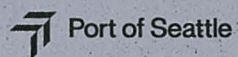


PORT OF SEATTLE - TERMINAL 115
LUST # 5011
KING / Seattle

**ANNUAL REPORT
UST 1997 COMPLIANCE MONITORING
TERMINAL 115
SEATTLE, WASHINGTON**

By: David Kleiber



October 29, 1997

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TABLE OF CONTENTS

	<u>Page</u>
1.0 Introduction	1
2.0 Background	1
3.0 Ground Water Monitoring	2
3.1 Field Methods	2
3.1.1 Water Level Measurements	2
3.1.2 Ground Water Sampling Procedures	2
3.1.2.1 Micro-Purge Ground Water Sampling Procedures	2-4
3.1.2.2 Traditional Ground Water Sampling Procedures Using a Bailer	4
3.1.3 Purge Water	4
3.2 Chemical Analysis Methods and Results	5
4.0 Conclusions	5

Appendices and Supporting Documents

- Tables:**
- Table 1: Summary of Field Measurements, Survey Information and Resulting Ground Water Elevations
 - Table 2: Laboratory Results for Ground water: Benzene, Ethylbenzene, Toluene, Total Xylene, Total and Dissolved Lead
- Figures:**
- Figure 1: Site Location Map
 - Figure 2: Ground Water Data

Appendices

- Appendix A: Laboratory Reports and Chain-of-Custody Records for Ground water Samples
- Appendix B: GroundWater Field Sampling Records



DEPARTMENT OF ECOLOGY NWRO/TCP TANK UNIT	
INTERIM CLEANUP REPORT	<input checked="" type="checkbox"/>
SITE CHARACTERIZATION	<input type="checkbox"/>
FINAL CLEANUP REPORT	<input type="checkbox"/>
OTHER <u>GW Monitoring</u>	<input checked="" type="checkbox"/>
AFFECTED MEDIA: SOIL	<input checked="" type="checkbox"/>
OTHER _____ GW	<input checked="" type="checkbox"/>
INSPECTOR (INIT.) <u>BR</u> DATE <u>4/6/98</u>	

Annual Report:
UST 1997 COMPLIANCE MONITORING
TERMINAL 115
Seattle, Washington

1.0 Introduction

This report documents actions performed during 1997 by the Port of Seattle (POS) to monitor ground water quality in the vicinity of the former underground storage tanks (USTs) at Terminal 115 (See Figure 1). Terminal 115 is located at 6020-6730 West Marginal Southwest, Seattle, Washington, 98106. The site is bordered on the north by industrial property, to the south by Southwest Michigan Street, on the east by the Duwamish Waterway, and on the west by West Marginal Way (See Figure 2). The property is relatively level at an elevation of approximately 20 feet above mean sea level. Terminal 115 is currently used as a marine storage, transfer, and loading facility.

The 1997 scope of work consisted of collecting water level measurements, collecting samples at two wells, analyzing samples for constituents of concern, and reporting analytical results as described below.

2.0 Background

Three, approximately 6,000-gallon gasoline USTs were discovered at Terminal 115 during construction activities for the tenant (Seafreeze, Inc.) in April 1994. Emcon conducted an environmental assessment for the POS.

Approximately 750 cubic yards of petroleum hydrocarbon impacted soil was removed from the UST excavation following tank decommissioning and removal. Assessment activities conducted at that time, indicated that soil samples collected from the four sidewalls of the excavation contained concentrations of total petroleum hydrocarbons as gasoline (TPH-G), diesel (TPH-D), and oil (TPH-O) exceeding MTCA Method A Cleanup Levels. Ground water was encountered at approximately 9 ft below the ground surface (bgs) during excavation activities. Results of the investigation by Emcon were presented to POS in the Underground Storage Tank Decommissioning and Soil Assessment Report, dated February 12, 1995.

Soil and ground water conditions in the vicinity of the USTs were investigated by Emcon Northwest, Inc¹. Findings include the following:

- Releases of fuel impacted soil in limited area(s) of the shallow subsurface. Laboratory testing indicated soil samples collected from borings MW-10 and MW-11 and hand auger boring HB2 contained concentrations of total petroleum hydrocarbons as oil (TPH-O) exceeding MTCA Method A cleanup levels.

¹ Emcon Northwest, Inc., Soil and Groundwater Assessment Report, Port of Seattle, T115, Seattle Washington, February 21, 1995.

- Ground water was present approximately 9 to 11 feet bgs during the November 4, 1994, sampling event with a hydraulic gradient of approximately 0.004 ft per ft, directed toward the west.
- Laboratory testing indicated that ground water samples collected from MW-8 and MW-9 on November 4, 1994, contained concentrations of TPH as Diesel (TPH-D) exceeding the MTCA Method A Cleanup Level. The groundwater sample from MW-9 also contained benzene exceeding the MTCA Method A Cleanup Level.
- Base neutral-acid semivolatile organic compound and volatile organic compound analyses indicated the groundwater sample collected from MW-8 contained a vinyl chloride, benzene, ethylbenzene, isopropylbenzene, n-propylbenzene, and naphthalene.
- Total lead concentrations exceeded the MTCA Method A Cleanup Level in all ground water samples analyzed.

3.0 Ground Water Monitoring

3.1 Field Methods

The methods used to measure the water levels in the four wells, and collect ground water samples from monitoring wells: MW-9, and MW-11 are described below.

3.1.1 Water Level Measurements

Ground water levels were measured prior to collecting ground water samples, using a Solinst electronic water level probe for this round. Ground water levels were measured to ± 0.01 foot relative to the top of the PVC well casing. Water level measurements are provided in Table 1. The probe was decontaminated between each use with a distilled water rinse.

3.1.2 Ground Water Sampling Procedures

In order to collect representative ground water samples from wells MW-9 and MW-11 for total and dissolved lead, and BTEX, ground water sampling was performed using what are termed “low flow” or “micro-purge” techniques. This technique relies on purging and sampling ground water at a very low rate (< 1 liter/minute) in order to minimize disturbances of the monitoring well’s water column and the aquifer surrounding the well. This results in consistent, low turbidity samples collected with a submersible pump and minimizes the quantity of purge water requiring disposal. Low flow sampling was accomplished with a Grundfos “Redi-Flo2” submersible pump. After collecting ground water samples using the “micro-purge” technique, ground water sampling was performed using the “traditional” technique using a bailer for collecting three to five casing volumes of water before collecting a sample.

3.1.2.1 Micro-Purge Ground Water Sampling Procedures

Field Parameter Measurement Equipment

The “micro-purge” technique relies on stabilization of water quality parameter measurements prior to sampling.

Electrical Conductivity/pH/Temperature Meter: A YSI Model 3560 water quality monitoring system was used to measure electrical conductivity, pH, and temperature of purged ground water.

The electrical conductivity meter was checked against factory supplied calibrator solutions prior to bringing the equipment to the site. The pH meter was calibrated before beginning sampling using two manufacturer-supplied buffer solutions (pH 7.0 and 10.0). The buffer solutions were replenished prior to beginning the project. The temperature probe's accuracy was checked against a mercury thermometer in the Port's office prior to bringing the equipment to the site.

Dissolved Oxygen: Dissolved oxygen was monitored using a YSI Model 820 meter. The meter was calibrated according to the procedures described in the factory manual, after a 20 to 50 minute warm up period.

Ground water Purging

Prior to purging, water depths were measured to the nearest 0.01 foot using a Solinst water level sounder. Ground water was purged from the monitoring wells using the following steps:

- Connect parameter measurement equipment probes to the flow cell.
- Gently lower the submersible pump into the monitoring well; the submersible pump intake was in the center of the screen section.
- Connect the flow cell to the submersible pump discharge line and switch the three-way valve to bypass.
- Turn on the submersible pump and slowly increase the flow rate until water flows through the discharge line on the reel.
- Pump at a rate of 300-500 milliliters per minute until about three gallons have been purged. This is about equal to approximately one pump/hose volume. Direct groundwater through the flow cell using the three-way valve.
- Monitor pH, temperature, conductivity, and dissolved oxygen and record readings after one tubing volume has been removed. When parameters show <10% variance over three consecutive measurements, begin sampling.

Groundwater Sampling

After parameters stabilized, the three-way valve was set to bypass and samples were collected. Samples were placed directly into the labeled sample containers via the bypass hose. The sample bottles were provided by Multichem Analytical Services Inc. (Multichem). After collection, the samples were placed into coolers with ice packs for transport for analysis. The samples and accompanying chain-of-custody documentation were delivered to Multichem, 560 Naches Avenue S.W. Suite 101, Renton, Washington.

Environmental Sampling Equipment

All equipment used to collect environmental samples (with the exception of the submersible pump hose) were decontaminated using similar procedures. Decontamination facilities included a series of three clean PVC or plastic buckets. The first bucket contained clean, potable water and served as prewash to remove excess solid material. The second bucket contained clean, potable water with non-phosphate-based soap and served as the main wash stage. The third bucket contained clean, potable rinse water. Water within the wash buckets was changed as it became dirty.

All sampling equipment was decontaminated before and after each sampling event. The specific procedure was as follows:

1. Preclean in potable water.
2. Wash in solution of nonphosphate-based soap and potable water. Nylon pads and brushes were used to facilitate washing.
3. Dip rinse with distilled water.
4. Final rinse with distilled water.
5. Place on clean polyethylene sheeting.

Sponges, brushes, and nylon scrubbers were used during steps 1 through 3. All equipment was air dried and contained in clean plastic bags, if possible, between sample collection events.

The submersible pump body and three-way valve assembly used for micro-purge sampling of groundwater were cleaned according to the procedures listed above. The interior surfaces of the pump and discharge hose were decontaminated using the following procedures:

1. Submerge pump in bucket of distilled water.
2. Run pump and discard water discharging from hose, replacing distilled water in bucket until about 3 gallons have passed through the system.
3. Continue running pump but now recycle discharge water into bucket. Run in this manner for about 3 minutes.
4. Unscrew the bottom cap of the pump and flush the fluid in this small reservoir. Fill the reservoir with distilled water and replace the cap.

3.1.2.2 Traditional Ground Water Sampling Procedures Using a Bailer

To obtain samples representative of the formation water in the aquifer, samples were collected from each well after a minimum of three well casing volumes of water were purged from each well, and pH, temperature, specific conductivity field measurements stabilized to within 10 percent of the previous measurements. Field parameter measurements are provided in Table 1.

Ground water samples were collected from wells: MW-9, and MW-11 using decontaminated dedicated PVC bailers. New polypropylene rope was used at each well. Water collected for analysis was poured from the bailer directly into bottles with preservatives. All sample bottles were provided by Multichem. After collection, samples were labeled and placed into coolers with ice packs for transport and analysis. The samples and accompanying chain-of-custody documentation were hand delivered to the lab. No problems were encountered during the field activities.

3.1.3 Purge Water

Well purge water for this round of sampling was stored in an appropriately labeled 55 gallon drum and stored at the Site. After the lab analysis was completed, the purge water was disposed of at the Port of Seattle Marine Maintenance oil water separator.

3.2 Chemical Analysis Methods and Results

In the annual monitoring event the two ground water samples were analyzed for total and dissolved lead, and BTEX. At both wells, total and dissolved lead concentrations were reported below detection limits, well MW-9 detected benzene at 32 ppb, and well MW-11 at 1.2 ppb using the "micro-purge" technique. The same wells were sampled using the traditional technique using a bailer. As in recent reports, detections continued to be noted, at concentrations typical of previously reported ranges when using a bailer. Historical analytical results for ground water samples are summarized in Table 2.

Copies of the laboratory reports and chain-of-custody forms follow the text of this report. The four laboratory reports were technically reviewed (including sample holding times, method blank analysis, surrogate recoveries, blank spike sample analysis, field duplicate analysis, and method detection limits) and the results validated. Quality control criteria were within acceptable limits.

4.0 Conclusions

Laboratory analyses of ground water samples indicated benzene concentrations exceeded MTCA Method A Cleanup Levels in well MW-9. However, benzene does not exceed marine acute or chronic toxicity under the Surface Water Quality Standards. Total and dissolved lead concentrations for both well MW-9 and MW-11 were not detected at the detection limit using the 'micropurge' technique. The former USTs and contaminated soils have been removed. Property use in the area is industrial, and ground water in the area is not used for drinking water .

Please review the attached letter to Roger Nye.

Respectfully submitted,



David Kleiber

Environmental Management Specialist

Table 1. T-115 Summary of Field Measurements, Survey Information, and Resulting Ground Water Elevations

Well Number	Date Measured	Northings ^a	Eastings ^a	Top of Casing Elevation (ft) ^b	Well Depth (Ft BTC)	Depth to Water (Ft BTC)	Ground Water Elevation (ft)	D.O. (%)	pH	Temp. (°C)	Specific Conductivity (uS/cm)	Turbidity	Comments
MW-10	4/25/95	772.27	31,113.83	20.78	14.47	8.02	12.76	-	6.76	14.3	635	opaque	
MW-10	7/27/95	772.27	31,113.83	20.78	14.46	8.71	12.07	-	6.57	16.8	659	opaque	
MW-10	10/23/95	772.27	31,113.83	20.78	14.46	8.81	11.97	-	6.41	16.7	795	opaque	
MW-10	2/7/96	772.27	31,113.83	20.78	14.46	7.56	13.22	-	6.63	13.1	880	cloudy	
MW-10	2/25/97	772.27	31,113.83	20.78	14.46	7.98	12.89	-	NA	NA	NA	NA	
MW-11	4/25/95	732.09	31,106.66	20.29	15.11	8.48	11.81	-	6.59	13.9	588	cloudy	
MW-11	7/27/95	732.09	31,106.66	20.29	15.11	9.22	11.07	-	6.56	15.0	474	opaque	
MW-11	10/23/95	732.09	31,106.66	20.29	15.11	9.34	10.95	-	6.52	15.6	337	opaque	
MW-11	2/7/96	732.09	31,106.66	20.29	15.11	7.99	12.30	-	6.67	13.1	631	cloudy	
MW-11	2/25/97	732.09	31,106.66	20.29	15.11	8.49	11.80	16	6.29	15.8	400	-	Micropurge
MW-11	2/25/97	732.09	31,106.66	20.29	15.11	8.49	11.80	-	6.35	12.6	190	cloudy	Bailer
MW-8	4/25/95	749.65	31,045.71	21.05	14.99	9.1	11.95	-	6.80	13.2	1611	cloudy	
MW-8	7/27/95	749.65	31,045.71	21.05	15.00	9.88	11.17	-	6.75	18.2	1613	opaque	
MW-8	10/23/95	749.65	31,045.71	21.05	15.00	10.68	10.37	-	7.26	17.8	2540	opaque	
MW-8	2/7/96	749.65	31,045.71	21.05	15.00	8.55	12.50	-	6.75	13.0	1059	cloudy	
MW-8	2/25/97	749.65	31,045.71	21.05	15.00	8.93	12.12	-	NA	NA	NA	NA	
MW-9	4/25/95	722.45	30,989.47	21.61	15.44	9.9	11.71	-	6.20	12.9	784	cloudy	
MW-9	7/27/95	722.45	30,989.47	21.61	15.45	10.46	11.15	-	6.15	14.9	696	opaque	
MW-9	10/23/95	722.45	30,989.47	21.61	15.45	10.53	11.08	-	6.24	15.2	693	cloudy	
MW-9	2/7/96	722.45	30,989.47	21.61	15.45	9.19	12.42	-	6.37	13.3	856	cloudy	
MW-9	2/25/97	722.45	30,989.47	21.61	15.45	9.65	11.96	11	6.18	14.7	468	-	Micropurge
MW-9	2/25/97	722.45	30,989.47	21.61	15.45	9.65	11.96	-	6.59	12.9	622	cloudy	Bailer
a	Grid Coordinates relative to Seattle Tide Lands Grid												
b	Elevation relative to Mean Low Low Water vertical datum												
D.O.	Dissolved Oxygen												

Table 2. Laboratory Results for Ground Water: Benzene, Ethylbenzene, Toluene, Total Xylene, Total and Dissolved Lead

MW	Sample ID	Date	Benzene (ug/L)	D Q	Ethyl- benzene (ug/L)	D Q	Toluene (ug/L)	D Q	Total Xylene (ug/L)	D Q	Total Lead (mg/L)	D Q	Dissolved Lead (mg/L)	D Q	WTPH-G (mg/L)	DQ	WTPH-D (mg/L)	D Q	TPH-O (ug/L)	D Q
Marine Acute L.O.E.L. ^{1,2}			5100.0								0.14									
Marine Chronic L.O.E.L. ^{1,3}			700.0								0.0056									
MTCA Method A Cleanup Levels			5.0		30.0		40.0		20.0		0.005		0.005		1.00		1.00		1.00	
MW-10	MW-10	11/4/94	0.7		1	U	1	U	1	U	0.039		NA		0.050	U	0.340		0.750	U
MW-10	MW-5	11/4/94	0.8		1	U	1	U	1	U	0.054		NA		0.050	U	0.320		0.750	U
MW-10	MW-10	4/25/95	1	U	NA		NA		NA		0.020		NA		NA		0.25	U	NA	
MW-10	T115-MW10	7/28/95	1	U	NA		NA		NA		0.022		NA		NA		0.25	U	NA	
MW-10	T115-MW10	10/23/95	1	U	NA		NA		NA		0.025		NA		NA		0.25	U	NA	
MW-10	T115-MW10	2/7/96	1	U	NA		NA		NA		0.009		NA		NA		0.25	U	NA	
MW-10	T115-MW10	2/25/97	NA		NA		NA		NA		NA		NA		NA		NA		NA	
MW-11	MW-11	11/4/94	0.8		1	U	1	U	1	U	0.015		NA		0.050	U	0.750		0.750	U
MW-11	MW-11	4/25/95	1	U	NA		NA		NA		0.061		NA		NA		0.25	U	NA	
MW-11	T115-MW11	7/28/95	1	U	NA		NA		NA		0.058		NA		NA		0.25	U	NA	
MW-11	T115-MW11	10/23/95	1	U	NA		NA		NA		0.108		NA		NA		0.25	U	NA	
MW-11	T115-MW11	2/7/96	1	U	NA		NA		NA		0.011		NA		NA		0.25	U	NA	
MW-11	T115MW11-MP	2/25/97	1.2		0.50	U	1.5		2.2		0.0030	U	0.0030	U	NA		NA		NA	
MW-11	T115MW11-B	2/25/97	0.51		0.50	U	0.50	U	0.50	U	0.034		0.0030	U	NA		NA		NA	
MW-11	T115MW11D-B	2/25/97	0.53		0.50	U	0.50	U	0.50	U	0.041		0.0030	U	NA		NA		NA	
MW-8	MW-8	11/4/94	2.0		1	U	1	U	1	U	0.012		NA		0.440		3.170		0.83	
MW-8	MW-8	4/25/95	2.9		NA		NA		NA		0.066		NA		NA		0.80		NA	
MW-8	T115-MW8	7/28/95	2.1		NA		NA		NA		0.022		NA		NA		1.1		NA	
MW-8	T115-MW8	10/23/95	2.6		NA		NA		NA		0.04		NA		NA		0.53		NA	
MW-8	T115-MW8-RE	10/23/95	2.3		NA		NA		NA		NA		NA		NA		NA		NA	
MW-8	T115-MW8	2/7/96	2.2		NA		NA		NA		0.012		NA		NA		1.3		NA	
MW-8	T115-MW12	2/7/96	2.2		NA		NA		NA		0.017		NA		NA		1.4		NA	
MW-8	T115-MW12	2/25/97	NA		NA		NA		NA		NA		NA		NA		NA		NA	
MW-9	MW-9	11/4/94	10.0		1	U	1	U	1		0.013		NA		0.050	U	1.420		0.750	U
MW-9	MW-9	4/25/95	74		NA		NA		NA		0.019		NA		NA		0.25	U	NA	
MW-9	T115-MW9	7/28/95	16		NA		NA		NA		0.007		NA		NA		0.54		NA	
MW-9	T115-MW9	10/23/95	14		NA		NA		NA		0.027		NA		NA		0.25	U	NA	
MW-9	T115-MW9	2/7/96	78		NA		NA		NA		0.016		NA		NA		0.25	U	NA	
MW-9	T115MW9-MP	2/25/97	32		0.50	U	1.9		2.3		0.0030	U	0.0030	U	NA		NA		NA	
MW-9	T115MW9-B	2/25/97	30		0.50	U	0.50	U	0.50	U	0.0050		0.0030	U	NA		NA		NA	

Note:

MW Monitoring Well
FD Field Duplicate
DQ Data qualifiers
U Compound not detected at the given detection limit.
DL Dilution
RE Reanalysis
Bold Denotes concentrations of analytes are above MTCA Method A Cleanup Levels
NA Not Analyzed

Samples Analyzed by:

Columbia Analytical Services, Inc.(11/4/94), Analytical Resources Inc. (4/25/95 to 2/7/96), Multichem Analytical Resources (2/25/97)

Analysis Methods:

WTPH-D and G by EPA Method 8015 modified

BETX by EPA Method 602

Total and Dissolved Lead by EPA Method 7421

VOCs analyzed by EPA Method 8260




 Port of Seattle

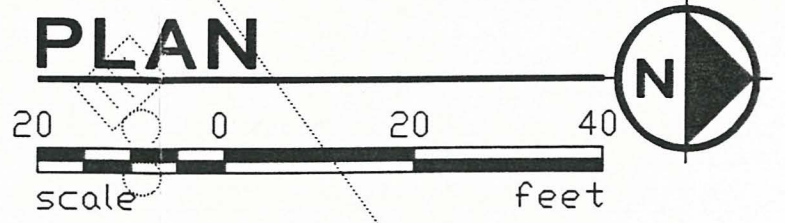
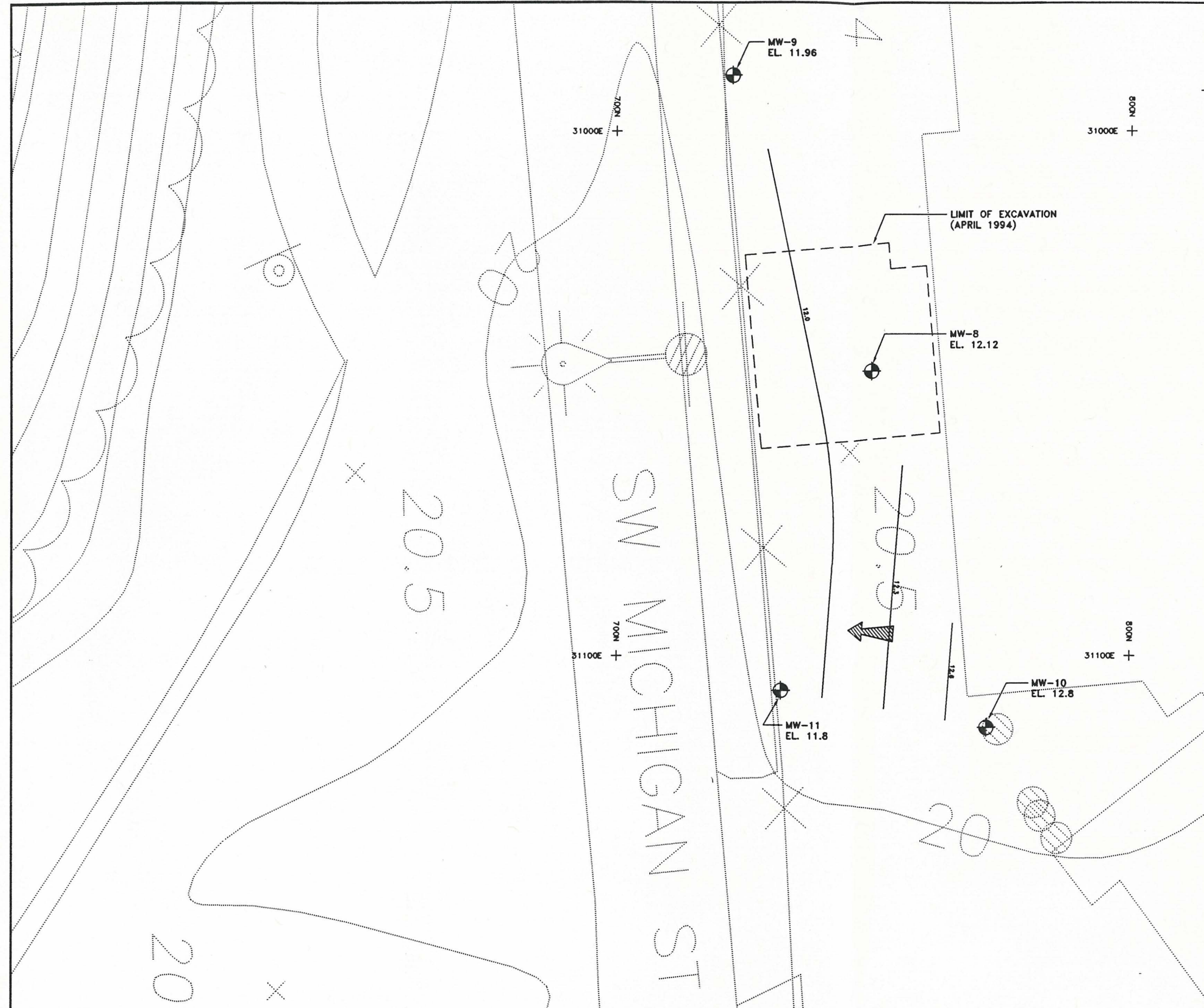
FIGURE NO. 1

SITE LOCATION MAP

UST TERMINAL 115 O,Q,R

LEGEND:

- 12.1 — KNOWN GROUNDWATER ELEVATION CONTOUR
- ↙ INFERRED GROUNDWATER FLOW DIRECTION
- ⊕ MW-1 MONITORING WELL LOCATION



CALL 48 HOURS BEFORE YOU DIG
1-800-424-5555

REVISIONS			
NO.	DATE	BY	DESCRIPTION

PROJECT ENGINEER
DAVID KLEBER
SCALE: 1" = 10'
DATE: 06-16-97
DRAWN BY: MICHAEL A. CORPUZ
CHECKED BY:

PORT OF SEATTLE
MARINE FACILITIES
TERMINAL 115
FIGURE 2 GROUNDWATER DATA
02-25-97

WORK ORDER NO. D-5032
COMPLETION DATE
PORT OF SEATTLE INC.
115-GW-1

APPENDIX A

Laboratory Reports and
Chain-of-Custody Records for Groundwater Samples

MAS I.D. # 702043

March 5, 1997

Port of Seattle
PO Box 1209
Seattle WA 98111

Attention : David Kleiber


Project Number : D-5032

Project Name : T-115

Dear Mr. Kleiber:

On February 25, 1997, MultiChem Analytical Services received five samples for analysis. The samples were analyzed with EPA methodology or equivalent methods as specified in the attached analytical schedule. The results, sample cross reference, and quality control data are enclosed.

Sincerely,


Cynthia L. Reznia
Project Manager

CLR/hal/mrj

Enclosure

RECEIVED
MAR 07 1997
CHIEF ENGINEERS OFFICE
PORT OF SEATTLE

SAMPLE CROSS REFERENCE SHEET

CLIENT : PORT OF SEATTLE
PROJECT # : D-5032
PROJECT NAME : T-115

MAS #	CLIENT DESCRIPTION	DATE SAMPLED	MATRIX
702043-1	T115MW9-MP	02/25/97	WATER
702043-2	T115MW9-B	02/25/97	WATER
702043-3	T115MW11-MP	02/25/97	WATER
702043-4	T115MW11-B	02/25/97	WATER
702043-5	T115MW11D-B	02/25/97	WATER

----- TOTALS -----

MATRIX	# SAMPLES
WATER	5

MAS STANDARD DISPOSAL PRACTICE

The samples from this project will be disposed of in thirty (30) days from the date of the report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

ANALYTICAL SCHEDULE

CLIENT : PORT OF SEATTLE
PROJECT # : D-5032
PROJECT NAME : T-115

ANALYSIS	TECHNIQUE	REFERENCE	LAB
BETX	GC/PID	EPA 8020	R
LEAD	AA/GF	EPA 7421	R

R = MAS - Renton
ANC = MAS - Anchorage
SUB = Subcontract

CASE NARRATIVE

CLIENT : PORT OF SEATTLE
PROJECT # : D-5032
PROJECT NAME : T-115

CASE NARRATIVE: VOLATILE ORGANICS ANALYSIS - BETX

No anomalies were associated with the preparation and/or analysis of the samples in this accession.

MultiChem Analytical Services

MAS I.D. # 702043

VOLATILE ORGANICS ANALYSIS DATA SUMMARY

CLIENT	: PORT OF SEATTLE	DATE SAMPLED	: N/A
PROJECT #	: D-5032	DATE RECEIVED	: N/A
PROJECT NAME	: T-115	DATE EXTRACTED	: N/A
CLIENT I.D.	: METHOD BLANK	DATE ANALYZED	: 02/25/97
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8020 (BETX)	DILUTION FACTOR	: 1

COMPOUNDS

RESULTS

BENZENE	<0.50
ETHYLBENZENE	<0.50
TOLUENE	<0.50
TOTAL XYLENES	<0.50

SURROGATE PERCENT RECOVERY

LIMITS

BROMOFLUOROBENZENE	106	81 - 124
--------------------	-----	----------

MAS I.D. # 702043

VOLATILE ORGANICS ANALYSIS DATA SUMMARY

CLIENT	: PORT OF SEATTLE	DATE SAMPLED	: N/A
PROJECT #	: D-5032	DATE RECEIVED	: N/A
PROJECT NAME	: T-115	DATE EXTRACTED	: N/A
CLIENT I.D.	: METHOD BLANK	DATE ANALYZED	: 02/26/97
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8020 (BETX)	DILUTION FACTOR	: 1

COMPOUNDS

RESULTS

BENZENE	<0.50
ETHYLBENZENE	<0.50
TOLUENE	<0.50
TOTAL XYLENES	<0.50

SURROGATE PERCENT RECOVERY

LIMITS

BROMOFLUOROBENZENE	105	81 - 124
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MAS I.D. # 702043-1

VOLATILE ORGANICS ANALYSIS DATA SUMMARY

CLIENT	: PORT OF SEATTLE	DATE SAMPLED	: 02/25/97
PROJECT #	: D-5032	DATE RECEIVED	: 02/25/97
PROJECT NAME	: T-115	DATE EXTRACTED	: N/A
CLIENT I.D.	: T115MW9-MP	DATE ANALYZED	: 02/26/97
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8020 (BETX)	DILUTION FACTOR	: 1

COMPOUNDS

RESULTS

BENZENE	32
ETHYLBENZENE	<0.50
TOLUENE	1.9
TOTAL XYLENES	2.3

SURROGATE PERCENT RECOVERY

LIMITS

BROMOFLUOROBENZENE	104	81 - 124
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MAS I.D. # 702043-2

VOLATILE ORGANICS ANALYSIS DATA SUMMARY

CLIENT	: PORT OF SEATTLE	DATE SAMPLED	: 02/25/97
PROJECT #	: D-5032	DATE RECEIVED	: 02/25/97
PROJECT NAME	: T-115	DATE EXTRACTED	: N/A
CLIENT I.D.	: T115MW9-B	DATE ANALYZED	: 02/26/97
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8020 (BETX)	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	30
ETHYLBENZENE	<0.50
TOLUENE	<0.50
TOTAL XYLENES	<0.50

SURROGATE PERCENT RECOVERY	LIMITS
BROMOFLUOROBENZENE	107 81 - 124

MultiChem Analytical Services

MAS I.D. # 702043-3

VOLATILE ORGANICS ANALYSIS DATA SUMMARY

CLIENT	: PORT OF SEATTLE	DATE SAMPLED	: 02/25/97
PROJECT #	: D-5032	DATE RECEIVED	: 02/25/97
PROJECT NAME	: T-115	DATE EXTRACTED	: N/A
CLIENT I.D.	: T115MW11-MP	DATE ANALYZED	: 02/26/97
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8020 (BETX)	DILUTION FACTOR	: 1

COMPOUNDS

RESULTS

BENZENE 1.2
ETHYLBENZENE <0.50
TOLUENE 1.5
TOTAL XYLENES 2.2

SURROGATE PERCENT RECOVERY

LIMITS

BROMOFLUOROBENZENE 104 81 - 124

MultiChem Analytical Services

MAS I.D. # 702043-4

VOLATILE ORGANICS ANALYSIS DATA SUMMARY

CLIENT	: PORT OF SEATTLE	DATE SAMPLED	: 02/25/97
PROJECT #	: D-5032	DATE RECEIVED	: 02/25/97
PROJECT NAME	: T-115	DATE EXTRACTED	: N/A
CLIENT I.D.	: T115MW11-B	DATE ANALYZED	: 02/26/97
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8020 (BETX)	DILUTION FACTOR	: 1

COMPOUNDS	RESULTS
BENZENE	0.51
ETHYLBENZENE	<0.50
TOLUENE	<0.50
TOTAL XYLENES	<0.50

SURROGATE PERCENT RECOVERY	LIMITS
BROMOFLUOROBENZENE	103 81 - 124

VOLATILE ORGANICS ANALYSIS
DATA SUMMARY

CLIENT	: PORT OF SEATTLE	DATE SAMPLED	: 02/25/97
PROJECT #	: D-5032	DATE RECEIVED	: 02/25/97
PROJECT NAME	: T-115	DATE EXTRACTED	: N/A
CLIENT I.D.	: T115MW11D-B	DATE ANALYZED	: 02/26/97
SAMPLE MATRIX	: WATER	UNITS	: ug/L
EPA METHOD	: 8020 (BETX)	DILUTION FACTOR	: 1

COMPOUNDSRESULTS

BENZENE	0.53
ETHYLBENZENE	<0.50
TOLUENE	<0.50
TOTAL XYLENES	<0.50

SURROGATE PERCENT RECOVERY

LIMITS

BROMOFLUOROBENZENE

103

81 - 124

MultiChem Analytical Services

MAS I.D. # 702043

VOLATILE ORGANICS ANALYSIS QUALITY CONTROL DATA

CLIENT : PORT OF SEATTLE
PROJECT # : D-5032
PROJECT NAME : T-115
SAMPLE MATRIX : WATER
EPA METHOD : 8020 (BETX)

SAMPLE I.D. # : BLANK
DATE EXTRACTED : N/A
DATE ANALYZED : 02/25/97
UNITS : ug/L

COMPOUNDS	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
BENZENE	<0.500	20.0	21.2	106	N/A	N/A	N/A
TOLUENE	<0.500	20.0	20.4	102	N/A	N/A	N/A
TOTAL XYLENES	<0.500	40.0	41.5	104	N/A	N/A	N/A

CONTROL LIMITS	% REC.	RPD
BENZENE	84 - 106	20
TOLUENE	90 - 110	20
TOTAL XYLENES	90 - 113	20

SURROGATE RECOVERIES	SPIKE	DUP. SPIKE	LIMITS
BROMOFLUOROBENZENE	105	N/A	81 - 124

MultiChem Analytical Services

MAS I.D. # 702043

VOLATILE ORGANICS ANALYSIS QUALITY CONTROL DATA

CLIENT : PORT OF SEATTLE
PROJECT # : D-5032
PROJECT NAME : T-115
SAMPLE MATRIX : WATER
EPA METHOD : 8020 (BETX)

SAMPLE I.D. # : BLANK
DATE EXTRACTED : N/A
DATE ANALYZED : 02/26/97
UNITS : ug/L

COMPOUNDS	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
BENZENE	<0.500	20.0	21.2	106	N/A	N/A	N/A
TOLUENE	<0.500	20.0	20.7	103	N/A	N/A	N/A
TOTAL XYLENES	<0.500	40.0	42.3	106	N/A	N/A	N/A

CONTROL LIMITS

	% REC.	RPD
BENZENE	84 - 106	20
TOLUENE	90 - 110	20
TOTAL XYLENES	90 - 113	20

SURROGATE RECOVERIES

	SPIKE	DUP. SPIKE	LIMITS
BROMOFLUOROBENZENE	106	N/A	81 - 124

MultiChem Analytical Services

MAS I.D. # 702043

VOLATILE ORGANICS ANALYSIS QUALITY CONTROL DATA

CLIENT : PORT OF SEATTLE
PROJECT # : D-5032
PROJECT NAME : T-115
SAMPLE MATRIX : WATER
EPA METHOD : 8020 (BETX)

SAMPLE I.D. # : 702036-2
DATE EXTRACTED : N/A
DATE ANALYZED : 02/25/97
UNITS : ug/L

COMPOUNDS	SAMPLE RESULT	SPIKE ADDED	SPIKED RESULT	% REC.	DUP. SPIKED SAMPLE	DUP. % REC.	RPD
BENZENE	0.604	20.0	21.6	105	21.8	106	1
TOLUENE	<0.500	20.0	20.7	103	20.4	102	1
TOTAL XYLENES	<0.500	40.0	41.7	104	41.4	103	1

CONTROL LIMITS	% REC.	RPD
BENZENE	83 - 109	20
TOLUENE	90 - 110	20
TOTAL XYLENES	89 - 113	20

SURROGATE RECOVERIES	SPIKE	DUP. SPIKE	LIMITS
BROMOFLUOROBENZENE	103	104	81 - 124

CASE NARRATIVE

CLIENT : PORT OF SEATTLE
PROJECT # : D-5032
PROJECT NAME : T-115

CASE NARRATIVE: METALS ANALYSIS

No anomalies were associated with the preparation and/or analysis of the samples in this accession.

MultiChem Analytical Services

MAS I.D. # 702043

TOTAL
METALS ANALYSIS

CLIENT : PORT OF SEATTLE
PROJECT # : D-5032
PROJECT NAME : T-115

MATRIX : WATER

ELEMENT	DATE PREPARED	DATE ANALYZED
LEAD	02/26/97	02/27/97

MultiChem Analytical Services

MAS I.D. # 702043

TOTAL
METALS ANALYSIS
DATA SUMMARY

CLIENT : PORT OF SEATTLE
PROJECT # : D-5032
PROJECT NAME : T-115

MATRIX : WATER

UNITS : mg/L

MAS I.D. #	CLIENT I.D.	LEAD
702043-1	T115MW9-MP	<0.0030
702043-2	T115MW9-B	0.0055
702043-3	T115MW11-MP	<0.0030
702043-4	T115MW11-B	0.034
702043-5	T115MW11D-B	0.041
METHOD BLANK	-	<0.0030

MultiChem Analytical Services

MAS I.D. # 702043

TOTAL
METALS ANALYSIS
QUALITY CONTROL DATA

CLIENT : PORT OF SEATTLE
PROJECT # : D-5032
PROJECT NAME : T-115

MATRIX : WATER
UNITS : mg/L

ELEMENT	MAS I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED RESULT	SPIKE ADDED	% REC.
LEAD	BLANK	<0.00300	N/A	N/A	0.0241	0.0250	96
LEAD	702043-1	<0.00300	<0.00300	NC	0.0243	0.0250	97

NC = Not calculable.

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{|(\text{Sample Result} - \text{Duplicate Result})|}{\text{Average Result}} \times 100$$

MultiChem Analytical Services

MAS I.D. # 702043

DISSOLVED METALS ANALYSIS

CLIENT : PORT OF SEATTLE
PROJECT # : D-5032
PROJECT NAME : T-115

MATRIX : WATER

ELEMENT	DATE PREPARED	DATE ANALYZED
LEAD	02/26/97	02/27/97

MultiChem Analytical Services

MAS I.D. # 702043

DISSOLVED
METALS ANALYSIS
DATA SUMMARY

CLIENT : PORT OF SEATTLE
PROJECT # : D-5032
PROJECT NAME : T-115

MATRIX : WATER

UNITS : mg/L

MAS I.D. #	CLIENT I.D.	LEAD
702043-1	T115MW9-MP	<0.0030
702043-2	T115MW9-B	<0.0030
702043-3	T115MW11-MP	<0.0030
702043-4	T115MW11-B	<0.0030
702043-5	T115MW11D-B	<0.0030
METHOD BLANK	-	<0.0030

MultiChem Analytical Services

MAS I.D. # 702043

DISSOLVED
METALS ANALYSIS
QUALITY CONTROL DATA

CLIENT : PORT OF SEATTLE
PROJECT # : D-5032
PROJECT NAME : T-115

MATRIX : WATER

UNITS : mg/L

ELEMENT	MAS I.D.	SAMPLE RESULT	DUP. RESULT	RPD	SPIKED RESULT	SPIKE ADDED	% REC.
LEAD	BLANK	<0.00300	N/A	N/A	0.0241	0.0250	96
LEAD	702043-1	<0.00300	<0.00300	NC	0.0243	0.0250	97

NC = Not calculable.

$$\% \text{ Recovery} = \frac{(\text{Spike Sample Result} - \text{Sample Result})}{\text{Spike Concentration}} \times 100$$

$$\text{RPD (Relative \% Difference)} = \frac{|(\text{Sample Result} - \text{Duplicate Result})|}{\text{Average Result}} \times 100$$

MultiChem Analytical Services

(if Y see other side)

SAMPLE LOG-IN CHECKLIST

DATE: 2/25/97
TIME: 1350
INITIALS: BJ

ACCESSION NO. 702043
CLIENT: Port of Seattle
PROJECT: F-115

Shipping:

Type:
 Cooler
 Box
 Other

COC Seals:
 Ship. Cont.
 On Bottles
 None

Intact?
Y N
Y N

Packing Material:
 Styrofoam
 Bubble Bags
 Foam Vial Packs
 Other

Refrigerant:

Gel Ice Pack
 Loose Ice
 Other
 None

Frozen?

Y N
 Y N
 Y N

Received Via:

Hand Delivery
 Federal Express
 Airborne
 Other: _____
 Courier
 UPS
 Taxi
 Goldstreak

Sample Information:

Samp. #	Bottle #	Type	Soil VOAs	0 headspace	Y	N
<u>5</u>	<u>20</u>	Soil	Water VOAs	0 headspace	Y	N
		Water		Preserved?	Y	N
		Product		Trip blanks?	Y	N
		Other				

Condition of Samples:

Containers:
Intact? (Bottle/Lid) Y N
Correct Type? Y N

CA #

Waters Preserved? (if needed) Y N

ID's Match C.O.C. Y N N

Temperature: 9.5 C 2 CA NO. _____
(See corrective action on reverse side for explanation if temperature is outside of the MAS recommended range.)

LAB USE ONLY NO NOTICE SENDOUTS NEEDED BY
 COC/TAT DOES NOT MATCH NOTICE NEED TEST(S) VERIFIED BY CLIENT

COMMENTS: _____

MultiChem Analytical Services

Corrective Action Sheet

(if Y see other side)

ACCESSION # 702043

CORRECTIVE ACTION AREA

EXPLAIN CORRECTIVE ACTION:

<p>CA NO. _____</p> <p>_____ Salvaged Sample</p> <p>_____ Replaced Lid</p> <p>_____ Preserved Sample w/ _____</p>	<p>CA NO. _____</p> <p>_____ Replaced Bottle</p> <p><input checked="" type="checkbox"/> Notified P.M.</p>	<p>CA NO. _____</p> <p>_____ Verified Id w/Client</p> <p>_____ Notified Client</p>
---	---	--

Comments: CA # 1: Bottles were received for "Diss. Pb", they will be filtered & preserved. Lab was notified.

Temperature: 9.5 C 2 CA NO. _____

2 Comments: Samples were received outside of the MAS recommended temperature range (4 C +/- 2 C) Samples were received within 5 hours of collection and may not have had sufficient time to equilibrate with coolant. A temperature range from 2 to 15 degrees Celsius is considered acceptable. The samples will be analyzed as scheduled unless directed otherwise by client.

_____ Comments: Samples were received outside of the MAS recommended temperature range (4 C +/- 2 C) The samples will be analyzed as scheduled unless directed otherwise by client.

Tech. Signature/Date: EG 2/25/97 P.M. Signature/Date: QR 2/25/97

CORRECTIVE ACTION TAKEN:

Explain Action Taken:

APPENDIX B

Ground water Field Sampling Records

T-115 Micro-purge

Port of Seattle
 Pier 69
 P.O Box 1209
 (206)728-3000

Location/Address:	T-115	Date:	2/25/97
Weather:	overcast 50s	Time:	11:40
Sample Designation:	T115MW11-MP	Testwell:	MW-11

WATER LEVEL MEASUREMENTS:

(nearest 0.01 ft)	Method/comments
8.46	SOLINST PROBE
8.46	SOLINST PROBE

WELL INFO:

Depth to Water Surface (ft)	Depth to bottom of Well(ft)	Height of Water (ft)	Casing Volume (Gallons /poreVolume)	Pore Volumes	Total Number of Gallons (g/pore Vol.) x 3	Well Diameter (in)
8.46	15.11					2

Amount of Silt at Bottom of well (ft)	Method Used	2 in = 0.163 gall)
	MICROPURGE	

FIELD WATER QUALITY TESTS:

	D.O.(%)	pH	Temp (oC)	Conductivity (mohms/cm)	Sampler Cleaning Method
	13	6.3	17.4	0.406	Liquinox
	10	6.3	15.8	0.397	H2O rinse
	12	6.3	15.4	0.397	MeOH rinse*
	13	6.3	15.4	0.399	Distilled H2O
	14	6.3	15.7	0.403	
	14	6.29	15.8	0.402	
	16	6.29	15.8	0.402	

SAMPLING:

Sample Name	Analytical Method	Container Type	Volume (ml)	Field Filtered (yes/no)	Preservative (yes, no)	Iced (yes, no)
MW-11	Total & dissolved Pb	plastic	500	NO	YES	YES
MW-11	BETX	glass	40	NO	YES	YES

NOTES: pump at 12.40 ft

Lab: Multichem Sampler: David Kleiber

Total number of bottles: Signature:

*methanol rinse if oily
 **Turbidity- clear, cloudy, opaque

T-115 Micro-purge

Location/Address: T-115		Date: 2/25/97				
Weather:		Time: 8:50				
Sample Designation: T115MW9-MP		Testwell: MW-9				
WATER LEVEL MEASUREMENTS:						
(nearest 0.01 ft)	Method/comments					
9.61	SOLINST PROBE					
9.61	SOLINST PROBE					
WELL INFO:						
Depth to Water Surface (ft)	Depth to bottom of Well(ft)	Height of Water (ft)	Casing Volume (Gallons /poreVolume)	Pore Volumes	Total Number of Gallons (g/pore Vol.) x 3	Well Diameter (in)
9.61	15.45					2
Amount of Silt at Bottom of well (ft)	Method Used	2 in = 0.163 gallon/ft				
	micropurge					
FIELD WATER QUALITY TESTS:						
	D.O.(%)	pH	Temp (oC)	Conductivity (mohms/cm)	Sampler Cleaning Method	
	8	6.17	15.5	0.456	Liquinox	
	9	6.2	15.1	0.455	H2O rinse	
	8	6.2	14.8	0.461	MeOH rinse*	
	7	6.18	14.7	0.465	Distilled H2O	
	10	6.16	14.7	0.467		
	10	6.17	14.7	0.468		
	11	6.18	14.7	0.468		
SAMPLING:						
Sample Name	Analytical Method	Container Type	Volume (ml)	Field Filtered (yes/no)	Preservative (yes, no)	Iced (yes, no)
MW-9	Total & dissolved Pb	plastic	500	NO	YES	YES
MW-9	BETX	glass	40	NO	YES	YES
NOTES: pump depth 12.50 ft						
Lab: Multichem	Sampler: David Kleiber					
Total number of bottles:			Signature:			
*methanol rinse if oily						
**Turbidity- clear, cloudy, opaque						

Port of Seattle Pier 69 P.O Box 1209 (206)728-3000						
Location/Address: T-115				Date: 2/25/97		
Weather: overcast 50s				Time: 12:15 12:20		
Sample Designation: T115MW11-B T115MW11D-B				Testwell: MW-11		
WATER LEVEL MEASUREMENTS:						
(nearest 0.01 ft)		Method/comments				
8.49		SOLINST PROBE				
8.49		SOLINST PROBE				
WELL INFO:						
Depth to Water Surface (ft)	Depth to bottom of Well(ft)	Height of Water (ft)	Casing Volume (Gallons /poreVolume)	Pore Volumes	Total Number of Gallons (g/pore Vol.) x 3	Well Diameter (in)
8.49	15.11	6.62	1.08	3.00	3.24	2
Amount of Silt at Bottom of well (ft)	Method Used	2 in = 0.163 gallon/ft				
	bailer					
FIELD WATER QUALITY TESTS:						
Casing Volume Number	pH	Temp (oC)	Conductivity (uS/cm)	Turbidity**	Sampler Cleaning Method	
		6.41	12.3	194	cloudy	Liquinox
		6.34	12.5	189	cloudy	H2O rinse
		6.35	12.6	190	cloudy	MeOH rinse*
						Distilled H2O
SAMPLING:						
Sample Name	Analytical Method	Container Type	Volume (ml)	Field Filtered (yes/no)	Preservative (yes, no)	Iced (yes, no)
MW-11	Total & dissolved Pb	plastic	500	NO	YES	YES
MW-11	BETX	glass	40	NO	YES	YES
NOTES:						
Lab: Multichem		Sampler: David Kleiber				
Total number of bottles:			Signature:			
*methanol rinse if oily						
**Turbidity- clear, cloudy, opaque						

Location/Address: T-115		Date: 2/25/97				
Weather:		Time: 9:35				
Sample Designation: T115MW9-B		Testwell: MW-9				
WATER LEVEL MEASUREMENTS:						
(nearest 0.01 ft)	Method/comments					
9.65	SOLINST PROBE					
9.65	SOLINST PROBE					
WELL INFO:						
Depth to Water Surface (ft)	Depth to bottom of Well(ft)	Height of Water (ft)	Casing Volume (Gallons /poreVolume)	Pore Volumes	Total Number of Gallons (g/pore Vol.) x 3	Well Diameter (in)
9.65	15.45	5.8	0.95	3.00	2.84	2
Amount of Silt at Bottom of well (ft)	Method Used	2 in = 0.163 gallon/ft				
	BAILER					
FIELD WATER QUALITY TESTS:						
Casing Volume Number	pH	Temp (oC)	Conductivity (uS/cm)	Turbidity**	Sampler Cleaning Method	
	6.75	12.5	589	cloudy	Liquinox	
	6.65	12.7	603	cloudy	H2O rinse	
	6.59	12.9	622	cloudy	MeOH rinse*	
					Distilled H2O	
SAMPLING:						
Sample Name	Analytical Method	Container Type	Volume (ml)	Field Filtered (yes/no)	Preservative (yes, no)	Iced (yes, no)
MW-9	Total & dissolved Pb	plastic	500	NO	YES	YES
MW-9	BETX	glass	40	NO	YES	YES
NOTES:						
Lab: Multichem	Sampler: David Kleiber					
Total number of bottles:			Signature:			
*methanol rinse if oily						
**Turbidity- clear, cloudy, opaque						