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**SUBSURFACE INVESTIGATION  
AIRPORT WAY SERVICE OPERATING CENTER  
SEATTLE, WASHINGTON**

*Prepared for*



**Qwest Communications International Inc.**  
1600 7th Avenue  
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*Prepared by*



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**August 2003**

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**TETRA TECH EM INC.**

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## 1.0 INTRODUCTION

Under Environmental Services Agreement No. USW-000215, Qwest Communications International Inc. (Qwest), tasked Tetra Tech EM Inc. (Tetra Tech), to conduct a subsurface investigation and provide a report summarizing the results of the investigation for the Qwest Airport Way Service Operating Center (SOC) in Seattle, Washington (Airport Way facility). Tetra Tech prepared this report to document the subsurface investigation conducted on July 24, 2003, at the Airport Way facility and to summarize the analytical data from the soil and groundwater samples collected during the investigation.

The objective of the investigation at the Airport Way facility was to evaluate if any total petroleum hydrocarbon (TPH) contamination remained in soil or groundwater. Tetra Tech collected soil and groundwater samples from borings completed at the site using a direct push drilling rig. Two soil samples and one groundwater sample were collected from each boring and were analyzed for TPH in the gasoline range (TPHg), TPH in the diesel range (TPHd), and benzene, toluene, ethylbenzene, and total xylenes (BTEX) constituents.

Section 2.0 of this report provides background information on the Airport Way facility and a brief summary of previous activities conducted at the site related to the removal and closure of underground storage tanks (UST) and subsurface investigations. Section 3.0 is a summary of the field activities conducted by Tetra Tech personnel at the Airport Way facility. Section 4.0 presents the analytical results and Section 5.0 is a discussion of the results. Figures are located at the end of this report, after the references. Appendix A is a copy of the field boring logs; Appendix B is the complete laboratory report.

## 2.0 BACKGROUND

The Airport Way facility is located on the southwest corner of the intersection of Airport Way and South Massachusetts Street in Seattle, Washington (see Figure 1). Eighth Avenue South is oriented north to south along the western property boundary of the site. The facility consists of a one-story office building on the northwest corner of the property, a vehicle parking and maintenance building along the southern edge of the property (SOC building), employee parking in the northeastern area of the property, and a small unused building in the southwestern corner of the property. Topography at the site is relatively flat (see Figure 1), but the topography of the vicinity surrounding the site slopes from the east, off of the Beacon Hill area of Seattle, to the west, towards Puget Sound.

In May 1993, two USTs that had contained waste motor oil and heating fuel oil were closed at the site (Boateng Environmental Scientists [Boateng] 1993a). Tank # 1, a 300-gallon waste motor oil tank, which had been located just west of the southwest corner of the SOC building, was excavated and removed from the site. Tank # 2, a 1,760-gallon heating fuel oil tank, was closed in place just north of the northwest corner of the SOC building. Eight soil samples (four from each excavation area) were collected during the closure of the two tanks. Only one sample (Sample ID T1-2), collected from the south wall of the excavation for Tank #1, contained petroleum hydrocarbon concentrations above the Washington State Department of Ecology's (Ecology) Model Toxics Control Act Method A groundwater cleanup levels. Boateng (1993b) removed additional soil in July 1993, from the southern end of the excavated area of Tank #1 and a soil sample collected from the southern wall of the over-excavation did not contain petroleum hydrocarbons above MTCA Method A cleanup levels.

In 1998, AGRA Earth & Environmental, Inc. (AGRA) conducted an UST site assessment for the excavation and removal of two 4,000 gallon USTs (one tank contained gasoline and one tank contained diesel) located at the site (AGRA 1998). Both tanks had been positioned end-to-end, next to each other, parallel to and just west of the northwestern corner of the SOC building. The gasoline UST was located at the north end of the tank pit and the diesel UST was located at the southern end of the tank pit. The former dispenser area was located above the southern end of the diesel UST. Six soil samples were collected from the sidewalls of the UST excavation, one from the north wall, one from the south wall, and two from each of the east and west walls. The soil samples from the south wall (Sample ID, T2S-10.0) had TPHd, TPHg, and all BTEX constituent concentrations greater than MTCA Method A cleanup levels. The southern sample from the west wall (Sample ID, T2W-10.0) had TPHd, TPHg, and BTEX constituents (except toluene) concentrations greater than MTCA Method A cleanup levels. The northern soil sample from the east wall (Sample ID, T1E-11.0) had TPHg concentrations greater than MTCA Method A levels. The southern soil sample from the east wall (Sample ID, T2E-10.0) had TPHd, TPHg, and all BTEX constituents concentrations greater than MTCA Method A cleanup levels.

### 3.0 FIELD ACTIVITIES

The following sections summarize the subsurface investigation conducted by Tetra Tech on July 24, 2003.

### 3.1 CURRENT CONDITIONS

Tetra Tech personnel mobilized to the Airport Way facility on July 24, 2003. The extent of the former excavation area of the two 4,000 gallon USTs was evident by the variations in asphalt texture.

### 3.2 SAMPLING

On July 24, 2003, Tetra Tech collected soil and groundwater samples from six direct-push soil borings located in and around the perimeter of the former gasoline and diesel UST excavation area, near the northwest corner of the SOC building. Figure 2 shows the locations of the soil borings.

Soil was retrieved throughout each boring in 4-foot intervals using a dedicated acetate sleeve that was split open lengthwise for soil logging and collection of a soil sample. Borings were completed to 12 feet below ground surface (bgs). Soils were classified on the field boring logs using the Unified Soil Classification System. Generally, soil samples were screened for petroleum hydrocarbon concentrations in the field at 2-foot intervals with a photoionization detector (PID). PID readings were recorded on the boring logs in the field (Appendix A). Two soil samples were collected from each boring for laboratory analyses -- one sample from the soil/water interface and one sample from the soil interval with the highest PID readings. All soil samples were analyzed for TPHg, TPHd, and BTEX. Duplicate soil samples for quality assurance were collected for both soil samples collected from Boring B-3.

Groundwater samples were collected from each boring. Groundwater samples were collected using dedicated low-density polyethylene tubing and a peristaltic pump. The groundwater samples were analyzed for TPHg, TPHd, and BTEX. A duplicate groundwater sample for quality assurance was collected from Boring B-4.

Soil and groundwater samples were labeled and immediately placed in a cooler on ice. Chain-of-custody documentation was recorded on a form once the samples were collected and the sample name, description, and time of collection were recorded. Tetra Tech field personnel wore disposable nitrile gloves while conducting the sampling. Investigation-derived waste was properly disposed of on site in municipal waste containers.

Samples were transported to the Friedman & Bruya, Inc., analytical laboratory located at 3012 16<sup>th</sup> Avenue West, in Seattle, Washington, on July 24, 2003. Samples were delivered following proper chain-

of-custody protocol. Friedman & Bruya analyzed the samples for BTEX using U.S. Environmental Protection Agency (EPA) Method 8021B (EPA 1996), for TPHg using Northwest Total Petroleum Hydrocarbons-Gx method (NWTPH-Gx) (Ecology 1997), and for TPHd using Northwest Total Petroleum Hydrocarbons-Dx (NWTPH-Dx) method (Ecology 1997).

#### 4.0 RESULTS

Soil borings were completed to 12 feet bgs and groundwater was encountered between 7.5 and 9 feet bgs. Boring B-3, located within the former gasoline/diesel UST excavation area, however, was the only boring not completed to 12 feet bgs because of refusal; Boring B-3 was completed at 10 feet bgs. Appendix A includes a copy of the boring logs. Soils encountered in the borings consisted primarily of sands, including clayey sand, silty sand, and gravelly sand. Wet soils, or groundwater, were commonly encountered at about 7.5 feet bgs in a poorly sorted sand to silty sand unit with traces of fine to medium sized gravel. Except for Boring B-3 and Boring B-5, the water table was encountered below a moist clay, silty clay, or clayey sand layer (0.5 to 1-foot thick). The backfill material encountered in Boring B-3 was sand, gravelly sand, and sandy gravel; native soils were encountered below 9 feet bgs.

Table 1 provides the soil analytical results; the laboratory results are provided in Appendix B. Only one of the twelve samples collected contained petroleum hydrocarbons above the MTCA Method A cleanup levels. In Boring B-3, TPHd (370 milligrams per kilogram [mg/kg]) was detected above the MTCA Method A cleanup level (200 mg/kg) in Sample ID B-3: 9' collected at 9 feet bgs. BTEX constituents and TPHg also were detected in this sample but not above MTCA Method A cleanup levels. Benzene and xylenes were detected at concentrations below MTCA Method A cleanup levels in Boring B-1 from the sample collected at 10 feet bgs. BTEX, TPHg, and TPHd were not detected above the laboratory detection limits in any other soil sample.

Table 2 provides the groundwater analytical results; the laboratory results are provided in Appendix B. BTEX, TPHg, and TPHd concentrations in groundwater were detected above the MTCA Method A cleanup levels in Boring B-3 as follows: benzene (300 micrograms per liter [ $\mu\text{g/L}$ ], toluene (430  $\mu\text{g/L}$ ), ethylbenzene (380  $\mu\text{g/L}$ ), xylenes (1,700  $\mu\text{g/L}$ ), TPHg (5,900  $\mu\text{g/L}$ ), and TPHd (6,100  $\mu\text{g/L}$ ). In Boring B-1, benzene, total xylenes, and TPHg concentrations were 880, 35, and 2,400  $\mu\text{g/L}$ . Concentrations of BTEX and TPH were detected in samples from Borings B-4, B-5, and B-6 but not above MTCA Method

A cleanup levels. The groundwater sample from Boring B-2 did not have detectable concentrations of any of the analytes.

TABLE 1

SOIL ANALYTICAL RESULTS (mg/kg)  
 QWEST AIRPORT WAY SOC  
 JULY 24, 2003

Location	Benzene	Toluene	Ethylbenzene	Xylenes (total)	TPHg	TPHd
B-1: 7.5'	ND	ND	ND	ND	ND	ND
B-1: 10'	0.05	ND	ND	0.06	ND	ND
B-2: 3.5'	ND	ND	ND	ND	ND	ND
B-2: 7.5'	ND	ND	ND	ND	ND	ND
B-3: 7'	ND	ND	ND	ND	ND	ND
B-3: 9'	0.06	0.04	1.1	2.5	80	370
B-4: 3'	ND	ND	ND	ND	ND	ND
B-4: 7.5'	ND	ND	ND	ND	ND	ND
B-5: 5'	ND	ND	ND	ND	ND	ND
B-5: 7.5'	ND	ND	ND	ND	ND	ND
B-6: 5'	ND	ND	ND	ND	ND	ND
B-6: 7.5'	ND	ND	ND	ND	ND	ND
MTCA Method A Level	0.5	40	20	20	100	200

Notes:

mg/kg Milligram per kilogram

ND Not detected above the detection limit: BTEX -- 0.02 mg/kg, TPHg -- 1.0 mg/kg, TPHd -- 50 mg/kg

MTCA Model Toxics Control Act

Shading indicates concentrations above the MTCA Method A cleanup level.

**TABLE 2**  
**GROUNDWATER ANALYTICAL RESULTS (µg/L)**  
**QWEST AIRPORT WAY SOC**  
**JULY 24, 2003**

Location	Benzene	Toluene	Ethylbenzene	Xylenes (total)	TPHg	TPHd
B-1	880	ND*	ND*	35	2,400	590
B-2	ND	ND	ND	ND	ND	ND
B-3	300	430	380	1,700	5,900	6,100
B-4	2	ND	ND	2	120	ND
B-5	ND	ND	2	9	ND	410
B-6	3	ND	ND	2	170	ND
<b>MTCA Method A Level</b>	5	40	30	20	1,000	1,000

**Notes:**

- µg/L      Microgram per liter
  - ND        Not detected above the detection limit: BTEX -- 1 µg/L, TPHg -- 50 µg/L, TPHd -- 280 µg/L (250 µg/L for Boring B-6)
  - ND\*      Not detected above the detection limit: BTEX -- 20 µg/L (sample diluted thus higher detection limit)
  - MTCA     Model Toxics Control Act
- Shading indicates concentrations above the MTCA Method A cleanup level.

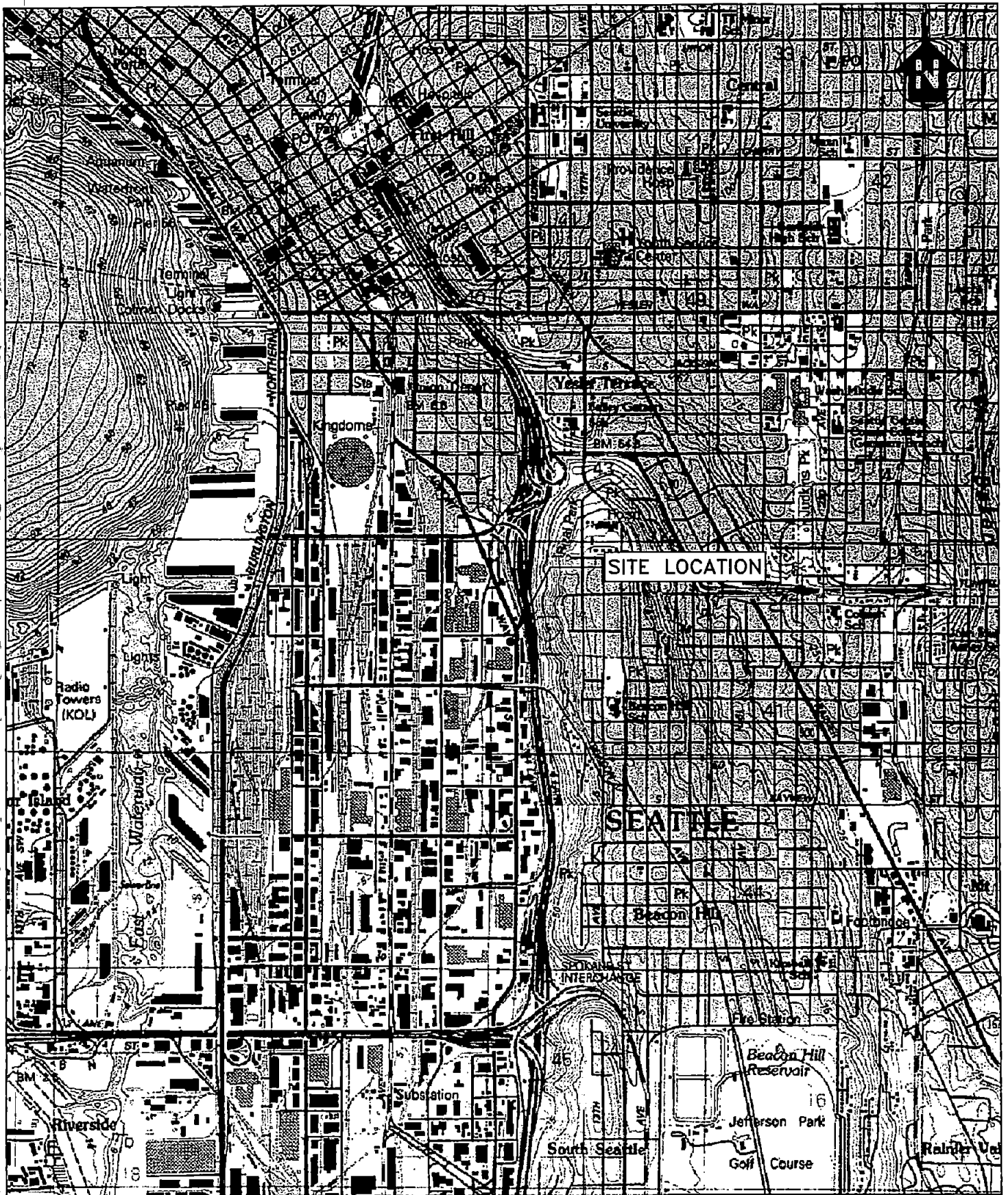
**5.0 DISCUSSION**

The results of this subsurface investigation indicate that groundwater and soil contamination is limited. In groundwater the MTCA Method A cleanup levels were exceeded in the sample collected from Boring B-3, which was completed within the location of the excavation area of the former USTs and the sample collected from Boring B-1, which was completed northwest of the excavation area. In soil, the MTCA Method A cleanup levels were only exceeded in one sample collected at 9 feet bgs in Boring B-3.

## REFERENCES

- AGRA Earth & Environmental (AGRA). 1998. "UST Site Assessment at US West Facility, 1709 Airport Way South, Seattle, Washington." August.
- Boateng Environmental Scientists (Boateng). 1993a. "Underground Storage Tank Decommissioning, Airport Way Service Operating Center, 1709 Airport Way South, Seattle, Washington." July.
- Boateng. 1993b. "Phase II Investigation of Contaminated Soils at the US West Service Operating Center, 1709 Airport Way South, Seattle, Washington." December.
- U.S. Environmental Protection Agency. 1996. "SW 846 Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods, Method 8021B, Aromatic and Halogenated Volatiles by Gas Chromatography using Photoionization and/or Electrolytic Conductivity Detectors." December.
- Washington State Department of Ecology. 1997. "Analytical Methods for Petroleum Hydrocarbons." Publication No. ECY 97-602. June.

**FIGURES**



SITE LOCATION

SEATTLE

Beacon Hill

INTERCHANGE

Fire Station

Beacon Hill Reservoir

Jefferson Park

Golf Course

South Seattle

Substation

Riverside

Radio Towers (KOL)

Waterbury

Terminal Light

Kingdome

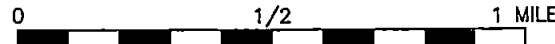


FIGURE 1

SITE LOCATION MAP

QWEST

1709 AIRPORT WAY SOUTH  
SEATTLE, WASHINGTON

TETRA TECH EM INC.

Source: USGS 7.5-Minute Quadrangle Map. Seattle South E, WA. 1978.

8TH AVENUE SOUTH

PROPERTY LINE

Groundwater contamination

B-1, B-3

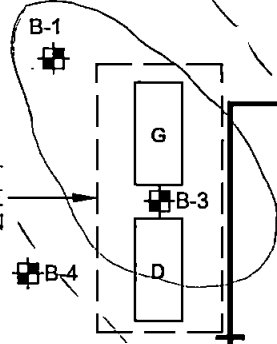
Soil contamination

B-3 (9')

APPROXIMATE EXTENT OF FORMER HEATING OIL TANK (TANK #2) EXCAVATION

APPROXIMATE EXTENT OF FORMER GASOLINE AND DIESEL UST EXCAVATION

APPROXIMATE EXTENT OF FORMER WASTE MOTOR OIL TANK (TANK #1) EXCAVATION






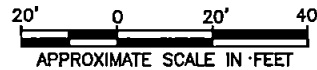
QWEST AIRPORT WAY SOC BUILDING

BAY DOOR

1. Install 3 Monitoring wells
2. groundwater monitoring
3. ORC installation
4. limited soil excavation around B-3

**LEGEND**


-  Boring Location
-  Former Gasoline UST
-  Former Diesel UST



**FIGURE 2**

**SITE PLAN**  
**QWEST**

1709 AIRPORT WAY SOUTH  
SEATTLE, WASHINGTON

 TETRA TECH EM INC.

**APPENDIX A  
BORING LOGS**

**Subsurface Investigation  
Qwest Airport Way SOC  
Seattle, Washington**

1709 Airport Way South

Seattle, WA

Airport Way SOC, Qwest

**SOIL BORING AND WELL INSTALLATION  
AND VISUAL CLASSIFICATION LOG**



Boring Number: <u>1</u>	Date Started: 7/24/03
Drilling Method: Direct Push <u>DP-II</u>	Date Completed: 7/24/03 <u>08:00</u>
	Logged By: John Hurley
Outer Diameter of Boring: 2.5 inches	Drilling Subcontractor: Cascade Drilling
Inner Diameter of Well Casing: NA	Driller: Don Hamten
Depth to Water (ft./bgs.) <u>7.5</u>	Location Sketch:

Time	Depth (ft) bgs	Drive Interval	Recovered Interval	Sample ID	Blow count (per 6 inches) / V.B. utility type, dia.	Description	USCS soil symbol	Well construction	OVM (ppm)
						asphalt ~ 1"			
						Sandy gravel	GW		ND
	4					Dry, tan, clayey sand, fine to medium sand, with 2" grey/black (no odor) clayey silt at 35	SC	4	ND
				(7.5)		4.5' Grey, slightly moist, fine to coarse sand, with traces of fine to medium gravel	SW		ND
	8					6' Grey, slightly moist, gravelly sand, sand	SG	8	8
				(10)		7' 13 fine to medium, gravel 13 medium			10
						Tan, moist, clayey sand, with trace fine gravel	SC		ND
	12					7.5' Grey, wet silty sand (sand fine to medium) with trace fine to medium gravel	SM	12	
						11' Grey, wet sand with plant fragments	ML		
						11.5' Grey, wet sand, fine to medium sand	SP		
						12' Bottom of hole at 12'			

-3 rows, 1-500 ml amber of groundwater collected

1709 Airport Way South  
Seattle, WA

**SOIL BORING AND WELL INSTALLATION  
AND VISUAL CLASSIFICATION LOG**

Airport Way SOC, Qwest



TETRA TECH EM INC.

Boring Number: 2	Date Started: 7/24/03
Drilling Method: Direct Push DP-11	Date Completed: 7/24/03 10:00
	Logged By: John Hurley
Outer Diameter of Boring: 2.5 inches	Drilling Subcontractor: Cascade Drilling
Inner Diameter of Well Casing: NA	Driller: Don Hamten
Depth to Water (ft./bgs.) ~7.8'	Location Sketch:

Depth (ft) bgs	Drive Interval	Recovered Interval	Sample ID	V.B. utility type, dia.	Description	USCS soil symbol	Well construction	OVM (ppm)
					asphalt ~1"			
			(3.5)		1' Grey, dry, fine to coarse gravel	GW		ND
4					5' Tan, slightly moist, fine to med. sand, with traces of clay lam. more	SP		150
			(7.5)		7' Grey, moist, sandy silt, sand is fine grained	ML		ND
8					7.5' Grey/brown, moist, silty clay with plant fragments	CL		ND
					Grey, very moist, silty sand, sand-fine to medium and trace fine to medium gravel, -wet below 7.8' -w/ medium to coarse gravel at 8.5'-10'	SM		ND
12					11' Grey wet clayey sand	SC		ND
					12' Bottom of hole at 12'			

-3 vials, 1-500ml amber collected of groundwater

1709 Airport Way South  
Seattle, WA

**SOIL BORING AND WELL INSTALLATION  
AND VISUAL CLASSIFICATION LOG**

Airport Way SOC, Qwest

**TETRA TECH EM INC.**

Boring Number: 3	Date Started: 7/24/03
Drilling Method: Direct Push DP-4	Date Completed: 7/24/03 1045
	Logged By: John Hurley
Outer Diameter of Boring: 2.5 inches	Drilling Subcontractor: Cascade Drilling
Inner Diameter of Well Casing: NA	Driller: Don Hamten
Depth to Water (ft./bgs.) 9'	Location Sketch:

Depth (ft) bgs	Drive Interval	Recovered Interval	Sample ID	V.B. utility type, dia.	Description	USCS soil symbol	Well construction	OVM (ppm)
0					asphalt ~1"			
4					Grey tan, slightly moist, gravelly sand, sand is fine to coarse gravel is fine to coarse	SL		ND
5								ND
8			(7) Dupl		Grey, slightly moist, sandy gravel gravel is fine to medium sand is fine to medium	GP		ND
9			(9) Dupl					148
9.5					Grey wet gravelly sand	GL		831
10					Grey wet fine to medium sand	SP		23
10					Bottom of boring at 10'-Refusal			

-Note: Duplicate soils collected  
water-slow yield no duplicates

-300as, 1-500mL amber of ground water collected

1709 Airport Way South  
Seattle, WA

**SOIL BORING AND WELL INSTALLATION  
AND VISUAL CLASSIFICATION LOG**

Airport Way SOC, Qwest



TETRA TECH EM INC.

Boring Number: <u>4</u>	Date Started: 7/24/03
Drilling Method: Direct Push <u>DP-11</u>	Date Completed: 7/24/03 <u>11:30</u>
	Logged By: John Hurley
Outer Diameter of Boring: 2.5 inches	Drilling Subcontractor: Cascade Drilling
Inner Diameter of Well Casing: NA	Driller: Don Harnten
Depth to Water (ft./bgs.) <u>7.5'</u>	Location Sketch:

Time	Depth (ft) bgs	Drive Interval	Recovered Interval	Sample ID	Blow count (per 6 inches) / V.B. utility type, dia.	Description	USCS soil symbol	Well construction	OVM (ppm)
						asphalt ~ 1"			
				<u>3'</u>		2' Brown, slightly moist, sandy clay, with trace medium gravel	CL		ND
						2' Tan slightly moist, fine to medium sand, -moist below 3.5'	SP		729
				<u>4.5'</u>		5' Grey, slightly moist, sandy gravel, fine to coarse gravel	GP		131
						6' Grey/brown, silty clay, with trace plant fragments	CL		38
						6.5' Grey, moist, gravelly sand, sand and gravel fine to medium	SC		21
						7.5' Grey, wet, fine to medium sand, with trace fine to medium gravel	SW		12
						11' Grey, wet, silty sand, with a clay lense at 11.5'	SM		
						12' Bottom of boring at 12'			

- Duplicate water samples collected  
- levoas, 2-500 ml ambers

1709 Airport Way South  
Seattle, WA

**SOIL BORING AND WELL INSTALLATION  
AND VISUAL CLASSIFICATION LOG**

Airport Way SOC, Qwest



TETRA TECH EM INC.

Boring Number: 5	Date Started: 7/24/03
Drilling Method: Direct Push DP-4	Date Completed: 7/24/03 12:10
Outer Diameter of Boring: 2.5 inches	Logged By: John Hurley
Inner Diameter of Well Casing: NA	Drilling Subcontractor: Cascade Drilling
Depth to Water (ft./bgs.) 7.5'	Driller: Don Hamten
	Location Sketch:

Depth (ft) bgs	Drive Interval	Recovered Interval	Sample ID	V.B. utility type, dia.	Description	USCS soil symbol	Well construction	OVM (ppm)
0					asphalt ~1"			
1					Grey slightly moist medium to coarse gravel	GW		ND
5			5		Brown, slightly moist, fine to medium sand, with trace medium gravel, - no gravel below 5'	SP		80
7.5			7.5		- very moist below 6.5'			1500
7.5					Grey, wet, fine to coarse sand, with trace fine gravel, with silt	SW		60
8.5					lense at 7.8'			16
8.5					Grey, wet, fine to coarse sand, with fine to medium gravel	SW		ND
10					Grey, very moist, silty clay, with trace fine gravel	Ch		
10.5					Grey, wet, fine to medium sand, with silt lense at 11.5'	SP		
12					Bottom of boring at 12'			

-30ccs, 1-500ml amber of ground water collected

1709 Airport Way South  
Seattle, WA

**SOIL BORING AND WELL INSTALLATION  
AND VISUAL CLASSIFICATION LOG**

Airport Way SOC, Qwest

**TT** TETRA TECH EM INC.

Boring Number: 6	Date Started: 7/24/03
Drilling Method: Direct Push DP-4	Date Completed: 7/24/03 13:15
	Logged By: John Hurley
Outer Diameter of Boring: 2.5 inches	Drilling Subcontractor: Cascade Drilling
Inner Diameter of Well Casing: NA	Driller: Don Hamten
Depth to Water (ft./bgs.) 7.5'	Location Sketch:

Depth (ft) bgs	Drive Interval	Recovered Interval	Sample ID	V.B. utility type, dia.	Description	USCS soil symbol	Well construction	OVM (ppm)
0					asphalt ~1"			
1					Grey, dry, sand, medium to coarse gravel	GW		ND
2			5'		Brown, slightly moist, sandy clay, with trace fine to medium gravel	CL		145
3			7.5'		Brown, slightly moist, fine to medium sand, fine to medium gravel - moist below 5'	SP		150
4					- no gravel below 4'			10
6					Grey, slightly moist, silty clay, with fine to coarse gravel	CL		12
7					Grey, moist, silty sand, with clay lense at 7.5'			11
8					- wet below 7.5'			
9					- with trace fine to med. gravel below 7.5'			
10					- sand is medium to coarse with fine gravel at 8.5' to 9.5'	SW		
11					Grey, very moist, silty clay	CL		
12					Grey, wet fine to coarse sand with silt	SW		

Bottom of boring at 12'

- 3 vials, 1-500 mL amber of groundwater collected

**APPENDIX B**  
**LABORATORY ANALYTICAL REPORT**

**Subsurface Investigation**  
**Qwest Airport Way SOC**  
**Seattle, Washington**

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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Charlene Morrow, M.S.  
Yelena Aravkina, M.S.  
Bradley T. Benson, B.S.  
Kurt Johnson, B.S.

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August 1, 2003

Donna Lacombe, Project Manager  
Tetra Tech EM Inc.  
6100 219th St. SW, Suite 550  
Mountlake Terrace, WA 98043

Dear Ms. Lacombe:

Included are the results from the testing of material submitted on July 24, 2003 from the Airport Way P1747015401, F&BI 307222 project. There are 11 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

*Charlene Morrow*

Charlene Morrow  
Chemist

Enclosures  
TTE0801R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on July 24, 2003 by Friedman & Bruya, Inc. from the Tetra Tech EM Inc. Airport Way P1747015401, F&BI 307222 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>Tetra Tech EM Inc.</u>
307222-01	B-1
307222-02	B-1:7.5
307222-03	B-1:10
307222-04	B-2
307222-05	B-2:3.5'
307222-06	B-2:7.5'
307222-07	B-3
307222-08	B-3:7'
307222-09	B-3:9'
307222-10	B-4
307222-11	B-4:3'
307222-12	B-4:7.5'
307222-13	B-5
307222-14	B-5:5'
307222-15	B-5:7.5'
307222-16	B-6
307222-17	B-6:5'
307222-18	B-6:7.5'
307222-19	DUP
307222-20	DUP1
307222-21	DUP2

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 08/01/03  
 Date Received: 07/24/03  
 Project: Airport Way P1747015401, F&BI 307222  
 Date Extracted: 07/25/03  
 Date Analyzed: 07/28/03

**RESULTS FROM THE ANALYSIS OF THE WATER SAMPLES  
 FOR BENZENE, TOLUENE, ETHYLBENZENE  
 XYLENES AND TPH AS GASOLINE  
 USING EPA METHOD 8021B AND NWTPH-Gx  
 Results Reported as µg/L (ppb)**

<u>Sample ID</u> Laboratory ID	<u>Benzene</u>	<u>Toluene</u>	<u>Ethyl Benzene</u>	<u>Total Xylenes</u>	<u>Gasoline Range</u>	<u>Surrogate (% Recovery)</u> (Limit 79-132)
B-1 d 307222-01	880	<20	<20	35	2,400	92
B-2 307222-04	<1	<1	<1	<1	<50	96
B-3 d 307222-07	300	430	380	1,700	5,900	101
B-4 307222-10	2	<1	<1	2	120	93
B-5 307222-13	<1	<1	2	9	<50	93
B-6 307222-16	3	<1	<1	2	170	94
DUP 307222-19	2	<1	<1	2	96	92
Method Blank	<1	<1	<1	<1	<50	96

d - The sample was diluted. Detection limits are raised due to dilution.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 08/01/03  
 Date Received: 07/24/03  
 Project: Airport Way P1747015401, F&BI 307222  
 Date Extracted: 07/29/03  
 Date Analyzed: 07/29/03 and 07/30/03

**RESULTS FROM THE ANALYSIS OF THE SOIL SAMPLES  
 FOR BENZENE, TOLUENE, ETHYLBENZENE,  
 XYLENES AND TPH AS GASOLINE  
 USING EPA METHOD 8021B AND NWTPH-Gx  
 Results Reported on a Dry Weight Basis  
 Results Reported as µg/g (ppm)**

<u>Sample ID</u> Laboratory ID	<u>Benzene</u>	<u>Toluene</u>	<u>Ethyl Benzene</u>	<u>Total Xylenes</u>	<u>Gasoline Range</u>	<u>Surrogate (% Recovery)</u> (Limit 76-129)
B-1:7.5 307222-02	<0.02	<0.02	<0.02	<0.02	<1	91
B-1:10 307222-03	0.05	<0.02	<0.02	0.06	<1	94
B-2:3.5' 307222-05	<0.02	<0.02	<0.02	<0.02	<1	94
B-2:7.5' 307222-06	<0.02	<0.02	<0.02	<0.02	<1	100
B-3:7' 307222-08	<0.02	<0.02	<0.02	<0.02	<1	97
B-3:9' 307222-09	0.06	0.04	1.1	2.5	80	89
B-4:3' 307222-11	<0.02	<0.02	<0.02	<0.02	<1	99
B-4:7.5' 307222-12	<0.02	<0.02	<0.02	<0.02	<1	102
B-5:5' 307222-14	<0.02	<0.02	<0.02	<0.02	<1	94
B-5:7.5' 307222-15	<0.02	<0.02	<0.02	<0.02	<1	95
B-6:5' 307222-17	<0.02	<0.02	<0.02	<0.02	<1	96

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 08/01/03  
 Date Received: 07/24/03  
 Project: Airport Way P1747015401, F&BI 307222  
 Date Extracted: 07/29/03  
 Date Analyzed: 07/29/03 and 07/30/03

**RESULTS FROM THE ANALYSIS OF THE SOIL SAMPLES  
 FOR BENZENE, TOLUENE, ETHYLBENZENE,  
 XYLENES AND TPH AS GASOLINE  
 USING EPA METHOD 8021B AND NWTPH-Gx**  
 Results Reported on a Dry Weight Basis  
 Results Reported as µg/g (ppm)

<u>Sample ID</u> Laboratory ID	<u>Benzene</u>	<u>Toluene</u>	<u>Ethyl Benzene</u>	<u>Total Xylenes</u>	<u>Gasoline Range</u>	<u>Surrogate (% Recovery)</u> (Limit 76-129)
B-6:7.5' 307222-18	<0.02	<0.02	<0.02	<0.02	<1	96
DUP1 307222-20	<0.02	<0.02	<0.02	<0.02	<1	100
DUP2 307222-21	0.06	<0.02	0.8	2.0	43	87
Method Blank	<0.02	<0.02	<0.02	<0.02	<1	92

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 08/01/03  
Date Received: 07/24/03  
Project: Airport Way P1747015401, F&BI 307222  
Date Extracted: 07/25/03  
Date Analyzed: 07/25/03

**RESULTS FROM THE ANALYSIS OF THE WATER SAMPLES  
FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL  
USING METHOD NWTPH-Dx  
Extended to Include Motor Oil Range Compounds  
Results Reported as µg/L (ppb)**

<u>Sample ID</u> Laboratory ID	<u>Diesel Extended</u> (C <sub>10</sub> -C <sub>36</sub> )	<u>Surrogate</u> <u>(% Recovery)</u> (Limit 45-147)
B-1 307222-01	590	115
B-2 307222-04	<280	109
B-3 307222-07	6,100	119
B-4 307222-10	<280	108
B-5 307222-13	410	126
B-6 307222-16	<250	109
DUP 307222-19	<280	117
Method Blank	<250	112

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 08/01/03  
Date Received: 07/24/03  
Project: Airport Way P1747015401, F&BI 307222  
Date Extracted: 07/25/03  
Date Analyzed: 07/25/03 and 07/28/03

**RESULTS FROM THE ANALYSIS OF THE SOIL SAMPLES  
FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL  
USING METHOD NWTPH-Dx**

**Extended to Include Motor Oil Range Compounds  
Results Reported on a Dry Weight Basis  
Results Reported as  $\mu\text{g/g}$  (ppm)**

<u>Sample ID</u> Laboratory ID	<u>Diesel Extended</u> (C <sub>10</sub> -C <sub>38</sub> )	<u>Surrogate</u> (% Recovery) (Limit 45-153)
B-1:7.5 307222-02	<50	123
B-1:10 307222-03	<50	118
B-2:3.5' 307222-05	<50	119
B-2:7.5' 307222-06	<50	118
B-3:7' 307222-08	<50	120
B-3:9' 307222-09	370	124
B-4:3' 307222-11	<50	120
B-4:7.5' 307222-12	<50	119
B-5:5' 307222-14	<50	122
B-5:7.5' 307222-15	<50	123
B-6:5' 307222-17	<50	124

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 08/01/03  
Date Received: 07/24/03  
Project: Airport Way P1747015401, F&BI 307222  
Date Extracted: 07/25/03  
Date Analyzed: 07/25/03 and 07/28/03

**RESULTS FROM THE ANALYSIS OF THE SOIL SAMPLES  
FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL  
USING METHOD NWTPH-Dx**

**Extended to Include Motor Oil Range Compounds**

Results Reported on a Dry Weight Basis

Results Reported as  $\mu\text{g/g}$  (ppm)

<u>Sample ID</u> Laboratory ID	<u>Diesel Extended</u> (C <sub>10</sub> -C <sub>36</sub> )	<u>Surrogate</u> (% Recovery) (Limit 45-153)
B-6:7.5' 307222-18	<50	126
DUP1 307222-20	<50	128
DUP2 307222-21	160	126
Method Blank	<50	120

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 08/01/03

Date Received: 07/24/03

Project: Airport Way P1747015401, F&BI 307222

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER  
 SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE,  
 XYLENES AND TPH AS GASOLINE  
 USING EPA METHOD 8021B AND NWTPH-Gx

Laboratory Code: 307222-01 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	Relative Percent Difference (Limit 20)
Benzene	µg/L (ppb)	880	850	3
Toluene	µg/L (ppb)	17	19	11
Ethylbenzene	µg/L (ppb)	12	11	9
Xylenes	µg/L (ppb)	35	30	15
Gasoline	µg/L (ppb)	2,400	2,300	4

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Benzene	µg/L (ppb)	25	86	99	71-117	14
Toluene	µg/L (ppb)	25	88	99	71-119	12
Ethylbenzene	µg/L (ppb)	25	85	98	67-125	14
Xylenes	µg/L (ppb)	75	82	91	65-127	10
Gasoline	µg/L (ppb)	1,000	100	100	62-120	0

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 08/01/03

Date Received: 07/24/03

Project: Airport Way P1747015401, F&BI 307222

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES  
FOR BENZENE, TOLUENE, ETHYLBENZENE,  
XYLENES AND TPH AS GASOLINE  
USING EPA METHOD 8021B AND NWTPH-Gx

Laboratory Code: 307257-01 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	Relative Percent Difference (Limit 20)
Benzene	µg/g (ppm)	<0.02	<0.02	nm
Toluene	µg/g (ppm)	<0.02	<0.02	nm
Ethylbenzene	µg/g (ppm)	<0.02	<0.02	nm
Xylenes	µg/g (ppm)	<0.02	<0.02	nm
Gasoline	µg/g (ppm)	<1	<1	nm

Laboratory Code: 307257-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Benzene	µg/g (ppm)	0.5	<0.02	78	70	60-131	11
Toluene	µg/g (ppm)	0.5	<0.02	84	78	68-129	7
Ethylbenzene	µg/g (ppm)	0.5	<0.02	86	79	69-131	8
Xylenes	µg/g (ppm)	1.5	<0.02	82	76	69-137	8

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Benzene	µg/g (ppm)	0.5	98	100	68-116	2
Toluene	µg/g (ppm)	0.5	102	104	75-114	2
Ethylbenzene	µg/g (ppm)	0.5	102	104	79-114	2
Xylenes	µg/g (ppm)	1.5	96	97	76-122	1
Gasoline	µg/g (ppm)	20	94	108	51-141	14

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 08/01/03

Date Received: 07/24/03

Project: Airport Way P1747015401, F&BI 307222

QUALITY ASSURANCE RESULTS FROM THE ANALYSIS OF WATER  
SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL  
EXTENDED USING METHOD NWTPH-Dx

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	µg/L (ppb)	2,500	107	100	71-128	7

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 08/01/03  
 Date Received: 07/24/03  
 Project: Airport Way P1747015401, F&BI 307222

**QUALITY ASSURANCE RESULTS FROM THE ANALYSIS OF SOIL SAMPLES  
 FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL EXTENDED  
 USING METHOD NWTPH-Dx**

Laboratory Code: 307222-15 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	Relative Percent Difference (Limit 20)
Diesel Extended	µg/g (ppm)	<50	<50	nm

Laboratory Code: 307222-15 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	µg/g (ppm)	500	<50	105	106	62-142	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	µg/g (ppm)	500	102	66-132

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

Send Report To Donna Lacombe  
 Company Tetra Tech EMI  
 Address 6100 219<sup>th</sup> St, SW, Suite 550  
 City, State, ZIP Mountlake Terrace WA 98043  
 Phone # \_\_\_\_\_ Fax # \_\_\_\_\_

SAMPLERS (signature) John Hurley  
 PROJECT NAME/NO. Airport Way PO # \_\_\_\_\_  
PI747015401  
 REMARKS Invest

Page # \_\_\_\_\_ of \_\_\_\_\_  
 TURNAROUND TIME  
 Standard (2 Weeks)  
 RUSH \_\_\_\_\_  
 Rush charges authorized by: \_\_\_\_\_  
 SAMPLE DISPOSAL  
 Dispose after 30 days  
 Return samples  
 Will call with instructions

Sample ID	Lab ID	Date	Time	Sample Type	# of containers	ANALYSES REQUESTED										Notes		
						TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by 8260	SVOCs by 8270	HFS							
B-1	01A-C	7/24	8:00	water	3 voas		X	X										
B-1	010	}	8:00	water	1-500ml amber	X												
B-1:7.5'	02		8:00	Soil	1	X	X	X										
B-1:10'	03		8:00	Soil	1	X	X	X										
B-2	04A-C		10:00	water	3 voas		X	X										
B-2	040		10:00	water	1 amber	X												
B-2:3.5'	05		10:00	Soil	1.4oz	X	X	X										
B-2 7.5'	06		10:00	Soil	1.4oz	X	X	X										
B-3	07A-C	10:45	water	3 voas		X	X											
B-3	070	10:45	water	1 amber	X													

Friedman & Bruya, Inc.  
 3012 16th Avenue West  
 Seattle, WA 98119-2029  
 Ph. (206) 285-8282  
 Fax (206) 283-5044

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: <u>John Hurley</u>	<u>John Hurley</u>	<u>Tetra Tech EMI</u>	<u>7/24</u>	<u>14:25</u>
Received by: <u>S. Olson</u>	<u>S. Olson</u>	<u>FH3, Inc</u>	<u>1</u>	<u>1</u>
Relinquished by:				
Received by:				

Send Report To Donna Lacombe  
 Company Tetra Tech EMI  
 Address 16100 219th St, SW, Suite 300  
 City, State, ZIP Mountlake Terrace WA 98043  
 Phone #                      Fax #                     

SAMPLERS (signature) John Hurley  
 PROJECT NAME/NO. Airport way PO #                       
P17417015401  
 REMARKS Qwest

TURNAROUND TIME  
 Standard (2 Weeks)  
 RUSH  
 Rush charges authorized by:                       
 SAMPLE DISPOSAL  
 Dispose after 30 days  
 Return samples  
 Will call with instructions

Sample ID	Lab ID	Date	Time	Sample Type	# of containers	ANALYSES REQUESTED										Notes			
						TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by 8260	SVOCs by 8270	HFS								
B-3: 7'	08	7/24	10:45	Soil	1-4oz	Y	Y	Y											
B-3: 9'	09		10:45	Soil	1-4oz	Y	Y	Y											
B-4#	10A-C		11:30	water	3-vials		Y	Y											
B-4	10D		11:30	water	1-amber	Y													
B-4: 3'	11		11:30	soil water	1-4oz	Y	Y	Y											
B-4: 7.5'	12		11:30	soil water	1-4oz	Y	Y	Y											
B-5	13A-C		12:10	water	3-vials		Y	Y											
B-5	13D		12:10	water	1-amber	Y													
B-5: 5'	14		12:10	Soil	1-4oz	Y	Y	Y											
B-5: 7.5'	15		12:10	Soil	1-4oz	Y	Y	Y											

Friedman & Bruya, Inc.  
 3012 16th Avenue West  
 Seattle, WA 98119-2029  
 Ph. (206) 285-8282  
 Fax (206) 283-5044

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: <u>John Hurley</u>	<u>John Hurley</u>	<u>Tetra Tech EMI</u>	<u>7/24/03</u>	<u>1425</u>
Received by: <u>S. Dobson</u>	<u>S. Dobson</u>	<u>F+B, Inc</u>		
Relinquished by:				
Received by:				

Send Report To Danwa Lakombe  
 Company Tetra Tech EM1  
 Address 6100 29<sup>th</sup> St, SW, Suite 550  
 City, State, ZIP Mountlake Terrace WA 98043  
 Phone # 425-776-3761 Fax # 425-673-9119

SAMPLERS (signature) John Hurley  
 PROJECT NAME/NO. Airport Way PO #  
P1747015 401  
 REMARKS Quest

Page # 1 of 1  
 TURNAROUND TIME  
 Standard (2 Weeks)  
 RUSH  
 Rush charges authorized by:  
 SAMPLE DISPOSAL  
 Dispose after 30 days  
 Return samples  
 Will call with instructions

Sample ID	Lab ID	Date	Time	Sample Type	# of containers	ANALYSES REQUESTED										Notes			
						TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by 8260	SVOCs by 8270	HFS								
B-6	16A-C	7/24	1315	water	3-ras		X	X											
B-6	120	}	1315	water	1amber	X													
B-6: 5'	17		1315	Soil	1-4oz	X	X	X											
B-6: 7.5'	18		1315	Soil	1-4oz	X	X	X											
DUP	19AC		-	water	3-ras		X	X											
DUP	19D		-	water	1amber	X													
DUP 1	20		-	Soil	1-4oz	X	X	X											
DUP 2	21		-	Soil	1-4oz	X	X	X											

Friedman & Bruya, Inc.  
 3012 16th Avenue West  
 Seattle, WA 98119-2029  
 Ph. (206) 285-8282  
 Fax (206) 283-5044

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: <u>John Hurley</u>	<u>John Hurley</u>	<u>Tetra Tech EM1</u>	<u>7/24/03</u>	<u>1425</u>
Received by: <u>S. Olson</u>	<u>S. Olson</u>	<u>F+B, Inc</u>	<u>7/24/03</u>	<u>1425</u>
Relinquished by:				
Received by:				