UNDERGROUND STORAGE TANK DECOMMISSIONING AND SOIL ASSESSMENT REPORT

Terminal 115
Port of Seattle
Seattle, Washington

Prepared for

Port of Seattle
2611 Alaskan Way
Seattle, Washington

February 12, 1995

Prepared by

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Project 0357-013.01

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

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SUMMARY

At the request of the Port of Seattle, EMCON conducted an environmental assessment at the Port of Seattle, Terminal 115 in Seattle, Washington. The work was conducted to document subsurface soil conditions following decommissioning of three underground storage tanks (USTs). The USTs were decommissioned by Olympus Environmental, Inc. Waste profiling and disposal were accomplished by Northwest EnviroServices, Inc. The tanks were discovered during new building construction and appeared to have been abandoned in place by backfilling with sand. Previous tank contents are not known.

Field activities completed in April and May 1994 consisted of the following:

- Collecting samples of fluid and sludge from the USTs for waste disposal profiling purposes
- Collecting soil samples from excavated stockpiled soil
- Observing limited over-excavation of petroleum hydrocarbon contaminated soil
- Collecting soil samples from the excavation sidewalls
- Coordinating chemical analyses of selected samples
- Evaluating the data
- Preparing this report

The investigation resulted in identification of the following conditions:

- Soils encountered during excavation generally consisted of brown sand and gravel fill from the ground surface to approximately 5 feet below the ground surface (bgs). A native silty sand layer including organic material extended from approximately 5 to 6.5 feet bgs, underlain by medium to fine sands to the total explored depth of approximately 10 feet bgs.
- Groundwater was encountered at approximately 9 feet bgs during excavation.

- Soil samples collected from the excavated soil stockpile contained gasoline-, diesel-, and oil-range hydrocarbons at concentrations exceeding Washington State Model Toxics Control Act (MTCA) Method A Cleanup Levels[1].

- Soil samples collected from all four excavation sidewalls contained gasoline-, diesel-, and oil-range hydrocarbons at concentrations exceeding MTCA Method A Cleanup Levels.

This summary is presented solely for introductory purposes and is intended for use in conjunction with the full text of this report, which contains site and project descriptions, soil sampling procedures, laboratory chemistry methods, laboratory results, conclusions, and recommendations.

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

1 INTRODUCTION

EMCON was retained by the Port of Seattle to conduct an environmental assessment following decommissioning of three 6,000-gallon underground storage tanks (USTs) (Port of Seattle tank numbers T115M, T115N, and T1150) at Terminal 115 located in Seattle, Washington. The USTs were discovered during new building construction and appeared to have been abandoned in place by backfilling with sand. Previous tank contents are not known.

The tasks completed under the current scope of work consisted of:

- Preparing a site-specific health and safety plan
- Collecting fluid and sludge samples from the USTs and soil samples from the stockpile
- Field screening soil for volatile organic compounds
- Observing over-excavation of petroleum hydrocarbon contaminated soil
- Collecting soil samples and logging soil conditions
- Coordinating chemical analyses of selected soil and tank contents samples
- Evaluating laboratory data
- Preparing a report of the findings

The work was authorized under Supplemental Agreement Number 10 of Professional Services Agreement Number 047006, dated July 19, 1993, between the Port of Seattle and EMCON. All tasks were completed in general accord with the April 15, 1994, proposal to the Port of Seattle regarding tank decommissioning activities.

2 SITE DESCRIPTION

The Terminal 115 property is owned by the Port of Seattle and is located approximately 20 feet above mean sea level, in Seattle, Washington (Figures 2-1, 2-2). The site is bordered on the north by industrial property, on the south by Southwest Michigan Street, on the east by the Duwamish Waterway, and on the west by West Marginal Way Southwest. The property is relatively level. The site is currently used as a marine storage, transfer, and loading facility.

In April 1994, three approximately 6,000 gallon USTs were discovered during new building construction for tenant improvements at the site. The USTs were located immediately north of Southwest Michigan Street and south of the building currently under construction (Figure 2-3). The tanks are believed to have been installed by the Boeing Company during their occupancy of the site. Prior history and previous tank contents of the tanks are unknown. Olympus Environmental, Inc. was retained to remove the USTs and coordinate waste disposal. EMCON was also retained by the Port to conduct an environmental evaluation of soil adjacent to the tanks.

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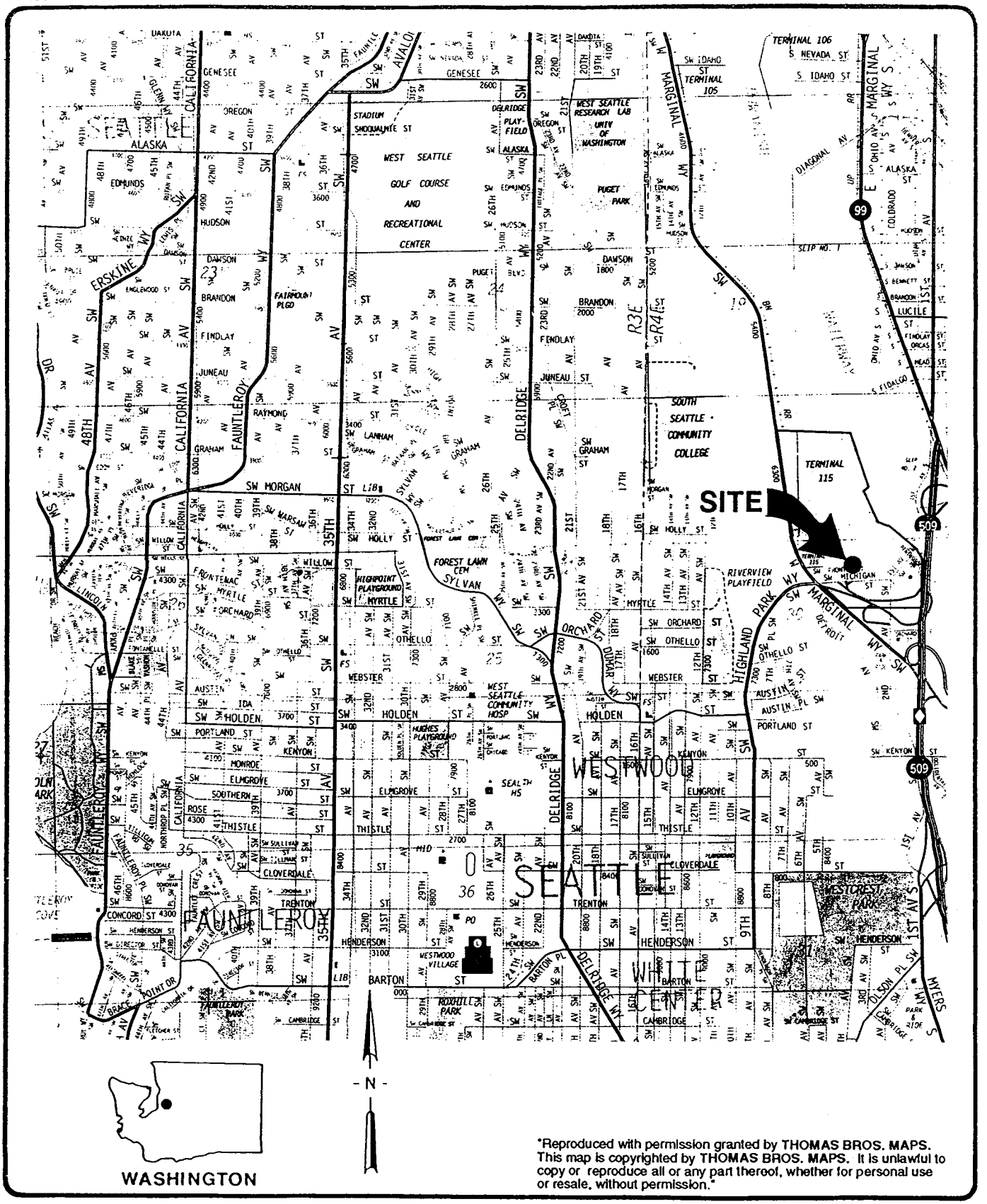
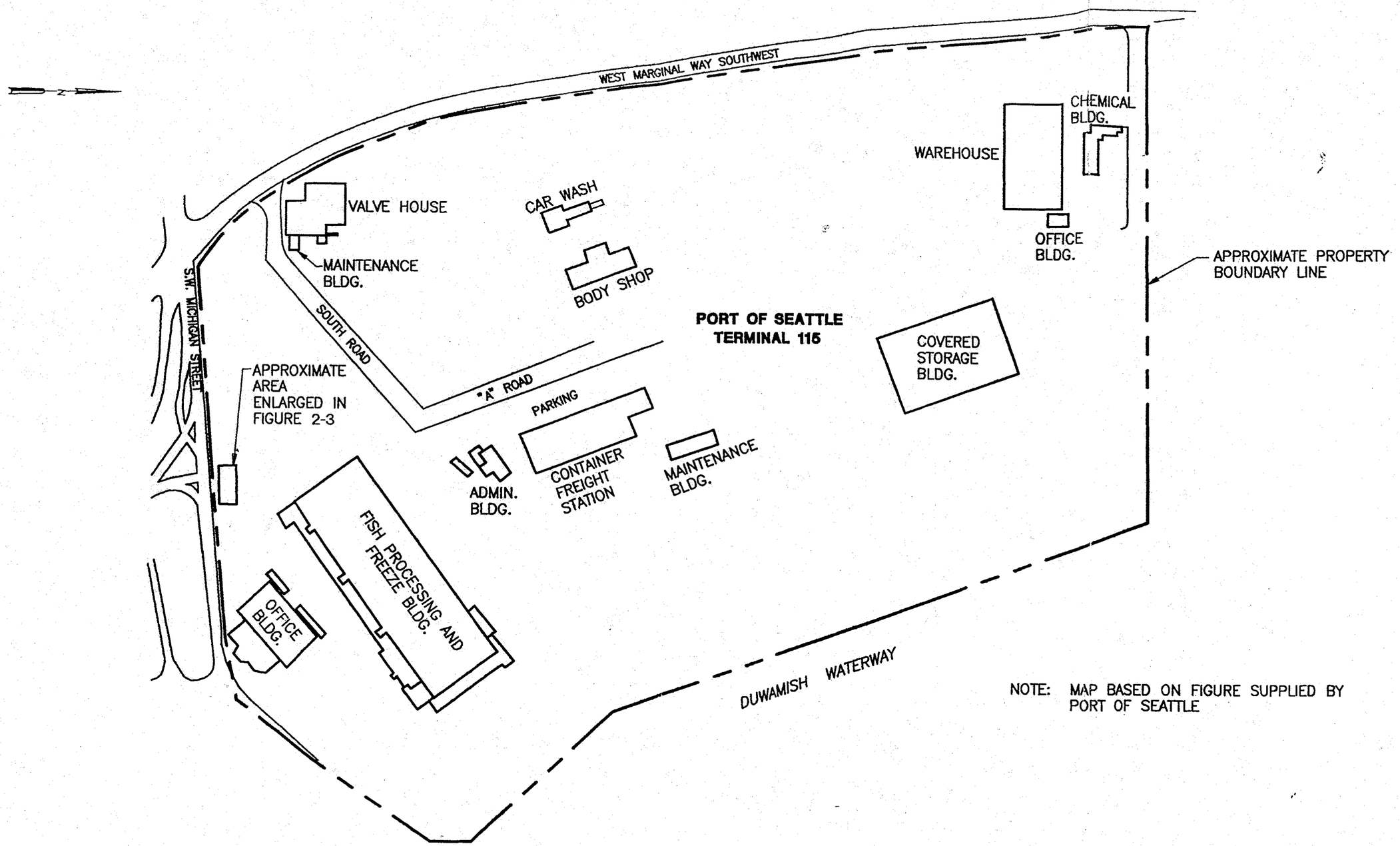


Emcon Northwest, Inc.

DATE 5-94
DWN. MLP
APPR.
REVIS.
PROJECT NO. 0357-013.01

Figure 2-1
PORT OF SEATTLE
TERMINAL 115
SEATTLE, WASHINGTON
SITE LOCATION MAP



NOTE: MAP BASED ON FIGURE SUPPLIED BY PORT OF SEATTLE

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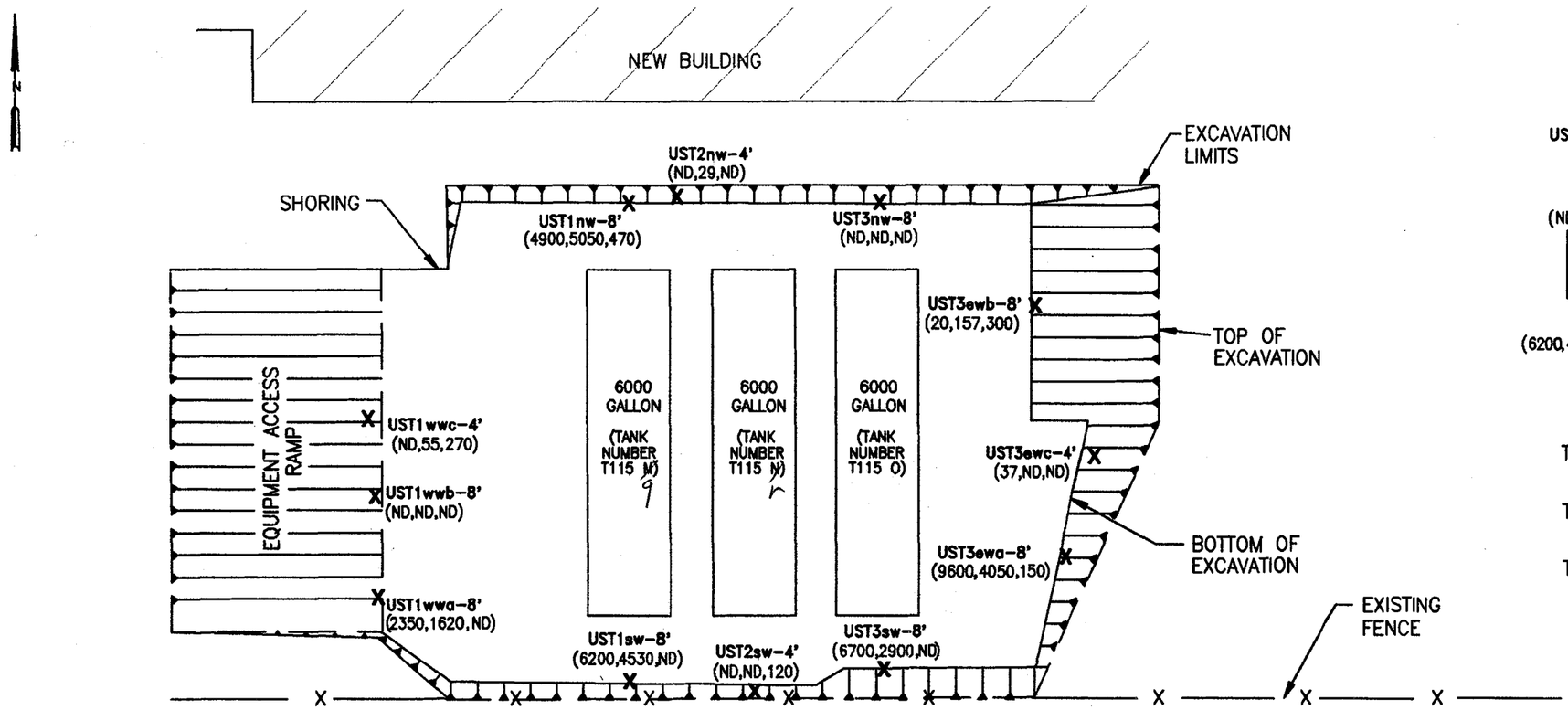
PROJECT NO.	0357-013.01

Figure 2-2
PORT OF SEATTLE
TERMINAL 115
SEATTLE, WASHINGTON
SITE PLAN

1= 300 12-13-94 G:\DWG\0357\013\01BLC03A



LEGEND:

X — Soil Sample Location

UST1sw-8' — Soil Sample Name (Numbers Signifies Depth Below Grade in Feet)

(ND, ND, ND)
- TPH-O Concentration
- TPH-D Concentration
- TPH-G Concentration

(6200, 4530, ND) — Numbers in Red Exceed MTCA Method A Cleanup Levels

TPH-G = Total Petroleum Hydrocarbons as Gasoline

TPH-D = Total Petroleum Hydrocarbons as Diesel

TPH-O = Total Petroleum Hydrocarbons as Oil

0 10 20

SCALE (ft)

AREA ENLARGED FROM FIGURE 2

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Figure 2-3
PORT OF SEATTLE
TERMINAL 115
SEATTLE, WASHINGTON
SOIL SAMPLE LOCATIONS AND LABORATORY RESULTS

1= 10 2-02-95 G:\DWG\0357\013\01BLC02C

3 FIELD ACTIVITIES

3.1 Health and Safety Plan

EMCON prepared a site-specific health and safety plan before beginning field activities in April 1994.

3.2 Waste Disposal Profiling

On April 26, 1994, EMCON personnel visited the site to assess site conditions and collect representative samples from the tanks. The tanks appeared to have been abandoned in place. Each tank contained a combination of sand, liquid, and sludge. EMCON personnel collected samples from the liquid and submitted them to Northwest EnviroService, Inc. (NWES), for waste disposal profiling. Composite soil samples (Comp #1 - SP1 & 2 and Comp #2 - SP3 & 4) were collected from the excavated soil stockpile and submitted to a laboratory for disposal profiling. NWES subsequently removed the liquid for off-site treatment and disposal.

On May 5, 1994, EMCON personnel returned to the site to collect a composite sample (Sludge 1) of the sludge within each tank. The sample was transported under standard chain-of-custody to a laboratory for profiling.

Olympus Environmental, Inc. (Olympus), subsequently removed remaining contents of the tanks and stockpiled it on site pending disposal.

A laboratory report and an NWES bill of lading for the liquid are included in Appendix A.

3.3 Underground Storage Tank Removal

During the week of May 9, 1994, Olympus removed the three USTs and transported them offsite for disposal. Underground storage tank decommissioning activities were reported to the Port of Seattle and the Washington State Department of Ecology (Ecology) by Olympus.

3.4 Soil Sampling and Excavation

On May 10, 1994, EMCON personnel returned to the site to observe the excavation and to collect soil samples. An apparent free product accumulation was observed floating on groundwater present in the excavation at approximately 9 feet bgs. The accumulation was not thick enough to be measured.

EMCON personnel then observed over-excavation of petroleum hydrocarbon impacted soil from the excavation sidewalls from the ground surface to approximately 9 feet bgs. Approximately 80 cubic yards of excavated soil was temporarily stockpiled onsite pending disposal. Excavation activities were halted due to the proximity of the partially constructed building and SW Michigan Street and to reduce delays in the new building construction schedule. During excavation activities, NWES removed free product and groundwater from the excavation using a vacuum truck and transported it offsite for treatment.

Following excavation activities, soil samples were collected at the excavation limits at depths of approximately 4 and 8 feet bgs. Soil samples were not collected from the excavation floor because groundwater was present approximately 9 feet bgs. Soil sample locations are shown in Figure 2-3

Soil samples were collected in clean glass jars with Teflon™-lined lids, then placed into an iced cooler. Samples were field-screened using a photoionization detector (PID) to measure volatile hydrocarbon concentrations in soil vapor. Results of field screening were used to select samples for laboratory analysis and to guide over-excavation of contaminated soil. Samples were delivered under standard chain of custody protocol to Columbia Analytical Services, in Bothell, Washington, for chemical analyses. Soil sampling procedures are presented in Appendix B.

3.5 Soil Conditions

Soils encountered during excavation generally consisted of brown sand and gravel fill present from the ground surface to approximately 5 feet bgs. A native silty sand layer, including organic material, extended from approximately 5 to 6.5 feet bgs and was underlain by medium to fine sands to the total explored depth of approximately 10 feet bgs.

4 QUANTITATIVE CHEMICAL ANALYSES

4.1 General Laboratory Procedures

Sample analyses were performed by Columbia Analytical Services, Inc. (CAS), in Bothell, Washington. The composite sludge sample (Sludge 1) collected from material within the USTs was analyzed for total petroleum hydrocarbons as gasoline (TPH-G) and benzene, toluene, ethylbenzene, and total xylenes (BTEX) using Ecology Method WTPH-G/EPA Method 5030/8020, total petroleum hydrocarbons as diesel (TPH-D) and as oil (TPH-O) using Ecology Method WTPH-D (extended), volatile organic compounds using EPA Method 8260, base neutral/acid semivolatile organic compounds using EPA Methods 3550/8270, polychlorinated biphenyls (PCBs) using EPA Method 3550/8080, and eight total metals using EPA Methods 3050/7060, 3050/6010, 3050/7740, and 7421.

Samples collected from the excavation sidewalls and the soil stockpile were analyzed for TPH-G and BTEX using Ecology Method WTPH-G/EPA Method 5030/8020, and for TPH-D and TPH-O using Ecology Method WTPH-D (extended). Soil samples collected from the excavated soil stockpile were also analyzed for eight metals using toxicity characteristic leaching procedure (TCLP) EPA Method 1311. Selected laboratory results are summarized in Table 4-1. Copies of the laboratory reports are included in Appendix C.

4.2 Laboratory Results

4.2.1 Sludge Sample Results

A review of laboratory results indicates that the composite sample collected from sludge within the USTs contained 29,000 parts per million (ppm) TPH-G, 39,700 ppm TPH-D, 6,390 ppm TPH-O, and 92 ppm total xylenes. Except for 43 ppm naphthalene and 110 ppm 2-methylnaphthalene, the sample did not contain concentrations of volatile organic compounds, base neutral/acid semivolatile organic compounds, or PCBs above the method reporting limits (MRLs). Barium, chromium, and lead concentrations of 45 ppm, 12 ppm, and 21 ppm, respectively, were detected. No other metals were detected.

Table 4-1

Results of Analyses
Port of Seattle, Terminal 115
Seattle, Washington

Sample Number	Depth (feet)	Date Collected	Results of Analyses (mg/kg)						
			Ecology Method WTPH-G	Ecology Method WTPH-D (extended)		Aromatic Volatile Hydrocarbons EPA Method 5030/8020			
			TPH-G	TPH-D	TPH-O	Benzene	Toluene	Ethyl-benzene	Total Xylenes
MTCA Method A Cleanup Levels[a]			100	200	200	0.5	40	20	20
Stockpiled Soil									
Comp #1 - SP1 & 2	NA	04/26/94	495	378	220	ND	ND	ND	0.1
Comp #2 - SP3 & 4	NA	04/26/94	595	506	310	ND	ND	ND	0.3
UST Contents									
Sludge 1	NA	05/05/94	29,000	39,700	6,390	ND<3*	ND<3*	8	92
North Wall Excavation Limit									
UST1nw-8'	8	05/10/94	4,900	5,050	470	ND	ND	1.4	11.2
UST2nw-4'	4	05/10/94	ND	29	ND	ND	ND	ND	ND
UST3nw-8'	8	05/10/94	ND	ND	ND	ND	ND	ND	ND
South Wall Excavation Limit									
UST1sw-8'	8	05/10/94	6,200	4,530	ND	ND	ND	2.0	14.5
UST2sw-4'	4	05/10/94	ND	ND	120	ND	ND	ND	ND
UST3sw-8'	8	05/10/94	6,700	2,900	ND	ND	ND	2.3	17.5

Table 4-1

Results of Soil Sample Analyses
Port of Seattle Terminal 115
Seattle, Washington

Sample Number	Depth (feet)	Date Collected	Results of Analyses (mg/kg)						
			Ecology Method WTPH-G	Ecology Method WTPH-D (extended)		Aromatic Volatile Hydrocarbons EPA Method 5030/8020			
			TPH-G	TPH-D	TPH-O	Benzene	Toluene	Ethyl-benzene	Total Xylenes
MTCA Method A Cleanup Levels[a]			100	200	200	0.5	40	20	20
East Wall Excavation Limit									
UST3ewa-8'	8	05/10/94	9,600	4,050	150	ND	ND	3.3	22.9
UST3ewb-8'	8	05/10/94	20	157	300	ND	ND	ND	ND
UST3ewc-4'	8	05/10/94	37	ND	ND	ND	ND	ND	ND
West Wall Excavation Limit									
UST1wwa-8'	8	05/10/94	2,350	1,620	ND	0.06	ND	1.0	8.0
UST1wwb-8'	8	05/10/94	ND	ND	ND	ND	ND	ND	ND
UST1wwc-4'	4	05/10/94	ND	55	270	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
mg/kg = Equals parts per million concentration
NA = Not analyzed
ND = Not detected at or above method reporting limit
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.

* Elevator method reporting limit due to matrix interference.

4.2.2 Excavated Soil Stockpile Results

A review of laboratory results indicates that the two composite soil samples collected from the excavated soil stockpile contained concentrations of TPH-G, TPH-D, and TPH-O exceeding MTCA Method A Cleanup Levels, with up to 595 ppm TPH-G, 506 ppm TPH-D, and 310 ppm TPH-O. Except for 0.6 ppm barium, no TCLP total metals were detected.

4.2.3 Excavation Sidewall Sample Results

A review of laboratory results indicates that soil samples collected from all four sidewalls following excavation contained concentrations exceeding MTCA Method A Cleanup Levels for TPH. TPH concentrations ranged up to 9,600 ppm TPH-G, 5,050 ppm TPH-D, and 470 ppm TPH-O. Except for 22.9 ppm total xylenes in sample UST3ewa-8' collected from the east sidewall, BTEX concentrations were below MTCA Method A Cleanup Levels in all excavation samples.

5 CONCLUSIONS

Soils encountered during excavation generally consisted of brown sand and gravel fill from ground surface to approximately 5 feet bgs. A native silty sand layer including organic material extended from approximately 5 to 6.5 feet bgs, underlain by medium to fine sands to the total explored depth of approximately 10 feet bgs.

Soil samples collected from the excavation sidewalls and stockpile following excavation activities contained concentrations of TPH-G, TPH-D, TPH-O, and total xylenes exceeding MTCA Method A Cleanup Levels.

No groundwater assessment has been performed.

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.

APPENDIX A

NORTHWEST ENVIROSERVICE LABORATORY REPORT

NORTHWEST ENVIROSERVICE INC

Sample No.
940426-1Z

Date: 4/26/94
Outside Lab: Spectra

LABORATORY REPORT

P.O. No:

Generator Name: Emcon/Port of Seattle

Job No.:

Generator Contact:

Gen. ID No:

NWES Contact: Kim Ducatt

WPQ/Man.#:

Stated Waste Composition: Oil/solvent/water

Physical Description	Characteristics	Screen Tests
No. of Layers: Two	pH: 6.3 solid sample: 1 + 1 w/H20 if checked [ ]	Copper Wire: [X]neg [ ]pos
Color: (top) Brown opaque (mid) (btm) Tan opaque	% Acid/Base:	Water Solubility: T: Negative B: Positive
% Liquid: 100%	Flash Point:	Cr+6: [X]neg [ ]pos
% Aqueous: 60%	[ ]<70° [ ]140-200°F	Cyanide: [X]neg [ ]pos
% Oil:	[ ]70-100°F [ ]>200°F	Sulfide: [X]neg [ ]pos
% Solvent: 40%	[X]101-139°F [ ]No Flash	Hach Test >200ppm [ ]yes [ ]no
% Solid:	Flam. Pot. [ ]pos [ ]neg	Phenol: [ ]neg [ ]pos
% Sludge:	[ ] Ignitable Solid	% Antifreeze:
Other: Dielel odor		s.g./density: [T] 0.8-0.9 actual: [B] 0.9-1.0 other;[ ] [ ] 1.0-1.1

Analyses (units are in ppm unless otherwise indicated)

Hexavalent Chromium:	Cyanide (Total);
Fats, Oil & Grease (F.O.G.):	Cyanide (Amenable):
Phenol:	Metals analysis attached if checked: [ ]
Other (specify):	Organic analysis attached if checked: [ ]

Comments:

Approvals: Analyzed by: Sample Storage Box:

Note: Analysis of waste samples is based on the Generator's description supplied to NWES regarding the sample(s). Any Generator knowledge or information including, but not limited to, applicable Material Safety Data Sheet(s), constituents in waste and particulars of the waste generating process, known to Generator but not supplied to NWES may alter the analyses performed by NWES. It is understood and agreed that NWES bases its analytical procedures on the waste composition provided by Generator. Reported analysis is only valid for wastes sent to NWES.

ORGANIC ANALYSIS REPORT

NORTHWEST ENVIROSERVICE INC.

SAMPLE NO.
940426-1Z

FID [ ] GC/MS [ ] DATE: 4/27/64

Compound Name	Amount	PQL
METHANOL	ND	8.0 ppm
TRICHLOROFLUOROMETHANE (FREON 11)	ND	8.0 ppm
1,1 - OXYBISETHANE (ETHYL ETHER)	ND	8.0 ppm
TRICHLOROTRIFLUOROETHANE (FREON 113)	ND	8.0 ppm
ACETONE	ND	8.0 ppm
1,1 DICHLOROETHENE (D029)	ND	8.0 ppm
METHYLENE CHLORIDE	ND	8.0 ppm
CARBON DISULFIDE	ND	8.0 ppm
2-BUTANONE (MEK) (D035)	ND	8.0 ppm
ETHYL ACETATE	ND	8.0 ppm
CHLOROFORM (D022)	ND	8.0 ppm
ISOBUTANOL	ND	8.0 ppm
1,1,1 TRICHLOROETHANE	ND	8.0 ppm
CARBON TETRACHLORIDE (D019)	ND	8.0 ppm
N-BUTANOL	ND	8.0 ppm
BENZENE (D018)	8.	8.0 ppm
1,2 DICHLOROETHANE (D028)	ND	8.0 ppm
TRICHLOROETHENE (TCE) (D040)	ND	8.0 ppm
2-ETHOXYETHANOL-(CELLOSOLVE)	ND	8.0 ppm
2-NITROPROPANE	ND	8.0 ppm
4,METHYL-2-PENTANONE (MIBK)	ND	8.0 ppm
TOLUENE (METHYL BENZENE)	200	8.0 ppm
PYRIDINE (D038)	ND	8.0 ppm
1,1,2 TRICHLOROETHANE	ND	8.0 ppm
TETRACHLOROETHANE (PCE) (D039)	ND	8.0 ppm
CHLOROBENZENE (D021)	ND	8.0 ppm
ETHYL BENZENE	320.	8.0 ppm
XYLENES	0.60%	8.0 ppm
CYCLOHEXANONE	ND	8.0 ppm
1,2 DICHLOROBENZENE (O-DICHLOROBENZENE)	ND	8.0 ppm
1,4 DICHLOROBENZENE (D027)	ND	8.0 ppm
HEXACHLOROETHANE (D034)	ND	8.0 ppm
CRESOLS (D026)	ND	8.0 ppm
NITROBENZENE (D036)	ND	8.0 ppm
2,4,5 TRICHLOROPHENOL (D041)	ND	8.0 ppm
2,4,6 TRICHLOROPHENOL (D042)	ND	8.0 ppm

Other test:

PCBs by GC/ECD:	<1	
TX:		
HOC:	<100	
Pentachlorophenol (D037)		
Other (specify)		

Analyzed by:

Storage box:

NORTHWEST ENVIROSERVICE INC

D-SERIES (D004 - D011)
SAMPLE NO.
940426-1Z

D-SERIES METALS - TCLP **DATE: 4/28/94**

	ppm	PQL
CADMIUM	<0.1	
CHROMIUM	<0.1	
COPPER	<0.1	
LEAD	<0.1	
NICKEL	<0.1	
ZINC	<0.1	
ARSENIC	<0.1	
BARIUM	0.24	0.1
MERCURY	<0.2	
SELENIUM	<0.1	
SILVER	<0.1	

Analysis Performed by:

APPENDIX B

FIELD METHODS AND SAMPLING PROCEDURES

FIELD METHODS AND SAMPLING PROCEDURES

This appendix documents the procedures EMCON Northwest, Inc., used to perform the underground storage tank decommissioning described in this report. The discussion includes information on the following subjects:

- Sampling procedures
- Sample jars, sample handling, and chain of custody
- Field screening tests
- Field equipment decontamination procedures

SAMPLING PROCEDURES

Soil

Soil samples collected during the field investigation were obtained from the backhoe bucket or directly from the excavation by using a stainless steel spoon. Samples taken from the backhoe bucket were collected from the least disturbed and most representative soils. Typically, these soils accumulated directly behind the backhoe bucket teeth. Samples taken directly from an excavation or test pit were collected from undisturbed soils near the base of a sidewall or the base of the excavation. Before collecting a soil sample from an excavation, approximately 6 inches of soil were scraped away to expose undisturbed soil for collection.

Sludge

Sludge samples were collected using a clean stainless steel spoon in areas of apparent free product accumulation or dark staining.

Liquid

Liquid samples were collected using a clean disposable Teflon bailer and transferred to 1 liter bottles.

Sample Jars, Sample Handling, and Chain of Custody

Each soil sample was submitted in a separate laboratory-prepared glass container. Sample jars were obtained specifically for use on this project. They consisted of glass jars with Teflon® lid inserts. Samples were collected, labeled, and placed immediately into a chilled cooler for transport to NWES or Columbia Analytical Services, Inc. (CAS), in Bothell, Washington, for analyses. Chain-of-custody records were maintained recording sample number, location, depth, and handling procedures.

Soil Sample Field Screening

Soil samples were screened with a portable PID at the time of collection for the presence of organic vapors. A Thermo Instruments Model 580B, calibrated to 100 ppm isobutylene, was used to obtain the measurements.

FIELD EQUIPMENT DECONTAMINATION PROCEDURES

All sampling equipment was decontaminated with a detergent wash, followed by a double distilled water rinse after each use.

APPENDIX C

LABORATORY MEASUREMENT OF PETROLEUM HYDROCARBONS AND LABORATORY REPORTS

LABORATORY MEASUREMENT OF PETROLEUM HYDROCARBONS

Laboratory measurement of petroleum hydrocarbons can be classified into two general types of analyses:

- Nonspecific (methods that seek to quantify either the total amount of petroleum hydrocarbons or some fraction of the total in general terms)
- Specific (methods that measure individual organic compounds or that provide analyte identification)

Figure C-1 summarizes petroleum hydrocarbons of particular interest and relates them to the laboratory procedures discussed below.

C.1 WTPH-418.1 Modified for Heavy Petroleum Oils

The method for measuring total recoverable petroleum hydrocarbons using infrared spectrometry is based on a modification of EPA Method 418.1. WTPH-418.1 Modified measures the total petroleum hydrocarbons recoverable from a soil or water sample. The method is not compound-specific. It is known to have a low recovery for gasoline, and it is susceptible to a significant positive or negative bias depending on the sample matrix. Analyte-specific tests using gas chromatography techniques give more reliable quantitative results and are often preferred.

WTPH-418.1 Modified is not applicable to the measurement of low boiling fractions (e.g., volatile solvents or gasoline) that can volatilize at temperatures below 70°C. This represents a theoretical lower limit of C-6 (i.e., a hydrocarbon chain containing six carbon atoms). For practical purposes, however, C-10 may be a more reliable lower limit of quantitation.

The higher boiling (semivolatile) fraction quantified by this method can also be limited by its solubility in the extraction solvent. The solvent used in TPH-IR extraction is a fluorochlorocarbon (freon 113), which has less solvating strength than the solvents (e.g., methylene chloride) used for extraction of TPH in other laboratory procedures. Heavier petroleum hydrocarbons may contain significant fractions which are not extractable with freon. The solubility of petroleum hydrocarbons, combined with the complexity of the

sample matrix (such as a soil containing higher percentages of longer chained hydrocarbons), may result in a practicable upper hydrocarbon limit of C-30.

Polar hydrocarbons (e.g., waxes and fats) are selectively removed using a silica gel cleanup before analysis. Samples with high organic backgrounds, such as woodwaste, peat, or organic soil, may, however, result in a high bias value due to the organic matrix contribution. A low bias can occur in a sample with high concentrations of petroleum hydrocarbons, such as oily waste, because the TPH infrared (IR) spectrum may undergo a chemical shift. In addition, a low bias may result when silica gel is used to remove polar interferences. The silica gel may also remove complex aromatic compounds and other hydrocarbons containing chlorine, sulfur, and nitrogen, which often represent at least a minor fraction of the total TPH in the sample. This method also requires calibration with a reference oil consisting of 25 percent aromatic TPH. Basing quantitation using a 25 percent aromatic standard can lead to significant bias if the amount of aromatic compounds in a sample makeup varies.

C.2 Gasoline Range (WTPH-G) and Diesel Range (WTPH-D) Petroleum Hydrocarbons

WTPH-G specifically measures volatile (C-7 to C-12), and WTPH-D measures semivolatile (C-12 to C-24), petroleum hydrocarbons by using a gas chromatograph (GC) equipped with a flame ionization detector (FID).

C.2.1 WTPH-G, Gasoline Range Petroleum Hydrocarbons

Volatile hydrocarbons, such as gasoline and solvents, can be analyzed by using methods which eliminate the extraction process to minimize volatile loss. This is accomplished by using a purge-and-trap method (EPA Method 5030) to introduce the analytes to the GC. As in other GC methods, a unique fingerprint represents the suite of compounds present in the petroleum hydrocarbon matrix. Other features of the WTPH-G analysis are the same as those described below for semivolatiles.

The key difference between the volatile and semivolatile methods is that, like WTPH-418.1 Modified, the semivolatile analysis (described in the next section) will give a low result if the sample contains volatile TPH (e.g., gasoline). In some instances, gasoline presence may be determined by using the WTPH-D semivolatile extract. Due to losses of volatile TPH (i.e., benzene, toluene, ethylbenzene, and total xylenes [BTEX]), however, gasoline determination may be biased, but will adequately serve as a screening method for gasoline products. If the analytes are known to be gasoline derivatives, the volatile analysis WTPH-G should be used. If, however, both gasoline and diesel are present, TPH analysis by volatile and semivolatile methods should be employed.

C.2.2 WTPH-D, Diesel Range Petroleum Hydrocarbons

The analysis of semivolatile hydrocarbons (i.e., diesel, fuel oils, and lube oil) employs soxhlet extraction (EPA Method 3540) or sonication (EPA Method 3550) with acetone methylene chloride in soil and liquid-liquid extraction (EPA Method 3510 or 3520) in water, using only methylene chloride. The extracted sample is analyzed by using a GC equipped with a flame ionization detector (FID). The FID is considered a universal detector since it does not significantly discriminate between hydrocarbon species. The method is specific for boiling point ranges, and the analyst has the ability to select the region (i.e., the carbon number or range of numbers) of the gas chromatogram on which to base the final quantitation of total petroleum hydrocarbons present.

WTPH-D does not specifically allow for the cleanup of non-petroleum hydrocarbon interferences (using silica gel), as does WTPH-418.1 Modified. The analyst can, however, base the range of hydrocarbons on the most representative quantitation of the sample. For this reason, the method is often considered representative of the true value of the petroleum hydrocarbons in the sample. The gas chromatogram, or GC fingerprint, represents the unique suite of compounds associated with the type of petroleum present in the sample and may be used for identification as well as quantitation.

C.3 Volatile Aromatic Hydrocarbons — BTEX (EPA Method 8020)

EPA Method 8020 is a specific hydrocarbon analysis used to detect benzene, toluene, ethylbenzene, and total xylenes (BTEX), the major aromatic compounds of interest in gasoline. As with WTPH-G volatile analysis, the Method 8020 analytes are introduced into the GC by using a purge-and-trap (EPA Method 5030). Typical of other GC methods, a unique fingerprint represents the suite of compounds present in the petroleum hydrocarbon matrix, so the individual BTEX compounds can be identified and quantified.

Simultaneous analyses of WTPH-G and BTEX can be accomplished by introducing the purge-and-trap fraction into a photoionization detector (PID) to quantify low concentrations of BTEX, then into a flame ionization detector to quantify the gasoline range TPH.

GOLDEN STATE/CAS
LABORATORIES, INC.

May 10, 1994

John Meyer
EMCON Northwest, Inc.
18912 N. Creek Parkway, Suite 100
Bothell, WA 98011-8016

Re: **Terminal 115/Project #0357.013.01**

Dear John:

Enclosed are the results of the rush samples submitted to our lab on May 6, 1994. For your reference, these analyses have been assigned our service request number LA941941.

All analyses were performed in accordance with our laboratory's quality assurance program. Golden State / CAS is certified for environmental analyses by the California Department of Health Services (Certificate # 1296/Expiration - August 1994).

Please call if you have any questions.

Respectfully submitted,

Golden State / CAS Laboratories, Inc.

Elaine R. Thomas for Dr. B Gene Bennett

Dr. B. Gene Bennett
Laboratory Director

GB/ib

GOLDEN STATE / CAS LABORATORIES, INC.

Analytical Report

Client:	EMCON Northwest, Inc.	Date Collected:	05/05/94
Project:	Terminal 115/#0357.013.01	Date Received:	05/06/94
Sample Matrix:	Sludge	Service Request No.:	LA941941

Volatile Organic Compounds
EPA Method 8260
µg/Kg (ppb)

Sample Name:		SLUDGE 1	Method Blank
Lab Code:		LA941941-1	LA941941-MB
Date Analyzed:		05/09/94	05/09/95
Analyte	**MRL**		
Chloromethane	10	*<500	ND
Vinyl Chloride	10	*<500	ND
Bromomethane	10	*<500	ND
Chloroethane	10	*<500	ND
Trichlorofluoromethane (Freon 11)	5	*<250	ND
1,1-Dichloroethene	5	*<250	ND
Acetone	50	*<2500	ND
Carbon Disulfide	5	*<250	ND
Methylene Chloride	10	*<500	ND
trans-1,2-Dichloroethene	5	*<250	ND
cis-1,2-Dichloroethene	5	*<250	ND
2-Butanone (MEK)	10	*<500	ND
1,1-Dichloroethane	5	*<250	ND
Chloroform	5	*<250	ND
1,1,1-Trichloroethane (TCA)	5	*<250	ND
Carbon Tetrachloride	5	*<250	ND
Benzene	5	*<250	ND
1,2-Dichloroethane	5	*<250	ND
Vinyl Acetate	10	*<500	ND
Trichloroethene (TCE)	5	*<250	ND
1,2-Dichloropropane	5	*<250	ND
Bromodichloromethane	5	*<250	ND
2-Chloroethyl Vinyl Ether	10	*<500	ND
trans-1,3-Dichloropropene	5	*<250	ND
2-Hexanone	10	*<500	ND
4-Methyl-2-pentanone (MIBK)	10	*<500	ND
Toluene	5	*<250	ND
cis-1,3-Dichloropropene	5	*<250	ND
1,1,2-Trichloroethane	5	*<250	ND
Tetrachloroethene (PCE)	5	*<250	ND
Dibromochloromethane	5	*<250	ND
Chlorobenzene	5	*<250	ND
Ethylbenzene	5	*<250	ND
Styrene	5	*<250	ND
Total Xylenes	5	*<250	ND
Bromoform	5	*<250	ND
1,1,2,2-Tetrachloroethane	5	*<250	ND
1,3-Dichlorobenzene	5	*<250	ND
1,4-Dichlorobenzene	5	*<250	ND
1,2-Dichlorobenzene	5	*<250	ND

MRL Method Reporting Limit
* MRLs are elevated because of matrix interferences and because the sample required diluting.
ND None Detected at or above the method reporting limit

Approved by Elaine R. Thomas Date 5-10-94

6925 CANOGA AVENUE ■ CANOGA PARK, CA 91303 ■ 818 587-5550 ■ FAX 818 587-5555

GOLDEN STATE / CAS LABORATORIES, INC.

Analytical Report

Client: EMCON Northwest, Inc.
Project: Terminal 115/#0357.013.01
Sample Matrix: Sludge

Date Collected: 05/05/94
Date Received: 05/06/94
Date Extracted: 05/06/94
Date Analyzed: 05/06/94
Service Request No.: LA941941

Base Neutral/Acid Semivolatile Organic Compounds
EPA Methods 3550/8270
mg/Kg (ppm)

Sample Name: SLUDGE 1
Lab Code: LA941941-1

Base Neutral Analyte	MRL	Result	Base Neutral Analyte	MRL	Result
N-Nitrosodimethylamine	0.3	*<9	2,6-Dinitrotoluene	0.3	*<9
Bis(2-chloroethyl) Ether	0.3	*<9	Diethyl Phthalate	0.3	*<9
1,2-Dichlorobenzene	0.3	*<9	4-Chlorophenyl Phenyl Ether	0.3	*<9
1,3-Dichlorobenzene	0.3	*<9	Fluorene	0.3	*<9
1,4-Dichlorobenzene	0.3	*<9	4-Nitroaniline	2	*<60
Bis(2-chloroisopropyl) Ether	0.3	*<9	N-Nitrosodiphenylamine	0.3	*<9
N-Nitrosodi-n-propylamine	0.3	*<9	4-Bromophenyl Phenyl Ether	0.3	*<9
Hexachloroethane	0.3	*<9	Hexachlorobenzene	0.3	*<9
Nitrobenzene	0.3	*<9	Phenanthrene	0.3	*<9
Isophorone	0.3	*<9	Anthracene	0.3	*<9
Bis(2-chloroethoxy)methane	0.3	*<9	Di-n-butyl Phthalate	0.3	*<9
1,2,4-Trichlorobenzene	0.3	*<9	Fluoranthene	0.3	*<9
Naphthalene	0.3	43	Pyrene	0.3	*<9
4-Chloroaniline	0.3	*<9	Butylbenzyl Phthalate	0.3	*<9
Hexachlorobutadiene	0.3	*<9	3,3'-Dichlorobenzidine	0.3	*<9
2-Methylnaphthalene	0.3	110	Benz(a)anthracene	0.3	*<9
Hexachlorocyclopentadiene	0.3	*<9	Bis(2-ethylhexyl) Phthalate	0.3	*<9
2-Chloronaphthalene	0.3	*<9	Chrysene	0.3	*<9
2-Nitroaniline	2	*<60	Di-n-octyl Phthalate	0.3	*<9
Dimethyl Phthalate	0.3	*<9	Benzo(b)fluoranthene	0.3	*<9
Acenaphthylene	0.3	*<9	Benzo(k)fluoranthene	0.3	*<9
3-Nitroaniline	2	*<60	Benzo(a)pyrene	0.3	*<9
Acenaphthene	0.3	*<9	Indeno(1,2,3-c,d)pyrene	0.3	*<9
Dibenzofuran	0.3	*<9	Dibenz(a,h)anthracene	0.3	*<9
2,4-Dinitrotoluene	0.3	*<9	Benzo(g,h,i)perylene	0.3	*<9
Aniline	0.3	*<9	Pyridine	0.6	*<18

Acid Analyte	MRL	Result	Acid Analyte	MRL	Result
Phenol	0.3	*<9	2,4-Dichlorophenol	0.3	*<9
2-Chlorophenol	0.3	*<9	4-Chloro-3-methylphenol	0.3	*<9
Benzyl Alcohol	0.3	*<9	2,4,6-Trichlorophenol	0.3	*<9
2-Methylphenol	0.3	*<9	2,4,5-Trichlorophenol	0.3	*<9
3- and 4-Methylphenol♦	0.3	*<9	2,4-Dinitrophenol	2	*<60
2-Nitrophenol	0.3	*<9	4-Nitrophenol	2	*<60
2,4-Dimethylphenol	0.3	*<9	2-Methyl-4,6-dinitrophenol	2	*<60
Benzoic Acid	2	*<60	Pentachlorophenol	2	*<60

MRL Method Reporting Limit
* MRLs are elevated because of matrix interferences and because the sample required diluting.
♦ Quantified as 4-methylphenol.

Approved by Elaine R. Thomas Date 5-10-94

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GOLDEN STATE / CAS LABORATORIES, INC.

Analytical Report

Client:	EMCON Northwest, Inc.	Date Extracted:	05/06/94
Project:	Terminal 115/#0357.013.01	Date Analyzed:	05/06/94
Sample Matrix:	Sludge	Service Request No.:	LA941941

Base Neutral/Acid Semivolatile Organic Compounds
EPA Methods 3550/8270
mg/Kg (ppm)

Sample Name: Method Blank
Lab Code: LA941941-MB

Base Neutral Analyte	MRL	Result	Base Neutral Analyte	MRL	Result
N-Nitrosodimethylamine	0.3	ND	2,6-Dinitrotoluene	0.3	ND
Bis(2-chloroethyl) Ether	0.3	ND	Diethyl Phthalate	0.3	ND
1,2-Dichlorobenzene	0.3	ND	4-Chlorophenyl Phenyl Ether	0.3	ND
1,3-Dichlorobenzene	0.3	ND	Fluorene	0.3	ND
1,4-Dichlorobenzene	0.3	ND	4-Nitroaniline	2	ND
Bis(2-chloroisopropyl) Ether	0.3	ND	N-Nitrosodiphenylamine	0.3	ND
N-Nitrosodi-n-propylamine	0.3	ND	4-Bromophenyl Phenyl Ether	0.3	ND
Hexachloroethane	0.3	ND	Hexachlorobenzene	0.3	ND
Nitrobenzene	0.3	ND	Phenanthrene	0.3	ND
Isophorone	0.3	ND	Anthracene	0.3	ND
Bis(2-chloroethoxy)methane	0.3	ND	Di-n-butyl Phthalate	0.3	ND
1,2,4-Trichlorobenzene	0.3	ND	Fluoranthene	0.3	ND
Naphthalene	0.3	ND	Pyrene	0.3	ND
4-Chloroaniline	0.3	ND	Butylbenzyl Phthalate	0.3	ND
Hexachlorobutadiene	0.3	ND	3,3'-Dichlorobenzidine	0.3	ND
2-Methylnaphthalene	0.3	ND	Benz(a)anthracene	0.3	ND
Hexachlorocyclopentadiene	0.3	ND	Bis(2-ethylhexyl) Phthalate	0.3	ND
2-Chloronaphthalene	0.3	ND	Chrysene	0.3	ND
2-Nitroaniline	2	ND	Di-n-octyl Phthalate	0.3	ND
Dimethyl Phthalate	0.3	ND	Benzo(b)fluoranthene	0.3	ND
Acenaphthylene	0.3	ND	Benzo(k)fluoranthene	0.3	ND
3-Nitroaniline	2	ND	Benzo(a)pyrene	0.3	ND
Acenaphthene	0.3	ND	Indeno(1,2,3-c,d)pyrene	0.3	ND
Dibenzofuran	0.3	ND	Dibenz(a,h)anthracene	0.3	ND
2,4-Dinitrotoluene	0.3	ND	Benzo(g,h,i)perylene	0.3	ND
Aniline	0.3	ND	Pyridine	0.6	ND

Acid Analyte	MRL	Result	Acid Analyte	MRL	Result
Phenol	0.3	ND	2,4-Dichlorophenol	0.3	ND
2-Chlorophenol	0.3	ND	4-Chloro-3-methylphenol	0.3	ND
Benzyl Alcohol	0.3	ND	2,4,6-Trichlorophenol	0.3	ND
2-Methylphenol	0.3	ND	2,4,5-Trichlorophenol	0.3	ND
3- and 4-Methylphenol♦	0.3	ND	2,4-Dinitrophenol	2	ND
2-Nitrophenol	0.3	ND	4-Nitrophenol	2	ND
2,4-Dimethylphenol	0.3	ND	2-Methyl-4,6-dinitrophenol	2	ND
Benzoic Acid	2	ND	Pentachlorophenol	2	ND

MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
♦ Quantified as 4-methylphenol.

Approved by Elaine R. Thomas Date 5-10-94

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GOLDEN STATE / CAS LABORATORIES, INC.

Analytical Report

Client:	EMCON Northwest, Inc.	**Date Collected:**	05/05/94
Project:	Terminal 115/#0357.013.01	**Date Received:**	05/06/94
Sample Matrix:	Sludge	**Date Extracted:**	05/09/94
		Service Request No.:	LA941941

Polychlorinated Biphenyls (PCBs)
EPA Methods 3550/8080
mg/Kg (ppm)

Sample Name:		**SLUDGE 1**	**Method Blank**
Lab Code:		**LA941941-1**	**LA941941-MB**
Date Analyzed:		**05/09/94**	**05/09/94**
Analyte	**MRL**		
Aroclor 1016	0.1	ND	ND
Aroclor 1221	0.1	ND	ND
Aroclor 1232	0.1	ND	ND
Aroclor 1242	0.1	ND	ND
Aroclor 1248	0.1	ND	ND
Aroclor 1254	0.1	ND	ND
Aroclor 1260	0.1	ND	ND

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

Approved by Elaine R. Thomas Date 5-10-94

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GOLDEN STATE / CAS LABORATORIES, INC.

Analytical Report

Client:	EMCON Northwest, Inc.	Date Collected:	05/05/94
Project:	Terminal 115/#0357.013.01	Date Received:	05/06/94
Sample Matrix:	Sludge	Date Analyzed:	05/06-09/94
		Service Request No.:	LA941941

Total Metals
mg/Kg (ppm)

			Sample Name:	SLUDGE 1	Method Blank
			Lab Code:	LA941941-1	LA941941-MB
Analyte	**EPA Method**	**MRL**			
Arsenic	3050/7060	5		ND	ND
Barium	3050/6010	1		45	ND
Cadmium	3050/6010	1		ND	ND
Chromium	3050/6010	2		12	ND
Lead	3050/6010	5		21	ND
Mercury	7471	0.2		ND	ND
Selenium	3050/7740	5		ND	ND
Silver	3050/6010	1		ND	ND

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

Approved by Elaine R. Thomas Date 5-10-94

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GOLDEN STATE / CAS LABORATORIES, INC.

QA/QC Report

Client: EMCON Northwest, Inc.
Project: Terminal 115/#0357.013.01
Sample Matrix: Sludge

Service Request No.: LA941941

Surrogate Recovery Summary
Volatile Organic Compounds
EPA Method 8260

Sample Name	Lab Code	Percent Recovery		
		Pentafluorobenzene	Toluene - D_8	4-Bromofluorobenzene
SLUDGE 1	LA941941-1	91	103	114
Method Blank	LA941941-MB	92	96	95
EPA Acceptance Criteria		70-130	81-120	74-121

Approved by Elaine R. Thomas Date 5-10-94

6925 CANOGA AVENUE ■ CANOGA PARK, CA 91303 ■ 818 587-5550 ■ FAX 818 587-5555

GOLDEN STATE / CAS LABORATORIES, INC.

QA/QC Report

Client: EMCON Northwest, Inc. **Service Request No.:** LA941941
Project: Terminal 115/#0357.013.01
Sample Matrix: Sludge

Surrogate Recovery Summary
Base Neutral/Acid Semivolatile Organic Compounds
EPA Methods 3550/8270

Sample Name	Lab Code	Percent Recovery					
		2FP	PHL	TBP	NBZ	FBP	TPH
SLUDGE 1	LA941941-1	NA	NA	NA	NA	NA	NA
Method Blank	LA941941-MB	78	74	83	77	79	86
EPA Acceptance Criteria		25-121	24-113	19-122	23-128	30-115	18-137

2FP 2-Fluorophenol
PHL Phenol-D_6
TBP 2,4,6-Tribromophenol
NBZ Nitrobenzene-D_5
FBP 2-Fluorobiphenyl
TPH Terphenyl-D_{14}

NA Not Applicable because of the sample matrix. Analysis of this sample required a dilution such that the surrogate concentration was diluted below the MRL.

Approved by Elaine R. Thomas Date 5.10.94

GOLDEN STATE / CAS LABORATORIES, INC.

QA/QC Report

Client: EMCON Northwest, Inc. Service Request No.: LA941941
Project: Terminal 115/#0357.013.01
Sample Matrix: Sludge

Surrogate Recovery Summary
Polychlorinated Biphenyls (PCBs)
EPA Methods 3550/8080

Sample Name	Lab Code	Percent Recovery Tetrachloro-*m*-xylene
SLUDGE 1	LA941941-1	84
Method Blank	LA941941-MB	100
	CAS Acceptance Criteria	60-140

Approved by Elaine R. Thomas Date 5-10-94

6925 CANOGA AVENUE ■ CANOGA PARK, CA 91303 ■ 818 587-5550 ■ FAX 818 587-5555

CHAIN OF CUSTODY/LABORATORY ANALYSIS REPORT FORM

Columbia Analytical Services inc.

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

DATE 5/5/94 PAGE 1 OF 1

PROJECT NAME Terminal 115 #

PROJECT 0357.013.01

COMPANY/ADDRESS EMCON NW

McCar

PHONE 425-5000

SAMPLERS SIGNATURE

ANALYSIS REQUEST

SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	PETROLEUM HCS: TPH - HCID State:	TPH - G State: WA X	TPH - D State: WA X	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 HPCL	TCLP Metals Semi-VOA VOA	Metals Total List Below X Pest/Herb DISS	Cyanide	ORGANIC METALS/INORGANICS: 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
Sludge 1	5/5/94	13:30	LA941941-1	Sludge	1		X	X				X	X	X		X	X							Total Metals
Sludge 2	"	"	2		1																			HOLD

RELINQUISHED BY:

Signature

John L McCar

Printed Name

EMCON

Firm

5/5/94 14:30

Date/Time

RECEIVED BY:

Signature

DAVID SEARS

Printed Name

CAS

Firm

5-5-94 14:30

Date/Time

TURNAROUND REQUIREMENTS

___ 24 hr ✓ 48 hr. ___ 5 day

___ Standard (10-15 working days)

___ Provide Verbal Preliminary Results

___ Provide FAX preliminary Results

Requested Report Date 5/9/94

REPORT REQUIREMENTS

___ 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 ___

SAMPLE RECEIPT:

Shipping VIA: ___

Shipping to: ___

Condition: ___

Lab No: LA941941

RELINQUISHED BY:

Signature

Printed Name

Firm

5/5/94 15:00

Date/Time

RECEIVED BY:

Signature

M. SIGMAN

Printed Name

GS/CAS

Firm

5-6-94 0900

Date/Time

FED EX

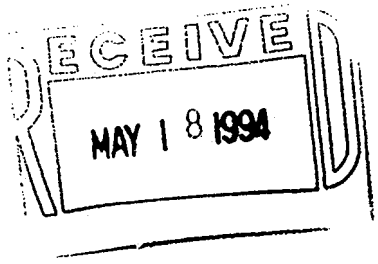
SPECIAL INSTRUCTIONS/COMMENTS:

8 TCLP RCRA metals run total metals; no TCLP extraction. RUSH - results by Monday 5/9/94.

Columbia Analytical Services, Inc.

May 18, 1994

Service Request No.: B940336



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

Re: **Terminal 115/Project #0357-013.01**

Dear John:

Attached are the results of the sample(s) submitted to our laboratory on May 5, 1994. Preliminary results were transmitted via facsimile on May 9, 1994. For your reference, these analyses have been assigned our service request number B940336.

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/crw

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	Date Collected:	05/05/94
Project:	Terminal 115	Date Received:	05/05/94
Sample Matrix:	Soil	Date Extracted:	05/06/94
		Work Order No.:	B940336

BTEX and TPH as Gasoline
EPA Methods 5030/8020
Washington DOE Method WTPH-G
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		Sludge 1	Method Blank
Lab Code:		B0336-1	B0336-MB
Date Analyzed:		05/07/94	05/07/94
Analyte	**MRL**		
Benzene	0.05	*<3	ND
Toluene	0.1	*<3	ND
Ethylbenzene	0.1	8	ND
Total Xylenes	0.1	92	ND
TPH as Gasoline	5	**29,000	ND

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
* Elevated MRL due to matrix interferences
** 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 C. Ellis Date 5/18/94

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	Date Collected:	05/05/94
Project:	Terminal 115	Date Received:	05/05/94
Sample Matrix:	Sludge	Date Extracted:	05/06/94
		Date Analyzed:	05/07/94
		Work Order No.:	B940336

Total Petroleum Hydrocarbons as Diesel and Oil
Washington DOE Method WTPH-D
mg/Kg (ppm)
Dry Weight Basis

		Diesel		Oil♦	
Sample Name	Lab Code	MRL	Result	MRL	Result
Sludge 1	B0336-1	25	*39700	100	6390
Method Blank	B0336-MB	25	ND	100	ND

♦ Quantified using 30-weight motor oil as a standard.
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
* 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 C. Elliott Date 5/18/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	Date Collected:	05/05/94
Project:	Terminal 115	Date Received:	05/05/94
Sample Matrix:	Soil	Date Extracted:	05/06/94
		Date Analyzed:	05/07,08/94
		Work Order No.:	B940336

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

Sample Name	Lab Code	Spike Level (mg/Kg)	Percent Recovery 4-Bromofluorobenzene
Sludge 1	B0336-1	8.8	*130
Method Blank	B0336-MB	8.8	48
	CAS Acceptance Criteria		73-116

TPH Total Petroleum Hydrocarbons
* Outside of acceptance limits because of matrix interferences. The chromatogram showed target components that interfered with the analysis.

Approved by A. Elliott Date 5/18/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	**Date Collected:**	05/05/94
Project:	Terminal 115	**Date Received:**	05/05/94
Sample Matrix:	Sludge	**Date Extracted:**	05/06/94
		Date Analyzed:	05/07/94
		Work Order No.:	B940336

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

Sample Name	Lab Code	Percent Recovery *p*-Terphenyl
Sludge 1	B0336-1	98
Method Blank	B0336-MB	97
Laboratory Control Sample	B0336-LCS	98
	CAS Acceptance Criteria	50-114

Approved by Jon. Elliott Date 5/18/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	**Date Extracted:**	05/06/94
Project:	Terminal 115	**Date Analyzed:**	05/07/94
LCS Matrix:	Soil	**Work Order No.:**	B940336

Laboratory Control Sample Summary
Total Petroleum Hydrocarbons as Diesel and Oil
Washington DOE Method WTPH-D
mg/Kg (ppm)

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Diesel	289	263	91	41-136

Approved by Cin. Elliott Date 5/18/94

CHAIN OF CUSTODY/LABORATORY ANALYSIS REPORT FORM

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

DATE 5/5/94 PAGE 1 OF 1

PROJECT NAME Terminal 115 #

PROJECT 0357.013.01

COMPANY/ADDRESS EMCON NW

Mayer

PHONE 485-5000

SAMPLERS SIGNATURE [signature]

ANALYSIS REQUEST

SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	PETROLEUM HCS: TPH - HCID State:	TPH - G State: WA BTEX	TPH - D State: WA Oil	TPH - 418.1 State: WA	TPH - Other	ORGANIC: Halogenated or Aromatic Volatiles 601/8010 Volatile Organics GC/MS 624/8240 602/8020	Base/Neu/Acid Organics GC/MS 625/8270	Pesticides/PCBS 8080 PCB ONLY	PAH 8310 HPCL	TCLP Metals Semi-VOA VOA	Metals Total List Below DISS	Cyanide	Pest/Herb	ORGANIC METALS/INORGANICS: 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
Sludge 1	5/5/94	13:30	336-1	Sludge	1		X	X				X	X	X		X	X							total metals
Sludge 2	"	"	-2		1																			HOLD

RELINQUISHED BY:

Signature [signature]

Printed Name John L Mayer

Firm EMCON

Date/Time 5/5/94 14:30

RECEIVED BY:

Signature [signature]

Printed Name DAVID SEARS

Firm CAS

Date/Time 5-5-94 14:30

TURNAROUND REQUIREMENTS

___ 24 hr ✓ 48 hr. ___ 5 day

___ Standard (10-15 working days)

___ Provide Verbal Preliminary Results

___ Provide FAX preliminary Results

Requested Report Date 5/9/94

REPORT REQUIREMENTS

___ 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 ___

SAMPLE RECEIPT:

Shipping VIA: ___

Shipping to: ___

Condition: ___

Lab No: 94-336

RELINQUISHED BY:

Signature ___

Printed Name ___

Firm ___

Date/Time ___

RECEIVED BY:

Signature ___

Printed Name ___

Firm ___

Date/Time ___

SPECIAL INSTRUCTIONS/COMMENTS:

8 TCLP RCRA metals run total metals; NO TCLP extraction. RUSH - results by Monday 5/9/94.

Columbia Analytical Services, Inc.

May 16, 1994

Service Request No.: K942709

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

Re: **Port of Seattle T115/Project #0357-013.01/B94-0315**

Dear John:

Enclosed are the results of the sample(s) submitted to our laboratory on April 26, 1994. Preliminary results were transmitted via facsimile on May 13, 1994. For your reference, these analyses have been assigned our service request number K942709.

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.

Lynde Thickstun for

Janice M. Sedlak
Project Chemist

JMS/sm

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	**Date Received:**	5/5/94
Project:	Port of Seattle T115 /#0357-013.01	**Date TCLP Performed:**	5/11/94
Matrix:	Water	**Date Analyzed:**	5/12/94
		Work Order No.:	K942709B

Toxicity Characteristic Leaching Procedure (TCLP)
EPA Method 1311
Metals
mg/L (ppm) in TCLP Extract

				Sample Name:	SP1&2 Composite	SP3&4 Composite
				Lab Code:	K270901	K270902
Analyte	EPA Method	MRL	Regulatory Limit*			
Arsenic	3010/6010 A	0.1	5.0		ND	ND
Barium	3010/6010 A	0.5	100		0.6	0.6
Cadmium	3010/6010 A	0.01	1.0		ND	ND
Chromium	3010/6010 A	0.01	5.0		ND	ND
Lead	3010/6010 A	0.05	5.0		ND	ND
Mercury	7470	0.001	0.2		ND	ND
Selenium	3010/6010 A	0.1	1.0		ND	ND
Silver	3010/6010 A	0.01	5.0		ND	ND

* From 40 CFR Part 261,et al., and Federal Register, March 29, 1990 and June 29, 1990

TCLPM/03-13-92

Approved: Lynda Hucketts Date: 5/16/94 Page No.:

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	**Date Received:**	NA
Project:	Port of Seattle T115 /#0357-013.01	**Date TCLP Performed:**	5/11/94
Matrix:	Water	**Date Analyzed:**	5/12/94
		Work Order No.:	K942709B

Toxicity Characteristic Leaching Procedure (TCLP)
EPA Method 1311
Metals
mg/L (ppm) in TCLP Extract

				Method
			Sample Name:	Blank
			Lab Code:	K2709MB
Analyte	EPA Method	MRL	Regulatory Limit*	
Arsenic	3010/6010 A	0.1	5.0	ND
Barium	3010/6010 A	0.5	100	ND
Cadmium	3010/6010 A	0.01	1.0	ND
Chromium	3010/6010 A	0.01	5.0	ND
Lead	3010/6010 A	0.05	5.0	ND
Mercury	7470	0.001	0.2	ND
Selenium	3010/6010 A	0.1	1.0	ND
Silver	3010/6010 A	0.01	5.0	ND

* From 40 CFR Part 261,et al., and Federal Register, March 29, 1990 and June 29, 1990

TCLPM/03-13-92

Approved: Lynda Thuckett Date: 5/16/94 Page No.: 00004

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	**Date Received:**	5/5/94
Project:	Port of Seattle T115 /#0357-013.01	**Date TCLP Performed:**	5/11/94
Matrix:	Water	**Date Analyzed:**	5/12/94
		Work Order No.:	K942709B

Matrix Spike Summary
Toxicity Characteristic Leaching Procedure (TCLP)
EPA Method 1311
Metals
mg/L (ppm) in TCLP Extract

Sample Name: SP1&2 Composite
Lab Code: K270901

Analyte	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery‡
Arsenic	5.0	ND	5.2	104
Barium	5.0	0.6	5.7	102
Cadmium	1.0	ND	0.95	95
Chromium	5.0	ND	4.79	96
Lead	5.0	ND	4.72	94
Mercury	0.010	ND	0.006	60
Selenium	1.0	ND	1.1	110
Silver	1.0	ND	0.94	94

‡ Percent recovery information is provided in order to assess the performance of the method on this matrix.

TCLPM.MS/03-13-92

Approved: Lynda Thickett Date: 5/16/94 Page No.:

K94-2709B

CHAIN OF CUSTODY/LABORATORY ANALYSIS REPORT FORM

Columbia Analytical Services inc.

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

DATE 4-26-94 PAGE 1 OF 1

PROJECT NAME Port of Seattle T115 # - 0357-013.01

PROJECT John Meyer

COMPANY/ADDRESS EMCON

PHONE

SAMPLERS SIGNATURE T. Bodle

ANALYSIS REQUEST

SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	PETROLEUM HCS: TPH - HCID State:	TPH - G State: WA X	BTEX X	TPH - D State: WA	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 X	Semi VOA ___ VOA ___ Pest/Herb ___	Metals Total ___ DISS ___ List Below	Cyanide	ORGANIC METALS/INORGANICS: 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
sp1	4-26-94		315-1	soil	1		X	X										X								hold
sp2	↓		-2	↓	1																					hold
sp3			-3		1		X	X										X								hold K-2709
sp4			-4		1																					hold -

RELINQUISHED BY:
Signature: Tom Bodle
Printed Name: Tom Bodle
Firm: EMCON
Date/Time: 4-26-94 1330

RECEIVED BY:
Signature: DJ Mosier
Printed Name: DJ MOSIER
Firm: CAS
Date/Time: 4/26/94 1330

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 ___

SAMPLE RECEIPT:
Shipping VIA: ___
Shipping to: ___
Condition: ___
Lab No: 894-315

RELINQUISHED BY:
Signature
Printed Name: DAVID SEARS
Firm: CAS
Date/Time: 5-4-94 12:00

RECEIVED BY:
Signature
Printed Name: Carol Jording
Firm: CAS/Weiss 5/5/94 13:08
Date/Time

SPECIAL INSTRUCTIONS/COMMENTS:

Hold 'em.

per John Meyer 5/4/94

Composite SP1 and SP2

SP3 and SP4

Analyze the composites for: BTEX/WTPH-G WTPH-D extended TCLP metals

K94-2709B

Columbia Analytical Services, Inc.

May 18, 1994

RECEIVED
MAY 18 1994

Service Request No.: B940315

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

Re: **Port of Seattle T115/Project #0357-013.01**

Dear John:

Attached are the results of the sample(s) submitted to our laboratory on April 26, 1994. For your reference, these analyses have been assigned our service request number B940.

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

ORIGINAL IS IN PROJECT FILING

CBE/crw

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	Date Collected:	04/26/94
Project:	Port of Seattle T115	Date Received:	04/26/94
Sample Matrix:	Soil	Date Extracted:	05/04/94
		Work Order No.:	B940315

BTEX and TPH as Gasoline
EPA Methods 5030/8020
Washington DOE Method WTPH-G
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		Comp #1 SP 1 & 2	Comp #2 SP 3 & 4	Method Blank
Lab Code:		B0315-5	B0315-6	B0315-MB
Date Analyzed:		05/05/94	05/05/94	05/05/94
Analyte	**MRL**			
Benzene	0.05	ND	ND	ND
Toluene	0.1	ND	ND	ND
Ethylbenzene	0.1	ND	ND	ND
Total Xylenes	0.1	0.1	0.3	ND
TPH as Gasoline	5	*495	*595	ND

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
* 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 _____ Date 5/18/94

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	**Date Collected:**	04/26/94
Project:	Port of Seattle T115	**Date Received:**	04/26/94
Sample Matrix:	Soil	**Date Extracted:**	05/09/94
		Date Analyzed:	05/10,11/94
		Work Order No.:	B940315

Total Petroleum Hydrocarbons as Diesel and Oil
Washington DOE Method WTPH-D
mg/Kg (ppm)
Dry Weight Basis

		Diesel		Oil♦	
Sample Name	**Lab Code**	**MRL**	**Result**	**MRL**	**Result**
Comp #1 - SP 1 & 2	B0315-5	25	*378	100	220
Comp #2 - SP 3 & 4	B0315-6	25	*506	100	310
Method Blank	B0315-MB	25	ND	100	ND

♦ Quantified using 30-weight motor oil as a standard.
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
* 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 Cris Elliott Date 5/18/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	Date Collected:	04/26/94
Project:	Port of Seattle T115	Date Received:	04/26/94
Sample Matrix:	Soil	Date Extracted:	05/04/94
		Date Analyzed:	05/05/94
		Work Order No.:	B940315

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

Sample Name	Lab Code	Spike Level (mg/Kg)	Percent Recovery 4-Bromofluorobenzene
Comp #1 - SP 1 & 2	B0315-5	8.8	106
Comp #2 - SP 3 & 4	B0315-6	8.8	106
Comp #2 - SP 3 & 4	B0315-6DUP	8.8	114
Method Blank	B0315-MB	8.8	*146
Laboratory Control Sample	B0315-LCS	8.8	102
Laboratory Control Sample	B0315-GLCS	8.8	99
	CAS Acceptance Criteria		73-116

TPH Total Petroleum Hydrocarbons

* Outside of acceptance limits. Since the elevated percent recovery is for the method blank, and since the percent recovery for all of the associated samples is acceptable, it is the opinion of CAS that the quality of the sample data has not been significantly affected.

Approved by Colin Ellis Date 5/18/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	**Date Collected:**	04/26/94
Project:	Port of Seattle T115	**Date Received:**	04/26/94
Sample Matrix:	Soil	**Date Extracted:**	05/04/94
		Date Analyzed:	05/05/94
		Work Order No.:	B940315

Duplicate Summary
BTEX and TPH as Gasoline
EPA Methods 5030/8020
Washington DOE Method WTPH-G
mg/Kg (ppm)
Dry Weight Basis

Sample Name: Comp #2 SP 3 & 4
Lab Code: B0315-6

Analyte	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Benzene	0.05	ND	ND	ND	<2
Toluene	0.1	ND	ND	ND	<2
Ethylbenzene	0.1	ND	ND	ND	<2
Total Xylenes	0.1	0.3	ND	--	--
TPH as Gasoline	5	595	585	590	2

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

Approved by Cin. Ellis Date 5/18/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	**Date Extracted:**	05/04/94
Project:	Port of Seattle T115	**Date Analyzed:**	05/05/94
Sample Matrix:	Soil	**Work Order No.:**	B940315

Laboratory Control Sample Summary
BTEX and TPH as Gasoline
EPA Method 5030/8020 WTPH-G
mg/kg (ppm)
Dry Weight Basis

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Benzene	1.00	0.89	89	23-170
Toluene	1.00	0.93	93	31-166
Ethyl Benzene	1.00	0.90	90	30-164
TPH as Gasoline	50	48	96	70-140

Approved by A. Ellwig Date 5/18/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	**Date Collected:**	04/26/94
Project:	Port of Seattle T115	**Date Received:**	04/26/94
Sample Matrix:	Soil	**Date Extracted:**	05/09/94
		Date Analyzed:	05/10,11/94
		Work Order No.:	B940315

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

Sample Name	Lab Code	Percent Recovery *p*-Terphenyl
Comp #1 - SP 1 & 2	B0315-5	99
Comp #2 - SP 3 & 4	B0315-6	93
Method Blank	B0315-MB	110
Laboratory Control Sample	B0315-LCS	101
	CAS Acceptance Criteria	50-114

Approved by Dale · Ellis Date 5/18/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	Date Collected:	----/----/----
Project:	Port of Seattle T115	Date Received:	04/26/94
Sample Matrix:	Soil	Date Extracted:	05/09/94
		Date Analyzed:	05/10/94
		Work Order No.:	B940315

Duplicate Summary
Total Petroleum Hydrocarbons as Diesel and Oil
Washington DOE Method WTPH-D
mg/Kg (ppm)
Dry Weight Basis

Sample Name: Batch QC
Lab Code: B0311-3

Analyte	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Diesel	25	28	37	32	28
Oil	100	ND	ND	--	--

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

Approved by Cole. Elliott Date 5/15/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	Date Collected:	----/----/----
Project:	Port of Seattle T115	Date Received:	04/26/94
Sample Matrix:	Soil	Date Extracted:	05/09/94
		Date Analyzed:	05/11/94
		Work Order No.:	B940315

Matrix Spike Summary
Total Petroleum Hydrocarbons as Diesel and Oil
Washington DOE Method WTPH-D
mg/Kg (ppm)
Dry Weight Basis

Sample Name: Batch QC
Lab Code: B0311-5

Analyte	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Diesel	265	ND	271	102	41-136

ND None Detected at or above the method reporting limit

Approved by John Elliott Date 5/18/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	Date Extracted:	05/09/94
Project:	Port of Seattle T115	Date Analyzed:	05/11/94
LCS Matrix:	Soil	Work Order No.:	B940315

Laboratory Control Sample Summary
Total Petroleum Hydrocarbons as Diesel and Oil
Washington DOE Method WTPH-D
mg/Kg (ppm)

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Diesel	289	335	116	41-136

Approved by Ch. Elliott Date 5/18/94

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

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

DATE 4-26-94 PAGE 1 OF 1

PROJECT NAME Port of Seattle T115 # - 0357-013.01

PROJECT John Meyer

COMPANY/ADDRESS EMCON

PHONE

SAMPLERS SIGNATURE T. Bodle

ANALYSIS REQUEST

SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	PETROLEUM HCS: TPH - HCID State:	TPH - G State:	BTEX X	TPH - D State:	OIL extended	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 X	Semi VOA	VOA	Pest/Herb	Metals Total	DISS	List Below	Cyanide	ORGANIC METALS/INORGANICS: pH, Cond Cl, SO4, PO4 F, Br NO2 NO3 (Circle)	NH3 - N, COD, Total-P TKN, TOC, TOX (Circle)	REMARKS
sp1	4-26-94		315-1	soil	1		X	X												X									hold
sp2	↓		-2	↓	1																								hold
sp3			-3		1		X	X												X									hold
sp4	↓		-4	↓	1																								hold

RELINQUISHED BY:
Signature: Tom Bodle
Printed Name: Tom Bodle
Firm: EMCON
Date/Time: 4-26-94 1330

RECEIVED BY:
Signature: DJ Mosier
Printed Name: DJ MOSIER
Firm: CAS
Date/Time: 4/26/94 1330

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 ___

SAMPLE RECEIPT:
Shipping VIA: ___
Shipping to: ___
Condition: ___
Lab No: 894-315

RELINQUISHED BY:
Signature
Printed Name
Firm
Date/Time

RECEIVED BY:
Signature
Printed Name
Firm
Date/Time

SPECIAL INSTRUCTIONS/COMMENTS:

Hold 'em.

per John Meyer 5/4/94

Composite sp1 and sp2

sp3 and sp4

Analyze the composites for: BTEX/cWPH-G. WTPH-D extended TCLP metals

Columbia Analytical Services, Inc.

May 27, 1994

Service Request No.: B940331

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

Re: **Port of Seattle T115/Project #0357-013.01**

Dear John:

Attached are the results of the sample(s) submitted to our laboratory on May 11, 1994. For your reference, these analyses have been assigned our service request number B940331.

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/crw

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	Date Collected:	05/10/94
Project:	Port of Seattle T115	Date Received:	05/11/94
Sample Matrix:	Soil	Date Extracted:	05/16/94
		Work Order No.:	B940331

BTEX and TPH as Gasoline
EPA Methods 5030/8020
Washington DOE Method WTPH-G
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		UST3sw-8'	UST1sw-8'	UST1wwb-8'
Lab Code:		B0331-1	B0331-2	B0331-3
Date Analyzed:		05/18/94	05/18/94	05/17/94
Analyte	**MRL**			
Benzene	0.05	ND	ND	ND
Toluene	0.1	ND	ND	ND
Ethylbenzene	0.1	2.3	2.0	ND
Total Xylenes	0.1	17.5	14.5	ND
TPH as Gasoline	5	*6700	*6200	ND

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
* Result is from the analysis of a diluted sample, performed on 05/20/94

Approved by Colin Elliott Date 5/31/94

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	**Date Collected:**	05/10/94
Project:	Port of Seattle T115	**Date Received:**	05/11/94
Sample Matrix:	Soil	**Date Extracted:**	05/16/94
		Work Order No.:	B940331

BTEX and TPH as Gasoline
EPA Methods 5030/8020
Washington DOE Method WTPH-G
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		UST1wwa-8'	UST1nw-8'	UST3nw-8'
Lab Code:		B0331-4	B0331-5	B0331-6
Date Analyzed:		05/17/94	05/18/94	05/17/94
Analyte	**MRL**			
Benzene	0.05	0.06	ND	ND
Toluene	0.1	ND	ND	ND
Ethylbenzene	0.1	1.0	1.4	ND
Total Xylenes	0.1	8.0	11.2	ND
TPH as Gasoline	5	2350	*4900	ND

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
* Result is from the analysis of a diluted sample, performed on 05/20/94

Approved by John Elliott Date 5/31/94

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	**Date Collected:**	05/10/94
Project:	Port of Seattle T115	**Date Received:**	05/11/94
Sample Matrix:	Soil	**Date Extracted:**	05/16/94
		Work Order No.:	B940331

BTEX and TPH as Gasoline
EPA Methods 5030/8020
Washington DOE Method WTPH-G
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		UST3ewa-8'	UST3ewb-8'	UST3ewc-4'
Lab Code:		B0331-7	B0331-8	B0331-9
Date Analyzed:		05/17/94	05/17/94	05/17/94
Analyte	**MRL**			
Benzene	0.05	ND	ND	ND
Toluene	0.1	ND	ND	ND
Ethylbenzene	0.1	3.3	ND	ND
Total Xylenes	0.1	22.9	ND	ND
TPH as Gasoline	5	*9600	20	37

TPH Total Petroleum Hydrocarbons
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
* Result is from the analysis of a diluted sample, performed on 05/20/94

Approved by Chris Ellwood Date 5/31/94

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	Date Collected:	05/10/94
Project:	Port of Seattle T115	Date Received:	05/11/94
Sample Matrix:	Soil	Date Extracted:	05/16/94
		Work Order No.:	B940331

BTEX and TPH as Gasoline
EPA Methods 5030/8020
Washington DOE Method WTPH-G
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		UST2sw-4'	UST1wwc-4'
Lab Code:		B0331-10	B0331-11
Date Analyzed:		05/17/94	05/17/94
Analyte	**MRL**		
Benzene	0.05	ND	ND
Toluene	0.1	ND	ND
Ethylbenzene	0.1	ND	ND
Total Xylenes	0.1	ND	ND
TPH as Gasoline	5	ND	ND

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

Approved by John Ebbett Date 5/31/94

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	Date Collected:	05/10/94
Project:	Port of Seattle T115	Date Received:	05/11/94
Sample Matrix:	Soil	Date Extracted:	05/16/94
		Work Order No.:	B940331

BTEX and TPH as Gasoline
EPA Methods 5030/8020
Washington DOE Method WTPH-G
mg/Kg (ppm)
Dry Weight Basis

Sample Name:		UST2nw-4'	Method Blank
Lab Code:		B0331-12	B0331-MB
Date Analyzed:		05/17/94	05/17/94
Analyte	**MRL**		
Benzene	0.05	ND	ND
Toluene	0.1	ND	ND
Ethylbenzene	0.1	ND	ND
Total Xylenes	0.1	ND	ND
TPH as Gasoline	5	ND	ND

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

Approved by C. Elliott Date 5/31/94

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	**Date Collected:**	05/10/94
Project:	Port of Seattle T115	**Date Received:**	05/11/94
Sample Matrix:	Soil	**Date Extracted:**	05/18/94
		Date Analyzed:	05/20,21/94
		Work Order No.:	B940331

Total Petroleum Hydrocarbons as Diesel and Oil
Washington DOE Method WTPH-D
mg/Kg (ppm)
Dry Weight Basis

		Diesel		Oil♦	
Sample Name	**Lab Code**	**MRL**	**Result**	**MRL**	**Result**
UST3sw-8'	B0331-1	25	*2900	100	ND
UST1sw-8'	B0331-2	25	*4530	100	ND
UST1wwb-8'	B0331-3	25	ND	100	ND
UST1wwa-8'	B0331-4	25	*1620	100	ND
UST1nw-8'	B0331-5	25	*5050	100	470
UST3nw-8'	B0331-6	25	ND	100	ND
UST3ewa-8'	B0331-7	25	*4050	100	150
UST3ewb-8'	B0331-8	25	*157	100	300
UST3ewc-4'	B0331-9	25	ND	100	ND
UST2sw-4'	B0331-10	25	ND	100	120

♦ Quantified using 30-weight motor oil as a standard.
MRL Method Reporting Limit
ND None Detected at or above the method reporting limit
* 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 Ch. Ellwood Date 5/31/94

COLUMBIA ANALYTICAL SERVICES, INC.

Analytical Report

Client:	EMCON Northwest	Date Collected:	05/10/94
Project:	Port of Seattle T115	Date Received:	05/11/94
Sample Matrix:	Soil	Date Extracted:	05/18/94
		Date Analyzed:	05/20,21/94
		Work Order No.:	B940331

Total Petroleum Hydrocarbons as Diesel and Oil
Washington DOE Method WTPH-D
mg/Kg (ppm)
Dry Weight Basis

		Diesel		Oil♦	
Sample Name	Lab Code	MRL	Result	MRL	Result
UST1wwc-4'	B0331-11	25	*55	100	270
UST2nw-4'	B0331-12	25	*29	100	ND
Method Blank	B0331-MB	25	ND	100	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 primarily due to the beginning of oil, which elutes in the diesel region.

Approved by Cole. Elliott Date 5/31/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	**Date Collected:**	05/10/94
Project:	Port of Seattle T115	**Date Received:**	05/11/94
Sample Matrix:	Soil	**Date Extracted:**	05/16/94
		Date Analyzed:	05/17,18/94
		Work Order No.:	B940331

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

Sample Name	Lab Code	Spike Level (mg/Kg)	Percent Recovery 4-Bromofluorobenzene
UST3sw-8'	B0331-1	8.8	*154
UST1sw-8'	B0331-2	8.8	*141
UST1wwb-8'	B0331-3	8.8	97
UST1wwb-8'	B0331-3MS	8.8	101
UST1wwa-8'	B0331-4	8.8	*133
UST1wwa-8'	B0331-4DUP	8.8	*126
UST1nw-8'	B0331-5	8.8	*146
UST3nw-8'	B0331-6	8.8	92
UST3ewa-8'	B0331-7	8.8	*172
	CAS Acceptance Criteria		73-116

TPH Total Petroleum Hydrocarbons
* Outside of acceptance limits because of matrix interferences. The chromatogram showed nontarget components that interfered with the analysis.

Approved by A. Ellis Date 5/31/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	Date Collected:	05/10/94
Project:	Port of Seattle T115	Date Received:	05/11/94
Sample Matrix:	Soil	Date Extracted:	05/16/94
		Date Analyzed:	05/17,18/94
		Work Order No.:	B940331

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

Sample Name	Lab Code	Spike Level (mg/Kg)	Percent Recovery 4-Bromofluorobenzene
UST3ewb-8'	B0331-8	8.8	100
UST3ewc-4'	B0331-9	8.8	102
UST2sw-4'	B0331-10	8.8	102
UST1wwc-4'	B0331-11	8.8	100
UST2nw-4'	B0331-12	8.8	100
Method Blank	B0331-MB	8.8	109
Laboratory Control Sample	B0331-LCS	8.8	104
Laboratory Control Sample	B0331-GLCS	8.8	97
	CAS Acceptance Criteria		73-116

TPH Total Petroleum Hydrocarbons

Approved by Chris Ellett Date 5/31/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	Date Collected:	05/10/94
Project:	Port of Seattle T115	Date Received:	05/11/94
Sample Matrix:	Soil	Date Extracted:	05/18/94
		Date Analyzed:	05/20,21/94
		Work Order No.:	B940331

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

Sample Name	Lab Code	Percent Recovery *p*-Terphenyl
UST3sw-8'	B0331-1	107
UST1sw-8'	B0331-2	110
UST1sw-8'	B0331-2DUP	114
UST1wwb-8'	B0331-3	106
UST1wwb-8'	B0331-3MS	112
UST1wwa-8'	B0331-4	109
UST1nw-8'	B0331-5	*116
UST3nw-8'	B0331-6	114
UST3ewa-8'	B0331-7	112
UST3ewb-8'	B0331-8	110
	CAS Acceptance Criteria	50-114

* Outside of acceptance limits because of matrix interferences. The chromatogram showed target components that interfered with the analysis.

Approved by C. Elliott Date 5/31/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	Date Collected:	05/10/94
Project:	Port of Seattle T115	Date Received:	05/11/94
Sample Matrix:	Soil	Date Extracted:	05/18/94
		Date Analyzed:	05/20,21/94
		Work Order No.:	B940331

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

Sample Name	Lab Code	Percent Recovery *p*-Terphenyl
UST3ewc-4'	B0331-9	110
UST2sw-4'	B0331-10	106
UST1wwc-4'	B0331-11	107
UST2nw-4'	B0331-12	104
Method Blank	B0331-MB	106
Laboratory Control Sample	B0331-LCS	108
	CAS Acceptance Criteria	50-114

Approved by C. L. Ellwood Date 5/31/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	Date Collected:	05/10/94
Project:	Port of Seattle T115	Date Received:	05/11/94
Sample Matrix:	Soil	Date Extracted:	05/16/94
		Date Analyzed:	05/17/94
		Work Order No.:	B940331

Duplicate Summary
BTEX and TPH as Gasoline
EPA Methods 5030/8020
Washington DOE Method WTPH-G
mg/Kg (ppm)
Dry Weight Basis

Sample Name: UST1wwa-8'
Lab Code: B0331-4

Analyte	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Benzene	0.05	0.06	ND	--	--
Toluene	0.1	ND	ND	--	--
Ethylbenzene	0.1	1.0	1.0	1.0	<1
Total Xylenes	0.1	8.0	6.5	7.2	21
TPH as Gasoline	5	2350	1910	2130	21

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

Approved by Chr. Elliott Date 5/31/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	Date Collected:	05/10/94
Project:	Port of Seattle T115	Date Received:	05/11/94
Sample Matrix:	Soil	Date Extracted:	05/18/94
		Date Analyzed:	05/20/94
		Work Order No.:	B940331

Duplicate Summary
Total Petroleum Hydrocarbons as Diesel and Oil
Washington DOE Method WTPH-D
mg/Kg (ppm)
Dry Weight Basis

Sample Name: UST1sw-8'
Lab Code: B0331-2

Analyte	MRL	Sample Result	Duplicate Sample Result	Average	Relative Percent Difference
Diesel	25	4530	4700	4620	4
Oil	100	ND	ND	ND	--

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

Approved by Ann Elliott Date 5/31/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	**Date Collected:**	05/10/94
Project:	Port of Seattle T115	**Date Received:**	05/11/94
Sample Matrix:	Soil	**Date Extracted:**	05/17/94
		Date Analyzed:	05/16/94
		Work Order No.:	B940331

Matrix Spike Summary
BTEX
EPA Methods 5030/8020
mg/Kg (ppm)
Dry Weight Basis

Sample Name: UST1wwb-8'
Lab Code: B0331-3

Analyte	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Benzene	1.15	ND	1.08	94	23-170
Toluene	1.15	ND	1.13	98	31-166
Ethylbenzene	1.15	ND	1.13	98	30-164

ND None Detected at or above the method reporting limit

Approved by Colin Elliott Date 5/31/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	Date Collected:	05/10/94
Project:	Port of Seattle T115	Date Received:	05/11/94
Sample Matrix:	Soil	Date Extracted:	05/18/94
		Date Analyzed:	05/21/94
		Work Order No.:	B940331

Matrix Spike Summary
Total Petroleum Hydrocarbons as Diesel and Oil
Washington DOE Method WTPH-D
mg/Kg (ppm)
Dry Weight Basis

Sample Name: UST1wwb-8'
Lab Code: B0331-3

Analyte	Spike Level	Sample Result	Spiked Sample Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Diesel	278	ND	300	108	41-136

ND None Detected at or above the method reporting limit

Approved by Chris Elliott Date 5/31/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	**Date Extracted:**	05/16/94
Project:	Port of Seattle T115	**Date Analyzed:**	05/18/94
Sample Matrix:	Soil	**Work Order No.:**	B940331

Laboratory Control Sample Summary
BTEX and TPH as Gasoline
EPA Method 5030/8020 WTPH-G
mg/Kg (ppm)

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Benzene	1.00	0.87	87	23-170
Toluene	1.00	0.91	91	31-166
Ethyl Benzene	1.00	0.90	90	30-134
TPH as Gasoline	53	55	104	70-140

Approved by John Elliott Date 5/31/94

COLUMBIA ANALYTICAL SERVICES, INC.

QA/QC Report

Client:	EMCON Northwest	**Date Extracted:**	05/18/94
Project:	Port of Seattle T115	**Date Analyzed:**	05/21/94
LCS Matrix:	Soil	**Work Order No.:**	B940331

Laboratory Control Sample Summary
Total Petroleum Hydrocarbons as Diesel and Oil
Washington DOE Method WTPH-D
mg/Kg (ppm)

Analyte	True Value	Result	Percent Recovery	CAS Percent Recovery Acceptance Criteria
Diesel	289	305	106	41-136

Approved by Cin-Elliott Date 5/31/94

CHAIN OF CUSTODY/LABORATORY ANALYSIS REPORT FORM

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

DATE 5-11-94 PAGE 1 OF 2

PROJECT NAME Port of Seattle T115 #

PROJECT Mayor

COMPANY/ADDRESS EMCON

PHONE

SAMPLERS SIGNATURE T. Bodle

SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	TPH - HCID State:	TPH - G State: WA ✓	BTEX ✓	TPH - D State: WA ✓	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 HPCL ___ 8100 GC ___	TCLP Metals ___ Semi VOA ___ VOA ___ Pest/Herb	Metals Total ___ DISS ___ List Below	Cyanide	pH, Cond Cl, SO_4, PO_4 F, Br NO_2 NO_3 (Circle)	NH_3 - N, COD, Total-P TKN, TOC TOX (Circle)	REMARKS
UST 3sw-8'	5-10-94	08:55	331-1	soil	1		✓		✓														
UST 1sw-8'		09:05	-2		1		✓		✓														
UST 1wwb-8'		11:30	-3		1		✓		✓														
UST 1wwa-8'		11:45	-4		1		✓		✓														
UST 1nw-8'		13:55	-5		1		✓		✓														
UST 3nw-8'		14:15	-6		1		✓		✓														
UST 3ewa-8'		14:25	-7		1		✓		✓														
UST 3ewb-8'		15:05	-8		1		✓		✓														
UST 3ewc-4'		15:20	-9		1		✓		✓														
UST 2sw-4'		15:30	-10		1		✓		✓														

RELINQUISHED BY:
Signature: T. Bodle
Printed Name: Tom Bodle
Firm: EMCON
Date/Time: 5-11-94 07:55

RECEIVED BY:
Signature: Wayne A Branson
Printed Name: WAYNE A. BRANSON
Firm: CAS
Date/Time: 5-11-94 0755

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

REPORT REQUIREMENTS
___ I. Routine Report
___ II. Report (includes DUP.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: 331-331

RELINQUISHED BY:
Signature
Printed Name
Firm
Date/Time

RECEIVED BY:
Signature
Printed Name
Firm
Date/Time

SPECIAL INSTRUCTIONS/COMMENTS:
Hold all samples possible further analyses.
Hold samples sp 5, sp6

CHAIN OF CUSTODY/LABORATORY ANALYSIS REPORT FORM

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

DATE 5-11-94 PAGE 2 OF 2

PROJECT NAME Port of Seattle T115 #

PROJECT Meyer

COMPANY/ADDRESS EMCON

PHONE

SAMPLERS SIGNATURE T. Bodle

SAMPLE I.D.	DATE	TIME	LAB I.D.	SAMPLE MATRIX	NUMBER OF CONTAINERS	TPH - HCID State:	TPH - G State: WA ✓ BTEX ✓	TPH - D State: WA 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 8100 GC ___ 8310 HPCL ___	TCLP Metals ___ Semi VOA ___ VOA ___ Pest/Herb	Metals Total ___ DISS ___ List Below	Cyanide	pH, Cond Cl, SO_4, PO_4 F, Br NO_2 NO_3 (Circle)	NH_3 - N, COD, Total-P TKN, TOC, TOX (Circle)	REMARKS
UST 1 nwc -4'	5-10-94	15:45	331-11	soil	1		✓	✓													
UST 2 nw -4'		15:55	-12		1		✓	✓													
sp 5		16:35	-13		1																HOLD
sp 6		16:40	-14		1																HOLD

RELINQUISHED BY:
Signature: T. Bodle
Printed Name: T. Bodle
Firm: EMCON
Date/Time: 5-11-94 07:55

RECEIVED BY:
Signature: Wayne A Branson
Printed Name: WAYNE A. BRANSON
Firm: CAS
Date/Time: 5/11/94 0755

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

REPORT REQUIREMENTS
___ I. Routine Report
___ II. Report (includes DUP.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: B94-331

RELINQUISHED BY:
Signature
Printed Name
Firm
Date/Time

RECEIVED BY:
Signature
Printed Name
Firm
Date/Time

SPECIAL INSTRUCTIONS/COMMENTS:

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