

**WORK PLAN FOR  
ADDITIONAL ENVIRONMENTAL INVESTIGATIONS  
Del Roy and Lindberg Apartments Area**

Former Texaco Service Station No. 211577  
631 Queen Anne Avenue North  
Seattle, Washington

September 17, 2004

*Prepared for:*

**ChevronTexaco**

Chevron Environmental Management Company  
6001 Bollinger Canyon Road, K2252  
San Ramon, CA 94583

*Prepared by:*



*An Employee-Owned Company*

Science Applications International Corporation  
18706 North Creek Parkway, Suite 110  
Bothell, WA 98011

every 2.5 feet to about the same depth. The total depth will be determined based on reaching below the base of contamination, as identified in the field, or reaching the Lawton Clay unit. The soil core will be logged for lithologic descriptions, odor, and sheen. Samples will be collected for laboratory analysis, and material will also be measured for volatile constituents using a photo-ionization detector (PID) and/or flame-ionization detector (FID), as described below. A portion of the collected soil will be placed in a plastic resealable bag and allowed to set for at least five minutes. The bag will be agitated immediately prior to opening. The tip of the PID/FID will then be inserted into the bag while minimizing the loss of air from the bag. The soil will also undergo a sheen test by placing a small amount of soil into a cup of distilled water and observing it for potential petroleum sheen. All recovered soils will be described in the field, and observations will be recorded on field boring logs. Undisturbed portions of the recovered soil will be rapidly placed into appropriate sample containers for laboratory analysis. Soils will be logged in accordance with the Universal Soil Classification System (USCS) and standard grain-size categories. At least one soil sample per boring will be submitted for analysis.

Soil samples will be shipped to Lancaster Laboratories in Pennsylvania. The decision as to which samples to analyze will depend on PID/FID values, odor, staining, sheen, and other lithologic and depth-dependent criteria.

### **2.3 Groundwater Monitoring Well Installation**

The monitoring wells will consist of 1-inch diameter PVC set in the probe boring, or 4-inch diameter PVC set in the hollow-stem auger boring. The screened interval is anticipated to be from 10-15 feet in length and with 0.010-inch slots. The screen will be set from above high seasonal water level to at least the base of the identified contaminant zone. A filter pack (such as 10-20 sand) will be placed surrounding the screened interval and extending above it approximately 1 foot. A bentonite seal will extend above the filter pack to within 2 feet of the surface, and a concrete surface seal will be placed above that and around the flush-grade well vault. The sand and bentonite will be slowly poured around the well to avoid bridging.

### **2.4 Monitoring Well Surveying**

All monitoring wells installed during this investigation will be surveyed for elevation by SAIC. The elevations of the top of the PVC well casings will be measured using standard surveying methods to the nearest 0.01 ft. All monitoring wells will be tied into the existing monitoring well datum by surveying from at least two other nearby pre-surveyed monitoring wells. The horizontal locations will be surveyed with a tape measure from building corners and other mapped features.

### **2.5 Well Development and Sampling**

Groundwater samples will be collected from each newly installed monitoring well that does not contain LNAPL. After the new monitoring wells are installed, they will be developed in order to draw as much fine-grained material as possible out of the well and filter pack, and to stabilize the filter pack. Development will be accomplished using a stainless steel bailer or submersible pump to surge the well and to remove turbid water. This process will continue until the turbidity in the water has minimized and stabilized, or at least 10 well-casing volumes of groundwater

### **3.2 Quality Assurance**

All chemical analyses will include a report from the laboratory detailing the results of quality control (QC) testing. QC measures will be taken to confirm the integrity of the field and laboratory data generated during the sampling program. These measures will consist of analyzing samples to establish the consistency and validity of sample data. Field QC samples associated with this groundwater and soil investigation will include trip blanks.

### **3.3 Chain-of-Custody, Labeling, and Field Notes**

Chain-of-custody procedures will be used to maintain a verifiable record of sample handling during sample collection, transport, and analysis. The field manager will maintain field notes, sample labels, chain-of-custody records, and sample forms.

Field records will be completed at the time samples are collected and labeled. Soil sampling information will be recorded on the field borehole log forms. Groundwater sample information will be recorded on dedicated field forms. All field records will be initialed or signed by the sample collector and will include the sample identification and the date and time the sample was collected. Field records shall also include sample locations, sample matrix, type and size of sample containers, preservative used, and other pertinent field data. Sample labels will be identified with sample identification numbers that will be used for sample tracking and identification during collection and analysis.

## **4.0 WASTE HANDLING**

Soil cuttings and decontamination/development/purge water will be generated during field activities. This material will be containerized in 55-gallon drums, soil will be segregated from water, and disposed of in accordance with all applicable laws and regulations. Drums will be temporarily located within the remediation equipment compound located adjacent to the Manhattan Express deli. An approved vendor will remove soil, and water will be treated in the enclosure.

## **5.0 SCHEDULE**

The field investigation is anticipated to begin in late September or early October 2004. The exact start date will depend on approval of this Work Plan by the property owners and other stakeholders in addition to availability by the drilling contractor and any required city permits. Groundwater sampling will take place shortly after drilling. The laboratory will provide all sample analytical data and documentation to SAIC within 15 days of receipt of the samples by the laboratory.

## **6.0 SITE ACCESS**

Site access is dependent on the arrangements made in the site access agreements and in agreement with property owners and managers. It is intended that all work performed under this Work Plan will be performed during normal daylight hours (7:00 am – 7:00 pm). Attempts will be made to expedite work to minimize disruption to apartment tenants. Coordination will also be

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## **1.0 INTRODUCTION**

This Work Plan includes the methods and procedures that will be used to further conduct field activities in the vicinity of the Del Roy and Lindberg Apartments, located southeast of the intersection of 1<sup>st</sup> Ave West and West Roy Street (Figure 1). The Plan describes types of activities, sample types, quantities, locations, and analyses that will be conducted. This investigation is being performed to delineate groundwater and soil conditions in this area, downgradient from the former Texaco Service Station no. 211577, prior to final remedial selection and design. A soil vapor investigation workplan will be submitted after groundwater remediation has begun. The soil vapor investigation will take place near the end of remedial activities so that post-remediation monitoring of soil vapors can verify adequate protection of human health in surrounding buildings.

The objectives of this investigation are to complete the following activities, which are described in detail in the sections below.

- Identify subsurface utilities at the drilling locations
- Install four direct-push (geoprobe) or auger soil borings and collect soil sample data
- Install four monitoring wells in geoprobe/auger borings
- Survey elevations and locations of newly installed monitoring wells
- Sample all new groundwater monitoring wells.

## **2.0 FIELD ACTIVITIES**

### ***2.1 Utility Survey and Hand Clearance***

Prior to any drilling, an underground utility survey will be conducted. This will include evaluating available reports and drawings showing locations of potential utilities. In order to identify underground conduits, lines, or pipes, the Utilities Underground Location Center will be notified at least 48 hours prior to drilling, and a private utility locator firm will also survey the field area. This will include accessible conductible utilities that can be located according to commonly used practice. Following utility locating, the borings will be hand-cleared to a depth of 8 feet using a hand auger, post-hole digger, or an air-knife.

### ***2.2 Soil Sampling Activities***

Activities include installing two direct-push soil borings and two hollow-stem auger borings at approximate locations shown on Figure 1. The exact locations will be finalized in the field based on the position of underground utilities and access.

Two borings will be installed using a limited-access direct-push rig attached to a Bobcat; the rig can also be disconnected and hand-wheeled up to 100 feet away for access into tight spaces. The probe borings will be located in the Del Roy courtyard and outside near the northwest corner of the Lindberg apartments. The other two borings will be drilled with a hollow-stem auger.

Soil samples will be collected using the probe rig over a continuous interval down to approximately 25 feet below ground surface (bgs). Hollow-stem auger samples will be collected

every 2.5 feet to about the same depth. The total depth will be determined based on reaching below the base of contamination, as identified in the field, or reaching the Lawton Clay unit. The soil core will be logged for lithologic descriptions, odor, and sheen. Samples will be collected for laboratory analysis, and material will also be measured for volatile constituents using a photo-ionization detector (PID) and/or flame-ionization detector (FID), as described below. A portion of the collected soil will be placed in a plastic resealable bag and allowed to set for at least five minutes. The bag will be agitated immediately prior to opening. The tip of the PID/FID will then be inserted into the bag while minimizing the loss of air from the bag. The soil will also undergo a sheen test by placing a small amount of soil into a cup of distilled water and observing it for potential petroleum sheen. All recovered soils will be described in the field, and observations will be recorded on field boring logs. Undisturbed portions of the recovered soil will be rapidly placed into appropriate sample containers for laboratory analysis. Soils will be logged in accordance with the Universal Soil Classification System (USCS) and standard grain-size categories. At least one soil sample per boring will be submitted for analysis.

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have been removed. The monitoring wells will then be allowed to stabilize for at least 48 hours prior to purging and sampling.

Purging of the monitoring well will precede sampling, and will begin by measuring the depth to water and total depth of the monitoring well. Each monitor well will be purged using a disposable polyethylene bailer until at least three well-casing volumes of groundwater have been removed. After purging is complete, groundwater samples will be collected using the disposable bailer.

### 3.0 ANALYTICAL INFORMATION

#### 3.1 Sample Analysis

Each sample collected in the field will be properly labeled, placed in appropriate sample containers, preserved, recorded on a chain-of-custody form, and shipped in a chilled portable cooler to the analytical laboratory. Sample analytical methods, sample containers, holding times, and preservation requirements are described in Table 1.

**TABLE 1. SUMMARY OF ANALYTICAL REQUIREMENTS**

Analytical Method	Matrix	Sampling Container	Holding Time	Preservation	Reporting Limit
NWTPH-Gx	Soil	1 – 2 oz jar	14 days	2-6°C	1.0 mg/kg
NWTPH-Dx	Soil	1 – 4 oz jar	14 days	2-6°C	3–10 mg/kg
VOCs EPA 8260B	Soil	1 – 2 oz jar	14 days	2-6°C	0.001–0.002 mg/kg
NWTPH-Gx	Water	3 – 40 ml vials	14 days	2-6°C, pre-preserved with HCl to pH <2	50 ug/L
NWTPH-Dx	Water	2 – 1L glass jars	14 days	2-6°C, pre-preserved with HCl to pH <2	80–130 ug/L
VOCs EPA 8260B	Water	3 – 40 ml vials	14 days	2-6°C, pre-preserved with HCl to pH <2	0.5–2 ug/L
Lead EPA 6020/7000	Water	1 – 1L poly	6 months	2-6°C, unpreserved; lab will filter	4 ug/L

NWTPH = Northwest Total Petroleum Hydrocarbons:

Gx = Gasoline Range Organics

Dx = Diesel Range Organics – extended range (diesel and heavy oil), with silica gel cleanup

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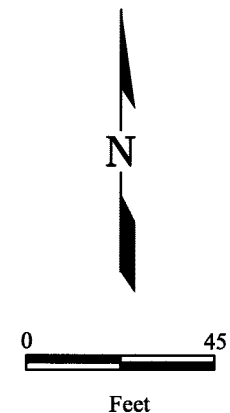
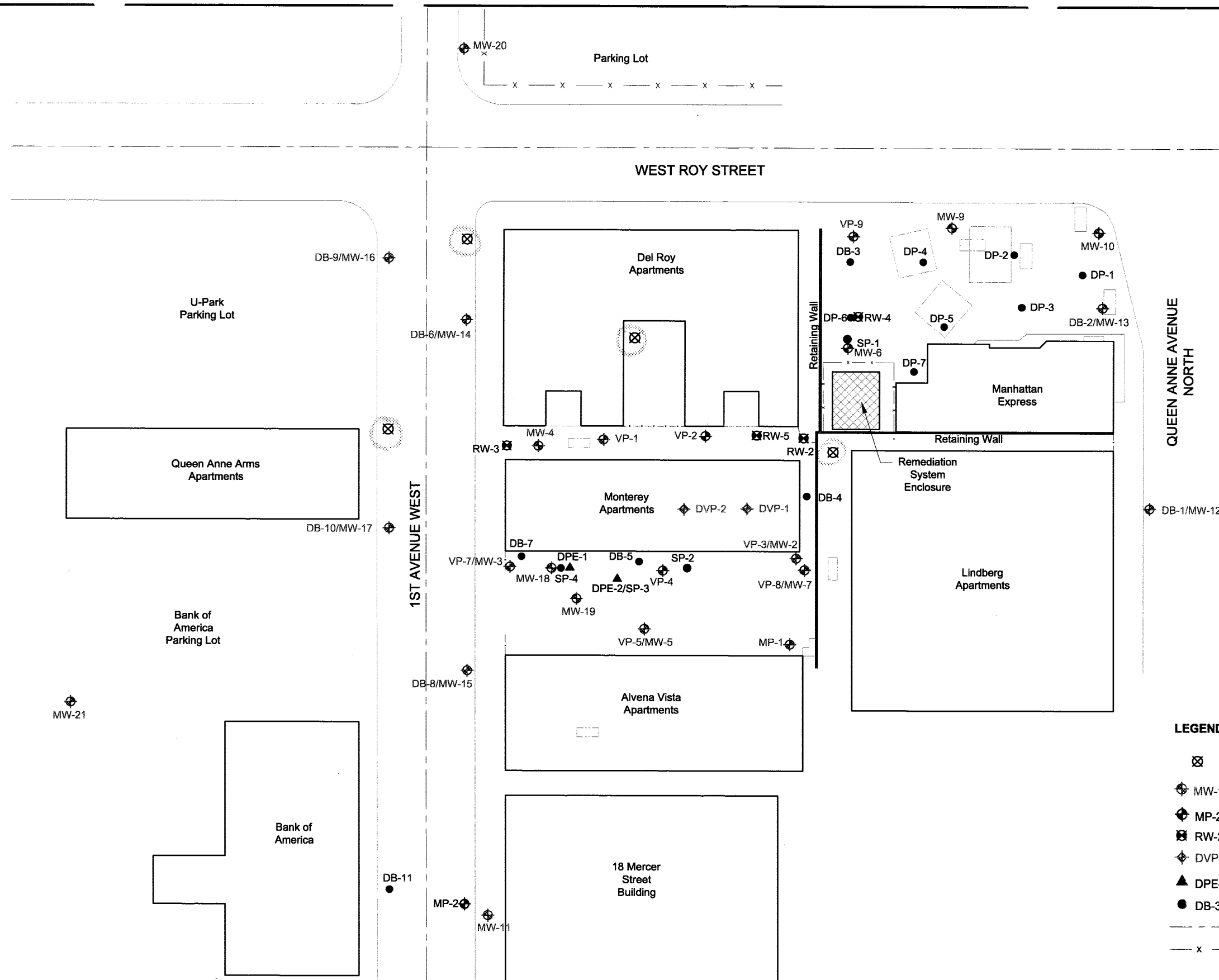


required to access certain areas. Some equipment may need to be moved temporarily during certain activities such as drilling.



211577 Workplan FIG1.pdf

08/15/2004  
 Drawn By: E. Leung  
 PLOT: B011168-2k(N)/Chevron/Tenacity/Projects/21-1577-Queen Anne/Site Map/21-1577-RSRT-Set\_Aug04.dwg Figure 1-Proposed Map Map



**LEGEND:**

	PROPOSED GROUNDWATER MONITORING WELL / SOIL BORING LOCATION
	MONITORING WELL
	DEEP MONITORING WELL
	RECOVERY WELLS
	VAPOR PROBE
	DUAL PHASE EXTRACTION/MONITORING WELL
	SOIL BORING
	STREET CENTER LINE
	FENCE

**ChevronTexaco**  
 Former Texaco Station, No. 211577  
 631 Queen Anne Ave. N.  
 Seattle, Washington

**FIGURE 1**  
 Proposed Groundwater Monitoring Well/Soil Boring Location Map