

G-LOGICS

CLEANUP ACTION REPORT

OCTOBER 31, 2005

---



Logical Solutions for Complex Problems

**Cleanup Action Report  
Former Gas Station  
2800 Martin Luther King Way South  
Seattle, WA 98144**

Prepared for: Mr. Bruce Biesold  
4854 194th Avenue SE  
Issaquah, WA 98027

Prepared by: G-Logics, Inc.  
175 First Place NW, Suite A  
Issaquah, WA 98027

Telephone: (425) 391-6874  
Facsimile: (425) 313-3074

October 31, 2005

**G-Logics Project 01-0356-C  
Copyright 2005 G-Logics, Inc.  
All Rights Reserved**

G-Logics has prepared this document only for our client's use, only for the purposes stated herein, and subject to any stated limitations. Use of this document by regulatory agencies is regarded as a "fair use" and is not a violation of our copyright. Regulatory agencies also may make additional copies of this document for their internal and public use, as required by law. All other copies or uses of this document must acknowledge our copyright and indicate that permission to copy/use has been received from G-Logics and our Client.



Logical Solutions for Complex Problems

October 31, 2005  
G-Logics Project 01-0356-C

Mr. Bruce Biesold  
4854 194th Avenue SE  
Issaquah, WA 98027

**Subject: Cleanup Action Report  
Former Gas Station  
2800 Martin Luther King Way South  
Seattle, WA 98144**

Dear Mr. Biesold:

Presented in this Cleanup Action Report are the results of G-Logics soil and groundwater activities performed at the above-referenced property. This report documents:

- The removal of approximately 200-feet of abandoned product lines.
- The results of exploratory trenching and soils testing.
- The installation and analytical results from three monitoring wells.
- The installation of five ozone injection points and associated trenching.
- The setup and starting of an ozone remediation system.

The purpose of this work is to reduce concentrations of gasoline-contaminants at the site to a point that the Washington State Department of Ecology subsequently can be requested to provide a No Further Action Determination.

**G-Logics, Inc.**  
175 First Place NW, Suite A  
Issaquah, WA 98027  
T: 425-391-6874  
F: 425-313-3074  
01-0356-C-R1 logo doc

We trust the information presented in this report meets your needs at this time. Should you require additional information or have any questions, please contact us at your convenience. Thank you again for this opportunity to be of service.

Sincerely,

**G-Logics, Inc.**

Rory L. Galloway, LG, LHG  
Principal

Michael J. Harrington, P.E.  
Senior Environmental Engineer

## TABLE OF CONTENTS

<b>1.0 INTRODUCTION</b>	<b>1</b>
<b>1.1 Site Description and Brief Background</b>	<b>2</b>
<b>2.0 SOIL CLEANUP ACTIONS</b>	<b>2</b>
<b>2.1 Initial Site Work</b>	<b>3</b>
<b>2.2 Remove Drums and Waste Oil AST</b>	<b>3</b>
<b>2.3 Remove the Concrete Surfacing in the Pump Island Areas</b>	<b>3</b>
<b>2.4 Soil Excavation</b>	<b>3</b>
<b>2.5 Confirmation Soil Sampling</b>	<b>4</b>
<b>3.0 SOIL SAMPLING RESULTS</b>	<b>4</b>
<b>3.1 Subsurface Conditions</b>	<b>5</b>
<b>3.2 Analytical Results, Confirmation Samples</b>	<b>5</b>
<b>3.3 Analytical Results, Stockpile Samples</b>	<b>5</b>
<b>4.0 GROUNDWATER REMEDIATION TASKS</b>	<b>5</b>
<b>4.1 Utilities Locates</b>	<b>6</b>
<b>4.2 Install Three Monitoring Wells and Conduct Initial Baseline Sampling</b>	<b>6</b>
4.2.1 Groundwater Baseline Sampling Results	6
<b>4.3 Installation of Ozone Injection Points</b>	<b>6</b>
<b>4.4 Ozone Injection Equipment</b>	<b>7</b>
4.4.1 Electrical Supply	8
4.4.2 Ventilation	8
<b>4.5 System Startup and Operation</b>	<b>8</b>
4.5.1 Startup	8
4.5.2 Ongoing Operation and Maintenance (O&M)	9
<b>5.0 CONCLUSIONS</b>	<b>9</b>
<b>6.0 LIMITATIONS</b>	<b>10</b>
<b>7.0 REFERENCES</b>	<b>11</b>

## **FIGURES**

- Figure 1: Site Location Map
- Figure 2: Site Plan
- Figure 3: Soil Sampling Locations and Results
- Figure 4: Groundwater Elevations and Contours
- Figure 5: Groundwater Sampling Locations and Results
- Figure 6: Ozone Injection Points, Monitoring Well Locations, and Trenching Layout

## **TABLES**

- Table 1 Soil Sample Analysis, Gasoline, and BTEX
- Table 2 Groundwater Depth Measurements. 08/19/05
- Table 3 Groundwater Sample Analysis, Gasoline, and BTEX

## **APPENDICES**

- Appendix A: Site Exploration Methods
- Appendix B: Laboratory Data and Chain-of-Custody Documents
- Appendix C: Boring Logs
- Appendix D: Site Photos

## **ATTACHMENTS**

- Attachment A: Permission and Conditions for Use and Copying

## 1.0 INTRODUCTION

Presented in this report are the results of the remediation activities performed at the Former Gas Station located at 2800 Martin Luther King Way South in Seattle, WA (Figure 1, Photo 1), conducted in July through October of 2005. G-Logics, Inc. (G-Logics) was retained by Mr. Bruce Biesold to monitor and document the remediation of TPH contaminated soils at the subject property. The following report presents the findings of the soil and groundwater remediation effort on the property (Figure 2).

Work at the site was performed in accordance with the *Workplan for Site Remediation*, dated July 8, 2005 (workplan), prepared by G-Logics. The objective of this project was to remediate the subject area in a cost-effective and efficient manner meeting the cleanup criteria specified under Washington's Model Toxics Control Act (MTCA). This work included the following activities.

- Remove a drum and waste oil AST at the property.
- Locate utilities under the western portion of the property and MLK Way sidewalk.
- Remove most of the concrete surfacing in the pump island area.
- Remove and dispose remaining fuel lines.
- Excavate, stockpile, and test potentially petroleum-contaminated soil...
- Monitor product line excavation using field-screening methods (odors and PID)
- After removal of product piping and potentially petroleum-contaminated soils, collect samples from the excavations for verification purposes.
- Dispose of product piping and concrete rubble.
- Backfill product line excavations with clean stockpiled soil.
- Install three monitoring wells and conduct groundwater sampling. Two of the wells were located on the western edge of the property, adjacent to the MLK Way sidewalk.
- Provide trenching for installation of ozone delivery lines.
- Install an ozone soil and groundwater remediation system.
- Operate and maintain the remediation system.

- Prepare a report summarizing the site cleanup and verification sampling (this report).
- Submit groundwater sampling reports and other required documentation to Ecology for the subsequent NFA request (forthcoming).

Presented below are descriptions of the completed tasks. G-Logics' activities, observations, and findings relating to this work are subject to the limitations included as a separate section of this report.

### 1.1 Site Description and Brief Background

The subject property is located at 2800 Martin Luther King Way South in Seattle, WA (Figure 1). The site consists of a 0.25-acre lot containing a vacant auto-repair garage. The property was developed as a gasoline station and operated from 1955 until 1989. Auto-repair businesses operated out of the gas station building during the 1990s until early 2004. Three underground storage tanks (two gasoline USTs and one used oil UST) were removed in 1989. Other service-station equipment, including vehicle hoists, a heating oil UST, an oil/water separator, and a floor drain sump were removed in February 2005. Based on the findings of site-exploration work described in the July 8, 2005 workplan, the installation and operation of an ozone-treatment system was identified as a feasible remedial method for the remaining gasoline contaminants at this site.

## 2.0 SOIL CLEANUP ACTIONS

The cleanup action and compliance-monitoring work was conducted in accordance with Washington's Model Toxics Control Act (MTCA) regulations and the Ecology guidance document, "*Guidance on Preparing Independent Remedial Action Reports*, (Working Draft dated March 9, 1994), and our workplan dated July 8, 2005.



The following sections describe general activities performed during the remediation of petroleum-contaminated soils in the identified area of the property.

## **2.1 Initial Site Work**

Site work began on August 1, 2005. Additional security fencing was installed on the western side of the property, to provide a better safety barrier between the work zone and pedestrian traffic. Prior to beginning excavation, trenching and drilling construction activities an on-site initial health and safety meeting was conducted. The Health and Safety Plan was reviewed and signed by all workers on-site.

## **2.2 Remove Drums and Waste Oil AST**

Two drums were removed from the site, one containing waste oil filters left by the station operator, and the other containing the decontamination water that was generated during the previous drilling activities. The drums were disposed by Emerald Environmental Services of Seattle (Emerald) on October 24, 2005. A waste-oil AST, used by the former site operator, was located in the north service bay (Photo 1). Prior to disposal as scrap metal, the AST was cleaned by Emerald. The tank was also transported off-site for recycling on October 24, 2005.

## **2.3 Remove the Concrete Surfacing in the Pump Island Areas**

The concrete supports and the surrounding concrete surfacing for the two former pump islands was stockpiled at the site. It is anticipated that this material will be transported off-site in conjunction with the building demolition (Photo 5)

## **2.4 Soil Excavation**

The excavation of abandoned product lines and potentially contaminated soils beneath the pump islands began on August 17, 2005. A G-Logics environmental engineer was present during the piping and soil removal and performed the post-excavation soil sampling. Particular attention was given to noting visible evidence of staining, discoloration, odors, or other relevant factors indicative of a release of petroleum hydrocarbons (Photos 2 and 3). Field sampling methods are described in Appendix A.

The G-Logics' engineer screened the excavated soils and observed the condition of the walls and base of the excavations for visual evidence of discoloration and odors. Two small regions, within 10-feet of the former pump islands, were observed to have grey coloration; however, no odors were detected in these areas. Deeper excavation under these areas revealed that the staining did not extend to more than a few inches below the piping. Piping excavation did not reveal obvious release points of site contamination (Photos 2 and 3). Approximately 15 tons of suspected petroleum-affected soil was removed from the immediate area surrounding the pump islands and beneath the abandoned product lines. This soil was stockpiled on and covered with visqueen plastic sheeting adjacent to the building.

Approximately 200-feet of 2-inch steel fuel supply lines were removed (Photos 4, 5 and 6). Most of the lines were located in close proximity to the western edge of the property and ran from the former pump islands to the former underground storage tank area (Figure 3). The removed lines were stockpiled, cut into 10-foot sections, and transported off-site to a metals recycling facility.

## **2.5 Confirmation Soil Sampling**

Soil removal excavations were advanced to an average depth of 3-feet. Four soil samples were collected for confirmation purposes from the bottom and sidewall areas of the excavations. Two composite samples were taken from the stockpiled soils. Sample locations, depths, and analytical results are summarized on Table 1 and Figure 3.

Collected soil samples were placed in laboratory supplied glass sample jars and then sealed with Teflon-lined plastic lids. Sample labels were fixed to all sample jars and included the following information: sample number, owner name, date and time of collection, and the sampler's initials. Sealed samples were stored in an ice chest containing blue ice and were maintained in a cooled condition until delivery to the analytical laboratory. Completed chain-of-custody records were transferred with the samples to the analytical laboratory.

## **3.0 Soil Sampling results**

Four confirmation soil samples were collected from the excavated areas. Advanced Analytical, an Ecology-accredited laboratory located in Bellevue, Washington, performed the analytical testing. The analytical results for these samples are described below.

### **3.1 Subsurface Conditions**

The excavated areas were paved with asphalt or concrete to a depth of approximately 4 inches. Soils encountered to a depth of 2 1/2 feet consisted of dark brown silts with some gravel and metal/wood debris. This soil was interpreted to be imported fill. Apparent native soil was located at approximately 2 1/2 feet and consisted of light brown to gray silts and sands with some gravel and cobbles. There was visual evidence of hydrocarbon-stained soil (with hydrocarbon odor) detectable in the area beneath the former fuel pump islands (Photo 2).

### **3.2 Analytical Results, Confirmation Samples**

All four-confirmation samples indicated that the remaining hydrocarbon concentrations were non-detectable or were below MTCA Method A levels. The results of laboratory analysis are summarized in Table 1, and depicted on Figure 3. The laboratory report and chain-of-custody documentation are presented in Appendix B.

### **3.3 Analytical Results, Stockpile Samples**

Based on the analytical results of the two collected soil samples, the excavated and stockpiled soils would be acceptable for disposal at a Subtitle D landfill. The results of laboratory analysis are summarized in Table 1, and depicted on Figure 3. The laboratory report and chain-of-custody documentation are presented in Appendix B.

## **4.0 Groundwater Remediation Tasks**

In addition to the above discussed soil remediation activities, the workplan listed several other tasks required to complete the installation of the ozone-remediation system. These tasks are listed and discussed below.

#### **4.1 Utilities Locates**

Prior to conducting excavation and/or drilling activities, two services were utilized to locate underground utilities: One-Call, and Applied Professional Services, of Bellevue WA. The One-Call service, USA (for Pacific NW) Underground Service Alert, was notified on August 1, 2005 (the confirmation number 525-0344). The second, private utility locate was conducted on August 2 and 3, 2005. Accordingly, no unmarked utilities were encountered during excavation, trenching, or drilling activities.

#### **4.2 Install Three Monitoring Wells and Conduct Initial Baseline Sampling**

On August 9, 2005, three monitoring wells were installed on the site: MW-1, MW-2, and MW-3. The locations are shown on Figure 4. Cascade Drilling of Woodinville, WA, installed the wells. The boring logs for the wells are included in Appendix C. Water levels were measured and the wells sampled on August 19, 2005. Results of the groundwater elevations and survey are presented in Table 2, and the contours are depicted on Figure 4.

##### ***4.2.1 Groundwater Baseline Sampling Results***

Results of the groundwater sampling (Photo 9) from the above wells are listed in Table 3, and depicted on Figure 5. Groundwater from the easternmost MW-1 tested to have hydrocarbon concentrations below method-detection limits. However, both MW-2 and MW-3, which are located immediately adjacent to the western sidewalk, had hydrocarbon concentrations that exceeded MTCA cleanup levels. The highest concentration detected was found in MW-3.

#### **4.3 Installation of Ozone Injection Points**

The locations of the five ozone injection points (IP-1 to IP-5) are shown on Figure 6. Cascade Drilling of Woodinville installed the injection points on August 18, 2005, using 8-inch hollow stem augers (Photo 7). Copies of the boring logs are attached in Appendix C.

Ceramic ozone diffusers were installed at the bottom of each injection point, at a depth of 30 to 33-feet. The diffusers are connected to the remediation equipment with continuous 100-foot lengths of EPDM hosing (Photo 7). This 1-inch i.d. hosing is tested to safely contain up to 200 pounds per square inch of pressure and is rated "Excellent" for ozone

compatibility. Inside the trenches, this EPDM hosing is protected by a sleeve of 1.5-inch HDPE (Photo 8). The surrounding sleeve acts to protect the internal hosing from possible crushing and will act as a conduit, should hosing replacement be required at some future point.

The ozone supply lines were all buried to a depth of approximately 18-inches (Photo 8). The locations of the trenching are shown on Figure 6. All five injection points had individual supply lines that daylight next to the outside of the station building. A small hole was cut at the base of the wall of the building and the lines were passed through to the remediation equipment inside (Photo 16 and 18). This opening was then covered with large blocks of concrete.

Each injection point is finished at the ground surface with an 8-inch valve-cover box. The HDPE sleeve terminates inside these boxes, while the other end terminates inside the station building.

#### **4.4 Ozone Injection Equipment**

The ozone generation equipment was manufactured by CEC, The Ozone Company, of Downers Grove IL. The equipment was custom built with the following engineering specifications.

- Two pounds of ozone production per day.
- Injection pressures of up to 30 pounds per square inch.
- Flow rates of between one and five standard cubic feet per minute, per injection point.
- Welded stainless steel manifold with five ports.
- Flow meters and back flow preventers.
- Additional air-drying and moisture removal equipment.
- An ambient air ozone sensor.
- Safety shut-off system.
- Welded stainless steel skid.

The air sensor terminates ozone production whenever the ambient air O<sub>3</sub> concentration exceeds a level of 0.10 parts per million (ppm), the OSHA permitted exposure limit for a time-weighted eight-hour average. If the 0.10-ppm level is exceeded, the air supply

continues to function, flushing out the system. When the ambient air returns to a concentration of less than 0.10 ppm, the production of ozone automatically restarts. Photos 10, 11, and 12 show the equipment and various details listed above.

#### ***4.4.1 Electrical Supply***

Existing electrical service was utilized, with wiring modifications made to accommodate the required amperages of the equipment (Photos 14 and 15).

#### ***4.4.2 Ventilation***

Ventilation of the room enclosing the remediation equipment with fresh air was increased with the following modifications.

- An exhaust fan was installed in a former ventilation duct, near the floor where the dense ozone is most likely to accumulate. The fan operates continually with power provided by a nearby electrical outlet (Photo 16).
- The ceiling vent has been opened fully.
- The narrow window above the entry door has been opened.
- The ozone distribution lines enter the room through a hole made through the lower wall. This 6-inch by 12-inch hole has been covered on the outside of the building with concrete debris (Photo 16).

### **4.5 System Startup and Operation**

The ozone remediation equipment was delivered to the site on Friday, August 26, 2005. The following section discusses the system start-up and operation

#### ***4.5.1 Startup***

The equipment manifold was connected to the ozone distribution lines and the ozone-generation equipment was started. All flows and injection pressures occurred within the specified design criteria. Determination of the flow rates is facilitated by viewing the individual flow meters (Photo 13). All five injection points accept flows at a rate of 1.5 standard cubic feet per minute, at a pressure of 17 pounds per square inch. The compressor, auto-drain, cooling system, and drying system have all continued to function as designed.

#### **4.5.2 Ongoing Operation and Maintenance (O&M)**

Weekly visits to the site have occurred since the August 26 startup. The system has been functioning as designed. Site visits include the following system checks.

- Injection pressure and flow rates.
- Ozone generation.
- Auto-drain.
- Drying agent absorbent capacity.
- Intake air filter.
- Manifold draining.
- Timer operation.
- Leak detection.
- Site security (Photo 17).

## **5.0 CONCLUSIONS**

All of the construction tasks listed in the workplan have been performed as follows.

- Two drum and an AST have been removed.
- Abandoned product lines have been excavated and removed.
- Soils samples have been taken from trenching excavations and confirmed to have hydrocarbon concentrations below MTCA Method A levels.
- Three monitoring wells have been installed, surveyed, and sampled.
- Five ozone injection points have been installed.
- An ozone-remediation system has been installed.
- The ozone-remediation system is continuing to function as designed.

The second groundwater sampling was conducted on October 27, and the results will be submitted in a separate report.

## 6.0 LIMITATIONS

The conclusions presented in this report are our professional opinions based solely upon our visual observations and the analysis of the soil samples collected from the trenching excavations and soil stockpiles. The results and conclusions are intended exclusively for the purpose outlined herein and for the site location and project indicated. Opinions and recommendations presented herein apply to site conditions existing at the time of our assessment and do not necessarily apply to future changes or other prior conditions at the site of which G-Logics, Inc. is not aware and has not had the opportunity to evaluate. Our scope of work was limited to those items specifically identified in this report. Other activities not specifically included in the presented scope of work (in a workplan, correspondence, or this report) are excluded and are therefore not part of our services.

G-Logics offers a range of environmental exploration services to suit the needs of our clients, including more quantitative explorations. Although risk can never be eliminated, more detailed and extensive explorations yield more information, which may help to better understand and manage site risks. Since such detailed services involve greater expense, we ask our clients to participate in identifying the level of service that will provide them with an acceptable level of risk. Please contact the signatories of this report if you would like to discuss this issue of risk further.

G-Logics assumes no responsibility or liability whatsoever for any claim, loss of property value, damage, or injury which results from pre-existing hazardous materials being encountered or present on the project site, or from the discovery of such hazardous materials.

This report is prepared for the sole use of our client. The scope of services performed during this assessment may not be appropriate for the needs of other users, and re-use of this document or the findings, conclusions, or recommendations presented herein are at sole risk of said user(s). Any party other than our client who would like to use this report shall notify G-Logics of such intended use by executing the "Permission and Conditions for Use and Copying" contained in this document. Based on the intended use of the report, G-Logics may require that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements will release G-Logics from any liability resulting from the use of this report by any unauthorized party.

No warranty, either express or implied, is made.



## 7.0 REFERENCES

American Society for Testing and Materials, 1997, Standard Guide for Environmental Site Assessments: Phase II Environmental Site Assessment Process: West Conshohocken, Penn., American Society for Testing and Materials, Designation E 1903 -97, 13 p.

Ecology 1997a. Analytical Methods for Petroleum Hydrocarbons. Toxics Cleanup Program and the Ecology Environmental Laboratory. Washington State Department of Ecology, Olympia, Washington. Publication No. ECY97-602.

Ecology, 1994, Guidance on Preparing Independent Remedial Action Reports, Washington State Department of Ecology, Working Draft dated March 9, 1994.

G-Logics, *Phase II Site Assessment and Equipment Removal, Former Gas Station. 2800 Martin Luther King Way South, Seattle WA.* dated March 17, 2005.

G-Logics, *Workplan for Site Remediation, 2800 Martin Luther King Way South, Seattle, WA,* dated July 8, 2005.

Washington Department of Ecology (Ecology), 1996, The Model Toxics Control Act cleanup regulation, chapter 173-340 WAC: Olympia, Wash., Washington State Department of Ecology Publication No 94-06, December 1995.

TABLE 1

Soil Sample Analysis, Gasoline and BTEX<sup>(1)</sup>, mg/Kg  
 Former Service Station, 2800 Martin Luther King Way South, Seattle, WA  
 Samples Collected on August 5 & 10, 2005

Boring or Testpit <sup>(2)</sup>	Sample Name	Depth (feet)	NWTPH-Gx (Gasoline-range)	Benzene	Toluene	Ethyl-benzene	Xylenes
Stockpile	SP-A	3	< 5.0*	< 0.020	< 0.050	< 0.050	< 0.050
	Pile	varies	<b>11</b>	< 0.020	< 0.050	< 0.050	<b>0.088</b>
UST Pit	NW-UST-3	3	< 5.0	< 0.020	< 0.050	< 0.050	< 0.050
	NW-UST-3 - Duplicate	3	< 5.0	< 0.020	< 0.050	< 0.050	< 0.050
West Pump Island	WPI-3	3	< 5.0	< 0.020	< 0.050	< 0.050	< 0.050
East Pump Island	EPI-N-2	2	< 5.0	< 0.020	< 0.050	< 0.050	< 0.050
Northwest Corner	NW Corner @ 2	2	<b>12</b>	< 0.020	< 0.050	< 0.050	<b>0.090</b>
<b>MTCA Method A Cleanup Level <sup>(3)</sup></b>			<b>100<sup>(a)</sup> / 30<sup>(b)</sup></b>	<b>0.03</b>	<b>7.0</b>	<b>6.0</b>	<b>9.0</b>

Notes:

- (1) TPH (Total Petroleum Hydrocarbons) by NWTPH-Gx Methods. BTEX (Benzene, Toluene, Ethyl-benzene, and Xylenes) by Method 8021B
- (2) Refer to Site Diagram for Sampling Locations
- (3) Method A Soil Cleanup Levels (mg/kg). Unrestricted Land Use. Amendments Adopted August 2001. Most Conservative Cleanup Level
- (a) Soil Cleanup Level for Gasoline With No Detectable Benzene in the Soil
- (b) Soil Cleanup Level for Gasoline With Detectable Benzene in the Soil
- Duplicate Repeated Sample for QA/QC Purpose (labeling of duplicate samples may need to be changed)
- < \* Concentration is Less Than the Laboratory Method Detection Limit (Listed)
- 27 Bold Number(s) Indicates Concentration Detected

**TABLE 2**  
**Groundwater Depth Measurements, 08/19/05**  
**Former Service Station, 2800 MLK Way South, Seattle, WA**

Sampling Designation	Sampling Location	Well Installation Date	Elevation Monument Rim (ft.)*	Elevation Top of PVC Casing (ft.)*	Depth to Top of Screen (ft.)	Bottom of Screen (ft.)	Well Diameter (Inches)	Depth to Water (ft.)	Calculated Elevations (ft.)
MW-1	Monitoring Well	8/9/05	Not Measured	97.92	13	23	2	13.01	84.91
MW-2	Monitoring Well	8/9/05	Not Measured	96.25	13	23	2	13.02	83.23
MW-3	Monitoring Well	8/9/05	Not Measured	97.43	10	20	2	12.72	84.71

\* The project benchmark is the top of the walkway at southwest corner of the building, and was assigned an elevation of 100-feet. All elevations were surveyed by G-Logics, Inc. on August 12, 2005.

**TABLE 3**

**Groundwater Sample Analysis, Gasoline and BTEX <sup>(1)</sup>, Units in ug/L**

**Samples Collected on August 19, 2005**

**Former Service Station, 2800 Martin Luther King Way South**

Monitoring Well ID	Sample Name	TPH (Gasoline-range)	Benzene	Toluene	Ethyl-benzene	Xylenes
MW-1	MW-1	nd	nd	nd	nd	nd
MW-2	MW-2	2,000	nd	10	81	91
MW-3	MW-3	44,000	4.1	18	780	3,600
	MW-3 DUP	45,000	4.9	18	810	3,700
<b>MTCA Method A Cleanup Level</b>		<b>1,000<sup>(a)</sup> / 800<sup>(b)</sup></b>	<b>5</b>	<b>1,000</b>	<b>700</b>	<b>1,000</b>

Notes:

Refer To Site Diagram For Sampling Locations.

(1) TPH by NWTPH-Gx Methods, BETX by Method 8021B

(a) Groundwater Cleanup Level For Gasoline With No Detectable Benzene

(b) Groundwater Cleanup Level For Gasoline With Detectable Benzene.

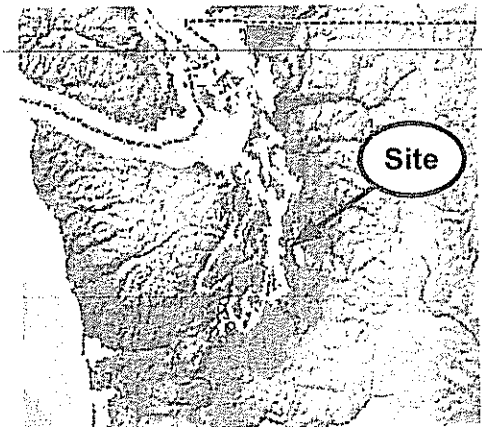
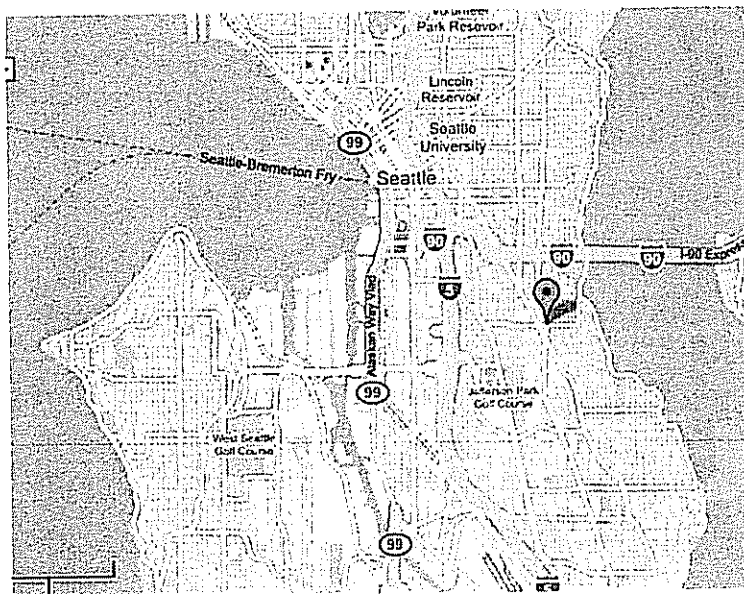
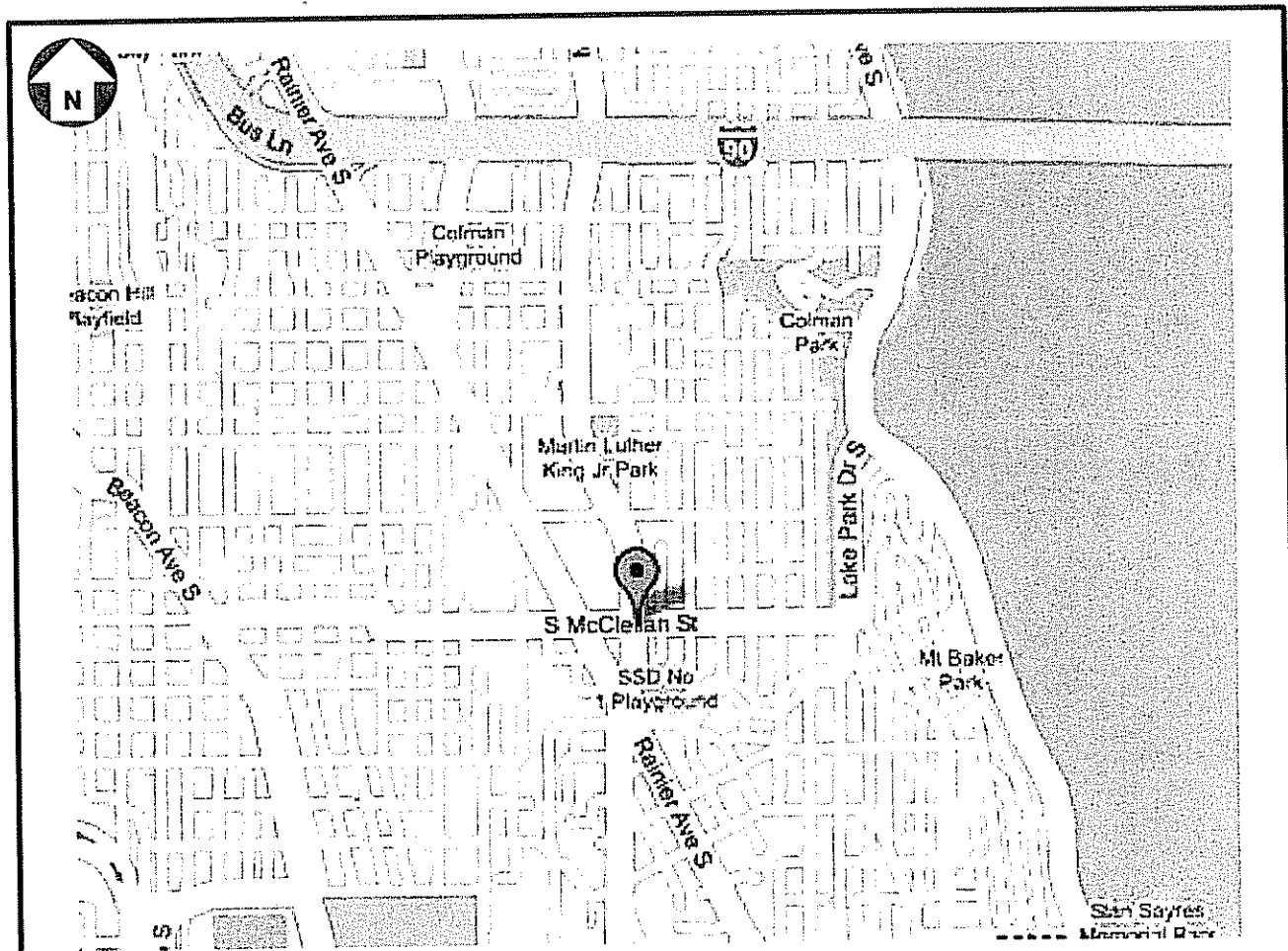
DUP Duplicate Sample For QA/QC Purpose

nd Concentration Less Than The Laboratory Method Detection Limit

27 Bold Number(s) Indicates Concentration Detected

250 Bold Number(s) and Shading Indicates Concentration Exceeds MTCA Method A Cleanup Level.

Exceeding These Levels Do Not Necessarily Trigger Requirements For Cleanup Action Under MTCA



Project File: 01-0356-C-F1.vsd

Street maps from Google Maps  
Topographic mapping from Delorme 3-D TopoQuads

*g*logics

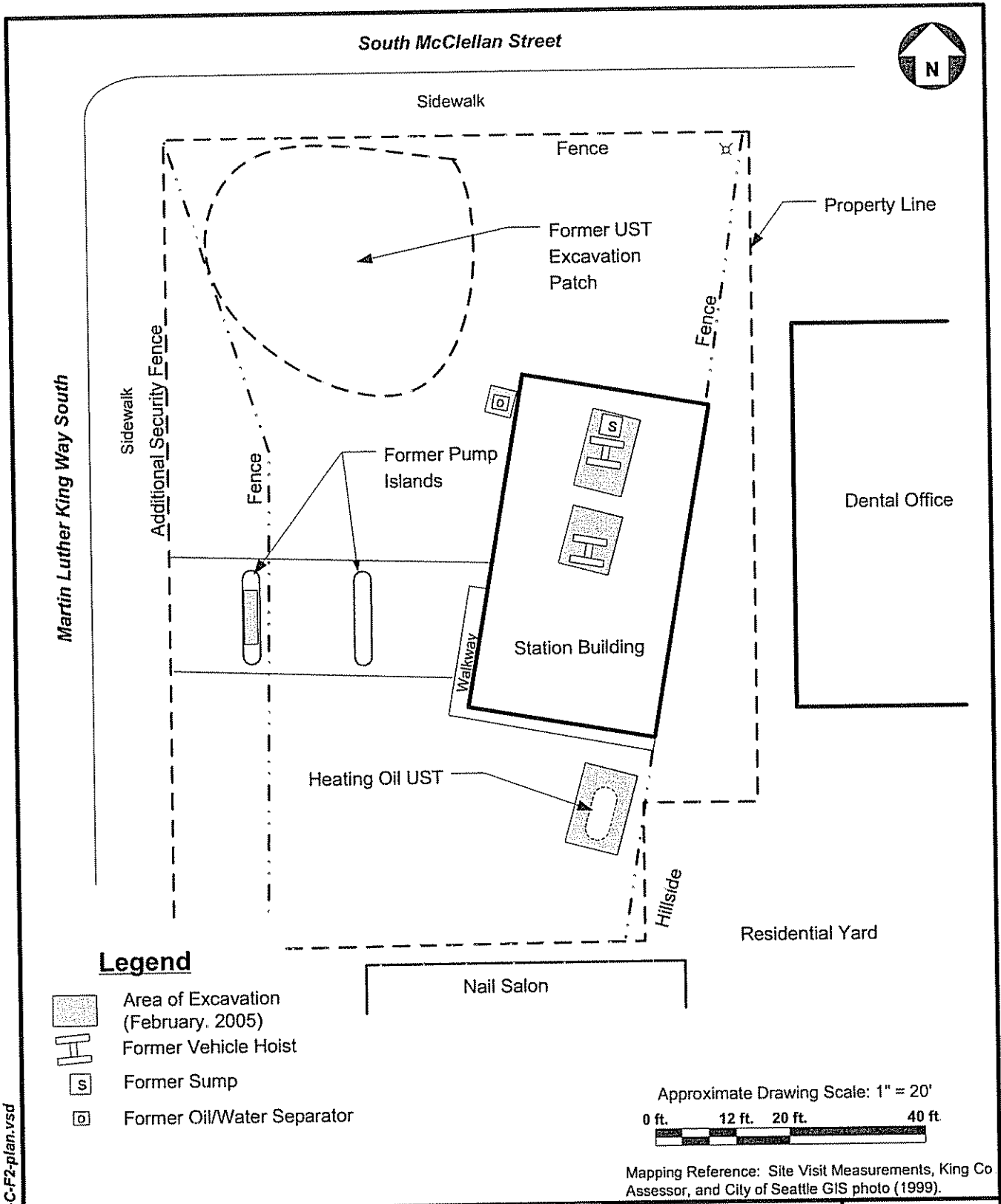
**Site Location Maps**

Former Gas Station  
2800 Martin Luther King Way South  
Seattle, Washington

Figure

1

Project File: 01-0356-C-F2-plan.vsd



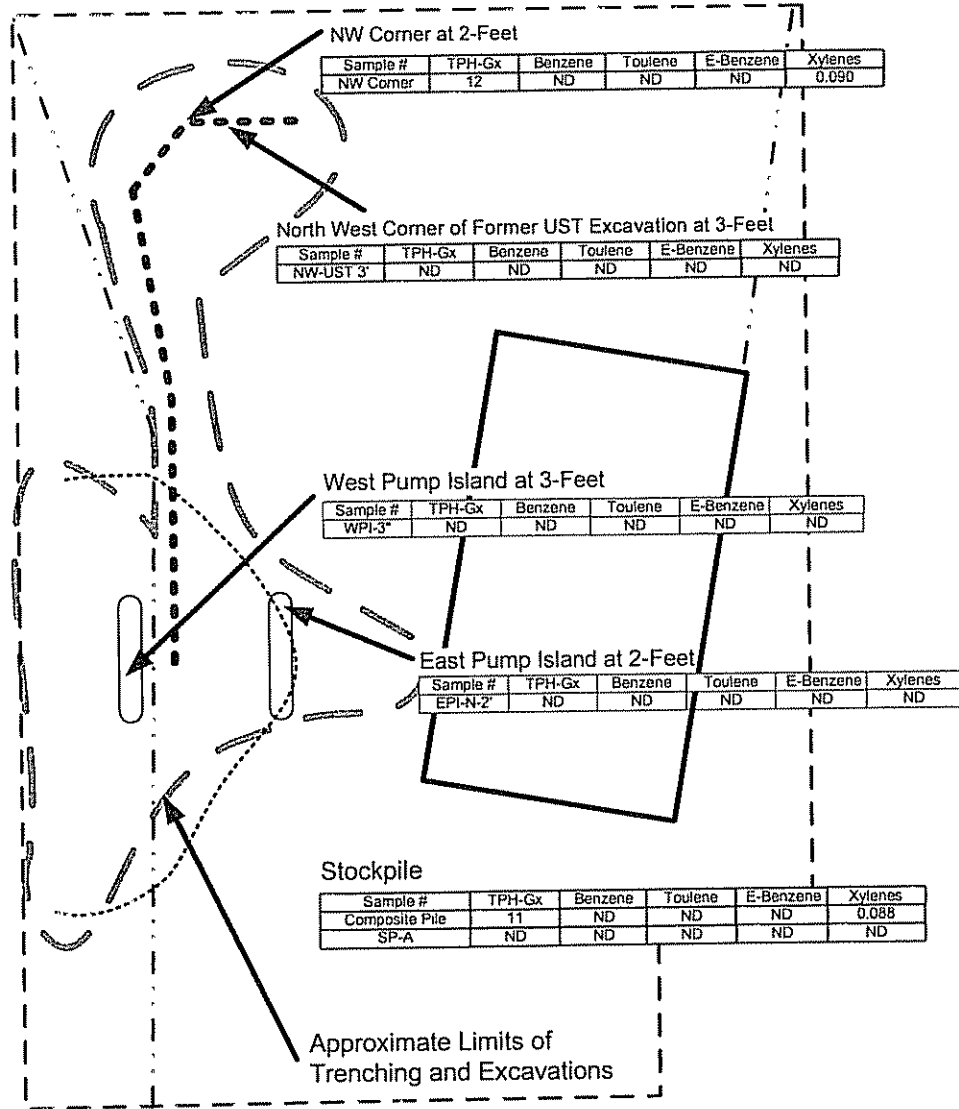
**Site Plan**  
**Former Gas Station**  
**2800 Martin Luther King Way South**  
**Seattle, Washington**

**Figure**  
**2**



Martin Luther King Way South

Sidewalk



**Legend**

- Estimated Edge of Impacted Area
- Hydrocarbon Concentration above Method Detection Limit-units in mg/kg
- Primary Location of Abandoned Product Piping
- Approximate Limits of Trenching and Excavations



Mapping Reference: Site Visit Measurements, King Co Assessor, and City of Seattle GIS photo (1999).

Project File: 01-0356-C-F3.vsd



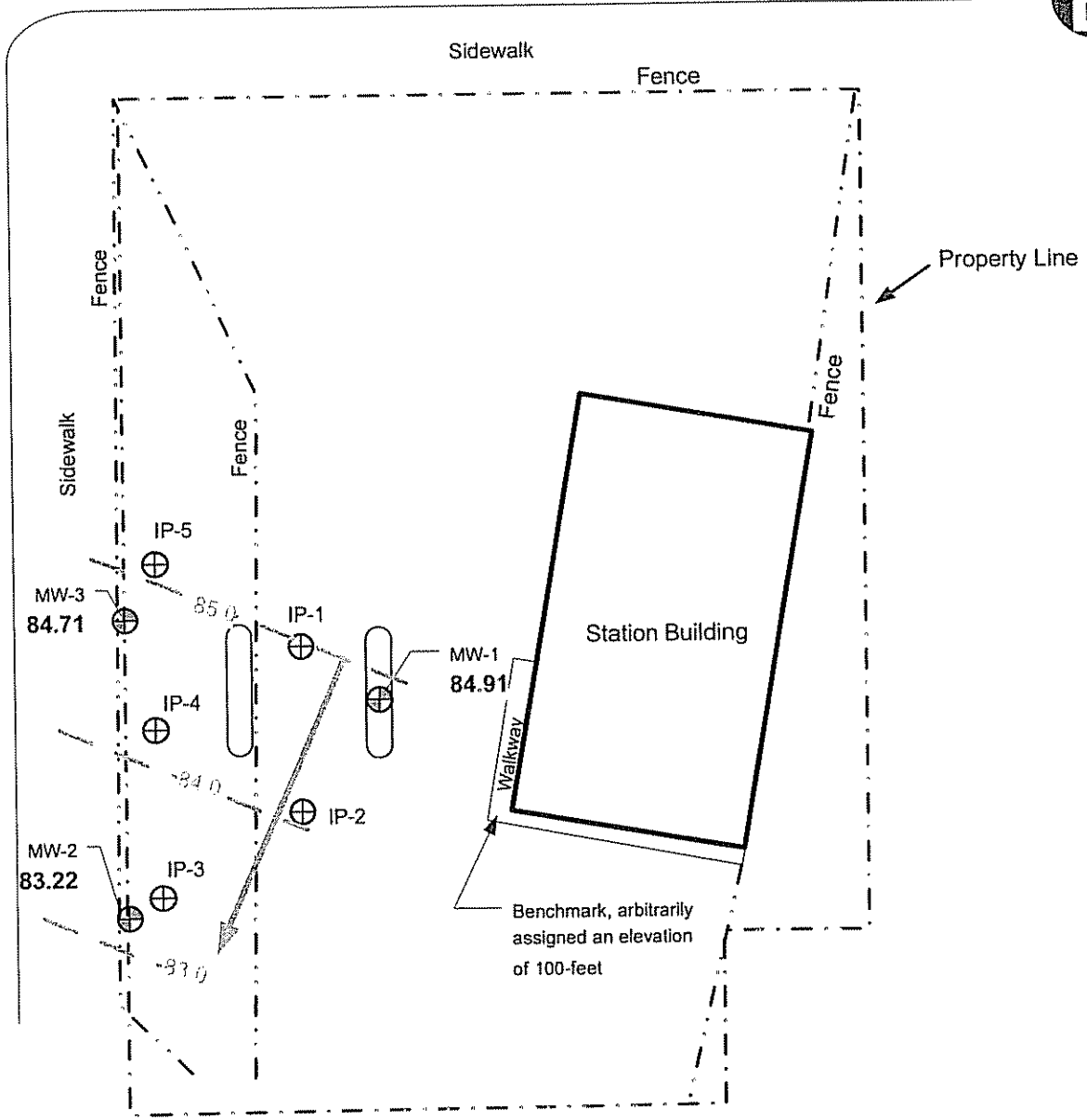
**Soil Sampling Locations & Results**  
 Former Gas Station  
 2800 Martin Luther King Way South  
 Seattle, Washington

**Figure**  
**3**

South McClellan Street



Martin Luther King Way South



**Legend**

- MW-1 Monitoring Well
- 83.22** Groundwater Elevation
- 83.0 Inferred Iso-elevation Groundwater Contour
- Ozone Injection Point

Note: The contours represent an interpretation of available data, for the indicated date. Site groundwater contours may change with additional measurements and/or data points, weather changes, construction activities, and/or other influences.



Mapping Reference: Site Visit Measurements, King Co Assessor, and City of Seattle GIS photo (1999)

Project File: 01-0356-C-F4 GWC.vsd

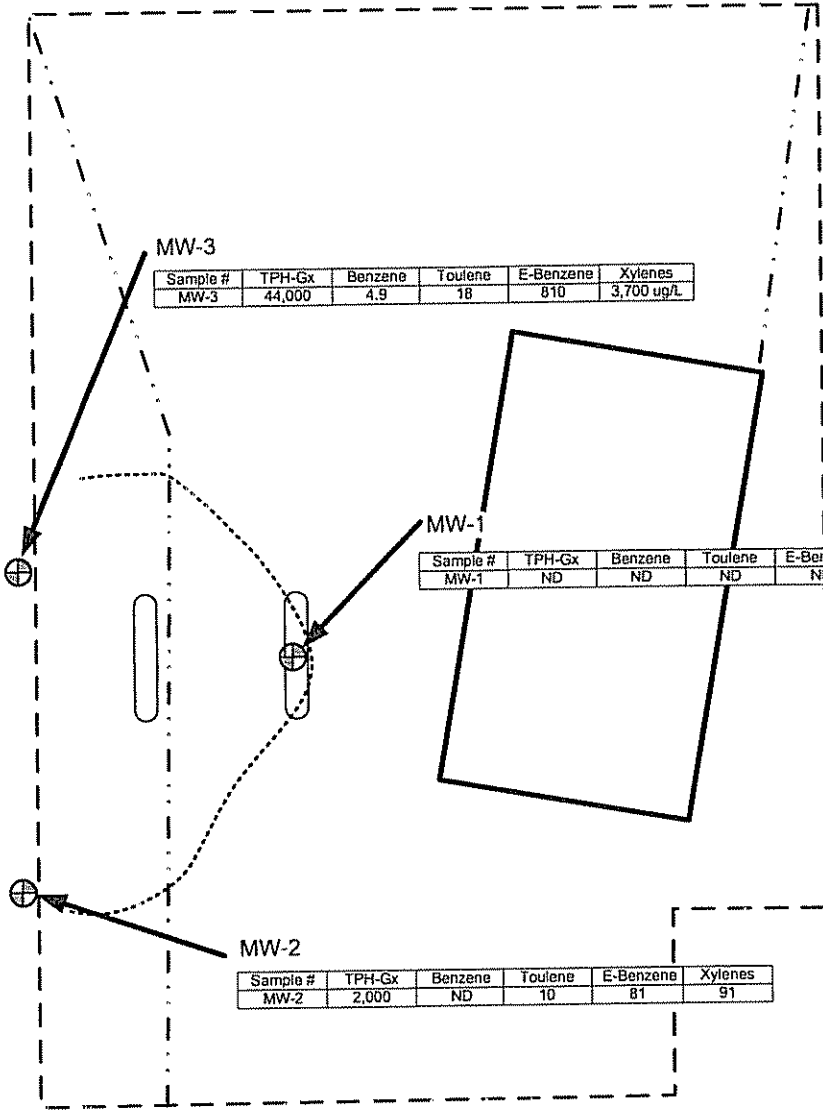
	<p><b>Groundwater Elevations &amp; Contours</b>  <b>Aug. 19, 2005</b>  <b>Former Gas Station</b>  <b>2800 Martin Luther King Way South</b>  <b>Seattle, Washington</b></p>	<p><b>Figure</b> <b>4</b></p>
--	--	-----------------------------------





Martin Luther King Way South

Sidewalk



Sample #	TPH-Gx	Benzene	Toulene	E-Benzene	Xylenes
MW-3	44,000	4.9	18	810	3,700 ug/L

Sample #	TPH-Gx	Benzene	Toulene	E-Benzene	Xylenes
MW-1	ND	ND	ND	ND	ND

Sample #	TPH-Gx	Benzene	Toulene	E-Benzene	Xylenes
MW-2	2,000	ND	10	81	91

**Legend**

- Estimated Edge of Impacted Area
- Hydrocarbon Concentration above Method Detection Limit – units in ug/L
- Monitoring Well

Approximate Drawing Scale: 1" = 20'



Mapping Reference: Site Visit Measurements, King Co Assessor, and City of Seattle GIS photo (1999).

Project File: 01-0356-C-F5.vsd



**Groundwater Sampling  
Locations & Results  
Former Gas Station  
2800 Martin Luther King Way South  
Seattle, Washington**

**Figure  
5**

South McClellan Street



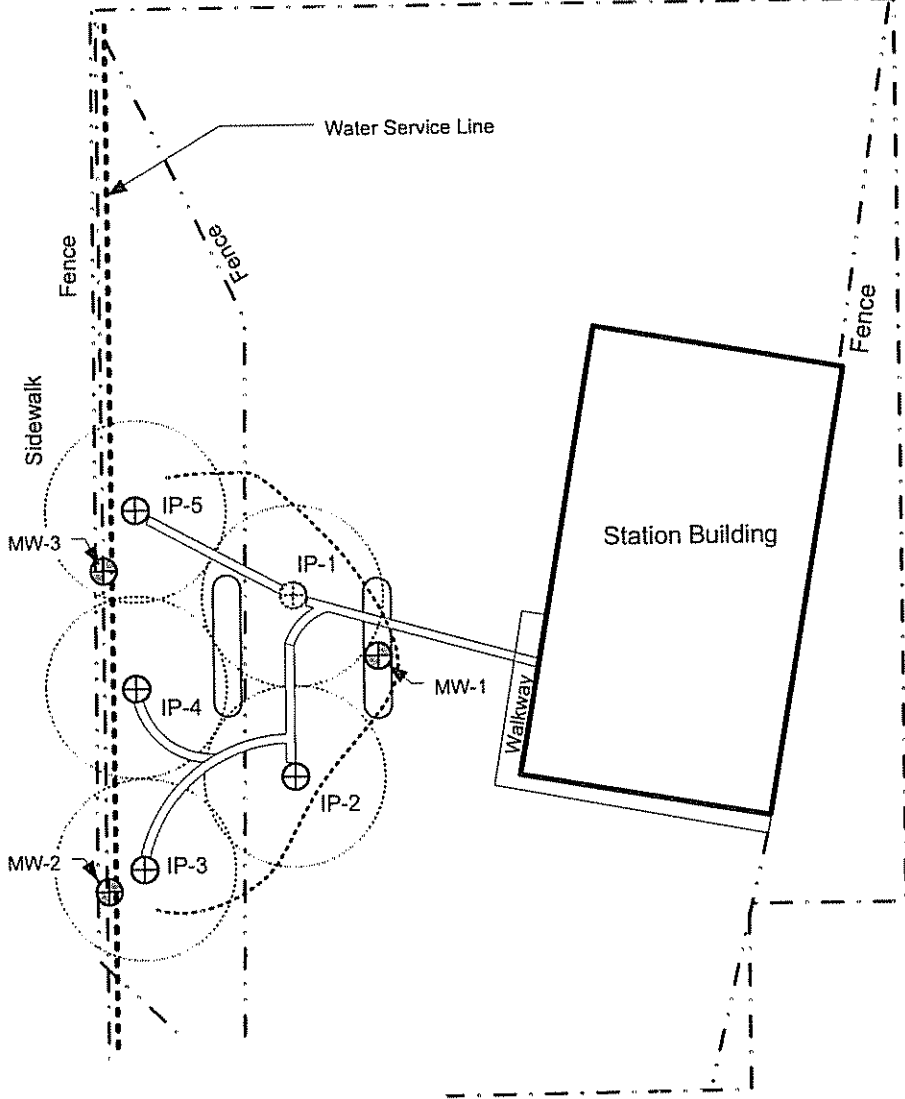
Sidewalk

Fence

Water Service Line

Property Line

Martin Luther King Way South



**Legend**

- Estimated Edge of Impacted Area
- Monitoring Well
- Trenching
- Ozone Injection Point
- Estimated Minimum Radius of Ozone Influence = 10-feet

Approximate Drawing Scale: 1" = 20'



Mapping Reference: Site Visit Measurements, King Co Assessor, and City of Seattle GIS photo (1999).

Project File: 01-0356-C-F6.vsd



**Site Plan - Ozone Injection Points, Monitoring Well Locations, and Trenching Layout**  
 Former Gas Station  
 2800 Martin Luther King Way South  
 Seattle, Washington

**Figure**  
**6**

## **APPENDIX A**

### **FIELD EXPLORATION METHODS**

G-Logics performed subsurface soil and groundwater sampling during the assessment conducted on the subject property. The sampling activities were conducted in general accordance with Ecology's guidelines and regulations. All sampling equipment was cleaned before mobilization to reduce the potential for cross contamination. In addition, the sampling equipment was cleaned between each sampling event, before the collection of the next sample

#### **Underground Utility Clearance**

Before conducting the subsurface characterization, G-Logics contacted a service that notifies public utilities of proposed subsurface investigations. Additionally, on-site private utilities were located by a private locating company to identify on-site utilities. Consequently, the below-grade utility locations were identified by marking their inferred location on the ground surface. This information was used to aid in identifying the locations of our sampling locations.

#### **Quality Assurance Quality Control**

Quality Assurance/Quality Control (QA/QC) for the presented scope of work included generally accepted procedures for sample collection, storage, tracking, and documentation. All sampling equipment was washed with a detergent wash and tap water rinse before the collection of the samples. All samples were labeled with a sample number, date, time, and sampler name, and were stored in an ice chest containing frozen "blue ice". Appropriate chain-of-custody documentation was completed.

#### **Soil Sample Collection**

Soil samples were collected during product-line removal excavations. The samples were collected from areas suspected of contamination that were evidenced by grey staining or odors. A G-Logics employee was present during the all activities, assisted in obtaining

samples of the subsurface materials and made detailed observations of site conditions, and provided technical assistance, as required.

### **Monitoring Well Sampling**

A G-Logics employee sampled groundwater monitoring wells in accordance with the following protocol:

- The groundwater samples were obtained with a clean dedicated PVC tubing and a low flow peristaltic pump. Sample containers were open only as long as necessary to collect the samples.
- Sample bottles were labeled with a sample number, date, time, and G-Logics employee's name and were stored in an ice chest containing frozen "blue ice". Chain-of-custody procedures were followed to document sample handling.
- Before use, the sampling equipment was washed in a "Liquinox", rinsed with tap water, and given a final rinse with distilled water.

The samples were then placed into an ice chest containing frozen "blue ice" for preservation. The samples were then forwarded to the analytical laboratory using proper Chain-of-Custody procedures. All soil and groundwater sample containers were labeled with sample identification numbers, the date, and the sampler's name. Sample containers prepared by the contract laboratory were used to conform to EPA-recommended preservation techniques for the analytes of concern.

**Permission and Conditions for Use and Copying Form**

**Cleanup Action Report  
Former Gas Station, 2800 Martin Luther King Way South  
Seattle, WA 98144**

**G-Logics Project 01-0356-C  
October 31, 2005**

G-Logics prepared the above-identified Document only for our Client and/or other user(s), as identified in the Document, for the purposes stated and subject to any identified and contractual limitations. Regulatory agencies may make additional "fair use" copies for internal and public use based on state and federal laws that do not violate copyright laws.

All other Requestors must obtain permission from G-Logics and our Client in order to avoid copyright violations. To request authorization for a copy of the Document, please read our conditions listed below, complete the Requestor section, and fax to G-Logics at 425-313-3074 for approval review.

- I recognize that G-Logics has prepared this Document only for their Client and/or other user(s), only for the purposes stated in the Document and subject to any identified and contractual limitations.
- My intended use of the Document is for general informational purposes only.
- I understand and accept that there may be limitations to the reliability of the Document's findings due to circumstances beyond the control of G-Logics, the limited scope of funding, and/or limitations inherent in the nature of the performed services.
- I agree not to rely on the Document as being comprehensive or inclusive of all possible site hazards and agree to defend, indemnify, and hold G-Logics harmless from and against any and all claims, damages, or liability which arise from or which are alleged to arise from my use of the Document. I also will compensate G-Logics for any time spent or expenses incurred by G-Logics in defense of any such claim.
- I am advised that the Document is a qualitative evaluation of site conditions and should not be used to estimate site-remediation costs, if cleanup is necessary. Remediation cost estimates would require additional data beyond what is presented in the Document.
- I agree not to provide the Document to any other person or organizations without prior authorization from G-Logics and their Client.
- I recognize that, in accordance with the current ASTM standard practice for Phase I Environmental Site Assessments (ESA), an ESA report can be relied upon for purposes of due diligence for a period of 180 days from the date of the report.

I, the Requestor, have reviewed the above-identified conditions for copying/use of the Document, am familiar with the presented limitations of the provided services, and acknowledge my understanding and concurrence, as indicated by my signature below.

Requestor's Company .....  
Mailing Address .....  
City, State, Zip Code .....  
Contact Name & Title .....  
Signature & Date .....  
Telephone & Fax Numbers .....  
Planned Use of Document .....

With your information and signature above, please fax to G-Logics (425-313-3074) for approval review. G-Logics will share your request with our Client for their approval.

**Client Review and Acknowledgment of Use and Copying Request**

Per the notification of G-Logics, I, the Client, have reviewed this request for copying/use of this Document, have discussed the request with G-Logics, and grant my consent as indicated by my signature below.

Client Company .....  
Client Contact Name & Title .....  
Signature & Date .....  
Telephone & Fax Numbers .....

**G-Logics review and Acknowledgment of Use and Copying Request**

Based on your concurrence with the above-presented conditions, approval of our Client, and our review of the information, G-Logics allows the Requestor to copy/use the above referenced Document for purposes stated. Additional fees may apply.

G-Logics Signature .....  
Title .....  
Date .....