1994 PROGRESS REPORT

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

Prepared for

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August 8, 1995

Prepared by

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Project 0368-013.11

Independent Action Report Update

Site Name: Texaco Station #63232 0037

Inc. #: 2298 Date of Report: 8/8/95

County: King Date Report Rec'd: 11/29/95

Reviewed by: Roger Nye

Comments (please include: free prod., tank info., contaminant migration, GW depth & flow, conc. trends, PCS treated?):

This report documents the installation of systems to remediate soil and groundwater, and a 2-month operational history. The systems consisted of a combination Soil VES and GW sparging system. A GW dewatering well was used for drawdown

1994 Progress Report
Texaco Service Station 63-232-0037
8701 Greenwood Avenue North
Seattle, Washington

The material and data in this report were prepared under the supervision and direction of the undersigned.

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DEPARTMENT OF ECOLOGY
NWRO/TCP TANK UNIT

INTERIM CLEANUP REPORT	☐
SITE CHARACTERIZATION	☐
FINAL CLEANUP REPORT	☐
OTHER _____	☐
AFFECTED MEDIA: SOIL	☐
OTHER _____ GW	☐
INSPECTOR (INIT.) ___ DATE _____	

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1 INTRODUCTION

1.1 Purpose and Scope of Work

On behalf of Texaco Environmental Services (TES), EMCON installed a groundwater and soil treatment system, performed system operations and maintenance, and conducted groundwater sampling at former Texaco Service Station 63-232-0037. The site is located at 8701 Greenwood Avenue North in Seattle, Washington (Figure 1). The work was performed to remediate residual concentrations of petroleum hydrocarbons in soil and groundwater beneath the site.

Services completed in this scope of work included the following:

- Installing an air sparging, vapor extraction, and groundwater recovery system at the site
- Obtaining a King County Department of Metropolitan Services (Metro) permit to discharge water pumped from the tank basin into the sanitary sewer
- Obtaining a Puget Sound Air Pollution Control Authority (PSAPCA) permit to operate the soil vapor extraction system
- Operating and maintaining the remediation system
- Collecting groundwater samples from monitoring and tank dewatering wells
- Coordinating laboratory analyses
- Preparing this report summarizing findings and presenting conclusions

1.2 Site Location and Description

The site is a former gasoline service station located in the southeast quarter of the southwest quarter of Section 31, Township 26 North, Range 3 East. The former station is located on the northwest corner of the intersection of North 87th Street and Greenwood Avenue North in Seattle, Washington. The site is bordered by commercial businesses to

the north, North 87th Street to the south, Greenwood Avenue North to the east, and a residential area to the west. The property generally slopes to the south and west, with a total elevation drop of approximately 2.5 feet.

1.3 Site History

Texaco leased the property in 1946. At that time, a small service station and one wood-framed house were present at the site. Available information did not indicate the type, number, or capacity of underground storage tanks (USTs) present at the site in 1946. After acquiring the lease for the property, Texaco razed the service station and house and constructed a full service gasoline station. The facility consisted of a station building with two service bays and one pump island. Based on the information Texaco provided, USTs present at the site at that time included one 4,000-gallon, one 3,500-gallon, and one 2,000-gallon fuel tank, and one 550-gallon waste oil tank.

Texaco purchased the property in 1967 and constructed a new service station on the site. The facility included a sales building with two bays and two pump islands. The existing USTs were removed and replaced with two 10,000-gallon gasoline tanks, one 550-gallon waste oil tank, and one 1,000-gallon heating oil tank. The new USTs were constructed of single-walled carbon steel. One 4,000-gallon gasoline tank was installed in 1971.

In 1986, the steel gasoline tanks were removed and replaced with four 10,000-gallon, single-walled fiberglass USTs. The new USTs consisted of three gasoline tanks and one diesel tank. The product lines were removed and replaced with fiberglass lines. The steel waste oil and fuel oil USTs were also removed and replaced with fiberglass tanks.

In 1994, the station building was razed, and the four 10,000-gallon fuel USTs, one 1,000-gallon heating oil UST, and one 550-gallon waste oil UST were removed from the site. Two approximately 1,250-gallon concrete sumps/separators and associated influent and effluent piping were discovered during excavation activities. One sump/separator was removed. The second (southernmost) sump was left in place to avoid disturbing the underlying peat and silt confining layer. Figure 2 is a site plan showing the former station facilities.

1.4 Previous Investigations

In March 1991, five groundwater monitoring wells (AGW-1 through AGW-5) were installed to evaluate subsurface conditions at the site (Figure 2). Results of the investigation were presented to the Washington State Department of Ecology (Ecology) in Texaco's report entitled, *Report on Initial Site Assessment*, dated July 1991. A review of boring log data from the report indicated that shallow groundwater at the site was confined beneath a peat and silt layer located 10 to 15 feet below the ground surface

(bgs). According to the report, soil samples collected adjacent to the waste oil and heating oil USTs contained concentrations of total petroleum hydrocarbons as oil (TPH-O) exceeding the Model Toxics Control Act (MTCA) Method A Cleanup Levels.[1] Monitoring well AGW-3 reportedly was decommissioned subsequent to installation due to artesian conditions in the well. Depth to water measurements ranged from approximately 0.5 to 3 feet below the top of the wells casings in the remaining four wells.

In January 1994, EMCON performed oversight and soil sampling during tank decommissioning at the site. Three 10,000-gallon gasoline tanks, one 10,000-gallon diesel tank, one 1,000-gallon heating oil tank, one 550-gallon waste oil tank, two hoists, one sump/separator, and product lines and dispensers were removed during field activities (Figure 2). Soil samples collected from the excavation limits at the UST complex, the heating oil tank, the pump island, and the hoist areas following over-excavation contained analytes at concentrations below MTCA Method A Cleanup Levels. Soil samples collected from the excavation limits at the waste oil/sump area following over-excavation contained analytes at concentrations exceeding MTCA Method A Cleanup Levels. The impacted soil in the waste oil/sump area was left in place to avoid disturbing the peat confining layer and flooding the excavation with water from the adjoining UST complex excavation. Well AGW-4 was abandoned and later overexcavated during field activities.

In March 1994, EMCON directed drilling and installation of two 4-inch-diameter monitoring wells (AGW-6 and AGW-7; Figure 3) at the site. Subsurface soil encountered during drilling generally consisted of 5 to 8 feet of moist to saturated gravely and silty sand overlying 5 to 8 feet of dry to damp peat. The peat was underlain by wet silts, sands, and gravel to the maximum explored depth of 27 feet bgs. Soil laboratory results indicated that total petroleum hydrocarbons as diesel (TPH-D) and TPH-O concentrations exceeded MTCA Method A Cleanup Levels in soil samples collected at 5.5 and 7 feet bgs in borings AGW-6 and AGW-7, respectively. Information regarding the tank decommissioning and well installation was contained in EMCON's report entitled *Underground Storage Tank Decommissioning*, dated September 9, 1994.

Nine groundwater sampling events were conducted at the site between April 1991 and June 1993. A review of the historic groundwater laboratory results (Table 1) indicated that groundwater samples collected from wells AGW-1, AGW-2, AGW-4, AGW-5, and AGW-6 contained one or more of the following analytes at concentrations above the MTCA Method A Cleanup Levels: TPH as gasoline (TPH-G), TPH-D, TPH-O, and benzene, toluene, ethylbenzene, and total xylenes (BTEX). The maximum benzene concentrations were detected in the groundwater sample collected from well AGW-1 in August 1991, subsequent to a reported release from the unleaded gasoline tank turbine.

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1 Chapter 173-340 WAC, *The Model Toxics Control Act Cleanup Regulation; Method A Cleanup Levels*. Amended December 1993.

Concentrations of TPH-G and benzene in sampled groundwater generally have declined since 1991.

2 GROUNDWATER SAMPLING ACTIVITIES

2.1 Field Activities

EMCON collected groundwater samples from existing monitoring wells AGW-1, AGW-2, AGW-5, AGW-6, and AGW-7 on November 10, 1994. Groundwater sampling procedures are provided in Appendix A. Groundwater sampling data sheets are provided in Appendix B.

Depth to water measured in each well before sampling ranged from 0.00 feet bgs in well AGW-7 to 3.52 feet bgs in well AGW-5. Depth-to-water measurements were converted to relative groundwater elevations by using well survey data EMCON collected on March 17, 1994. The maximum groundwater elevation difference was 4.21 feet between wells AGW-6 and AGW-7, approximately 90 feet apart.

Depth-to-water data indicated that the inferred hydraulic gradient beneath the site was to the southwest at a magnitude of approximately 0.045 foot per foot (ft/ft) on November 10, 1994. Well survey and groundwater elevation data are presented in Table 1. Groundwater elevations are shown on Figure 3.

2.2 Laboratory Analyses and Results

Five groundwater samples collected during the November 10, 1994, sampling event were submitted to Columbia Analytical Services, Inc. (CAS), of Bothell, Washington, for analyses. The samples were analyzed for TPH-G using Ecology Method WTPH-G, TPH-D and TPH-O using Ecology Method WTPH-D (extended), BTEX using EPA Methods 5030/8020, and total lead using EPA Method 7421.

Review of the groundwater laboratory results indicated that groundwater samples collected from monitoring wells AGW-2 and AGW-6 contained concentrations of benzene and total xylenes above MTCA Method A Cleanup Levels. No total lead was detected above the method reporting limits in analyzed groundwater samples. All other results were below MTCA Method A Cleanup Levels. A summary of laboratory results for groundwater is presented in Table 2. Copies of the laboratory reports and chain-of-custody forms are included in Appendix C.

2.3 Water Disposal

Approximately 190 gallons of purge water were accumulated during groundwater sampling activities. The purgewater was contained in secured 55-gallon drums and transported to EMCON for disposal under EMCON's Metro permit for wastewater discharge.

3 REMEDIATION SYSTEM

Based on the results of the underground storage tank decommissioning and additional site assessment, Texaco requested that EMCON install a remediation system to treat residual petroleum hydrocarbon impacted groundwater and soil at the site. EMCON installed a combined air sparging and vapor extraction system (VES) at the site between February and December 1994. An existing tank pit dewatering well is used to lower the water table at the site, to enhance vapor extraction, and to reduce condensate collection.

3.1 System Installation

The remediation system at the site consists of three vapor extraction lines, three air sparging lines, and a groundwater recovery pump installed within the former tank pit dewatering well (Figure 4). By applying a vacuum to the VES lines, volatile hydrocarbons are extracted from the unsaturated zone and the capillary fringe. Injecting air into the sparge lines forces the air through the saturated zone, allowing contaminants in the aquifer to volatilize. The volatilized contaminants migrate to the unsaturated zone, where they are extracted by the VES. The vapor extraction lines at the site are located in an area of shallow groundwater and are submerged under normal groundwater conditions. The groundwater recovery well lowers the water table to increase the unsaturated zone for vapor extraction and avoid submerging the VES lines.

The vapor extraction and air sparging lines were installed horizontally within the former UST basin during tank removal activities in February 1994 (Figure 4). Each line consists of approximately 30 feet of 3-inch-diameter PVC screen with machined slots and approximately 10 feet of blank PVC piping. The VES lines were placed approximately 3 feet bgs, and the sparge lines were placed approximately 10 feet bgs. The VES lines were connected to 4-inch-diameter, blank PVC riser pipe, and the sparge lines were connected to 3-inch-diameter, blank PVC riser pipes, which extend vertically from the VES and sparge lines to the surface. The VES and sparge riser pipes were connected to 4-inch and 3-inch aboveground manifolds, respectively. The lines are connected to the remediation system equipment using aboveground piping.

The groundwater recovery system consists of a pump installed in the tank pit dewatering well near the southwest corner of the former tank basin (Figure 4). The pump is connected to a compressor located in the enclosure. The pump is controlled by a Coyote controller, which automatically starts and stops it as necessary to avoid submerging the

VES piping. A high water level sensor is located on the north sparge line to maintain the proper water level. The water pumped from the dewatering well is discharged directly to the Metro sanitary sewer system.

The remediation system equipment is housed in a fenced enclosure located near the southwest corner of the former UST complex (Figure 4). The system primarily consists of two blowers, an electrical panel, and a vent stack (Figure 5). The VES lines are connected to a Rotron EN 606 blower. The emissions from the vapor extraction blower are vented to the atmosphere through a 15-foot-tall, 6-inch-diameter stack. Sampling ports are located on each line in the VES manifold and at the influent line to the VES stack. The sparge lines are connected to a Rotron EN 404 blower.

3.2 Permit Acquisition

EMCON obtained a permit from PSAPCA to operate the soil vapor extraction system. EMCON also acquired a permit from Metro to discharge water pumped from the groundwater recovery well directly to the sanitary sewer. Copies of the permits are included in Appendix D.

3.3 System Startup

The remediation system was activated on December 2, 1994. EMCON initiated an operation and maintenance (O & M) schedule when the system was started. A schedule of weekly O & M site visits was established for the first month, bi-monthly for the next 2 months, and monthly thereafter. The system may be shut down periodically for equipment maintenance and monitoring.

3.3.1 Field Methods

The system monitoring visits consist of recording airflow, vacuum pressure, and volatile organic vapor concentrations. Airflow rates at each of the extraction sampling ports and at the system stack are monitored by using a Kurz™ Instruments, Inc., Mini Anemometer Series 490. Airflow readings are recorded in linear feet per minute (fpm). The flow readings are converted to volumetric cubic feet per minute (cfm) by using the diameter of the extraction pipe at the given sample port and monitoring location. The vapor extraction system stack and extraction points are 4 inches in diameter.

Vacuum pressure is monitored at the sampling ports for the individual extraction lines and at the sparge line manifold by using a series of portable magnehelic gauges with a pressure range of 0.01 to 50 inches of water.

Volatile organic vapor concentrations are measured at the system stack, at each individual extraction sampling port, and at the sparge line manifold. The concentrations are measured by using a flame ionization detector (FID), Foxboro™ Model 88 OVA.

Hydrocarbon mass removal rates are calculated using the following formula:[2]

lbs/day = [cfm] x [FID (ppmv)] x [molecular weight (gasoline)] x [1.581 x 10^{-7}] x [24 hrs/day]

1) cfm = the volumetric airflow from the system stack.

2) FID = volatile organic vapor concentrations are measured in parts per million - volume (µl/L).

3) Molecular weight of gasoline = 102.2 mg/mole.

4) 1.581 x 10^{-7} lb-mole min/ft^3 ppmv hr = $\frac{1}{10^6\ ppm-v} \times \frac{60\,min}{hr} \times \frac{1lb-mole}{379.5ft^3}$

The following formula was used to calculate total pounds removed from the site.

$$Total\ Pounds = \frac{FE+IE}{2} \times Days$$

1) FE = emissions in lbs/day during previous site visit.

2) IE = emissions in lbs/day during the next site visit.

3) Days = number of days between the two site visits.

4) Total pounds were calculated by assuming a linear increase or decrease in stack emissions from monitoring date to monitoring date.

3.3.2 Operation and Maintenance Site Visits

EMCON conducted site inspection visits to monitor system operations and maintain equipment on December 2, 7, and 16, 1994, and January 3, 9, 11, and 30, and February 15, 1995. Operation parameters were recorded on December 7, 1994, and January 11 and 30, 1995. Appendix E contains the field measurements collected during EMCON's three monitoring visits.

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[2] Reference: United States Environmental Protection Agency, Office of Underground Storage Tanks, June 1989. *Estimating Air Emissions from Petroleum UST Cleanups.*

On December 2, the groundwater recovery pump was activated. Following initialization, groundwater samples were collected from the recovery well influent. The samples were submitted to CAS in Bothell, Washington, for laboratory analyses to show compliance with the Metro discharge permit. The samples were analyzed for BTEX by using EPA Method 602, nonpolar fats, oils and grease by Standard Method 5520F, and total lead by using EPA Method 7421. Laboratory results reported 2.3, 1.0, 7.0, and 4.0 ppb for BTEX, respectively. All results were below Metro discharge requirements.

On December 5, 1994, EMCON personnel returned to the site to activate the VES and allow the lines to be purged.

The VES and sparge system were operating properly upon EMCON's arrival on December 7, 1994, with vacuum applied to all three VES lines. The groundwater recovery pump was not operating properly. After being removed and manually energized, the pump was reinstalled. Each vapor point was isolated before measuring vacuum pressure, air flow, and volatile organic concentrations. Following isolation, volatile organic concentrations of 30, 10, and 10 parts per million (ppm) were detected at the north, middle, and south vapor points. Vacuum pressures of 1 inch of water were measured at each vapor point. Linear airflow of 1,200 fpm and volatile organic concentrations of 30 ppm were measured at the discharge stack. An air sample was collected from the VES stack and submitted to CAS in Bothell, Washington, for laboratory analyses. The sample was analyzed for BTEX and total petroleum hydrocarbons as gasoline (TPH-G) by using EPA Methods 5030/8020 and Modified 8015, and for oxygen, carbon dioxide, and methane by using ASTM Method D-3416. The laboratory results indicated no concentrations above the method reporting limit for BTEX and methane and 42 µg/L (10.3 ppm-V) TPH-G. The results indicated components in the gasoline range, but the chromatograph did not represent a typical gasoline fingerprint.

On December 16, 1994, a new Grundfos pump and Coyote controller were installed in the groundwater recovery well. The VES was manually activated. On January 3, 1995, the sparge blower was found to be inoperative, and the Coyote controller was not automatically shutting off the groundwater recovery pump. The circuit breakers for the system would not reset after maintenance was performed, and the system was turned off. New breakers were installed on January 9, 1995. System operation was tested, and the system was reactivated.

The VES and sparge blowers were not active upon EMCON's arrival on January 11, 1995. The blowers were reactivated. Following isolation of each vapor extraction point, volatile organic concentrations of 5 ppm and 0 to 5 ppm were measured at the north and south vapor points, respectively. No measurable volatile vapor concentrations were detected at the middle vapor point. Vacuum pressures of 0.5 to 1 inch, 1 inch, and 1 inch were measured at the north, middle, and south vapor points, respectively. Linear airflow

of 1,000 fpm and volatile organic concentrations of 5 ppm were measured at the discharge stack.

The VES and groundwater recovery pump were operational upon EMCON's arrival on January 30, 1995. The sparge system was not active because the high water level sensor was inoperative. Following isolation of each vapor extraction point, volatile organic concentrations of 16 and 10 ppm were measured at the north and middle vapor points, respectively. No measurable volatile vapor concentrations were detected at the south vapor point. Vacuum pressures of 1 inch were measured at each of the three vapor points. Linear airflow of 1,100 fpm and volatile organic concentrations of 10 ppm were measured at the discharge stack.

3.3.3 Results

The system has removed approximately 22 pounds of volatile hydrocarbons from the subsurface since the vapor extraction and sparging system were activated in December 1994. The groundwater recovery well has pumped approximately 263,669 gallons of water between December 2, 1994, and January 30, 1995. Table 3 presents the VES operating parameters and estimated total emissions from December 1994 to date. Copies of laboratory reports are included in Appendix C.

4 SUMMARY/CONCLUSIONS

EMCON installed a combined air sparging and vapor extraction system at the site in December 1994 to address residual petroleum hydrocarbon concentrations in the soil and groundwater. The system consists of three vapor extraction lines and three sparge lines, installed horizontally in the former UST basin and connected to pressure and vacuum equipment. A groundwater recovery pump was installed in an existing dewatering well to lower the water table below the VES lines.

The system was activated on December 2, 1994. System monitoring parameters were measured on December 7, 1994, and January 11 and 30, 1995. The operating parameter measurements recorded that linear airflow ranged from 0 to 1,300 feet per minute (fpm) at the three isolated vapor points and 1,000 to 1,200 fpm at the discharge stack, volatile organic concentrations ranged from 0 to 30 parts per million (ppm) at the isolated vapor points and 5 to 30 ppm at the discharge stack. Vacuum pressure ranged from 0.5 to 1 inch of water in the isolated vapor points and from 1.3 to 4.5 inches of water in the sparge manifold.

The treatment system recovered low levels of volatile hydrocarbons from the subsurface during the period of operation from December 7, 1994, to January 30, 1995. The system was operated intermittently during this period due to pump malfunctions and electrical problems. During this time, the VES extracted approximately 22 pounds of volatile hydrocarbons from the site. Hydrocarbon removal rates ranged from 0.17 to 1.22 pounds per day. The groundwater recovery system recovered approximately 263,669 gallons of water during this period. The volume of hydrocarbons removed by the groundwater recovery system was negligible.

Before system activation, groundwater samples were collected from monitoring wells AGW-1, AGW-2, AGW-4, AGW-6, and AGW-7 on November 10, 1994. Depth to water measured in the wells before sampling ranged from 0.00 to 3.52 feet bgs. Groundwater samples collected from monitoring wells AGW-2 and AGW-6 contained concentrations of benzene and total xylenes that exceeded MTCA Method A Cleanup Levels. Groundwater laboratory results for samples collected from the tank pit dewatering well on December 2, 1994, were below MTCA Method A Cleanup Levels.

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.

TABLES

Table 1

Groundwater Monitoring Data
Texaco Service Station 63-232-0037
8701 Greenwood Avenue North
Seattle, Washington

Well Number	Screened Interval (feet bgs)	Top of Casing Elevation (feet)	Date	Depth to Water (feet)	Depth to Product (feet)	Groundwater Elevation (feet)	Groundwater Elevation Change Since Last Measurement (feet)
AGW-1	4.5 - 19.5	47.36	04/03/91	3.18	NONE	44.18	—
			05/15/91	—	NONE	—	—
			08/15/91	0.62	NONE	46.74	+2.56
			11/21/91	0.70	NONE	46.88	+0.14
			03/06/92	0.47	NONE	46.89	+0.01
			11/06/92	0.46	NONE	46.90	+0.01
			03/26/93	0.49	NONE	46.87	- 0.03
			06/09/93	0.42	NONE	46.94	+0.07
		47.36*	03/17/94	1.99	NONE	45.37	- 1.57
			11/10/94	1.21	NONE	46.15	+0.78
AGW-2	4.5 - 19.0	47.59	04/03/91	3.43	NONE	44.16	—
			05/15/91	—	NONE	—	—
			08/15/91	1.65	NONE	45.94	+1.78
			11/21/91	1.30	NONE	46.29	+0.35
			03/06/92	1.14	NONE	46.45	+0.16
			11/06/92	1.18	NONE	46.41	- 0.04
			03/26/93	1.18	NONE	46.41	0.00
			06/09/93	1.06	NONE	46.53	+0.12
		47.64*	03/17/94	2.18	NONE	45.46	- 0.07
			11/10/94	1.57	NONE	46.07	+0.61

Table 1

Groundwater Monitoring Data
Texaco Service Station 63-232-0037
8701 Greenwood Avenue North
Seattle, Washington

Well Number	Screened Interval (feet bgs)	Top of Casing Elevation (feet)	Date	Depth to Water (feet)	Depth to Product (feet)	Groundwater Elevation (feet)	Groundwater Elevation Change Since Last Measurement (feet)
AGW-3	4.5 - 19.0	49.10	03/29/91	—	NONE	49.10+	—
Well Decommissioned							
AGW-4	4.5 - 19.5	47.97	04/03/91	4.61	NONE	43.36	—
			05/15/91	—	NONE	—	—
			08/15/91	2.76	NONE	45.21	+1.85
			11/21/91	2.45	NONE	45.52	+0.31
			03/06/92	2.45	NONE	45.52	0.00
			11/06/92	3.21	NONE	44.76	- 0.76
			03/26/93	3.03	NONE	44.94	+0.18
			06/09/93	2.66	NONE	45.31	+0.37
Well decommissioned							
AWG-5	4.5 - 19.5	49.47	04/03/91	2.78	NONE	46.69	—
			05/15/91	—	NONE	—	—
			08/15/91	1.53	NONE	47.94	+1.25
			11/21/91	2.40	NONE	47.07	- 0.87
			03/06/92	1.45	NONE	48.02	+0.95
			11/06/92	2.27	NONE	47.20	- 0.82
			03/26/93	2.05	NONE	47.42	+0.22
			06/09/93	1.95	NONE	47.52	+0.10
		49.11*	03/17/94	1.65*	NONE	47.46	- 0.06
			11/10/94	3.52	NONE	45.59	- 1.87

Table 1

Groundwater Monitoring Data
Texaco Service Station 63-232-0037
8701 Greenwood Avenue North
Seattle, Washington

Well Number	Screened Interval (feet bgs)	Top of Casing Elevation (feet)	Date	Depth to Water (feet)	Depth to Product (feet)	Groundwater Elevation (feet)	Groundwater Elevation Change Since Last Measurement (feet)
AGW-6	14.0 - 24.0	46.17*	03/17/94	.51	NONE	45.66	—
			11/10/94	1.58	NONE	44.59	-1.07
AGW-7	16.0 - 26.0	48.70	03/17/94	.05	NONE	48.65	—
			11/10/94	0.00	NONE	48.70	+0.05

NOTE: * = Resurveyed March 16, 1994.

Table 2
Groundwater Laboratory Results
Texaco Service Station 63-232-0037
8701 Greenwood Avenue North
Seattle, Washington

Monitoring Well	Date	Results of Analyses (µg/L)							
		Ecology Method WTPH-G	Ecology Method WTPH-D (extended)		EPA Method 5030/602				EPA Method 7421
		TPH-G	TPH-D	TPH-O	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total Lead
MTCA Method A Cleanup Levels[a]		1,000	1,000	1,000	5	40	30	20	5
AGW-1	04/03/91	ND	—	—	ND	ND	ND	ND	—
	05/15/91	—	—	—	440	1,000	92	670	—
	08/15/91	361,000	—	—	1,400	7,400	1,000	8,100	ND
	11/21/91	47,000	ND	ND	680	6,400	2,000	13,000	—
	03/06/92	48,000	ND	ND	710	3,200	1,400	8,700	ND
	11/06/92	37,000	—	—	95.1	260	1,400	8,200	ND
	03/26/93	18,400	—	—	42.8	27	397	1,450	ND
	06/09/93	15,000	—	—	35.2	23	415	1,530	ND
	03/17/94	1,960	730	ND	17.8	8	24	104	ND
	11/10/94	ND	840	ND	2.2	ND	ND	2	ND
	*11/10/94	ND	—	—	2.2	ND	ND	2	—
AGW-2	04/03/91	—	—	—	ND	ND	ND	ND	—
	05/15/91	—	—	—	ND	ND	ND	ND	—
	08/15/91	1,030	—	—	250	220	15	86	ND
	11/21/91	7,300	ND	1,200	910	1,300	260	1,200	—
	03/06/92	24,000	ND	1,100	870	3,700	760	4,900	ND
	11/06/92	3,230	—	—	152	98	175	804	ND
	03/26/93	3,390	340	ND	113	33	149	642	ND
	06/09/93	3,270	ND	ND	108	18	164	666	3
	03/17/94	470	270	ND	18.4	ND	17	68	ND
	11/10/94	470	ND	ND	11.5	ND	10	72	ND

Table 2
Groundwater Laboratory Results
Texaco Service Station 63-232-0037
8701 Greenwood Avenue North
Seattle, Washington

Monitoring Well	Date	Results of Analyses (µg/L)							
		Ecology Method WTPH-G	Ecology Method WTPH-D (extended)		EPA Method 5030/602				EPA Method 7421
		TPH-G	TPH-D	TPH-O	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total Lead
MTCA Method A Cleanup Levels[a]		1,000	1,000	1,000	5	40	30	20	5
AGW-3 Well decommissioned.	03/29/91	—	—	—	ND	ND	ND	ND	—
AGW-4	04/03/91	—	—	—	2.6	20	2.7	31	—
	05/15/91	—	—	—	8.4	19	2.4	20	—
	08/15/91	1,200	3,260	—	11	4	1	7	4
	11/21/91	3,500	ND	2,040	660	700	21	133	—
	03/06/92	ND	ND	800	139	182	3	18	ND
	11/06/92	90	—	—	20.9	13	4	17	ND
	03/26/93	999	480	ND	31.8	35	51	246	ND
	06/09/93	1,900	1,060	ND	61.1	64	108	533	ND
Well decommissioned.	03/17/94	—	—	—	—	—	—	—	—
AGW-5	04/03/91	—	—	—	30	10	5	7	—
	05/15/91	—	—	—	220	53	3.5	12	—
	08/15/91	—	—	—	9.4	ND	ND	ND	ND
	11/21/91	100	ND	ND	2.5	ND	ND	ND	—
	03/06/92	ND	ND	ND	0.9	ND	ND	ND	ND
	11/06/92	ND	—	—	ND	ND	ND	ND	ND
	03/26/93	ND	—	—	ND	ND	ND	ND	ND
	06/09/93	ND	—	—	ND	ND	ND	ND	ND
	03/17/94	ND	ND	ND	ND	ND	ND	ND	ND
	11/10/94	ND	ND	ND	ND	ND	ND	ND	ND

Table 2
Groundwater Laboratory Results
Texaco Service Station 63-232-0037
8701 Greenwood Avenue North
Seattle, Washington

Monitoring Well	Date	Results of Analyses (µg/L)							
		Ecology Method WTPH-G	Ecology Method WTPH-D (extended)		EPA Method 5030/602				EPA Method 7421
		TPH-G	TPH-D	TPH-O	Benzene	Toluene	Ethylbenzene	Total Xylenes	Total Lead
MTCA Method A Cleanup Levels[a]		1,000	1,000	1,000	5	40	30	20	5
AGW-6	03/17/94	300	ND	ND	10.6	1	14	56	4
	11/10/94	200	ND	ND	7.4	ND	6	29	ND
AGW-7	03/17/94	ND	ND	ND	ND	ND	ND	ND	ND
	11/10/94	ND	ND	ND	ND	ND	ND	ND	ND

NOTE: TPH-G = Total petroleum hydrocarbons as gasoline.
TPH-D = Total petroleum hydrocarbons as diesel.
TPH-O = Total petroleum hydrocarbons as oil.
µg/L = Micrograms per liter; approximates parts per billion.
ND = Not detected at or above method reporting limit.
— = Not analyzed.
* = Results for duplicate sample, designated AGW-8-1194.
Shaded values exceed MTCA Method A Cleanup Levels.

[a] Chapter 173-340 WAC, *The Model Toxics Control Act Cleanup Regulations, Method A Cleanup Levels.* Amended December 1993.

Table 3

Hydrocarbon Emissions/Mass Removal Results
Texaco Service Station 63-232-0037
Seattle, Washington

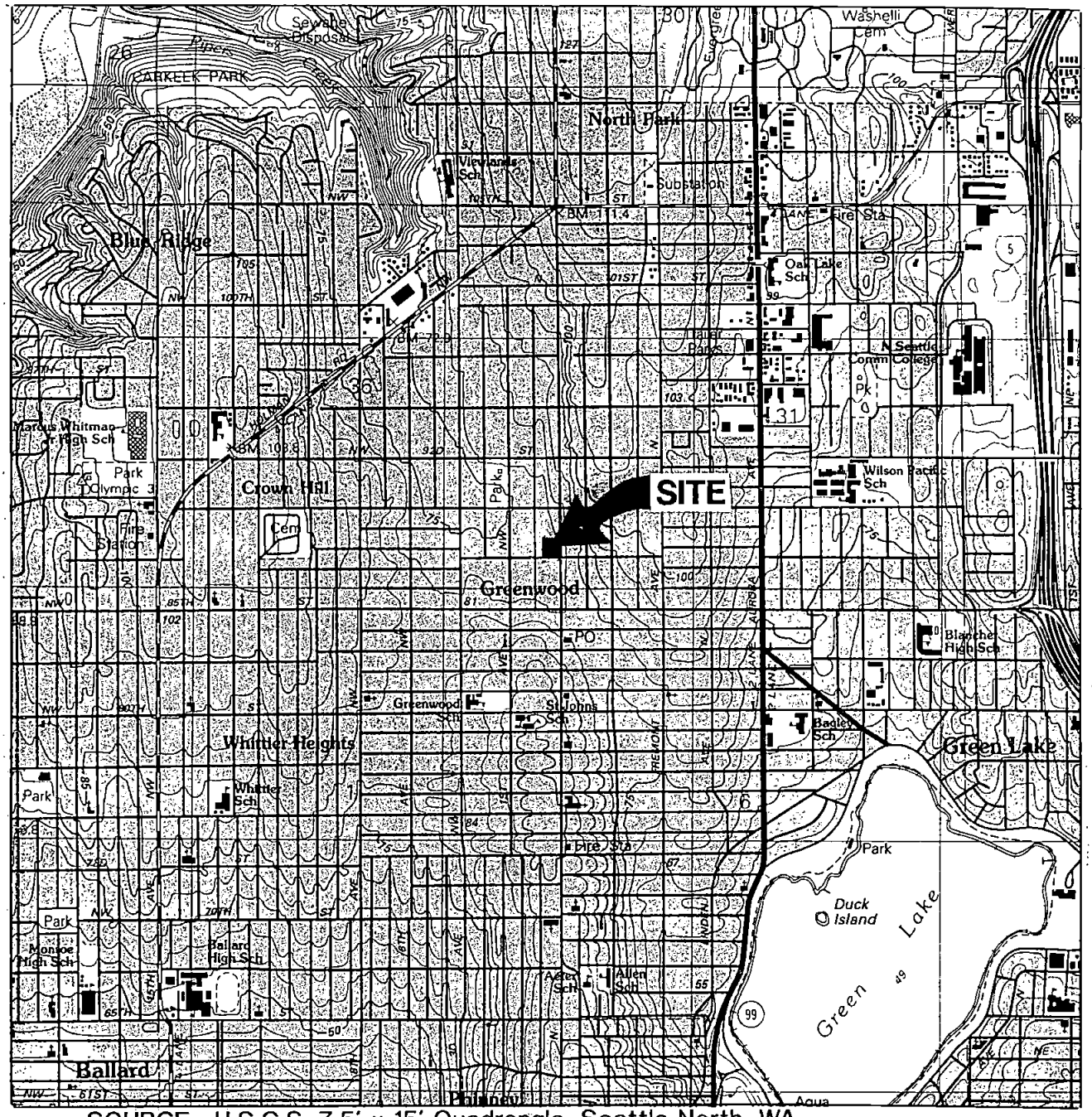
Date	Flow @ Stack[a] (fpm)	Flow @ Stack[a] (cfm)	Vacuum[b] (" water)	FID[a] (ppmv)	Emissions (lbs/day)	Total[c] (pounds)
12/05/94	System activated					
12/07/94	1,200	105	1	30	1.22	—
01/03/95	System deactivated					16.5
01/11/95	System reactivated					16.5
01/11/95	1,000	87	1	5	0.17	16.5
01/30/95	1,100	96	1	10	0.37	21.6

NOTE: * = Emissions calculated using PID reading.
NA = Not analyzed.
Equation: ER (emission rate, lbs/day) = [cfm] x [FID (ppmv)] x [MW] x [1.581 ^-7] x [24 hours/day].
(Molecular weight [MW] for gasoline = 102.2 grams/mole).
Reference: United States Environmental Protection Agency, Office of Underground Storage Tanks, June 1989.
Estimating Air Emissions from Petroleum UST Cleanups.

a Measured at the VES discharge stack.
b Vacuum was measured from the north vapor extraction line.
c Total pounds were calculated assuming a linear increase or decrease in stack emissions from monitoring date to monitoring date.

FIGURES

142322



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

WASHINGTON

N

0 2000 4000

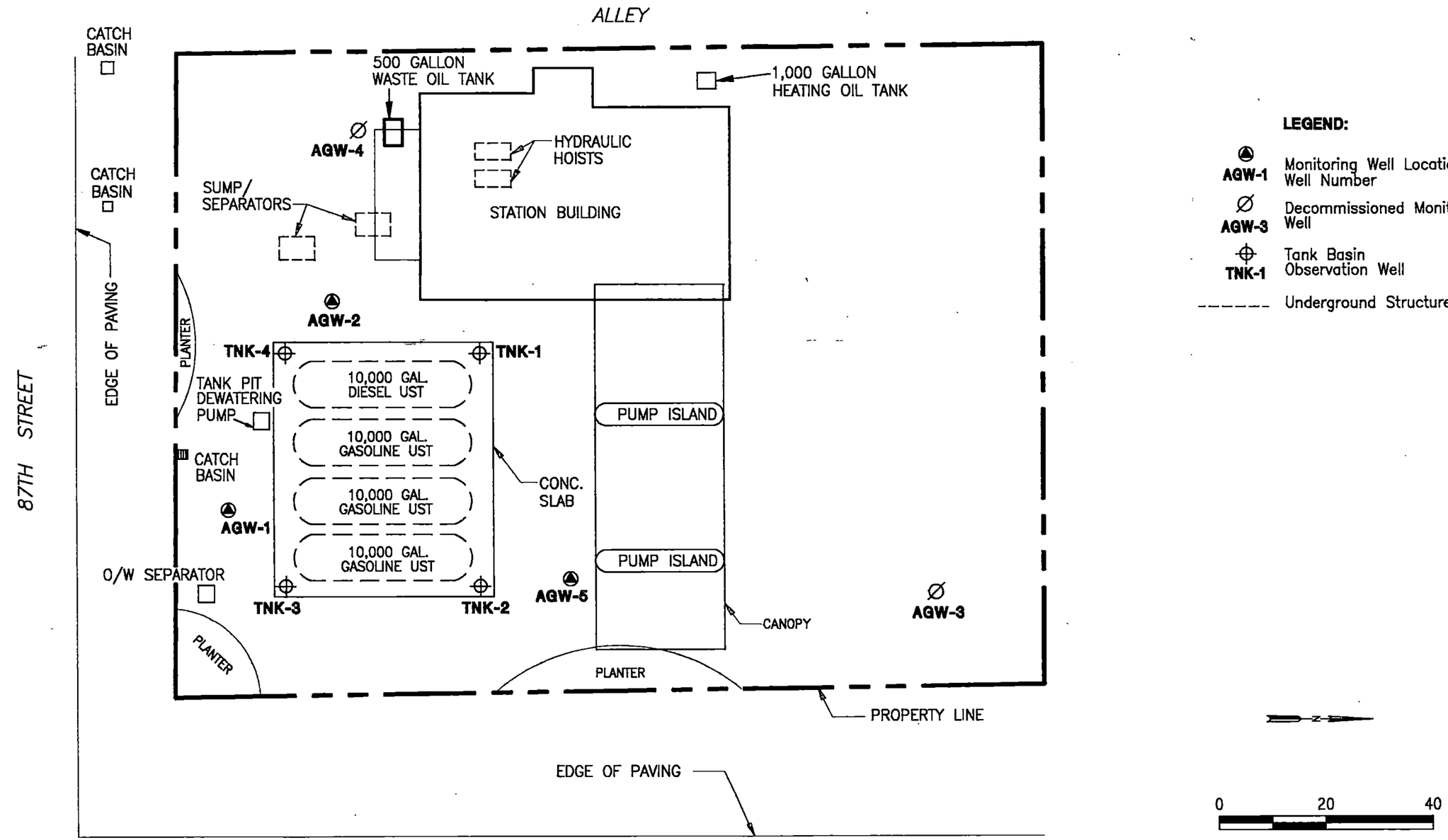
SCALE (ft)

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



LEGEND:

- AGW-1 — Monitoring Well Location and Well Number
- AGW-3 — Decommissioned Monitoring Well
- TNK-1 — Tank Basin Observation Well
- Underground Structures

0 20 40

SCALE (ft)

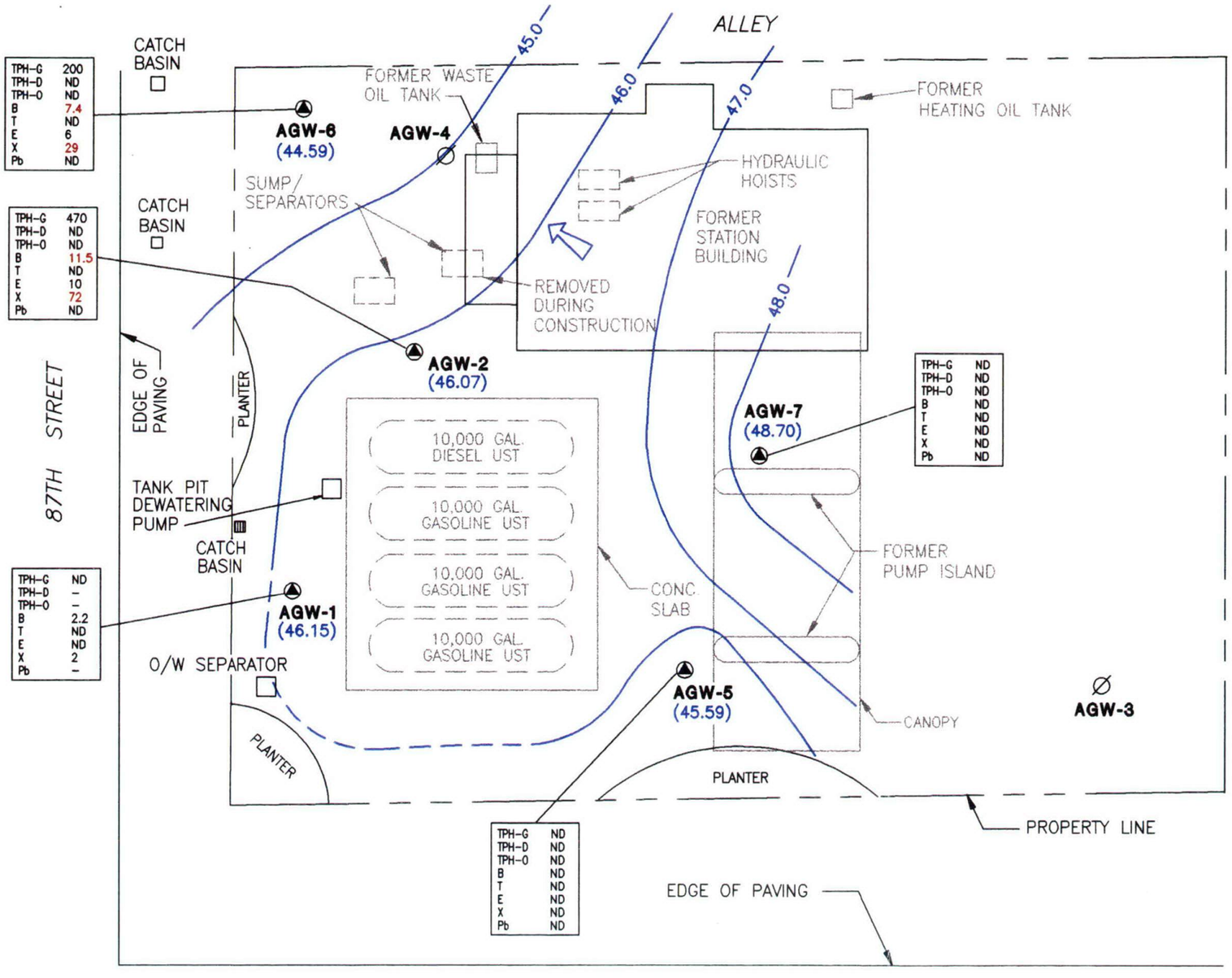
EMCON

DATE 3-95
DWN. MLP
REV.
APPR.
PROJECT NO. 0368-013.11

Figure 2
8701 GREENWOOD AVENUE NORTH
SEATTLE, WASHINGTON

SITE MAP - BEFORE TANK REMOVAL

I=20 3-28-95 G:\DWG\0368\013\11BLC01



TPH-G	200
TPH-D	ND
TPH-O	ND
B	7.4
T	ND
E	6
X	29
Pb	ND

TPH-G	470
TPH-D	ND
TPH-O	ND
B	11.5
T	ND
E	10
X	72
Pb	ND

TPH-G	ND
TPH-D	ND
TPH-O	ND
B	ND
T	ND
E	ND
X	ND
Pb	ND

TPH-G	ND
TPH-D	–
TPH-O	–
B	2.2
T	ND
E	ND
X	2
Pb	–

TPH-G	ND
TPH-D	ND
TPH-O	ND
B	ND
T	ND
E	ND
X	ND
Pb	ND

LEGEND:

- **AGW-1** — Monitoring Well Location and Well Number
- **AGW-3** — Decommissioned Monitoring Well
- **TNK-1** — Tank Basin Observation Well
- 45.0 — Groundwater Elevation Contour
- (44.59) — Relative Groundwater Elevation
- Inferred Groundwater Flow Direction

TPH-G	200
TPH-D	ND
TPH-O	ND
B	7.4
T	ND
E	6
X	29
Pb	ND

Laboratory Results in Parts per Billion

TPH-G = Total Petroleum Hydrocarbons as Gasoline
TPH-D = Total Petroleum Hydrocarbons as Diesel
TPH-O = Total Petroleum Hydrocarbons as Oil
B = Benzene
T = Toluene
E = Ethylbenzene
X = Total Xylenes
Pb = Total Lead
ND = Not Detected at or Above Method Reporting Limits
-- = Not Analyzed

Numbers in red equal or exceed MTCA Method A Cleanup Levels

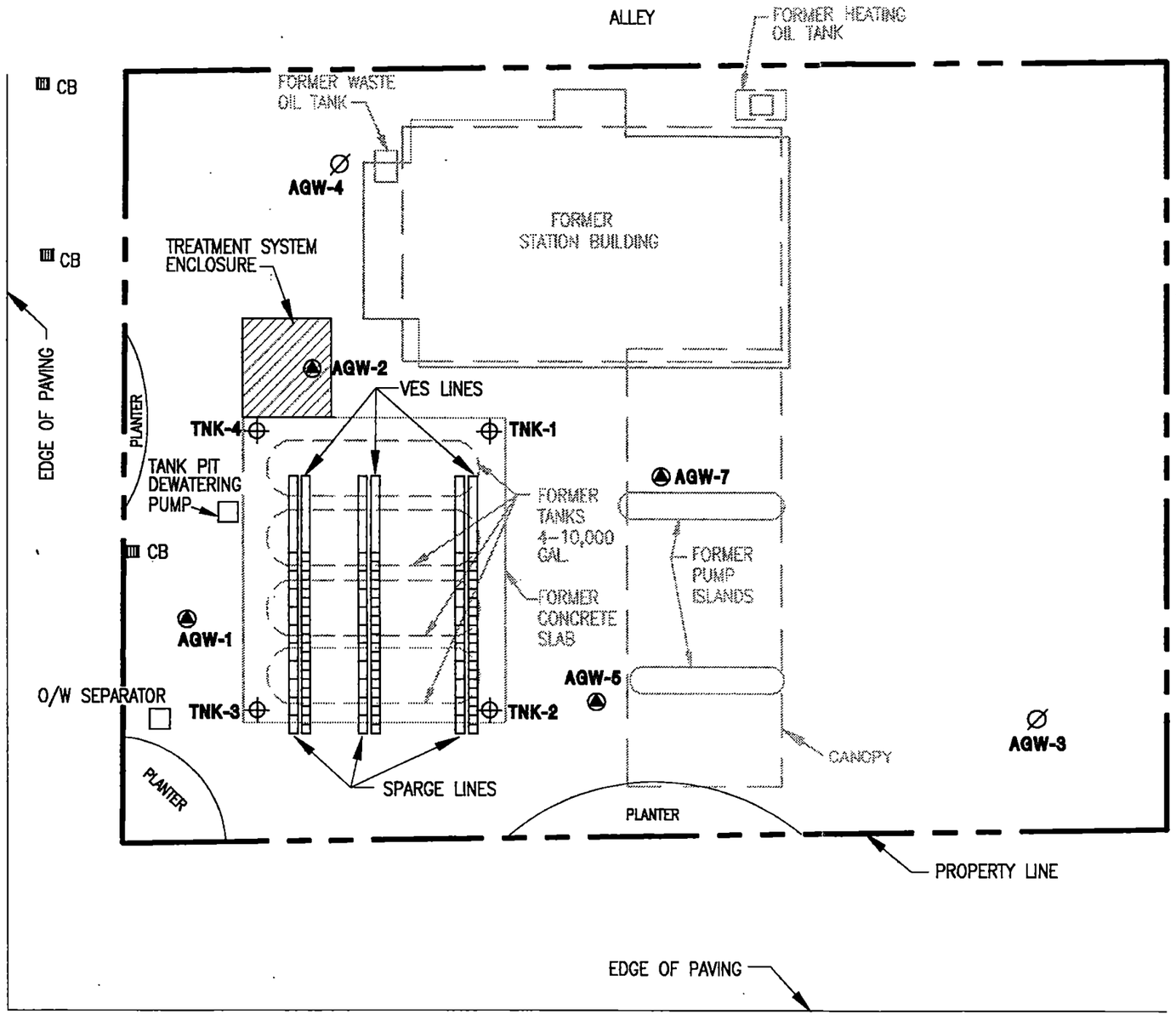
EMCON

0 20 40
SCALE (ft)

DATE 3-95
DWN. MLP
REV.
APPR.
PROJECT NO. 0368-013.11

Figure 3
8701 GREENWOOD AVENUE NORTH
SEATTLE, WASHINGTON
GROUNDWATER DATA (NOVEMBER 10, 1994)

I=20 08-05-95 G:\DWG\0368\013\11BLC04A



GREENWOOD AVENUE NORTH

LEGEND:

- **AGW-1** — Monitoring Well Location and Well Number
- **AGW-3** — Decommissioned Monitoring Well
- **TNK-1** — Tank Basin Observation Well
- CB — Catch Basin

Blank

Screened

Sparge Lines set approximately 10' BGS
VES Lines set approximately 3' BGS

0 20 40

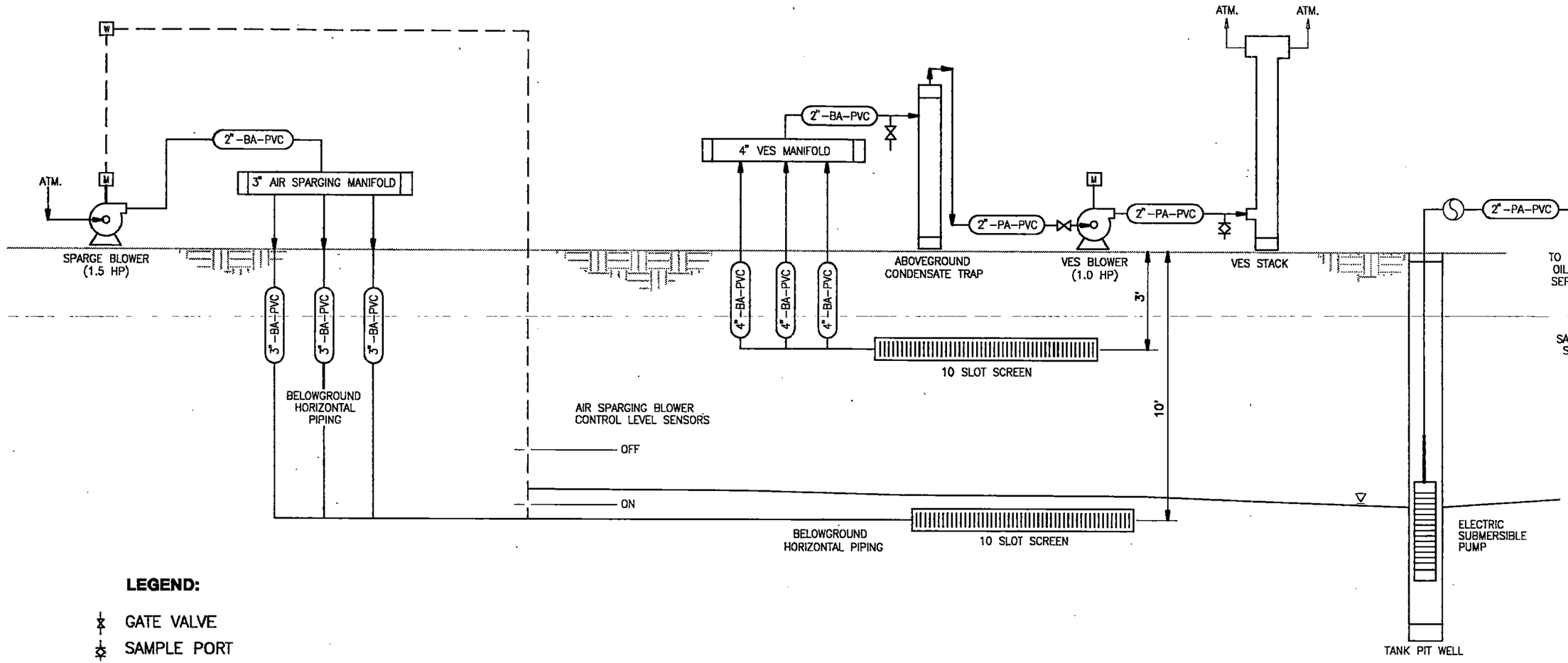
SCALE (ft)

EMCON

DATE	8-95
DWN.	MLP
REV.	
APPR.	
PROJECT NO.	40368-013.011

Figure 4
TEXACO SERVICE STATION NO. 63-232-0037
8701 GREENWOOD AVENUE NORTH
SEATTLE, WASHINGTON
SITE MAP - SHOWING TREATMENT SYSTEM LINES AND ENCLOSURE

I=20 8-05-95 G:\DWG\0368\013\11BLC03E



LEGEND:

- GATE VALVE
- SAMPLE PORT
- [M] MOTOR STARTER
- [W] WARRICK LEVEL CONTROLLER
- FLOW METER (TOTALIZING)

EMCON

DATE	3-95
DWN.	MLP
REV.	
APPR.	
PROJECT NO.	0368-013.11

Figure 5
TEXACO SERVICE STATION NO. 63-232-0037
8701 GREENWOOD AVENUE NORTH
SEATTLE, WASHINGTON
PROCESS FLOW DIAGRAM

SCALE: 1=1 3-28-95 G:\DWG\0368\013\11BLC02

APPENDIX A

GROUNDWATER SAMPLING PROCEDURES

APPENDIX A
GROUNDWATER SAMPLING PROCEDURES

Groundwater Sampling

Groundwater samples were collected from monitoring wells AGW-1, AGW-2, AGW-5, AGW-6, and AGW-7 on November 10, 1994. Before sample collection, at least three well casing volumes of water were removed from each sampled well, except well AGW-5, by using a disposable bailer. Two casing volumes of water were removed from well AGW-5 due to poor groundwater recovery. Conductivity, pH, and temperature parameters were measured after each well casing volume was purged.

Samples were collected when parameter readings stabilized within 10 percent of the previous reading. Samples AGW-1-1194, AGW-2-1194, AGW-5-1194, AGW-6-1194, and AGW-7-1194 were collected from monitoring wells AGW-1, AGW-2, AGW-5, AGW-6, and AGW-7, respectively. One duplicate sample, designated AGW-8-1194, was collected from well AGW-1. The samples were placed in labeled 40-milliliter glass vials, 1-liter amber glass bottles, and 1-pint polyethylene containers. All samples were placed in an iced cooler and transported to CAS for analyses. The samples were maintained under custody at all times.

Approximately 190 gallons of purge water were accumulated during sampling activities. The purge water was contained in labeled and secured 55-gallon drums and transported to EMCON for disposal. Field sampling sheets are provided in Appendix B.

Monitoring Well Survey

EMCON personnel surveyed monitoring wells AGW-1, AGW-2, AGW-5, AGW-6, and AGW-7 on March 16, 1994. The tops of casing elevations were surveyed to the nearest 0.01 foot. The elevations were based on an arbitrary site datum (elevation of 50 feet). The well elevations were used to determine relative groundwater elevations and, consequently, the inferred hydraulic gradient beneath the site when the measurements were obtained. Survey data are included in Table 1 of this report.

Depth-to-Groundwater Measurements

Depth-to-groundwater measurements were obtained by using a Solinst electronic water level indicator. Measurements were obtained by lowering the probe into the well until it indicated that the water surface was encountered, then measuring the distance from the top of the inside riser pipe to the probe. All depth to groundwater measurements were recorded to the nearest 0.01 foot.

APPENDIX B

GROUNDWATER SAMPLING DATA SHEETS

EMCON Northwest, Inc.

18912 North Creek Parkway, Suite 100 ● Bothell, WA 98011
Office (206) 485-5000 ● FAX (206) 486-9766

Field Sampling Data

* Duplicate

LOCATION/ADDRESS 8701 Greenwood Ave. N., Seattle, WA
PROJECT NAME Texaco - # 0368-013-09
CLIENT/CONTACT John Meyer

Well or Surface Site Number AGW-1
Sample Designation AGW-1 -1194
Date, Time 11-10-94 1215
Weather Cloudy, 50°F

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method Used (M-Scope Number or Other)
DTW 1.21		11-10-94	Solinst 09789
DTB 19.40		0840	

WELL EVACUATION:

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
36	3	~~perist pump~~ S.S. Bailer	as below	11-10-94

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
~~as~~/BTEX	11-10-94 1215	disp. bailer	4 x 40	glass		No	HCl	Yes	Non-Phosphatic detergent wash H2O rinse MeOH rinse Distilled H2O rinse
WTPH-D ext	↓	~~perist pump~~	1000	glass		↓	HCl	↓	
Total Lead	↓	↓	500	poly		↓	HNO_3	↓	

FIELD WATER QUALITY TESTS:

Pore Vol. Number	pH	µS Conductivity	°C Temp	Gallons Removed	Time
1	7.17	278	13	12	1030
2	6.88	256	13	24	1045
3	6.74	251	13	36	1105

NOTES:

Depth to Bottom 19.40
- Depth to Water 1.21
18.19
x 0.67
Pore Volume = 12.19 gallons

Water is dark brown, moderately turbid and has no noticeable odor.

* Duplicate Gas/BTEX samples designated AGW1-8-1194 at 1230

Total # of Bottles: 6 Signature: Michael Paulsen

SEA-400-01

EMCON Northwest, Inc.
18912 North Creek Parkway, Suite 100 • 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 - # 0368-013-09
CLIENT/CONTACT John Meyer

Well or Surface Site Number AGW - 2
Sample Designation AGW - 2 - 1194
Date, Time 11-10-94 1200
Weather Cloudy, 50°F

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method Used (M-Scope Number or Other)
DTW 1.57		11-10-94	Solinst 09789
DTB 19.65		0835	

WELL EVACUATION:

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
36	3	perin pump		11-10-94

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
BTEX	11-10-94 1206	disp. bailer	2X40	glass		No	HCl	Yes	Non-Phosphatic detergent wash H2O rinse MeOH rinse Distilled H2O rinse
WTPH-D ext	↓	peri pump	1000	glass		↓	HCl	↓	
Oil and Grease	↓	↓	500	poly		↓	HNO_3	↓	

FIELD WATER QUALITY TESTS:

Pore Vol. Number	pH	µS Conductivity	°C Temp	Gallons Removed	Time
1	~~7.11~~ 6.85	~~337~~	13	12	1058
2	6.65	327	13	24	1112
3	6.62	313	13	36	1125

NOTES:

Depth to Bottom 19.65
- Depth to Water 1.57
18.08
X 0.67
Pore Volume = 12.11 gallons

Water is slightly turbid, grey and has no noticeable odor.

Total # of Bottles: 4 Signature: Michael Paulsen

SEA-400-01

EMCON Northwest, Inc.
18912 North Creek Parkway, Suite 100 ● 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 - # 0368-013.09
CLIENT/CONTACT John Meyer

Well or Surface Site Number AGW-5
Sample Designation AGW-5-1194
Date, Time 11-10-94 1140
Weather Cloudy, 50°F

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method Used (M-Scope Number or Other)
DTW 3.52		11-10-94	Solinst 09789
DTB 19.11		0825	

WELL EVACUATION:

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
22	2	perin pump		11-10-94

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
~~as~~ /BTEX	11-10-94 1140	disp. bailer	2X40	glass		No	HCl	Yes	Non-Phosphatic detergent wash H2O rinse MeOH rinse Distilled H2O rinse
WTPH-D ext	↓	~~perl pump~~ ↓	1000	glass		↓	HCl	↓	
Fecal Coli	↓	↓	500	poly		↓	HNO_3	↓	

FIELD WATER QUALITY TESTS:

Pore Vol. Number	pH	µS Conductivity	°C Temp	Gallons Removed	Time
1	7.20	250	14	11	0900
2	7.29	252	13	22	0928

NOTES:

Depth to Bottom 19.11
- Depth to Water 3.52
15.59
x 0.67
Pore Volume = 10.45 gallons

Pumped dry at 1+ pore volume. Allow to recharge, pump 2nd p.v. Dry again at 2 p.v. Allow to recharge again, then sample

Water is clear, light brown and has no noticeable odor

Total # of Bottles: 4 Signature: Michael Paulsen

SEA-400-01

EMCON
Northwest, Inc.
18912 North Creek Parkway, Suite 100 ● 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 - # 0368-013-09
CLIENT/CONTACT John Meyer

Well or Surface Site Number AGW-6
Sample Designation AGW-6-1194
Date, Time 11-10-94 1050
Weather Cloudy 50°F

HYDROLOGY MEASUREMENTS:

	(Nearest .01 ft.)	Elevation	Date, Time	Method Used (M-Scope Number or Other)
DTW	1.58		11-10-94	Solinst 09789
DTB	23.82		0830	

WELL EVACUATION:

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
45	3	perin pump		11-10-94

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
BTEX	11-10-94 1050	disp. bailer	2X40	glass		No	HCl	Yes	Non-Phosphatic detergent wash H2O rinse MeOH rinse Distilled H2O rinse
TPH-D ext	↓	peri pump	1000	glass		↓	HCl	↓	
Oil Load	↓		500	poly		↓	HNO_3	↓	

FIELD WATER QUALITY TESTS:

Pore Vol. Number	pH	µS Conductivity	°C Temp	Gallons Removed	Time
1	7.40	248	13	15	1008
2	7.22	306	13	30	1022
3	7.11	289	13	45	1040

NOTES:

Depth to Bottom 23.82
- Depth to Water 1.58
22.24
X 0.67
Pore Volume = 14.90 gallons

Water is clear, colorless and has no noticeable odor

Total # of Bottles: 4 Signature: Michael Paulson

EMCON
Northwest, Inc.
18912 North Creek Parkway, Suite 100 ● 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 - # 0368-013-09
CLIENT/CONTACT John Meyer

Well or Surface Site Number AGW-7
Sample Designation AGW-7 -1194
Date, Time 11-10-94 1150
Weather Cloudy, 50°F

HYDROLOGY MEASUREMENTS:

(Nearest .01 ft.)	Elevation	Date, Time	Method Used (M-Scope Number or Other)
DTW 0.00		11-10-94	Solinst 09789
DTB 25.40		0820	

WELL EVACUATION:

Gallons	Pore Volumes	Method Used	Rinse Method	Date, Time
51	3	~~perist. pump~~ S.S. bailer	as below	11-10-94

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
Conc/BTEX	11-10-94 1150	disp. bailer	2X40	glass		No	HCl	Yes	Non-Phosphatic detergent wash H2O rinse MeOH rinse Distilled H2O rinse
418.1 ext	↓	~~perist. pump~~	1000	glass		↓	HCl	↓	↓
Metal Lead	↓	↓	500	poly		↓	HNO3	↓	↓

FIELD WATER QUALITY TESTS:

Pore Vol. Number	pH	µS Conductivity	°C Temp	Gallons Removed	Time
1	7.15	277	13	17	0914
2	7.23	272	13	34	0938
3	7.28	271	13	51	0950

NOTES:

Depth to Bottom 25.40
- Depth to Water 0.00
25.40
X 0.67
Pore Volume = 17.02 gallons

Water is gray, turbid and has no noticeable odor.

Total # of Bottles: 4 Signature: Michael Paulsen

SEA-400-01

APPENDIX C

LABORATORY REPORTS AND CHAIN-OF-CUSTODY FORMS

Columbia Analytical Services, Inc.

December 2, 1994

Service Request No.: B940870

John Meyer
EMCON Northwest
18912 N Creek Parkway
Suite 210
Bothell, WA 98011

Re: **Texaco - Greenwood/Project #0368-013.09**

Dear John:

Attached are the results of the sample(s) submitted to our laboratory on November 10, 1994. For your reference, these analyses have been assigned our service request number B940870.

All analyses were performed consistent with our laboratory's quality assurance program. All results are intended to be considered in their entirety, and CAS is not responsible for use of less than the complete report. Results only apply to samples analyzed.

Please call if you have any questions.

Respectfully submitted,

Columbia Analytical Services, Inc.

Colin B. Elliott
Laboratory Manager

CBE/bdr

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	**Date Collected:**	11/10/94
Project:	Texaco - Greenwood	**Date Received:**	11/10/94
Sample Matrix:	Water	**Work Order No.:**	B940870

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

Sample Name:		AGW-1-1194	AGW-2-1194	AGW-5-1194
Lab Code:		B0870-1	B0870-2	B0870-3
Date Analyzed:		11/12/94	11/12/94	11/12/94
Analyte	**MRL**			
Benzene	0.5	2.2	11.5	ND
Toluene	1	ND	ND	ND
Ethylbenzene	1	ND	10	ND
Total Xylenes	1	2	72	ND
TPH as Gasoline	50	ND	470	ND

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

Approved by C. Elliott Date 12/2/94

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	**Date Collected:**	11/10/94
Project:	Texaco - Greenwood	**Date Received:**	11/10/94
Sample Matrix:	Water	**Work Order No.:**	B940870

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

Sample Name:		AGW-6-1194	AGW-7-1194	AGW-8-1194
Lab Code:		B0870-4	B0870-5	B0870-6
Date Analyzed:		11/11/94	11/11/94	11/11/94
Analyte	**MRL**			
Benzene	0.5	7.4	ND	2.2
Toluene	1	ND	ND	ND
Ethylbenzene	1	6	ND	ND
Total Xylenes	1	29	ND	2
TPH as Gasoline	50	200	ND	ND

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

Approved by: Dr. Ellis Date: 12/2/94

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	**Date Collected:**	11/10/94
Project:	Texaco - Greenwood	**Date Received:**	11/10/94
Sample Matrix:	Water	**Work Order No.:**	B940870

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

Sample Name:		Method Blank
Lab Code:		B0870-MB
Date Analyzed:		11/12/94
Analyte	**MRL**	
Benzene	0.5	ND
Toluene	1	ND
Ethylbenzene	1	ND
Total Xylenes	1	ND
TPH as Gasoline	50	ND

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

Approved by Ann - Elliott Date 12/2/94

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	**Date Collected:**	11/10/94
Project:	Texaco - Greenwood	**Date Received:**	11/10/94
Sample Matrix:	Water	**Date Extracted:**	11/15/94
		Date Analyzed:	11/23/94
		Work Order No.:	B940870

Total Petroleum Hydrocarbons as Diesel and Oil
Washington DOE Method WTPH-D
µg/L (ppb)

		Diesel		Oil♦	
Sample Name	**Lab Code**	**MRL**	**Result**	**MRL**	**Result**
AGW-1-1194	B0870-1	250	*840	750	ND
AGW-2-1194	B0870-2	250	ND	750	ND
AGW-5-1194	B0870-3	250	ND	750	ND
AGW-6-1194	B0870-4	250	ND	750	ND
AGW-7-1194	B0870-5	250	ND	750	ND
Method Blank	B0870-MB	250	ND	750	ND

♦ Quantified using 30-weight motor oil as a standard.
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
* Result is from an analysis performed on December 2, 1994. Quantified as diesel. The sample contained components that eluted in the diesel range, but the chromatogram did not match the typical diesel fingerprint.

Approved by John Elliott Date 12/2/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	**Date Collected:**	11/10/94
Project:	Texaco - Greenwood	**Date Received:**	11/10/94
Sample Matrix:	Water	**Date Analyzed:**	11/11,12/94
		Work Order No.:	B940870

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

Sample Name	Lab Code	Spike Level (µg/L)	Percent Recovery 4-Bromofluorobenzene
AGW-1-1194	B0870-1	100	110
AGW-2-1194	B0870-2	100	112
AGW-2-1194	B0870-2Dup	100	114
AGW-5-1194	B0870-3	100	109
AGW-6-1194	B0870-4	100	111
AGW-6-1194	B0870-4MS	100	113
AGW-7-1194	B0870-5	100	113
AGW-8-1194	B0870-6	100	111
Method Blank	B0870-MB	100	111
Laboratory Control Sample	B0870-LCS	100	110
Laboratory Control Sample	B0870-GLCS	100	111
	CAS Acceptance Criteria		86-116

TPH Total Petroleum Hydrocarbons

Approved by C. Elliott Date 12/2/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	**Date Collected:**	11/10/94
Project:	Texaco - Greenwood	**Date Received:**	11/10/94
Sample Matrix:	Water	**Date Analyzed:**	11/12/94
		Work Order No.:	B940870

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

Sample Name: AGW-2-1194
Lab Code: B0870-2

Analyte	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Benzene	0.5	11.5	11.3	11.4	<1
Toluene	1	ND	ND	--	--
Ethylbenzene	1	10	10	10	<1
Total Xylenes	1	72	70	71	3
TPH as Gasoline	50	470	490	480	4

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

Approved by C. Elliott Date 12/2/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	Date Collected:	11/10/94
Project:	Texaco - Greenwood	Date Received:	11/10/94
Sample Matrix:	Water	Date Analyzed:	11/12/94
		Work Order No.:	B940870

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

Sample Name: AGW-6-1194
Lab Code: B0870-4

Analyte	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Benzene	100	2.2	112	110	77-127
Toluene	100	ND	107	107	78-127
Ethylbenzene	100	ND	113	113	74-128

TPH Total Petroleum Hydrocarbons
ND None Detected at or above the method reporting limit

Approved by Chris Elliott Date 12/2/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	**Date Extracted:**	11/11/94
Project:	Texaco - Greenwood	**Date Analyzed:**	11/12/94
LCS Matrix:	Water	**Work Order No.:**	B940870

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
Benzene	100	102	102	77-127
Toluene	100	106	106	78-127
Ethylbenzene	100	109	109	74-128
TPH as Gasoline	5,500	6,500	118	70-140

TPH Total Petroleum Hydrocarbons

Approved by Ch. Ellwood Date 12/2/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	**Date Collected:**	11/10/94
Project:	Texaco - Greenwood	**Date Received:**	11/10/94
Sample Matrix:	Water	**Date Extracted:**	11/15/94
		Date Analyzed:	11/23/94
		Work Order No.:	B940870

Surrogate Recovery Summary
Total Petroleum Hydrocarbons as Diesel and Oil
Washington DOE Method WTPH-D

Sample Name	Lab Code	Percent Recovery *p*-Terphenyl
AGW-1-1194	B0870-1	115
AGW-2-1194	B0870-2	108
AGW-5-1194	B0870-3	110
AGW-6-1194	B0870-4	112
AGW-7-1194	B0870-5	123
Method Blank	B0870-MB	106
Laboratory Control Sample	B0870-LCS	109
Laboratory Control Sample	B0870-DLCS	103
	CAS Acceptance Criteria	59-124

Approved by Date 12/2/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	**Date Extracted:**	11/15/94
Project:	Texaco - Greenwood	**Date Analyzed:**	11/23/94
Sample Matrix:	Water	**Work Order #:**	B940870

Laboratory Control Sample/Duplicate Laboratory Control Sample Summary
Total Petroleum Hydrocarbons as Diesel and Oil
Washington DOE Method WTPH-D
µg/L (ppb)

	Spike Level		Spike Result		Percent Recovery			
Analyte	LCS	DLCS	LCS	DLCS	LCS	DLCS	CAS Acceptance Criteria	Relative Percent Difference
Diesel	5,970	5,970	7,010	7,010	117	117	42-155	<1

Approved by Cn. Ellwood Date 12/2/94

CHAIN OF CUSTODY / LABORATORY ANALYSIS REQUEST FORM

Northwest, Inc.

DATE 11-10-94 PAGE 1 OF 1

PROJECT NAME Texaco - Greenwood # 0368-013.09

PROJECT Manager: John Meyer

COMPANY/ADDRESS EMCON N.W. / Bothell

PHONE 485-5000

SAMPLERS SIGNATURE Michael Paulsen

SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	ANALYSIS REQUEST: PETROLEUM HCS — TPH - HCID State:	TPH - G X BTEX X State: WA	TPH - D X OIL X State: WA	TPH - 418.1 State:	TPH - Other	ORGANIC — Halogenated or Aromatic Volatiles 601/8010 602/8020	Volatile Organics GC/MS 624-8240	Base/Neu/Acid Organics GC/MS 625/8270	Pesticides/PCBS 8080 PCB ONLY	PAH 8310 8100 GC HPCL	TCLP Metals Semi VOA VOA Pest/Herb	ORGANIC METALS/INORGANICS — Metals Total X DISS List Below 1620	Cyanide	pH, Cond Cl, SO_4, PO_4 F, Br NO_2 NO_3 (Circle)	NH_3 - N, COD, Total-P TKN, TOC, TOX (Circle)	REMARKS
AGW-1-1194	11-10-94	1215		Water	4		X	X									X			
-2-		1200			4		X	X									X			
-5-		1140			4		X	X									X			
-6-		1050			4		X	X									X			
-7-		1150			4		X	X									X			
-8-		1230			2		X													

RELINQUISHED BY:
Signature: Michael Paulsen
Printed Name: Michael Paulsen
Firm: EMCON N.W.
Date/Time: 11-10-94 1409

RECEIVED BY:
Signature:
Printed Name:
Firm:
Date/Time: 11-10-94 2:09

TURNAROUND REQUIREMENTS
___ 24 hr ___ 48 hr. ___ 5 day
X Standard (10-15 working days)
___ Provide Verbal Preliminary Results
___ Provide FAX preliminary Results
Requested Report Date ___

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

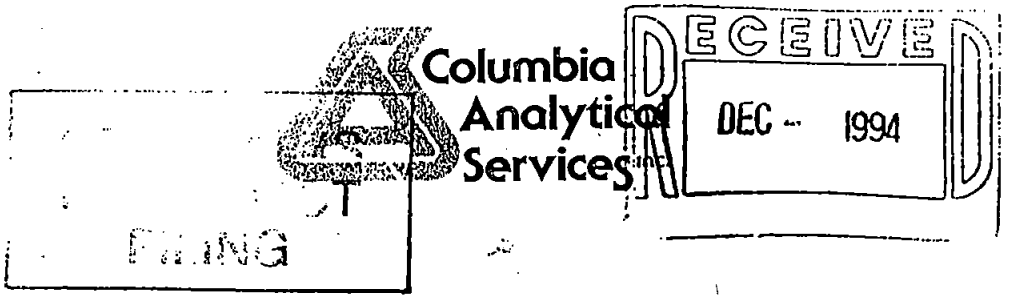
INVOICE INFORMATION:
P.O.# ___
Bill To ___

SAMPLE RECEIPT:
Shipping VIA: ___
Shipping to: ___
Condition: ___
Lab No: 9410870

RELINQUISHED BY:
Signature: Cathy Elliott
Printed Name: Cathy Elliott
Firm: CAS
Date/Time: 11/10/94 16:30

RECEIVED BY:
Signature:
Printed Name:
Firm:
Date/Time:

SPECIAL INSTRUCTIONS/COMMENTS:



November 18, 1994

Service Request No.: K947071B

John Meyer
EMCON Northwest, Inc.
18912 North Creek Parkway, Suite 210
Bothell, WA 98011

Re: **Texaco - Greenwood/Project #0368-013.09/B94-0870**

Dear John:

Enclosed are the results of the sample(s) submitted to our laboratory on November 11, 1994. For your reference, these analyses have been assigned our service request number K947071B.

All analyses were performed consistent with our laboratory's quality assurance program. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the samples analyzed.

Please call if you have any questions. My extension is 260.

Respectfully submitted,

Columbia Analytical Services, Inc.

Janice M. Sedlak
Project Chemist

JMS/sam

COLUMBIA ANALYTICAL SERVICES, Inc.

Acronyms

ASTM	American Society for Testing and Materials
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected at or above the MRL
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons

00002

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client: EMCON Northwest
Project: Texaco -Greenwood /# 0368-013.09
Sample Matrix: Water

Service Request: K947071B
Date Collected: 11/10/94
Date Received: 11/11/94
Date Extracted: NA
Date Analyzed: 11/16/94

Total Lead
EPA Method 7421
Units: µg/L (ppb)

Sample Name	Lab Code	MRL	Result
AGW-1-1194	K707101	2	ND
AGW-2-1194	K707102	2	ND
AGW-5-1194	K707103	2	ND
AGW-6-1194	K707104	2	ND
AGW-7-1194	K707105	2	ND
Method Blank	K7071MB	2	ND

Approved By: Eileen M Arnold Date: 11/17/94 00003

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client: EMCON Northwest
Project: Texaco -Greenwood /# 0368-013.09
Sample Matrix: Water

Service Request: K947071B
Date Collected: 11/10/94
Date Received: 11/11/94
Date Extracted: NA
Date Analyzed: 11/16/94

Duplicate Summary
Total Metals
Units: µg/L (ppb)

Sample Name: AGW-2-1194
Lab Code: K707102

Analyte	EPA Method	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Lead	7421	2	ND	ND	ND	-

Approved By: Eileen M Arnold Date: 11/17/94

00004

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	**Service Request:**	K947071B
Project:	Texaco -Greenwood /# 0368-013.09	**Date Collected:**	11/10/94
Sample Matrix:	Water	**Date Received:**	11/11/94
		Date Extracted:	NA
		Date Analyzed:	11/16/94

Matrix Spike Summary
Total Metals
Units: µg/L (ppb)

Sample Name: AGW-2-1194
Lab Code: K707102

Analyte	MRL	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Limits
Lead	2	20	ND	20	100	75-125

Approved By: Eileen M Arnett Date: 11/17/94

MS1S/102194

7071BICP.WM1 - Spike 11/17/94

EMCON Northwest, Inc.

CHAIN OF CUSTODY/LABORATORY ANALYSIS REPORT FORM

DATE 11-10-94 PAGE 1 OF 1

PROJECT NAME Texaco - Greenwood # 0368-013.09
PROJECT Manager: John Meyer
COMPANY/ADDRESS EMCON N.W. / Bothell
PHONE 485-5000
SAMPLERS SIGNATURE Michael Paulsen

SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	ANALYSIS REQUEST: PETROLEUM HCS: TPH - HCID State:	TPH - G X BTEX X State: WA	TPH - D X OIL X State: WA	TPH - 418.1 State:	TPH - Other	Halogenated or Aromatic Volatiles 601/8010 ___ 602/8020 ___	Volatile Organics GC/MS 624-8240	ORGANIC: Base/Neu/Acid Organics GC/MS 625/8270	Pesticides/PCBS 8080 PCB ONLY ___	PAH 8310 HPCL ___	TCLP Metals ___ Semi VOA ___ VOA ___ Pest/Herb	ORGANIC METALS/INORGANICS: Metals Total X DISS ___ List Below Lead	Cyanide	pH, Cond Cl, SO_4, PO_4 F, Br NO_2 NO_3 (Circle)	NH_3 - N, COD, Total-P TKN, TOC, TOX (Circle)			REMARKS
AGW-1-1194	11-10-94	1215		Water	4		X	X								X							
-2-		1200			4		X	X								X							
-5-		1140			4		X	X								X							
-6-		1050			4		X	X								X							
-7-		1150			4		X	X								X							
-8-		1230			2		X																

RELINQUISHED BY:
Signature: Michael Paulsen
Printed Name: Michael Paulsen
Firm: EMCON N.W.
Date/Time: 11-10-94 1409

RECEIVED BY:
Signature:
Printed Name:
Firm:
Date/Time: 11-10-94 2:09

TURNAROUND REQUIREMENTS
___ 24 hr ___ 48 hr. ___ 5 day
X Standard (10-15 working days)
___ Provide Verbal Preliminary Results
___ Provide FAX preliminary Results
Requested Report Date ___

REPORT REQUIREMENTS
___ I. Routine Report
X II. Report (includes DUP.MAS. 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 to: ___
Condition: ___
Lab No: 1694 7071.B

RELINQUISHED BY:
Signature:
Printed Name: Cathy Elliott
Firm: EMCON
Date/Time: 11/10/94 16:30

RECEIVED BY:
Signature:
Printed Name: D Storms
Firm: EMCON
Date/Time: 11/11/94 1100

SPECIAL INSTRUCTIONS/COMMENTS:

Columbia Analytical Services, Inc.

December 13, 1994

Service Request No.: B940923

John Meyer
EMCON Northwest
18912 N Creek Parkway
Suite 210
Bothell, WA 98011

Re: **Texaco - Greenwood/Project #0368-013.09**

Dear John:

Attached are the results of the sample(s) submitted to our laboratory on December 7, 1994. For your reference, these analyses have been assigned our service request number B940923.

All analyses were performed consistent with our laboratory's quality assurance program. All results are intended to be considered in their entirety, and CAS is not responsible for use of less than the complete report. Results only apply to samples analyzed.

Please call if you have any questions.

Respectfully submitted,

Columbia Analytical Services, Inc.

Colin B. Elliott
Laboratory Manager

CBE/bdr

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	**Date Collected:**	12/07/94
Project:	Texaco - Greenwood	**Date Received:**	12/07/94
Sample Matrix:	Air	**Date Analyzed:**	12/07/94
		Work Order #:	B940923

Permanent Gas Analysis
Method: Modified ASTM D-3416
Percent (v/v)

Sample Name:		Stack	Method Blank
Lab Code:		B0923-1	B0923-MB
Analyte	**MRL**		
Oxygen	0.2	21.7	ND
Carbon Dioxide	0.05	0.05	ND
Methane	0.01	ND	ND

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

Approved by Colin Elliott Date 12/13/94

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	**Date Collected:**	12/07/94
Project:	Texaco - Greenwood	**Date Received:**	12/07/94
Sample Matrix:	Air	**Date Analyzed:**	12/07/94
		Work Order No.:	8940923

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

Sample Name: **Stack**
Lab Code: **B0923-1**

Analyte	MRLs		Results	
	µg/L	µL/L (ppmv)	µg/L	µL/L (ppmv)
Benzene	0.05	0.02	ND	ND
Toluene	0.05	0.01	ND	ND
Ethylbenzene	0.05	0.01	ND	ND
Total Xylenes	0.05	0.01	ND	ND
TPH♦	2	0.5	*42	*10.3

MRL Method Reporting Limit
TPH Total Petroleum Hydrocarbons
♦ Quantified using commercial gasoline with a fuel hydrocarbon range of C_5-C_{12}. (MW = 100)
* Quantified as gasoline. The sample contained components that eluted in the gasoline range, but the chromatogram did not match the typical gasoline fingerprint.

Approved by A. Elliott Date 12/13/94

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	**Date Collected:**	----/----/----
Project:	Texaco - Greenwood	**Date Received:**	----/----/----
Sample Matrix:	Air	**Date Analyzed:**	12/07/94
		Work Order No.:	B940923

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

Sample Name: **Method Blank**
Lab Code: **B0923-MB**

Analyte	MRLs		Results	
	µg/L	µL/L (ppmv)	µg/L	µL/L (ppmv)
Benzene	0.05	0.02	ND	ND
Toluene	0.05	0.01	ND	ND
Ethylbenzene	0.05	0.01	ND	ND
Total Xylenes	0.05	0.01	ND	ND
TPH♦	2	0.5	ND	ND

MRL Method Reporting Limit
TPH Total Petroleum Hydrocarbons
♦ Quantified using commercial gasoline with a fuel hydrocarbon range of C_6-C_{12}. (MW = 100)
* Quantified as gasoline. The sample contained components that eluted in the gasoline range, but the chromatogram did not match the typical gasoline fingerprint.

Approved by Ch. Elliott Date 12/13/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	Date Collected:	12/07/94
Project:	Texaco - Greenwood	Date Received:	12/07/94
Sample Matrix:	Water	Date Analyzed:	12/07/94
		Work Order #:	B940923

Duplicate Summary
Permanent Gases
Method: Modified ASTM D-3416
µL/L (ppmv)

Sample Name: Batch QC
Lab Code: B0916-1

Analyte	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Oxygen	0.05	17.0	17.2	17.1	1
Carbon Dioxide	0.05	4.73	4.94	4.84	4
Methane	0.05	7.75	7.99	7.87	3

MRL Method Reporting Limit

Approved by _____ Date 12/13/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	**Date Analyzed:**	12/07/94
Project:	Texaco - Greenwood	**Work Order No.:**	B940923
LCS Matrix:	Air		

Laboratory Control Sample Summary
Permanent Gas Analysis
Method: ASTM D-3416
Percent (v/v)

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Oxygen	1.00	1.05	105	85-115
Carbon Dioxide	1.00	0.99	99	85-115
Methane	1.00	1.04	104	85-115

Approved by Chris Elliott Date 12/15/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	Date Collected:	----/----/----
Project:	Texaco - Greenwood	Date Received:	----/----/----
Sample Matrix:	Air	Date Analyzed:	12/07/94
		Work Order No.:	B940923

Duplicate Summary
BTEX and TPH as Gasoline♦
EPA Methods 5030/8020/Modified 8015
µg/L

Sample Name: Batch QC
Lab Code: B0919-1

Analyte	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Benzene	0.05	0.19	0.19	0.19	<1
Toluene	0.05	1.36	1.36	1.36	<1
Ethylbenzene	0.05	0.47	0.49	0.48	4
Total Xylenes	0.05	2.97	2.98	2.98	<1
TPH♦	2	57	58	58	2

♦ Quantified using gasoline with a hydrocarbon range of C_6-C_{12}. (MW = 100)
TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit

Approved by C. Elliott Date 12/13/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	**Date Analyzed:**	12/07/94
Project:	Texaco - Greenwood	**Work Order No.:**	B940923
LCS Matrix:	Air		

Laboratory Control Sample Summary
BTEX and TPH as Gasoline♦
EPA Methods 5030/8020/Modified 8015
µg/L

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Benzene	34	33	97	60-137
Toluene	41	39	95	56-130
Ethylbenzene	34	33	97	55-130
TPH♦	2,200	2,140	97	53-135

♦ Quantified using commercial gasoline with a hydrocarbon range of C_6-C_{12}. (MW = 100)
TPH Total Petroleum Hydrocarbons

Approved by J. Elliott Date 12/13/94

Fa py ab ort CC Texaco Contact: ☐ FAX (206) 771-7786 ☐ No [redacted] Chain of Custody Record

Texaco Environmental Services under contract with Columbia Analytical Services 800-695-7222

Consultant: EMCON NW
Address: 18912 North Creek Pkwy
Project Manager: John Meyer — Project No.:
Phone: 485-5000 — Fax: 486-9766
Collected by: R. Scott Telford — Date: 12-7-94
Sampler Signature: R. Scott Telford

Texaco Manager:
Address:
Job Number: TEXACO GREENWOOD
Facility Number:
Columbia Analytical Services Service Request No.: B940923

Sample Number	Lab Sample Number	Number of Containers	Matrix S - Soil W - Water A - Air C - Charcoal	Type G - Grab C - Composite D - Discrete	Time	Date Collected	Analyses To Be Performed: TPH-HCID State: n/a	TPH-G State: n/a	BTEX (8020) n/a	TPH-D State:	TPH Special Instructions	TPH-1R (418.1)	Purgeable Halocarbons (8010)	Purgeable Aromatics (8020)	Purgeable Organics (8240) GC/MS	Extractable Organics (8270) GC/MS	8310 PAHS	PCB only (8080)	Total and/or Dissolved LEAD	EDB - EDC	Permanent Gases CO2 CH4 O2	HOLD SAMPLE	Remarks
Stack		1	A	G	1600	12-7		X	X												X		

Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
R. Scott Telford	Emcon	12-7-94 1645			
Relinquished By (Signature)	Organization	Date/Time	Received By (Signature)	Organization	Date/Time
Relinquished By (Signature)	Organization	Date/Time	Received For Laboratory By (Signature)		Date/Time
			Lin-Elliott		12/7/94 16:45

Turn Around Time (Circle Choice)
24 Hrs.
48 Hrs.
5 Days
(10 Days)

Columbia Analytical Services, Inc.

December 21, 1994

Service Request No.: B940926

John Meyer
EMCON Northwest
18912 N Creek Parkway
Suite 210
Bothell, WA 98011

Re: Texaco Greenwood/Project #0368-013.02

Dear John:

Attached are the results of the sample(s) submitted to our laboratory on December 8, 1994. For your reference, these analyses have been assigned our service request number B940926.

All analyses were performed consistent with our laboratory's quality assurance program. All results are intended to be considered in their entirety, and CAS is not responsible for use of less than the complete report. Results only apply to samples analyzed.

Please call if you have any questions.

Respectfully submitted,

Columbia Analytical Services, Inc.

Colin B. Elliott
Laboratory Manager

CBE/bdr

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	Date Collected:	12/02/94
Project:	Texaco Greenwood	Date Received:	12/08/94
Sample Matrix:	Water	Date Extracted:	12/09/94
		Date Analyzed:	12/14/94
		Work Order No.:	B940926

Non-Polar Fats, Oil and Grease
SM 5520 F
mg/L (ppm)

Sample Name	Lab Code	MRL	Result
Initial	B0926-1	0.5	ND
Method Blank	B0926-MB	0.5	1.0

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
SM *Standard Methods for the Examination of Water and Wastewater*, 17th Ed., 1989.

Approved by C. Elliott Date 12/21/94

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	Date Collected:	12/02/94
Project:	Texaco Greenwood	Date Received:	12/08/94
Sample Matrix:	Water	Work Order No.:	B940926

BTEX
EPA Methods 602
µg/L (ppb)

Sample Name:		Initial	Method Blank
Lab Code:		B0926-1	B0926-MB
Date Analyzed:		12/12/94	12/12/94
Analyte	**MRL**		
Benzene	0.5	2.3	ND
Toluene	1	1	ND
Ethylbenzene	1	7	ND
Total Xylenes	1	4	ND

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

Approved by Ann Elliott Date 12/21/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	**Date Collected:**	12/02/94
Project:	Texaco Greenwood	**Date Received:**	12/08/94
Sample Matrix:	Water	**Date Analyzed:**	12/12/94
		Work Order No.:	B940926

Surrogate Recovery Summary
BTEX
EPA Methods 602

Sample Name	Lab Code	Spike Level (µg/L)	Percent Recovery 4-Bromofluorobenzene
Initial	B0926-1	100	102
Method Blank	B0926-MB	100	108
Laboratory Control Sample	B0926-LCS	100	109
	CAS Acceptance Criteria		86-116

Approved by Date 12/21/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	Date Extracted:	12/12/94
Project:	Texaco Greenwood	Date Analyzed:	12/12/94
LCS Matrix:	Water	Work Order No.:	B940926

Laboratory Control Sample Summary
BTEX
EPA Methods 602
µg/L (ppb)

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Benzene	100	111	111	77-127
Toluene	100	111	111	78-127
Ethylbenzene	100	109	109	74-128

Approved by Ann Elliott Date 12/21/94

Analytical Services Inc. — CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

18912 North Creek Pkwy, Suite 118 • Bothell, WA 98011 • (206) 486-6983 • FAX (206) 486-7695

DATE 12-8-94 PAGE 1 OF 1

PROJECT NAME 0368-013, 02 / GREENWOOD

PROJECT TEXACO

COMPANY/ADDRESS EMCON

P.M. - JOHN MEYER 337

PHONE 485-5000

SAMPLERS SIGNATURE Peter A Scybert

SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	ANALYSIS REQUEST: PETROLEUM HCS — TPH - HCID State:	TPH - G State: BTEX X	TPH - D State: OIL	TPH - 418.1 State:	TPH - Other	Halogenated or Aromatic Volatiles 601/8010 ___ 602/8020 ___	Volatile Organics GC/MS 624-8240	Base/Neu/Acid Organics GC/MS 625/8270	Pesticides/PCBS 8080 PCB ONLY	PAH 8310 8100 GC HPCL	TCLP Metals Semi VOA VOA Pest/Herb	Metals Total X DISS List Below Lead	Cyanide	pH, Cond Cl, SO_4, PO_4 F, Br NO_2 NO_3 (Circle)	NH_3 - N, COD, Total-P TKN, TOC, TOX (Circle)	TPH 5, O/G Grease NPDES SSC OF	REMARKS
INITIAL	12-2	1700		H_2O			X									X				X		

RELINQUISHED BY:
Signature: Peter A Scybert
Printed Name: EMCON NW Inc
Firm
Date/Time: 12-8-94 13:45

RECEIVED BY:
Signature: Chris Elliott
Printed Name: CAS
Firm
Date/Time: 12/8/94 13:45

TURNAROUND REQUIREMENTS
___ 24 hr ___ 48 hr. ___ 5 day
X Standard (10-15 working days)
___ Provide Verbal Preliminary Results
___ Provide FAX preliminary Results
Requested Report Date ___

REPORT REQUIREMENTS
X I. Routine Report
___ II. Report (includes DUP.MAS. 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 Texaco

SAMPLE RECEIPT:
Shipping VIA: ___
Shipping to: ___
Condition: ___
Lab No: B940926

RELINQUISHED BY:
Signature: B. Regan
Printed Name: B. Regan
Firm: CAS/Bothell
Date/Time: 12/08/94 1600

RECEIVED BY:
Signature
Printed Name
Firm
Date/Time

SPECIAL INSTRUCTIONS/COMMENTS:

Columbia Analytical Services Inc.

December 20, 1994

Service Request No.: K947694B

John Meyer
EMCON Northwest, Inc.
18912 North Creek Parkway, Suite 210
Bothell, WA 98011

Re: **Texaco-Greenwood/Project #0368-013.02/B940926**

Dear John:

Enclosed are the results of the sample(s) submitted to our laboratory on December 9, 1994. For your reference, these analyses have been assigned our service request number K947694B.

All analyses were performed consistent with our laboratory's quality assurance program. All results are intended to be considered in their entirety, and Columbia Analytical Services, Inc. (CAS) is not responsible for use of less than the complete report. Results apply only to the samples analyzed.

Please call if you have any questions. My extension is 260.

Respectfully submitted,
Columbia Analytical Services, Inc.

Janice M. Sedlak

Janice M. Sedlak
Project Chemist

JMS/rr

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

COLUMBIA ANALYTICAL SERVICES, Inc.

Acronyms

ASTM	American Society for Testing and Materials
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LUFT	Leaking Underground Fuel Tank
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NAN	Not Analyzed
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected at or above the MRL
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	**Service Request:**	K947694B
Project:	Texaco-Greenwood / #0368-013.02	**Date Collected:**	12/2/94
Sample Matrix:	Water	**Date Received:**	12/9/94
		Date Extracted:	NA
		Date Analyzed:	12/18/94

Total Lead
EPA Method 7421
Units: µg/L (ppb)

Sample Name	Lab Code	MRL	Result
Initial	K769401	2	2
Method Blank	K7694MB	2	ND

Approved By: _____ Date: 12/19/94

1AMRL/102594
7694BICP.JC1 - Sample 12/19/94

CHAIN OF CUSTODY LABORATORY ANALYSIS REPORT FORM

Analytical Services Inc. 18912 North Creek Pkwy, Suite 118 • Bothell, WA 98011 • (206) 486-6983 • FAX (206) 486-7695

DATE 12-8-94 PAGE 1 OF 1

PROJECT NAME 0368-013.02 # GREENWOOD

PROJECT TEXACO

COMPANY/ADDRESS EMCON

P.M. - JOHN MEYER 337

PHONE 485-5000

SAMPLERS SIGNATURE Peter A Saymont

SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	ANALYSIS REQUEST: PETROLEUM HCS: TPH - HCID State:	TPH - G State:	BTEX	TPH - D State:	OIL	TPH - 418.1 State:	TPH - Other	ORGANIC: Halogenated or Aromatic Volatiles 601/8010 ___ 602/8020 ___	Volatile Organics GC/MS 624-8240	Base/Neu/Acid Organics GC/MS 625/8270	Pesticides/PCBS 8080 PCB ONLY ___	PAH 8100 GC ___ 8310 HPCL ___	TCLP Metals ___	Semi VOA ___ VOA ___ Pest/Herb	ORGANIC METALS/INORGANICS: Metals Total X DISS ___ List Below Lead	Cyanide	pH, Cond Cl, SO_4, PO_4 F, Br NO_2 NO_3 (Circle)	NH_3 - N, COD, Total-P TKN, TOC, TOX (Circle)	FATS, OIL & GREASE 552 or		REMARKS
INITIAL	12-2	1700	L769A-1	H_2O			X											X				X				

RELINQUISHED BY:
Peter A Saymont
Signature
Printed Name
EMCON NW Inc
Firm
12-8-94 13:45
Date/Time

RECEIVED BY:
Colin Elliott
Signature
Colin Elliott
Printed Name
CAS
Firm
12/8/94 13:45
Date/Time

RELINQUISHED BY:
B. Regan
Signature
B. Regan
Printed Name
CAS/Bothell
Firm
12/09/94 1600
Date/Time

RECEIVED BY:
Ruth Higley
Signature
Ruth Higley
Printed Name
CAS
Firm
12/9/94 1000
Date/Time

TURNAROUND REQUIREMENTS
___ 24 hr ___ 48 hr. ___ 5 day
X Standard (10-15 working days)
___ Provide Verbal Preliminary Results
___ Provide FAX preliminary Results
Requested Report Date ___

REPORT REQUIREMENTS
X I. Routine Report
___ II. Report (includes DUP.MAS. 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 Texaco

SAMPLE RECEIPT:
Shipping VIA: ___
Shipping to: ___
Condition: ___
Lab No: B940926

SPECIAL INSTRUCTIONS/COMMENTS:

PUGET

APPENDIX D

PERMITS

Puget Sound Air Pollution Control Agency

Registration No. 17684

Notice of Construction No. 5640

Date SEP 1 2 1994

HEREBY ISSUES AN ORDER OF APPROVAL TO CONSTRUCT, INSTALL, OR ESTABLISH

Air Sparging Vapor Extraction System including a Rotron EN606 Regenerative Blower.

LISA RUTAN, PROJ ENGINEER

APPLICANT
EMCON NORTHWEST, INC
18912 NORTH CREEK PKY, #100
BOTHELL WA 98011

OWNER
TEXACO REFINING AND MARKETING INC
PO BOX 2969
KIRKLAND WA 98083

INSTALLATION ADDRESS

TEXACO STATION (G18427 CLOSED), 8701 GREENWOOD AVE N, SEATTLE, WA, 98103

THIS ORDER IS ISSUED SUBJECT TO THE FOLLOWING RESTRICTIONS AND CONDITIONS

1. Approval is hereby granted as provided in Article 6 of Regulation I of the Puget Sound Air Pollution Control Agency to the applicant to install or establish the equipment, device or process described hereon at the INSTALLATION ADDRESS in accordance with the plans and specifications on file in the Engineering Division of PSAPCA.
2. Compliance with this ORDER and its conditions does not relieve the owner or operator from the responsibility of compliance with Regulations I, II or III, RCW 70.94 or any other emission control requirements, nor from the resulting liabilities and/or legal remedies for failure to comply. Section 5.05(e) of Regulation I requires that the owner or operator must develop and implement an operation and maintenance (O&M) plan to assure continuous compliance with Regulations I, II, and III.
3. This approval does not relieve the applicant or owner of any requirement of any other governmental agency.
4. Operation of the air sparging vapor extraction system shall not be caused or allowed for a period longer than 12 months.

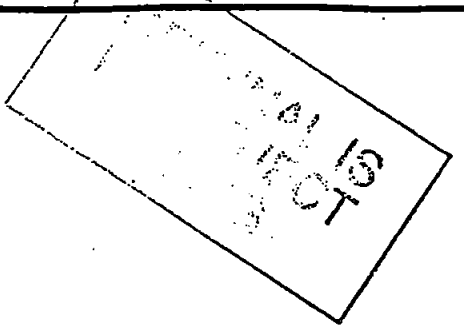
Dave Lenington — DAVID J. LENINGTON, Reviewing Engineer

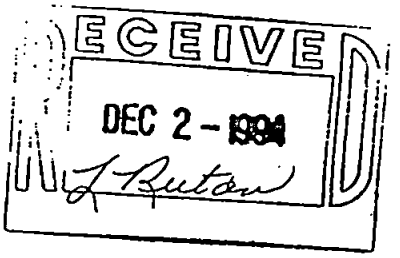
Jay M. Willenberg PE — JAY M. WILLENBERG, Reviewing Engineer

David D. Kuch — for DENNIS J. McLERRAN, Air Pollution Control Officer

MEJ

METRO
King County Department of Metropolitan Services
Industrial Waste • 130 Nickerson St., Suite 200 • Seattle, WA 98109-1658 • (206) 689-3000





November 23, 1994

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Michael Condon
Texaco Environmental Services
3400 188th Street S.W., Suite 630
Lynnwood, Washington 98037

Issuance of Wastewater Discharge Authorization No. 489 to Texaco Environmental Services by King County Department of Metropolitan Services (Metro)

Dear Mr. Condon:

The Metro Industrial Waste section has reviewed your application for a waste discharge permit for the Texaco Environmental Services facility located at 8701 Greenwood Avenue North in Seattle, Washington and determined that the attached major discharge authorization is the appropriate document for this discharge.

This authorization permits you to discharge limited amounts of industrial wastewater into the Metro sewer system in accordance with the effluent limitations and other requirements and conditions set forth in the document and the regulations outlined in King County Ordinance No. 11034 (enclosed). The formal requirements and fees of a full wastewater permit will not be required as long as you maintain good compliance and do not change the nature and volume of your discharge.

Changes to, or additions at, Texaco Environmental Services may cause us to reassess this decision and require that you obtain a full wastewater discharge permit. If you propose to substantially increase the volume of your discharge or change the type and quantities of substances discharged, you must submit a new waste discharge permit application to Metro. State law requires that such application for a permit be made a minimum of sixty (60) days before starting a new discharge. Therefore, to avoid delays, please time your submittal accordingly.

Metro Industrial Waste staff want to help you stay in compliance with our regulations. If at any time you have questions about this discharge authorization, or other questions about your discharge, please do not hesitate to call me at 689-3019.

Sincerely,

Harace Lee for Pat Magnuson

Patricia Magnuson
Industrial Waste Investigator
Environmental Programs

Enclosure

cc: Doug Knutson, Department of Ecology
Doug Hilderbrand, Metro
Kami Wong, City of Seattle
Lisa Rutan, EMCON Northwest, Inc.

magnuson\dajtexgr

SPECIAL CONDITIONS

Texaco Environmental Services shall contact Kami Wong (684-0833) of the City of Seattle to arrange for billing prior to discharge.

Discharge Limitations

Constituent	Maximum Concentration, ppm
Benzene	0.13
Toluene	1.5
Ethylbenzene	1.4
Nonpolar Fats, Oil & Grease (nonpolar FOG)	100

Operating Criteria

a) There shall be no pronounced odor of solvent or gasoline.
b) There shall be no pronounced oil sheen or unusual color.
c) There shall be no pronounced hydrogen sulfide (rotten egg) odor.
d) There shall be no visibly pronounced turbidity, the discharge must remain translucent.

Metro will expect operators on site to pay close attention to these operating criteria whenever discharge to the sanitary sewer is occurring. If any of the discharge limits or operating criteria are exceeded, you must stop discharging and notify the Metro Industrial Waste Section at 689-3000.

GENERAL DISCHARGE LIMITATIONS

Corrosive Substances

Lower Limit

Minimum	pH 5.0
Average	pH 5.5

The lower pH limit is violated whenever any single sample or any instantaneous recording is less than pH 5.0 or when a composite sample consisting of at least four consecutive samples taken at intervals of 15 minutes or greater is less than 5.5 or when any recording of 15 minutes or more averages less than 5.5.

Upper Limit

Process rinsewater discharges pH 12.0

Discharges of more than 50 gallons per day of caustic solutions equivalent to more than 5% NaOH by weight or greater than pH 12.0 are prohibited unless authorized by permit and subject to special conditions to protect worker safety, the collection system, and treatment works.

High Temperature

The industrial user shall not discharge material with a temperature in excess of 65 C (150 F).

Fats, Oils and Greases (FOG)

Polar FOG = FOG of animal and/or vegetable origin. Dischargers of polar FOG shall minimize free floating polar FOG. Dischargers of Polar FOG shall not result in significant accumulations which either alone or in combination with other wastes are capable of obstructing flow or interfere with the operation or performance of sewer works or treatment facilities. Dischargers may not add emulsifying agents exclusively for the purposes of emulsifying free floating FOG. Companies which discharge free floating polar FOG may be required to complete, for Metro's review and approval, a FOG control plan.

Nonpolar FOG = FOG of mineral/petroleum origins. The industrial user shall not discharge wastes that contain in excess of 100 milligrams per liter (mg/l) of nonpolar fats, oils and greases (FOG).

Flammable or Explosive Materials

No person shall discharge any pollutant, as defined in 40 CFR 401.11, that creates a fire or explosion hazard in any sewer or treatment works, including, but not limited to, wastestreams with a closed cup flashpoint of less than 140 degrees Fahrenheit or 60 degrees Centigrade using the test methods specified in 40 CFR 261.21.

The instantaneous maximum is violated whenever the concentration of any sample, including a grab within a series used to calculate daily average concentrations, exceeds the limitation.

GENERAL CONDITIONS

1. All requirements and ordinances of King County Ordinance No. 11034 pertaining to the discharge of wastes into the municipal sewer system are hereby made a condition of this Discharge Authorization.

2. Any facility changes which will result in a change in the character or volume of the pollutants discharged to the municipal sewer system must be reported to your Metro representative. Any facility changes that will cause the violation of the effluent limitations specified herein will not be allowed.

3. In the event the industrial user is unable to comply with any of the conditions of this Discharge Authorization because of breakdown of equipment or facilities, an accident caused by human error, negligence, or any other cause, such as an act of nature the company shall:

   (a) take immediate action to stop, contain and clean up the unauthorized discharges and correct the problem.

   (b) immediately notify the Metro so steps can be taken to prevent damage to the sewerage system.

   (c) submit a written report describing the breakdown, the actual quantity and quality of resulting waste discharged, corrective action taken, and the steps taken to prevent recurrence.

   Compliance with these requirements does not relieve the industrial user from responsibility to maintain continuous compliance with the conditions of the Discharge Authorization or the resulting liability for failure to comply.

4. The industrial user shall, at all reasonable times, allow authorized representatives of the Metro to enter that portion of the premises where an effluent source or disposal system is located or in which any records are required to be kept under the terms and conditions of this Discharge Authorization.

5. Nothing in the Discharge Authorization shall be construed as excusing the industrial user from compliance with any applicable federal, state or local statutes, ordinances, or regulations.

6. This Discharge Authorization does not constitute authority for discharge into waters of the state. Any such discharge is subject to regulation and enforcement action by the Department of Ecology.

KING COUNTY DEPARTMENT OF METROPOLITAN SERVICES

MAJOR DISCHARGE AUTHORIZATION

NUMBER 489

FOR

Texaco Environmental Services

MAILING ADDRESS : 3400 188th Street S.W., Suite 630
Lynnwood, Washington

PHYSICAL ADDRESS: 8701 Greenwood Avenue North, Seattle, Washington

PHONE: (206)485-5000 CONTACT: Lisa Rutan, EMCON, Northwest, Inc.

METRO SAMPLE SITE STATION NUMBER: A1065

INDUSTRY TYPE: Gasoline Service Station

SIC: 5541 EPA I.D.: Not Applicable

DISCHARGE TO: WEST POINT TREATMENT PLANT

*Note: This authorization is valid only for the specific process and dates shown below:

DISCHARGE PROCESS:

MAXIMUM VOLUME: 1465 GPD

EFFECTIVE DATE: November 28, 1994

EXPIRATION DATE: November 28, 1999

For information concerning this Metro Discharge Authorization please contact Patricia Magnuson, Industrial Waste Investigator at 689-3019.

24-HOUR
EMERGENCY NOTIFICATION

WEST POINT TREATMENT PLANT: 689-3801

DEPARTMENT OF ECOLOGY: 649-7000

(For Your Use)

LOCAL FIRE DEPARTMENT: _____

24-HR. CORPORATE CONTACTS: _____

Post-it™ Fax Note 7671	Date 11/23	# of pages ▶ 7
To John Mayer/Lisa Rutan	From PAT MAGNUSON	
Co./Dept. EMCON	Co. METRO	
Phone # 485-5000	Phone # 689-3019	
Fax # 486-9766	Fax # 689-3001	

SPECIAL CONDITIONS

Texaco Environmental Services shall contact Kami Wong (684-0833) of the City of Seattle to arrange for billing prior to discharge.

Discharge Limitations

Constituent	Maximum Concentration, ppm
Benzene	0.13
Toluene	1.5
Ethylbenzene	1.4
Nonpolar Fats, Oil & Grease (nonpolar FOG)	100

Operating Criteria

a) There shall be no pronounced odor of solvent or gasoline.
b) There shall be no pronounced oil sheen or unusual color.
c) There shall be no pronounced hydrogen sulfide (rotten egg) odor.
d) There shall be no visibly pronounced turbidity, the discharge must remain translucent.

Metro will expect operators on site to pay close attention to these operating criteria whenever discharge to the sanitary sewer is occurring. If any of the discharge limits or operating criteria are exceeded, you must stop discharging and notify the Metro Industrial Waste Section at 689-3000.

Monitoring Requirements
The following monitoring requirements shall be met for this discharge authorization:

Parameter	Frequency	Sample Type/Method
Flow	Monthly Total and daily average (gallons and gallons per day)	Meter or pump
Hydrogen Sulfide	Only if operating criteria are exceeded	Meter
Settleable Solids	Only if operating criteria are exceeded	Grab/Imhoff Cone
Explosivity	Only if operating criteria are exceeded	Meter
Nonpolar FOG	Twice yearly (once between Jan. & June and once between July & Dec.)	Grab/Standard Method 5520F
Benzene, toluene, ethylbenzene	Initial Discharge, Twice yearly thereafter(once between Jan. & June and once between July & Dec.)	Grab/EPA Method 602

An annual self-monitoring report shall be filed with Metro by the 15th of January each year. This annual report must include the total monthly volumes of water discharged to the sewer as well as the analytical results of the twice yearly testing. If no discharge takes place during any monitoring period, it shall be noted on the annual report.

If a violation of any discharge limits or operating criteria are detected in monitoring, you shall notify the Metro Industrial Waste Section immediately upon receipt of analytical data.

The suggested analytical method for the contaminant indicators benzene, ethylbenzene and toluene is EPA Method 602 in Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater (EPA-600/4-82-057, July 1982). The required analytical method for the contaminant indicator of nonpolar FOG is Method 5520F (with a partition-gravimetric extraction procedure) in the 1989 Standard Methods for the Examination of Water and Wastes (17th edition). For petroleum hydrocarbon contaminated sites that are following MTCA cleanup protocols and standards (WAC 173-340) EPA Method 418.1 (TPH by IR) or Washington State Methods WTPH-G, WTPH-D and WTPH-O may be substituted for Method 5520F (with a partition gravimetric extraction procedure).

GENERAL DISCHARGE LIMITATIONS

Corrosive Substances

Lower Limit

Minimum	pH 5.0
Average	pH 5.5

The lower pH limit is violated whenever any single sample or any instantaneous recording is less than pH 5.0 or when a composite sample consisting of at least four consecutive samples taken at intervals of 15 minutes or greater is less than 5.5 or when any recording of 15 minutes or more averages less than 5.5.

Upper Limit

Process rinsewater discharges pH 12.0

Discharges of more than 50 gallons per day of caustic solutions equivalent to more than 5% NaOH by weight or greater than pH 12.0 are prohibited unless authorized by permit and subject to special conditions to protect worker safety, the collection system, and treatment works.

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The industrial user shall not discharge material with a temperature in excess of 65 C (150 F).

Fats, Oils and Greases (FOG)

Polar FOG = FOG of animal and/or vegetable origin. Dischargers of polar FOG shall minimize free floating polar FOG. Dischargers of Polar FOG shall not result in significant accumulations which either alone or in combination with other wastes are capable of obstructing flow or interfere with the operation or performance of sewer works or treatment facilities. Dischargers may not add emulsifying agents exclusively for the purposes of emulsifying free floating FOG. Companies which discharge free floating polar FOG may be required to complete, for Metro's review and approval, a FOG control plan.

Nonpolar FOG = FOG of mineral/petroleum origins. The industrial user shall not discharge wastes that contain in excess of 100 milligrams per liter (mg/l) of nonpolar fats, oils and greases (FOG).

Flammable or Explosive Materials

No person shall discharge any pollutant, as defined in 40 CFR 401.11, that creates a fire or explosion hazard in any sewer or treatment works, including, but not limited to, wastestreams with a closed cup flashpoint of less than 140 degrees Fahrenheit or 60 degrees Centigrade using the test methods specified in 40 CFR 261.21.

At no time shall two successive readings on an explosion hazard meter, at the point of discharge into the system (or at any point in the system), be more than five percent (5) nor any single reading be more than ten percent (10%) of the Lower Explosive Limit (LEL) of the meter.

Pollutants subject to this prohibition include, but are not limited to, gasoline, kerosene, naphtha, benzene, toluene, xylene, ethers, alcohols, ketones, aldehydes, peroxides, chlorates, perchlorates, bromates, carbides, hydrides, and sulfides, and any other substances that Metro, a fire department, the State, or EPA have notified the user are a fire hazard or a hazard to the system.

Settleable Solids

Settleable solids 7.0 ml/L

Organic Compounds

No person shall discharge any organic pollutants that result in the presence of toxic gases, vapors, or fumes within a public or private sewer or treatment works in a quantity that may cause acute worker health and safety problems.

Organic pollutants subject to this restriction include, but are not limited to:

Any organic pollutants compound listed in 40 CFR Section 433.11 (e) (Total Toxic Organics (TTO) definition).

Acetone, 2-butanone (MEK), 4-methyl-2-pentanone (MIBK), xylenes.

Hydrogen Sulfide

Atmospheric hydrogen sulfide 10.0 ppm
(As measured at a monitoring manhole designated by Metro)

Soluble sulfide limits may be established on a case-by-case basis depending upon volume of discharge and conditions in the receiving sewer, including oxygen content and existing sulfide concentrations.

Restricted Substances

The industrial user shall not discharge wastes which exceed the following limitations:

Instantaneous Maximum (mg/L)			
Arsenic	4.0	Mercury	0.2
Cadmium	0.6	Nickel	5.0
Chromium	5.0	Silver	3.0
Copper	8.0	Zinc	10.0
Lead	4.0	Cyanide	3.0

The instantaneous maximum is violated whenever the concentration of any sample, including a grab within a series used to calculate daily average concentrations, exceeds the limitation.

GENERAL CONDITIONS

1. All requirements and ordinances of King County Ordinance No. 11034 pertaining to the discharge of wastes into the municipal sewer system are hereby made a condition of this Discharge Authorization.

2. Any facility changes which will result in a change in the character or volume of the pollutants discharged to the municipal sewer system must be reported to your Metro representative. Any facility changes that will cause the violation of the effluent limitations specified herein will not be allowed.

3. In the event the industrial user is unable to comply with any of the conditions of this Discharge Authorization because of breakdown of equipment or facilities, an accident caused by human error, negligence, or any other cause, such as an act of nature the company shall:

   (a) take immediate action to stop, contain and clean up the unauthorized discharges and correct the problem.

   (b) immediately notify the Metro so steps can be taken to prevent damage to the sewerage system.

   (c) submit a written report describing the breakdown, the actual quantity and quality of resulting waste discharged, corrective action taken, and the steps taken to prevent recurrence.

   Compliance with these requirements does not relieve the industrial user from responsibility to maintain continuous compliance with the conditions of the Discharge Authorization or the resulting liability for failure to comply.

4. The industrial user shall, at all reasonable times, allow authorized representatives of the Metro to enter that portion of the premises where an effluent source or disposal system is located or in which any records are required to be kept under the terms and conditions of this Discharge Authorization.

5. Nothing in the Discharge Authorization shall be construed as excusing the industrial user from compliance with any applicable federal, state or local statutes, ordinances, or regulations.

6. This Discharge Authorization does not constitute authority for discharge into waters of the state. Any such discharge is subject to regulation and enforcement action by the Department of Ecology.

7. All requirements and ordinances of the Environmental Protection Agency and Department of Ecology pertaining to hazardous and toxic wastes, disposal facilities, and discharge of wastes into the municipal sewer system, are hereby made a condition of the Discharge Authorization.

8. This authorization does not authorize discharge after its expiration date. If the industrial user wishes to continue its discharge after the expiration date an application must be filed for reissuance of this discharge authorization at least 180 days prior to the expiration date. If the industrial user submits its reapplication in the time specified herein, the industrial user shall be deemed to have an effective waste discharge authorization until Metro issues or denies the new waste discharge authorization. If the industrial user fails to file its reapplication in the time period specified herein, the industrial user will be deemed to be discharging without a discharge authorization.

Investigator: Patricia Magnuson

Date: 11/22/94

magnuson/mdjtexgr

APPENDIX E

FIELD MEASUREMENTS OF SYSTEM PARAMETERS

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

Job Number: 0363-013
Task Number: _____
Page: 2 of 2
Date: 12-7-94

FIELD REPORT

COMMENTS: THE ELECTRICAL JUNCTION BOX ON THE SPARGE BLOWER WAS OPEN. THE COVER AND BOLTS WERE ON THE GROUND. PLACED THE COVER AND TIGHTENED THE BOLTS.

MEASURED FLOW AND PRESSURE FROM THE SPARGE BLOWER AT THE 2" MAIN LINE.

PRESSURE = 4.5" w POSITIVE
FLOW = 6,000 + FPM

MEASURED VES PARAMETERS AT 4" PVC LINES.

		VACUUM w/	FLOW for VOC (F.I.D)
STACK	—	1200	30 ppm
SOUTH LINE	1"	0-5	10 ppm
CENTRAL LINE	1"	0-25	10 ppm
NORTH LINE	1"	1200	30 ppm

COLLECTED AN AIR SAMPLE AT THE STACK IN A TEDLAR BAG. SUBMITTED FOR TPH / DIESEL AND PERMANENT GASES.

By: _____
EMCON Representative

Reviewed By: _____
EMCON Project Manager

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

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

Job Number: 0268-013.11
Task Number: 02
Page: 1 of 1
Date: 1-11-95

FIELD REPORT

PROJECT: Remediation
ARRIVAL TIME: 1200 / 1530
LOCATION: Seattle (Greenwood)
DEPARTURE TIME: 1300/1620
CLIENT: Texaco
WEATHER: Scattered clouds, Rain forecast later
PURPOSE OF WORK/OBSERVATIONS: O&M

EMCON REPRESENTATIVE: Russell Thompson
EMCON PROJECT MANAGER: John Meyer

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

COMMENTS: ① Reactivated VES & Sparge blower. (Sparge blower did not activate on its own.
② took Pressure, flow & FID Readings.
Stack air flow = 1000 fpm, FID = 5
Point 1 (South) Pressure = 1", flow = 0-25 fpm, FID = 0ppm - 5ppm
Point 2 (middle) Pressure = 1", flow = 0-25 fpm, FID = 0ppm
Point 3 (north) Pressure = .5-1", flow = 1000 fpm, FID = 5ppm
Sparge Pressure = 1.8" +
FID did not work so I returned to take Readings.

By: Russell Thompson
EMCON Representative

Reviewed By:
EMCON Project Manager

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

VACUUM EXTRACTION SYSTEM - FIELD OPERATIONS DATA SHEET

PROJECT: 0328-013,11 (02) Groenwoud

DATE: 1-30-95

LOCATION	INITIAL SET-UP/final			ISOLATION			FINAL SET-UP		
	Vacuum	Flow	Concentration	Vacuum	Flow	Concentration	Vacuum	Flow	Concentration
	(in. wc)	(fpm)	(ppm-v)	(in. wc)	(fpm)	(ppm-v)	(in. wc)	(fpm)	(ppm-v)
Stack		1100	10						
Condensation Tank									
Manifold									
P-1	1"	0	0						
P-2	1"	0-25	10						
P-3	1"	1300	16						
Sparge line	+1.3	4500							
positive ↗									

Emissions within 15lbs/day: (Y)N

Air intake valve open (initial): Y(N)

Air intake valve open (final): Y(N)

COMMENTS: see Field Report