	12.28
3	6.70	292	14.7	12:37

NOTES:

purge water: observed sheen in well
clear, with p.v#2, to slightly silty
musty odor, possibly hydrocarbon like (h.c.)
exc. recovery
bolt housing on monu. cover broken (1 of 2)

Total # of Bottles: 4 (also dup 03-11-06-92) Signature: [signature]

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Field Sampling Data

duplicate

LOCATION/ADDRESS
PROJECT NAME Texaco Greenwood #
CLIENT/CONTACT

Well or Surface Site Number AGW-1
Sample Designation 03-11-06-92
Date, Time 11-6-92 @ 1200
Weather

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method Used (M-Scope Number or Other)

WELL EVACUATION:

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time

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
WTPHG	11-6-92								Non-Phosphatic detergent wash H2O rinse MeOH rinse Distilled H2O rinse
BTEX	12:00								

FIELD WATER QUALITY TESTS:

Pore Vol. Number	pH	Conductivity	Temp	Eh				

NOTES:

Duplicate of AGW-1, see AGW-1 field sampling data sheet.

Total # of Bottles: 4 Signature: Bob

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Field Sampling Data

LOCATION/ADDRESS 8701 Greenwood Ave N
PROJECT NAME Texaco Greenwood #0368-013-02
CLIENT/CONTACT

Well or Surface Site Number AGW-2
Sample Designation 02-11-06-92
Date, Time 11-6-92 14:00
Weather cloudy misty 50's

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method Used (M-Scope Number or Other)
dtw = 4.18	top = 47.59	11-6-92 10:55	Solinst (#2)
dtb = 19.65 (3-6-92)	rel. = 46.41		
Δ = 18.47			

WELL EVACUATION: 1 pv = 12.06 gallon

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
37	3+	pump	N/A	11-6-92 13:39

Surface Water Flow Speed N/A Measurement Method N/A Date, Time N/A

SAMPLING:

Sample	Date, Time	Method	Volume (ml)	Container Type	Depth Taken (feet)	Field Filtered (yes,no)	Preservative	Iced (yes,no)
TPH	11-6-92	d.b.	2x40	VoA	N/A	N	HCl	Y
BTEX	14:00							
Total Pb	"		16oz	plastic	"	"	HNO_3	"

Sampler Cleaning Method: Non-Phosphatic detergent wash, H_2O rinse, MeOH rinse, Distilled H_2O rinse

FIELD WATER QUALITY TESTS:

Pore Vol. Number	pH	Conductivity	Temp	Eh (time)
1	6.43	577 uS	14.7°C	13:28
2	6.73	435	14.2	13:37
3	6.99	426	13.9	13:49

NOTES:

purge water observed sheen in well
slightly silty, olive brown
sewage odor - also possibly h.c. like
mod. to heavily silted at end of pv. #2, going dry?
mod silty at end pv. #3
replaced well capand lock as in poor shape, seal may be bad
one bolt housing missing in monument cover assembly

Signature:

EMCON
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Office (206) 485-5000 • FAX (206) 486-9766

16:37 16:37

Field Sampling Data

LOCATION/ADDRESS
PROJECT NAME Texaco Greenwood #0368 01302
CLIENT/CONTACT

Well or Surface Site Number AGW-4
Sample Designation 04-11-06-92
Date, Time 11-6-92 14:00
Weather cloudy misty 50's

HYDROLOGY MEASUREMENTS: 4"

(Nearest .01 ft.)	Elevation	Date, Time	Method Used (M-Scope Number or Other)
dtw = 3.21	top = 47.97	11-6-92 10:57	Solinst (#2)
dtb = 19.70 (3-6-92)	re = 44.76		
Δ = 16.49			

WELL EVACUATION: 1 p.v. = 10.77 gallon

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
27	2.5	pump	N/A	11-6-92

Surface Water Flow Speed ~0 Measurement Method N/A Date, Time N/A

SAMPLING:

Sample	Date, Time	Method	Volume (ml)	Container Type	Depth Taken (feet)	Field Filtered (yes,no)	Preservative	Iced (yes,no)
TPH	11-6-92	d.b	2x40	VOA	N/A	No	HCl	Yes
BTEX	16:00							
total Pb	"	"	1 pint	plastic	"	"	HNO_3	"
ethylene glycol	"		2x40	VOA	"	"	no	"
total coliform	"		?	whirl-pak	"	"	no	"

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

FIELD WATER QUALITY TESTS:

Pore Vol. Number	pH	Conductivity	Temp	time Eh				
1	7.01	309 µs	14.2°c	13:10				
2	7.30	312	14.3	14:55				
3	6.63	310	13.3	15:48				

NOTES:

purge water slightly silty, olive brown in color
observed sewage like odor
well running dry at end p.v. #1, allow to recover
" p.v. #2, " " "
" " #25, w.l. sample
found no preservative (?) in total coliform bags
replaced lock and cap, could not unlock

Total # of Bottles: 6 ERM

EMCON
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Field Sampling Data

LOCATION/ADDRESS 820 (Greenwood
PROJECT NAME Tex. Greenwood #
CLIENT/CONTACT

Well or Surface Site Number AGW-5
Sample Designation 05-11-06-92
Date, Time 11-06-92 14:40
Weather cloudy misty 50's

HYDROLOGY MEASUREMENTS: 4"

(Nearest .01 ft.)	Elevation	Date, Time	Method Used (M-Scope Number or Other)
dtw = 2.27	top = 49.47	11-6-92 10:53	Solinst (#2)
dtb = 19.50 (36-92)	rel = 47.20		
Δ = 17.23			

WELL EVACUATION: 1 p.v. = 11.25 gallon

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
34	3+	pump	N/A	11-6-92 14:25

Surface Water Flow Speed N/A Measurement Method N/A Date, Time N/A

SAMPLING:

Sample	Date, Time	Method	Volume (ml)	Container Type	Depth Taken (feet)	Field Filtered (yes,no)	Preservative	Iced (yes,no)
TPH	11-6-92	8.6	3x40	VOA	N/A	N	HCl	Y
BTEX	14:40							
total Pb	"	"	16oz	plastic	"	"	HNO3	"
ethylene glycol	"	"	3x40	VOA	"	"	none	"

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

FIELD WATER QUALITY TESTS:

Pore Vol. Number	pH	Conductivity	Temp	time on				
1	6.27	262 µS	14.9	11:53				
2	7.01	258 µS	13.5	14:20				
3	7.11	259 µS	13.8	14:25				

NOTES:

purge water: clear to slightly silty cannot distinguish color
observed a musty odor cannot discern if hydro carbon like
well going dry at ~ 1.5 p.v (i.e. p.v #1.5)
clear at end of pv #2
slightly silty at end of pv #3

Total # of Bottles: 7 Signature:

EMCON
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Field Sampling Data

field blank

LOCATION/ADDRESS (Texaco) 801 Greenwood N. Seattle
PROJECT NAME Texaco Greenwood # 0368 013 02
CLIENT/CONTACT

Well or Surface Site Number N/A
Sample Designation 06-11-06-92
Date, Time 11-6-92 15:00
Weather cloudy mist 50s

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method Used (M-Scope Number or Other)
N/A			

WELL EVACUATION:

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
N/A				

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)	Sample Cleaning Method
11-6-92	11-6-92	8.6	2x40	VOA	N/A	N	HCl	Y	Non-Phosphatic detergent wash H2O rinse MeOH rinse Distilled H2O rinse
WTPHG	1500								
BTEX									

~~FIELD WATER QUALITY TESTS:~~ N/A

Pore Vol. Number	pH	Conductivity	Temp	Eh				

NOTES:

field blank collected after 3x rinse of plastic bailer with "certified" distilled water (1 gallon jug)

Total # of Bottles: 2 Signature:

Appendix B

LABORATORY REPORTS AND CHAIN-OF-CUSTODY FORMS

November 18, 1992 Work Order No.: B920622

Pat Brooks
EMCON Northwest
18912 N Creek Parkway
Suite 210
Bothell, WA 98011

Re: **Texaco Greenwood/Project #0368-013-02**

Dear Pat:

Enclosed are the results of the samples submitted to our laboratory on November 6, 1992. For your reference, this service request has been assigned our work order number B920622.

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.

Michael C. Higgins
Laboratory Manager

MCH/bdr

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	**Date Collected:**	11/06/92
Project:	Texaco Greenwood	**Date Received:**	11/06/92
Sample Matrix:	Water	**Work Order No.:**	B920622

BTEX and TPH as Gasoline
EPA Methods 5030/8020/Washington DOE Method WTPH-G
µg/L (ppb)

Sample Name:		01-11-06-92	02-11-06-92	03-11-06-92
Lab Code:		B0622-1	B0622-2	B0622-3
Date Analyzed:		11/11/92	11/10/92	11/11/92
Analyte	**MRL**			
Benzene	0.5	95.1	152	98.0
Toluene	1	260	98	260
Ethylbenzene	1	1,400	175	1,400
Total Xylenes	1	8,200	804	8,300
TPH as Gasoline	50	37,000	3,230	37,000

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

Approved by _____ Date 12/11/92

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	**Date Collected:**	11/06/92
Project:	Texaco Greenwood	**Date Received:**	11/06/92
Sample Matrix:	Water	**Work Order No.:**	B920622

BTEX and TPH as Gasoline
EPA Methods 5030/8020/Washington DOE Method WTPH-G
µg/L (ppb)

Sample Name:		04-11-06-92	05-11-06-92	06-11-06-92
Lab Code:		B0622-4	B0622-5	B0622-6
Date Analyzed:		11/10/92	11/10/92	11/10/92
Analyte	**MRL**			
Benzene	0.5	20.9	ND	ND
Toluene	1	13	ND	ND
Ethylbenzene	1	4	ND	ND
Total Xylenes	1	17	ND	ND
TPH as Gasoline	50	90	ND	ND

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

Approved by _____ Date 92119

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	**Date Collected:**	11/06/92
Project:	Texaco Greenwood	**Date Received:**	11/06/92
Sample Matrix:	Water	**Work Order No.:**	B920622

BTEX and TPH as Gasoline
EPA Methods 5030/8020/Washington DOE Method WTPH-G
µg/L (ppb)

Sample Name:		Trip Blank	Method Blank
Lab Code:		B0622-7	B0622-MB
Date Analyzed:		11/10/92	11/10/92
Analyte	**MRL**		
Benzene	0.5	ND	ND
Toluene	1	ND	ND
Ethylbenzene	1	ND	ND
Total Xylenes	1	ND	ND
TPH as Gasoline	50	ND	ND

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

Approved by _____ Date 12/11/92

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	**Date Collected:**	11/06/92
Project:	Texaco Greenwood	**Date Received:**	11/06/92
Sample Matrix:	Water	**Date Analyzed:**	11/10,11/92
		Work Order No.:	B920622

Surrogate Recovery Summary
BTEX and TPH as Gasoline
EPA Methods 5030/8020
Washington DOE Method WTPH-G

Sample Name	Lab Code	Spike Level (ug/L)	Percent Recovery *α,α,α*-Trifluorotoluene
01-11-06-92	B0622-1	500	116
02-11-06-92	B0622-2	500	101
03-11-06-92	B0622-3	500	117
04-11-06-92	B0622-4	500	101
05-11-06-92	B0622-5	500	100
05-11-06-92	B0622-5MS	500	100
06-11-06-92	B0622-6	500	100
Trip Blank	B0622-7	500	101
Method Blank	B0622-MB	500	101
Laboratory Control Sample	B0622-LCS	500	111
	CAS Acceptance Criteria		50-130

TPH Total Petroleum Hydrocarbons

Approved by _____ Date 12/11/9

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	**Date Collected:**	11/06/92
Project:	Texaco Greenwood	**Date Received:**	11/06/92
Sample Matrix:	Water	**Date Analyzed:**	11/10/92
		Work Order No.:	B920622

Duplicate Summary
BTEX and TPH as Gasoline
EPA Methods 5030/8020/Washington DOE Method WTPH-G
µg/L (ppb)

Sample Name: Batch QC
Lab Code: B0617-2

Analyte	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Benzene	0.5	112	108	110	4
Toluene	1	1	ND	--	--
Ethylbenzene	1	1	1	1	<1
Total Xylenes	1	7	7	7	<1
TPH as Gasoline	50	50	50	50	<1

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

Approved by _____ Date 9/11/19

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	**Date Collected:**	11/06/92
Project:	Texaco Greenwood	**Date Received:**	11/06/92
Sample Matrix:	Water	**Date Analyzed:**	11/10/92
		Work Order No.:	B920622

Matrix Spike Summary
BTEX and TPH as Gasoline
EPA Methods 5030/8020/Washington DOE Method WTPH-G
µg/L (ppb)

Sample Name: 05-11-06-92
Lab Code: B0622-5

Analyte	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Benzene	100	ND	98	98	51-159
Toluene	100	ND	97	97	50-156
Ethylbenzene	100	ND	98	98	49-157

ND None Detected at or above the method reporting limit

Approved by _____ Date 6/21/19

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	**Date Analyzed:**	11/10/92
Project:	Texaco Greenwood	**Work Order No.:**	B920622
LCS Matrix:	Water		

Laboratory Control Sample Summary
BTEX and TPH as Gasoline
EPA Methods 5030/8020
Washington DOE Method WTPH-G
µg/L (ppb)

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
TPH as Gasoline	4,900	4,670	95	70-140

TPH Total Petroleum Hydrocarbons

Approved by _____ Date 12/11/92

Columbia Analytical Services inc.

1317 South 13th Ave. • Kelso, WA 98626 • (206) 577-7222, FAX (206) 636-1068

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

DATE 11-6-92 PAGE ____ OF ____

PROJECT NAME Texaco Greenwood # 0368-013-02

PROJECT MNGR. Brooks

COMPANY/ADDRESS EMCON

PHONE 485-5000

SAMPLERS SIGNATURE Tom Bodle

SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	ANALYSIS REQUESTED: Base/Neu/Acid Organics GCMS 625/8270	Volatile Organics GCMS 624/8240	Halogenated or Aromatic Volatiles 601/8010 ☐ 602/8020 ☐	Pesticides/PCBs 608/8080	Total Petroleum Hydrocarbons EPA 418.1 ☐	TPH/Gas/BTEX 5030/8015/8020 Oregon 418.1 ☐ Gas ☒ BTEX ☒	TPH/8015 Modified Diesel ☐	Hydrocarbon Scan ☐ TPH - HCID	TCLP Metals ☐	Semi Pest/ VOA ☐ VOA ☐ Herb ☐ Metals (total or dissolved) List Below *	Cyanide	pH, Cond, Cl, SO4, PO4, F, Br NO2 NO3 (circle)	Nitr-N, COD, Total P, TKN, TOC (circle)	Total Organic Halides (TOX) 9020	ethylene glycol	total coliform	REMARKS
01-11-06-92	11-6-92	12:50	1	water	4						✓				✓							
02-11-06-92		14:00	2	TB	4						✓				✓							
03-11-06-92		12:00	3		4						✓				✓							
04-11-06-92		16:00	4		6						✓				✓							
05-11-06-92		14:40	5		7						✓				✓							
06-11-06-92		15:00	6		2						✓											
trip blank		N/A	7		1						✓											

95 per P. Brooks TB disregard

RELINQUISHED BY:

Signature: Tom Bodle

Printed Name: Tom Bodle

Firm: EMCON

Date/Time: 11-6-92 17:40

RECEIVED BY:

Signature: Barbara D. Regan

Printed Name: Barbara D. Regan

Firm: CAS/Bothell

Date/Time: 11-06-92 1740

RELINQUISHED BY:

Signature

Printed Name

Firm

Date/Time

RECEIVED BY:

Signature

Printed Name

Firm

Date/Time

TURNAROUND REQUIREMENTS:

___ 24 hr ___ 48 hr ___ 5 day

✓ Standard (~ 10-15 working days)

___ Provide Verbal Preliminary Results

___ Provide FAX Preliminary Results

Requested Report Date ____

REPORT REQUIREMENTS

___ I. Routine Report

___ II. Report (Includes DUP, MS, MSD, as required, may be charged as samples)

___ III. Data Validation Report (includes All Raw Data)

___ IV. CLP Deliverable Report

INVOICE INFORMATION:

P.O. # ____

Bill to: ____

SAMPLE RECEIPT:

Shipping VIA: ____

Shipping #: ____

Condition: ____

Lab No.: BA2-01627

SPECIAL INSTRUCTIONS/COMMENTS:

* total lead

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

400-05

Columbia Analytical Services, Inc.

November 28, 1992

Pat Brooks
EMCON Northwest, Inc.
18912 North Creek Parkway, Suite 210
Bothell, WA 98011

Re: **Texaco - Greenwood/Project #0368-013-02/B920622**

Dear Pat:

Enclosed are the results of the samples submitted to our laboratory on November 6, 1992. For your reference, these analyses have been assigned our work order number K927092B.

All analyses were performed in accordance with our laboratory's quality assurance program. Reproduction of reports is allowed only in whole, not in part. Results apply only to the samples analyzed.

Please call if you have any questions.

Respectfully submitted,

Columbia Analytical Services, Inc.

Colin B. Elliott
Senior Project Chemist

CBE/akn

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest, Inc.	**Date Received:**	11/06/92
Project:	Texaco - Greenwood	**Date Analyzed:**	11/13/92
Sample Matrix:	Water	**Work Order No.:**	K927092B

Total Lead
EPA Method 7421
µg/L (ppb)

Sample Name	Lab Code	MRL	Result
01-11-06-92	K7092-1	2	ND
02-11-06-92	K7092-2	2	ND
03-11-06-92	K7092-3	2	ND
04-11-06-92	K7092-4	2	ND
05-11-06-92	K7092-5	2	ND
Method Blank	K7092-MB	2	ND

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

Approved by Glen Elliott Date 11/30/92

APPENDIX A

LABORATORY QC RESULTS

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest, Inc.	**Date Received:**	11/06/92
Project:	Texaco - Greenwood	**Date Analyzed:**	11/23/92
Sample Matrix:	Water	**Work Order No.:**	K927092B

Ethylene Glycol
EPA Method Modified 8015
mg/L (ppm)

Sample Name	Lab Code	MRL	Result
04-11-06-92	K7092-4	10	ND
05-11-06-92	K7092-5	10	ND
Method Blank	K7092-MB	10	ND

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

Approved by Chris Ellis Date 11/30/92

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest, Inc.	**Date Received:**	11/06/92
Project:	Texaco - Greenwood	**Date Analyzed:**	11/13/92
Sample Matrix:	Water	**Work Order No.:**	K927092B

Duplicate Summary
Total Lead
EPA Method 7421
µg/L (ppb)

Sample Name	Lab Code	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
01-11-06-92	K7092-1	2	ND	2	NC	NC

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
NC Not Calculated

Approved by Ann Ellis Date 11/30/92

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest, Inc.	Date Received:	11/06/92
Project:	Texaco - Greenwood	Date Analyzed:	11/13/92
Sample Matrix:	Water	Work Order No.:	K927092B

Matrix Spike Summary
Total Lead
EPA Method 7421
µg/L (ppb)

Sample Name	Lab Code	MRL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
01-11-06-92	K7092-1	2	20	ND	21	105	75-125

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

Approved by John Elliott Date 11/30/92

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest, Inc.	**Date Received:**	11/06/92
Project:	Texaco - Greenwood	**Date Analyzed:**	11/23/92
Sample Matrix:	Water	**Work Order No.:**	K927092B

Matrix Spike/Duplicate Matrix Spike Summary
Ethylene Glycol
EPA Method Modified 8015
mg/L (ppm)

Sample Name: 05-11-06-92
Lab Code: K7092-5

Analyte	Spike Level MS	Spike Level DMS	Sample Result	Spike Result MS	Spike Result DMS	Percent Recovery MS	Percent Recovery DMS	Relative Percent Difference
Ethylene Glycol	25	25	7J	33	31	104	96	6

J Estimated value below the method reporting limit, but above the instrument detection limit.

Approved by Colin Ellwood Date 11/30/92

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest, Inc.	**Date Analyzed:**	11/23/92
Project:	Texaco - Greenwood	**Work Order No.:**	K927092B
LCS Matrix:	Water		

Laboratory Control Sample Summary
Ethylene Glycol
EPA Method Modified 8015
mg/L (ppm)

Analyte	True Value	Result	Percent Recovery
Ethylene Glycol	50	49	98

Approved by Colin Elliott Date 11/30/92

Columbia Analytical Services inc.

1317 South 13th Ave. • Kelso, WA 98626 • (206) 577-7222, FAX (206) 636-1068

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

DATE 11-6-92 PAGE ____ OF ____

PROJECT NAME Texaco Greenwood # 0368-013-02

PROJECT MNGR. Brooks

COMPANY/ADDRESS EMCON

PHONE 485-5000

SAMPLERS SIGNATURE Tom Bodle

ANALYSIS REQUESTED

	SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	Base/Neu/Acid Organics GC/MS 625/8270	Volatile Organics GC/MS 624/8240	Halogenated or Aromatic Volatiles 601/8010 ☐ 602/8020 ☐	Pesticides/PCBs 608/8080	Total Petroleum Hydrocarbons EPA 418.1 ☐ Oregon 418.1 ☐	TPH/Gas/BTEX 5030/8015/8020 Gas ☒ BTEX ☒	TPH/8015 Modified Diesel ☐ Hydrocarbon Scan ☐	TPH - HCID	TCLP Metals ☐ VOA ☐ Semi VOA ☐ Pest ☐ Herb ☐	Metals (total or dissolved) List Below *	Cyanide	pH, Cond, Cl, SO_4, PO_4, F, Br, NO_2, NO_3 (circle)	NH_3-N, COD, Total-P, TKN, TOC (circle)	Total Organic Halides (TOX) 9020	ethylene glycol	total coliform	REMARKS
	01-11-06-92	11-6-92	12:50	K7052-1 1	water	4						✓				✓							
	02-11-06-92	↓	14:00	-2 2	↓ TB →	[redacted] 4						✓				✓							
	03-11-06-92	↓	12:00	-3 3	↓	4						✓				✓							
5	04-11-06-92	↓	16:00	-4 4	↓	6						✓				✓					✓	✗	per P. Brooks 11-9-92
7	05-11-06-92	↓	14:40	-5 5	↓	7						✓				✓					✓	[redacted]	→ disregard TB
	06-11-06-92	↓	15:00	6	↓	2						✓											
	trip blank	↓	N/A	7	↓	1						✓											

RELINQUISHED BY:
Signature: Tom Bodle
Printed Name: Tom Bodle
Firm: EMCON
Date/Time: 11-6-92 17:40

RECEIVED BY:
Signature: Barbara D. Reagan
Printed Name: Barbara D. Reagan
Firm: CAS/Bothell
Date/Time: 11-6-92 1740

TURNAROUND REQUIREMENTS:
___ 24 hr ___ 48 hr ___ 5 day
✓ Standard (~ 10-15 working days)
___ Provide Verbal Preliminary Results
___ Provide FAX Preliminary Results
Requested Report Date ________

REPORT REQUIREMENTS
___ I. Routine Report
___ II. Report (includes DUP,MS, MSD, as required, may be charged as samples)
___ III. Data Validation Report (includes All Raw Data)
___ IV.CLP Deliverable Report

INVOICE INFORMATION:
P.O. # ________
Bill to: ________

SAMPLE RECEIPT:
Shipping VIA: ________
Shipping #: ________
Condition: K92-7052B
Lab No.: B92-0622

RELINQUISHED BY:
Signature: Barbara D. Reagan
Printed Name: Barbara D. Reagan
Firm: CAS/Bothell
Date/Time: 11-09-92 1500

RECEIVED BY:
Signature: Lance Jording
Printed Name: Lance Jording
Firm: CAS 11/10/92
Date/Time: 11:00

SPECIAL INSTRUCTIONS/COMMENTS:

* total lead

8000

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

400-05