NW0911

DRAFT WORK PLAN
SITE INVESTIGATION
QUEEN ANNE TEXACO SITE
(MANHATTAN EXPRESS, 631 QUEEN ANNE AVE. N. AND MONTEREY APARTMENTS, 622 FIRST AVE. W.)
SEATTLE, WASHINGTON

Farallon PN: 619-010

Submitted By
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For:

Texaco Inc.

January 12, 2001

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1.0 INTRODUCTION

Farallon Consulting, L.L.C. (Farallon) has prepared this Work Plan for the Site Investigation of the Queen Anne Texaco site. The site includes the Manhattan Express property located at 631 Queen Anne Avenue North and the Monterey Apartments located at 622 First Avenue West in Seattle, Washington (herein referred to as the site, Figure 1). The Work Plan provides a specific scope of work for the Site Investigation, and it includes as appendices a Sampling and Analysis Plan, a Quality Assurance Project Plan, and a Health and Safety Plan. This Site Investigation will be conducted as an Independent Action.

1.1 PURPOSE

This Work Plan has been developed in accordance with the Washington State Department of Ecology (Ecology) *Model Toxics Control Act Cleanup Regulation* (MTCA), Chapter 173-340 WAC Washington Administrative Code (WAC). The purpose of the Site Investigation is to gather sufficient data necessary to characterize the vertical and lateral distribution of total petroleum hydrocarbons as gasoline (TPH-g) and diesel (TPH-d) in soil and groundwater on-site, to determine the distribution of light non-aqueous phase liquid (LNAPL) on-site, and to identify potential sources and migration pathways of TPH-g, TPH-d, and LNAPL. The purpose of the Work Plan is to provide technical guidance for completing the Site Investigation and to provide specific protocols for collection, development, and evaluation of sufficient information regarding the site to enable the selection of a technically feasible interim action for LNAPL recovery.

Previous sampling and analyses conducted by Farallon and others at the site indicate that LNAPL is present in on-site groundwater monitoring wells. Groundwater underlying the site contains dissolved concentrations of TPH-g and TPH-d above the Model Toxics Control Act (MTCA) Method A cleanup levels. However, the information obtained from prior investigations is not adequate to determine the source and migration of contamination or to evaluate and select a technically feasible interim action for LNAPL recovery.

1.2 WORK PLAN ORGANIZATION

Combined within this Work Plan, either directly or by reference, are the following three documents that have been developed for the Site Investigation: (1) Sampling and Analysis Plan (WAC 173-340-820), (2) Quality Assurance Project Plan (WAC 173-340-810) and (3) Health and Safety Plan (WAC 173-340-810). These documents have been combined into one comprehensive Work Plan to minimize duplication of effort and to expedite implementation.

The Work Plan has been organized into the following sections:

- **Section 2.0 – Background:** Section 2.0 provides a description of the site's geologic and hydrogeologic setting, and a summary of previous subsurface assessment investigations.

- **Section 3.0 – Technical Elements:** Section 3.0 provides a summary of the technical elements for the Work Plan, including a discussion of the constituents and media of concern.

- **Section 4.0 –Technical Scope of Work:** Section 4.0 provides a summary of the scope of work for the Work Plan and includes task descriptions.

- **Section 5.0 – Schedule:** Section 5.0 provides a preliminary schedule.

- **Section 6.0 – References:** Section 6.0 lists the references sited in this Work Plan.

2.0 BACKGROUND

This section provides a brief summary of previous subsurface investigations completed at the site and describes the environmental setting. A list of references is included in Section 6.0 of this Work Plan.

2.1 SITE LOCATION AND DESCRIPTION

The site is located at the southern base of Queen Anne Hill in Seattle, Washington. The site consists of a commercial property located at 631 Queen Anne Avenue North, occupied by the Manhattan Express convenience store, and a multi-family residential property located at 622 First Avenue West, occupied by the Monterey Apartments (Figure 2). The site is defined in the Work Plan as the areas where soil and groundwater contain concentrations of total petroleum hydrocarbons (TPH) and benzene, toluene, ethylbenzene and xylenes (BTEX) above the applicable cleanup levels.

Land use surrounding the site consists of commercial retail and office buildings to the north, a former UNOCAL gasoline station site (currently vacant), former Orestes site (currently under new construction), the Marqueen Hotel to the east, commercial retail and apartment buildings to the south, and apartment buildings to the west. The Del Roy Apartments are located adjacent to the north of the Monterey Apartments, and adjacent to the west of the Manhattan Express property.

The legal description for the Manhattan Express property is:

Block 9 Lots 1 & 2 of G. Kinnear's Supplemental,
Township 25N, Range 3E, Section 25, NE Quarter,
Located in King County, Washington.

The legal description for the Monterey Apartments property is:

Block 9, Lots 11 & 12 of G. Kinnear's Addition Supplemental,
Township 25N, Range 3E, Section 25, NE Quarter,
Located in King County, Washington.

2.2 HISTORICAL USE

The Manhattan Express property has been used as a retail gasoline station since the early 1900s. The Monterey Apartments has occupied the 622 First Avenue West address since the early 1900s. A detailed description of historical land use is presented in the *Background Investigation Report* dated September 20, 2000 prepared by Texaco Inc. (Texaco Inc., 2000).

2.3 SUMMARY OF PREVIOUS INVESTIGATIONS

The history of the site and previous investigations is summarized in the *Background Investigation Report* (Texaco Inc., 2000). The following is a brief summary of site activities since 1993.

Ecology supervised the removal of several gasoline, diesel, and oil-containing underground storage tanks (USTs) at the Manhattan Express property and installed a remediation system on the site in 1993. The UST removal and the remediation system was initiated in response to ongoing complaints of gasoline vapors in the basement of the Monterey Apartments that were first reported in February 1978. The remediation system consisted of a groundwater extraction and soil vapor extraction (SVE) system. The system was activated in 1996 and deactivated in December 1997 due to lack of funds. Farallon reactivated the SVE system and has been conducting maintenance and monitoring of the SVE system and monitoring wells at the site on behalf of Texaco since December 1999. The SVE system has been operating continuously since March 2000. Quarterly groundwater monitoring has been conducted at the site since December 1999.

The analytical results of groundwater samples collected for the quarterly groundwater monitoring has indicated that the highest concentrations of dissolved phase TPH-g and TPH-d in groundwater are present on the western portion of the Manhattan Express property and on the western portion of the Monterey Apartments property. LNAPL has been present in wells VP-1, VP-4, VP-6, RW-4, and MW-6 during the quarterly sampling. Farallon has recovered LNAPL from these wells on a weekly basis and has reduced LNAPL to a sheen in wells VP-1 and VP-4. Measurable LNAPL is consistently present in wells VP-6 and RW-4, and sporadically present in MW-6 (Figure 2).

The source and migration pathways of LNAPL and dissolved phase TPH-g and TPH-d in groundwater at the site has not been determined. The condition of the former UST system and subsurface soil around the former USTs at the Manhattan Express property was not adequately documented when the USTs were removed.

2.4 ENVIRONMENTAL SETTING

The following sections describe the geology and hydrology of the site and the site vicinity. The description is based on the information provided in the previous investigation as summarized in the *Background Investigation Report* (Texaco Inc., 2000).

2.4.1 Geology

Regional geologic mapping indicates that the site vicinity is underlain by Vashon Till overlying Older Sand. The Vashon Till consists of a mixture ranging from clay to gravel that may contain local lenses of sand and gravel. Older Sand (i.e., Esperance Sand) underlies the Vashon Till and consists of a well graded, medium to coarse sand interbedded with silt. Underlying the Esperance Sand is Lawton Clay.

Subsurface investigations by Farallon and others indicate that the site in underlain by a medium dense fill seven to 11 feet below ground surface (bgs) underlain by silt ranging from three to 13 feet in thickness, underlain by a silty sand interbedded with silt ranging from two to nine feet in thickness, underlain by clay to the total depth explored of 30 feet bgs. The basal gray clay may be the upper Lawton Clay unit that underlies the Esperance Sand.

2.4.2 Hydrology

Groundwater migration in the Puget Sound Region is generally confined to the most recent alluvial deposits overlaying the glacial till or over-consolidated sands and gravels (Esperance Sand) that underlie the glacial till. The dense and relatively impermeable nature of the till and the commonly lateral discontinuity of the groundwater-bearing materials impedes lateral and vertical migration of the groundwater.

Groundwater occurs a few feet above the clay layer in the eastern portion of the site ranging from 13 to 20 feet bgs and in the western portion of the site ranging from nine to 12 feet bgs. The groundwater flow direction at the site is generally to the southwest. Based on previous aquifer tests at the site, saturated soils appear to have low permeabilities. Clay lenses, underground utilities, and other subsurface structures may affect local groundwater flow direction at the site.

2.4.3 Land Use

The site and surrounding properties are zoned for mixed use of residential and commercial developments. The future and continued use of the area is likely to be the same.

2.4.4 Surface Water

The site and other properties in the vicinity slope to the south and west and are covered by impermeable surfaces. Surface water drainage at the site is generally from east to west and is captured by the stormwater conveyance system of the city of Seattle.

3.0 TECHNICAL ELEMENTS

Farallon conducted a review of historical uses and previous investigations at the site in order to identify the following technical issues for evaluation as part of the Site Investigation. The technical issues have also been identified from discussions with Ecology, Texaco, and the representative for the owners of the Manhattan Express.

3.1 LNAPL RECOVERY AND GROUNDWATER MONITORING

Since December 1999, quarterly groundwater samples have been collected from the thirteen vapor extraction (VP) recovery wells (RW) and groundwater monitoring wells (MW) located on-site. Wells VP-6 and RW-4 have consistently contained measurable LNAPL that is currently being removed on a weekly basis using absorbent socks and a Keck product recovery system. LNAPL has successfully been removed from wells VP-1, VP-4, and MW-6 with these absorbent socks. Wells VP-1 and MW-6 are still being monitored for the presence of LNAPL.

Approximately 1 to 2 gallons of LNAPL is being removed from VP-6 on a weekly basis. Approximately 1 gallon of LNAPL was removed from RW-4 during the September quarterly groundwater sampling. Absorbent socks in RW-4 become saturated and are replaced weekly.

3.2 PREFERENTIAL CONTAMINANT MIGRATION PATHWAYS

Manhattan Express Property

The *Phase I Remedial Investigation Report* prepared by Ecology and Environment (E&E) dated August 1991, documents an attempt to locate the sewer line serving the Manhattan Express property; however, the location of the sewer line was never accurately determined outside of the building footprint. The locator service interpreted that the snake was "meandering beneath the building through a convoluted pipe matrix, or within a septic tank."

Two on-site stormwater catch basins were also investigated by E&E, one located at the northwest corner and one located at the southwest corner of the Manhattan Express property. The discharge pipe from the northwest catch basin was determined to trend north and discharge directly onto West Roy Street through a pipe emerging from the curb. The piping from the southwest catch basin was traced in a east-northeast direction toward the location of the former USTs, paralleling the southeast edge of the concrete pad and terminating approximately 10 feet bgs at the southeast corner of the concrete pad. E&E speculated that the piping might have been disrupted during UST installation. The piping from the southwest catch basin was most likely encountered during UST removal and re-routed.

Monterey Apartments

A review of City of Seattle sewer maps showed a sewer line extending from First Ave W. to the east beneath the north side of the Monterey Apartments and branching into two separate lines extending to the eastern end of the building.

Street Catch Basins

A tracer dye test was reportedly conducted in 1986 on an unspecified storm drain located at the corner of W. Roy and Queen Anne Ave. N. to the east of the Queen Anne Texaco site. The tracer dye was observed in the sump located in the stairwell of the Monterey Apartments approximately two days later. No record has been found regarding the construction of the sump at the Monterey Apartments.

3.3 SUBSURFACE SOIL AND GROUNDWATER CONDITIONS

The USTs formerly located on the Manhattan Express property were removed by Ecology in 1993. Farallon has been unable to locate documentation regarding the condition of the subsurface soil and groundwater within the UST excavation. Additional soil and groundwater sampling within the area of the former UST excavation is necessary to evaluate if there are concentrations of TPH-g and TPH-d in soil that are acting as a continued source to groundwater and/or if there is LNAPL within this area.

The limited information reviewed for the UST excavation indicated that a concrete "tank" was located at the northeast corner of the building on the Manhattan Express property. Collection of

soil and groundwater samples in proximity to the concrete structure is warranted to evaluate if this "tank" is a potential source of TPH-g or TPH-d in groundwater.

The location of the most upgradient well (MW-10) is not adequately positioned to provide groundwater data for evaluation of the potential for TPH to migrate on-site. The recent analytical results of groundwater samples collected from the groundwater wells located on the east side of Queen Anne Ave. N., adjacent to the former UNOCAL site, detected concentrations of TPH-g above the MTCA Method A cleanup levels. A south to southwest direction of groundwater flow has been reported east of Queen Anne Ave. N. Groundwater monitoring well MW-10 is located on the northeast corner of the site, possibly too far north to evaluate the potential for off-site migration.

3.4 MEDIA OF CONCERN

Previous investigations have indicated that measurable LNAPL and concentrations of dissolved phase TPH-g and TPH-d is present in groundwater in on-site wells. Therefore, groundwater is a medium of concern at the site.

Previous investigations at the site have not included analysis of any soil samples. Therefore, soil is a potential medium of concern.

3.5 CONSTITUENTS OF CONCERN

The constituents of concern for the site are:

- TPH-g;
- TPH-d;
- Benzene, ethyl benzene, toluene, and xylenes (BETX); and
- LNAPL.

3.6 SOURCE CHARACTERISTICS

Based on available information, Ecology has assumed that the release of TPH-g and TPH-d to soil and groundwater at the site occurred during the time that a retail gasoline station operated on the Manhattan Express property. However, there is insufficient documentation to confirm that a release from the former UST system at the Manhattan Express property is directly responsible for all of the TPH-g and TPH-d found in groundwater at the site. Other suspected sources include USTs and associated piping and transfer lines from adjacent properties located east and north of the site.

3.7 AREAL DISTRIBUTION OF CONTAMINATION

The results of quarterly groundwater monitoring by Farallon and previous investigations by others have documented concentrations of TPH-g and TPH-d in groundwater above MTCA Method A cleanup levels. The highest concentrations of dissolved phase TPH in groundwater or LNAPL are present in wells located at the western portion of the Monterey Apartments property and at the western portion of the Manhattan Express property. The distribution of TPH in soil and in the former UST excavation has not been adequately defined.

4.0 TECHNICAL SCOPE OF WORK

This section describes the scope of work for the Site Investigation to meet the objectives identified in Section 1.1. The scope of work includes subsurface soil and groundwater sampling and analysis, evalution of preferential pathways for contaminant migration, a LNAPL bail-down test, and continued interim action for LNAPL recovery and operation of the VES. The Site Investigation and interim action will be conducted as an independent action by Texaco Inc.

4.1 SITE INVESTIGATION

The Site Investigation will include subsurface soil and groundwater sampling and analysis, investigation of underground conduits for contamination migration, and a LNAPL bail-down test. The specific scope of work is presented in this section.

4.1.1 Subsurface Soil and Groundwater Conditions

Soil Sampling

Four soil borings will be completed on the Manhattan Express property to a depth of approximately 30 feet bgs at the locations shown on Figure 2 to collect soil samples for laboratory analysis. The exact location of the soil samples will depend on access, underground utilities, site conditions, and field observations at the time of the field sampling. Soil samples will be collected from each boring at 2.5 foot intervals using a limited-access hollow-stem auger drill rig with a split-spoon sampler. The sample locations, collection procedures, and handling methods are presented in the Sampling and Analysis Plan (Appendix A).

Installation of Groundwater Monitoring Wells

The four soil borings will be completed as groundwater monitoring wells to a depth of approximately 30 feet bgs in accordance with Chapter 173-160 WAC. The groundwater monitoring wells will be installed at the approximate locations shown on Figure 2. Construction details for the groundwater monitoring wells are presented in the SAP (Appendix A).

Groundwater Sample Collection

The newly installed groundwater monitoring wells will be developed and sampled in accordance with the protocols set forth in the SAP (Appendix A) prior to collection of groundwater samples.

All of the existing groundwater monitoring, recovery, and vapor extraction wells and the newly installed groundwater monitoring wells located on-site will be sampled immediately after installation and development of the new wells, and on a quarterly basis thereafter for a minimum of one-year. The quarterly sampling schedule will coincide

with quarterly sampling conducted at the UNOCAL site in order to compare the on- and off-site analytical results and groundwater measurements. Specific criteria for collection procedures and handling methods are presented in the SAP (Appendix A).

Off-Site Data Review

Quarterly groundwater monitoring reports prepared by others for the UNOCAL, former Orestes, and Marqueen Hotel sites will be obtained for review by Ecology. Data from these reports will be reviewed to evaluate any correlations between subsurface contamination at these sites and the Queen Anne Texaco site.

4.1.2 LNAPL Bail-Down Test

An LNAPL bail-down test will be conducted on vapor extraction well VP-6 and recovery well RW-4. The bail-down test will be conducted to determine a rate of LNAPL inflow to the wells in order to develop a more efficient method for LNAPL removal for the interim action. Specific criteria for the bail-down test are presented in the SAP (Appendix A).

Samples of the LNAPL will be collected for laboratory analysis to determine the percent of TPH-g, TPH-d, and BTEX.

4.1.3 Preferential Pathway

Included with the Site Investigation will be an evaluation of potential preferential pathways for contaminant migration on-site and from possible off-site sources. The proposed scope of work to determine preferential contaminant migration pathways will include an evaluation of buried utilities, subsurface soil conditions, and direction of groundwater flow.

The evaluation will include investigation of the piping runs connected to the stormwater catch basins located on the east side of Queen Anne Avenue and on the Manhattan Express property (Figure 2). The investigation will include locating the underground piping using a fiber optic cable by Northwest Cascade Incorporated. In addition to the fiber optic cable, a tracer dye test will be conducted by placing a tracer dye in the catch basins located on the east side of Queen Anne Avenue. The sump located on the Monterey Apartments property and wells MW-6, VP-8, and RW-2 will be monitored for the dye.

A detailed review of the city of Seattle underground utility maps will be conducted to identify potential underground piping, such as sewer lines, footing drain lines, and other pipes that may be acting as a conduit for contamination migration. The mapped locations will be field-tested by Northwest Cascade Incorporated using fiber optic cable.

The specific protocols for the underground utility investigation are summarized in the SAP (Appendix A).

4.1.4 Summary Report

The results of the Site Investigation will be presented in a Summary Report. The report will present the results of the LNAPL bail-down test, soil and groundwater sampling and analysis, the preferential pathway investigation, evaluation of off-site quarterly groundwater monitoring data, and will incorporate the analytical results of the previous investigations. The Summary Report will provide recommendations for the interim action for LNAPL recovery.

4.2 INTERIM ACTION

Combined with the Site Investigation will be an interim action for on-going site cleanup. The interim action will be defined in more detail based on the results of the Site Investigation, but may include LNAPL recovery.

4.2.1 LNAPL Recovery

Removal of LNAPL from VP-6 and RW-4 will continue after the completion of the Site Investigation. The result of the bail-down test will be used to develop a cost-effective and efficient method for recovery of the LNAPL. The selected method will be discussed with Ecology and presented in the Summary Report.

4.3 LABORATORY ANALYSIS

Soil, groundwater, and LNAPL samples will be analyzed on a standard 10-day turnaround by OnSite Environmental Inc., a Washington State accredited laboratory. As defined in the SAP (Appendix A), soil, groundwater, and LNAPL samples will be analyzed for TPH-g, TPH-d, and BTEX.

5.0 SCHEDULE

The schedule for completion of the Site Investigation is dependent upon access to the Manhattan Express and Monterey Apartment properties, authorization to proceed from Texaco Inc., and Ecology review of the Work Plan. The following schedule is anticipated to complete the Site Investigation.

- Submit Draft Work Plan to Ecology	Day 1
- Receive Comments from Ecology	1 Week
- Revise and Finalize the Work Plan	2 Weeks
- Install Soil Borings/Groundwater Wells	2 – 3 Weeks
- Conduct Utility Investigation	1 Week
- Conduct Tracer Test	1 Week
- Sample Groundwater Wells	2 Weeks
- Field Testing for LNAPL Recovery	1 Week
- Submit Draft Summary Report	7 Weeks
- Finalize Summary Report	3 Weeks

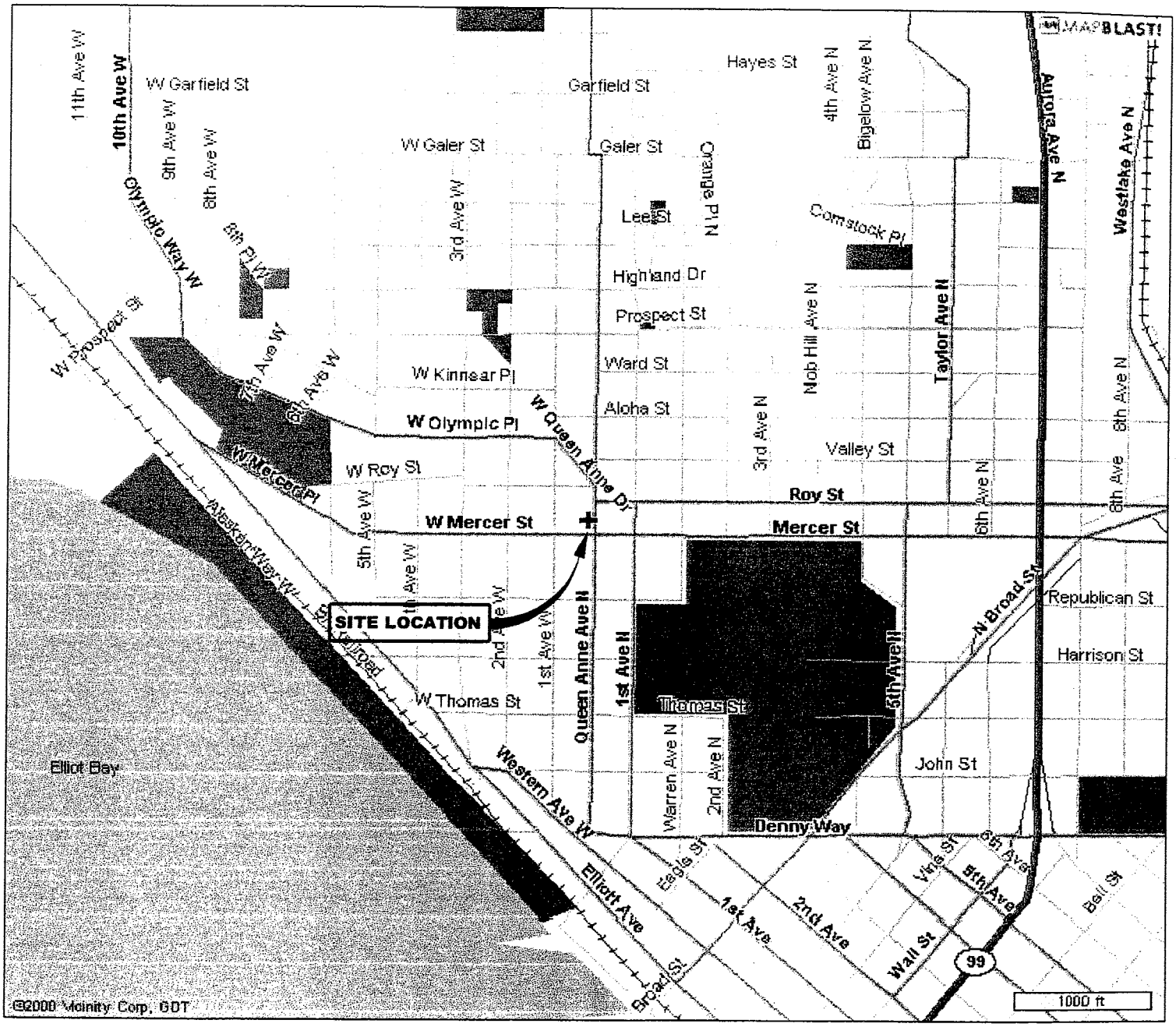
The quarterly groundwater sampling and ongoing LNAPL recovery will continue after completion of the Site Investigation. The quarterly groundwater sampling will coincide with the sampling being conducted at the UNOCAL and/or Marqueen Apartments.

6.0 REFERENCES

Background Investigation Report prepared by Texaco Inc. dated September 20, 2000.

Phase I Remedial Investigation Report prepared by Ecology & Environment dated August 1991.

FIGURES



FARALLON CONSULTING
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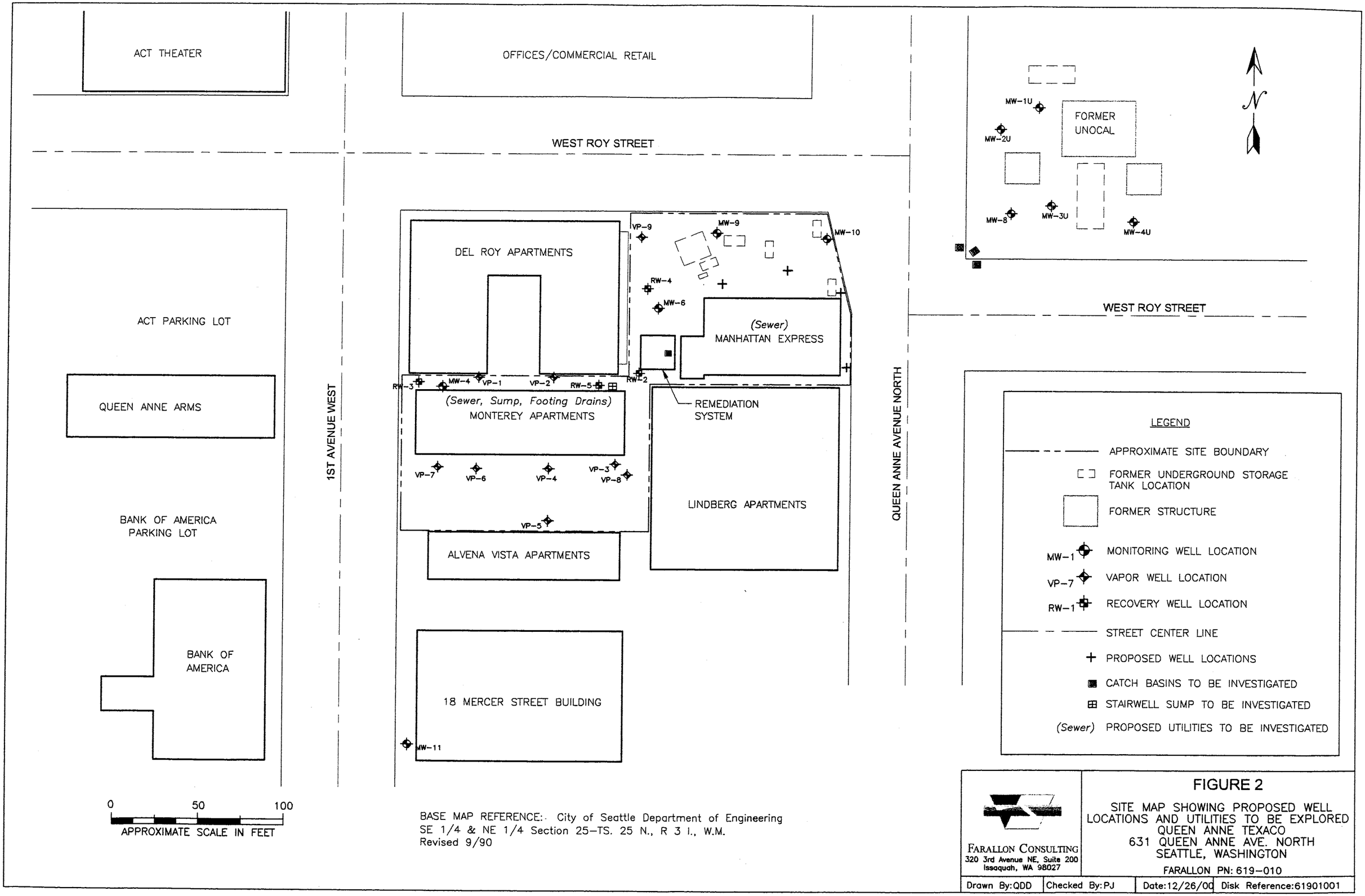
FIGURE 1

SITE VICINITY MAP

QUEEN ANNE TEXACO
631 QUEEN ANNE AVE. NORTH
SEATTLE, WA.

FARALLON PN: 619-010

Drawn By: QDD	Checked By: CS	Date: 6/26/00	Disk Reference: 619-001



BASE MAP REFERENCE: City of Seattle Department of Engineering
SE 1/4 & NE 1/4 Section 25–TS. 25 N., R 3 I., W.M.
Revised 9/90

FARALLON CONSULTING
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FIGURE 2

SITE MAP SHOWING PROPOSED WELL LOCATIONS AND UTILITIES TO BE EXPLORED
QUEEN ANNE TEXACO
631 QUEEN ANNE AVE. NORTH
SEATTLE, WASHINGTON

FARALLON PN: 619–010

Drawn By: QDD	Checked By: PJ	Date: 12/26/00	Disk Reference: 61901001

APPENDIX A
SAMPLING AND ANALYSIS PLAN

Site Investigation
Queen Anne Texaco Site
Seattle, Washington
January 12, 2001

APPENDIX A OF WORK PLAN
SAMPLING AND ANALYSIS PLAN
SITE INVESTIGATION
QUEEN ANNE TEXACO SITE
(MANHATTAN EXPRESS, 631 FIRST AVE. W. AND
MONTEREY APARTMENTS, 622 FIRST AVE. W.)
SEATTLE, WASHINGTON

FARALLON PN: 619-010

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FIGURES

1.0 INTRODUCTION

This Sampling and Analysis Plan (herein referred to as the SAP) has been prepared in accordance with WAC 173-340-820. The SAP is incorporated within the Work Plan for Site Investigation (Work Plan) of the Queen Anne Texaco site. The site includes the Manhattan Express property located at 631 Queen Anne Ave. North and the Monterey Apartments property located at 622 First Avenue West in Seattle, Washington (the site, Figure 1). The objective of the SAP is to ensure that sample collection, handling, and analysis during implementation of the Work Plan will result in data that meet the data quality objectives for characterization of the site.

The SAP provides specific methods and procedures for the Site Investigation. Data Quality Assurance/Quality Control (QA/QC) is presented in the Quality Assurance Project Plan (QAPP) included with the Work Plan as Appendix B. Protection monitoring is addressed in the Health and Safety Plan (HASP) included with the Work Plan as Appendix C.

2.0 SITE INVESTIGATION

The Site Investigation will consist of installing four new monitoring wells; sampling and analysis of soil from the monitoring well borings; continued quarterly groundwater sampling and analysis for total petroleum hydrocarbon (TPH) compounds; light non-aqueous petroleum liquid (LNAPL) recovery from wells VP-6 and RW-4; and investigating underground utilities for preferential contaminant migration pathways. The procedures for sample collection, handling, and analysis are discussed in this section.

2.1 SOIL SAMPLING AND ANALYSIS

Soil samples will be collected from four soil borings drilled to a depth of 30 feet below ground surface (bgs) with a hollow-stem auger drill rig. The drilling will be done under contract with Cascade Drilling Inc. Public and private utility location services will be used to locate subsurface utilities at the soil boring locations prior to drilling. The borings will be completed as monitoring wells and will be placed in the Manhattan Express parking lot and in the sidewalk on the east side of the Manhattan Express building, as shown in Figure 2.

2.1.1 Soil Sample Collection and Handling Procedures

Soil samples will be collected from the proposed monitoring well borings to determine the subsurface stratigraphy and the extent of TPH impacted soils. A photoionization detector (PID) will be used to take headspace readings from each soil sample as sample volumes allow. Headspace readings will consist of a small amount of soil taken from the split-spoon sampler at each sample interval. The soil will then be placed in a sealed container and allowed to volatilize before taking a reading with the PID. The lithology will be recorded on well logs and will include field observations that may indicate the presence of TPH, such as PID readings, soil discoloration, or sheen.

A stainless steel spoon will be used to collect discreet soil samples from the split spoon sampler, and the sample will be placed in a laboratory prepared jar for analysis. The sample jars will be completely filled with soil, immediately sealed with Teflon-lined screw caps, and placed in a field cooler on ice pending delivery to the analytical laboratory. The sample containers will be clearly labeled using a unique sample number, and chain-of-custody procedures will be followed for all sampling events. The soil samples will then be submitted to Onsite Environmental for laboratory analysis. Soil cuttings generated during drilling will be placed in drums, labeled, and stored on-site pending laboratory analytical results.

2.1.2 Soil Sampling Frequency and Decontamination Procedures

Continuous soil samples will be collected from each boring in order to provide sufficient information to describe site lithology. The soils will be described in accordance with Farallon's soil description protocols.

All sampling equipment will be decontaminated between sample intervals using Alconox in tap water, followed by a tap water rinse, and a final rinse with deionized water. Decontamination water will be placed in drums and stored on-site pending laboratory analysis.

2.1.3 Laboratory Analysis

A minimum of one soil sample from each soil boring will be submitted for laboratory analysis based on the field indications such as elevated PID readings, soil discoloration, sheen, and odor. If there are no field indications of contamination, then the soil sample collected from the soil/groundwater interface will be submitted for analysis. The soil samples will be analyzed for TPH-g and BTEX by Ecology Method NWTPH-G/BTEX, and TPH-d and TPH-oil by Ecology Method NWTPH-Dx. A detailed description of analytical methods is presented in Section 3.0 of this Plan.

2.2 GROUNDWATER MONITORING WELL INSTALLATION

The soil borings will be completed as groundwater monitoring wells for collection of groundwater samples. The total depth of each well will depend on the depth to groundwater. Each well will be constructed with approximately 10 feet of 2-inch diameter schedule 40 PVC screen below the water table and approximately three to five feet of screen placed above the water table. The bottom of the screen will be capped. A 10/20 Colorado Silica sand or equivalent will be placed in the annulus to at least 1-foot above the top of the screen. The sand will be topped with hydrated bentonite chips to seal the well in accordance with Chapter 173-160 WAC. A two-inch schedule 40 PVC blank will be used from approximately six inches bgs to the top of the screen. Each well will be completed with a traffic-rated flush-mount monument. Upon completion, each well will be developed in accordance with standard protocols. Well construction and depth to groundwater at the time of drilling will be recorded on well logs.

2.3 WELL SURVEY

The four new monitoring wells will be surveyed to the previously established onsite datum. The top of the flush-mount monument and the top of the PVC casing for each new well will be surveyed. Depth to groundwater will be measured to the top of the PVC casing with a Solinist water level meter in all of the onsite wells where LNAPL is not present. LNAPL thickness and depth to groundwater will be measured with an interface probe in wells where measurable LNAPL is present. The groundwater elevations and gradient will be calculated and tabulated.

2.4 GROUNDWATER SAMPLING AND ANALYSIS

Groundwater samples will be collected from the existing and newly installed wells no sooner than 24 hours after the new wells have been developed, and quarterly thereafter for a minimum of one year. The groundwater samples will be collected from wells VP-1 through VP-9, MW-4, MW-6, MW-9, MW-10, and the new monitoring wells (Figure 2). After the initial groundwater sampling, Farallon will conduct quarterly sampling on a schedule similar to that of the UNOCAL site located east of Queen Anne Avenue N.

2.4.1 Groundwater Sample Collection and Handling Procedures

Depth to groundwater below the top of the PVC casing will be recorded using a Solinist water level meter prior to collecting groundwater samples. Before sampling, three to five well volumes will be purged from each well using a disposable bailer. Groundwater samples will be collected with a disposable bailer and slowly decanted directly into laboratory prepared bottles. The bottles will be filled so that there is no headspace, sealed with a Teflon-lined cap, and placed in a field cooler on ice pending delivery to the analytical laboratory. The sample containers will be clearly labeled using a unique sample number, and chain-of-custody procedures will be followed for all sampling events. Water generated from well development and purging will be placed in drums and stored on site pending laboratory analytical results.

2.4.2 Analytical Testing

The groundwater samples will be analyzed for TPH-g and BTEX by Ecology Method NWTPH-G/BTEX, and TPH-d and TPH-oil by Ecology Method NWTPH-Dx. A detailed description of analytical methods is presented in Section 3.0 of this Plan.

2.5 LNAPL RECOVERY

LNAPL has been measured in VP-6 and RW-4 during the past year, and it has been removed manually on a weekly basis from these two wells. An objective of the Work Plan is to evaluate a more efficient and effective method of continued LNAPL removal. The bail-down test described below will provide information about pumping rates needed for efficient LNAPL removal. The analytical testing will provide information regarding the number and type of sources for the LNAPL present on-site.

2.5.1 Bail-Down Test

LNAPL thickness will be measured using an interface probe prior to conducting a bail-down test. The bail-down test will consist of using a disposable bailer to remove all measurable LNAPL from VP-6 and RW-4. The total volume of LNAPL removed from each well will be recorded. An oil/water interface probe will then be placed in each well to measure the rate at which LNAPL reenters the well. Measurements will be recorded by the minute for the first 10 minutes, at 5-minute intervals for the next half hour, and every half-hour thereafter until at least 80 percent of the original volume reenters the well. Timeframes for each well are expected to vary. The rate of migration data will be used to determine pumping rates and the types of recovery systems that would be most productive for each well.

2.5.2 LNAPL Sample Collection and Handling Procedures

LNAPL samples will be collected with a disposable bailer and decanted directly into laboratory prepared bottles. The bottles will be sealed with a Teflon-lined cap, and placed in a field cooler on ice pending delivery to the analytical laboratory.

2.5.3 Analytical Testing

The LNAPL samples will be analyzed for volatile and semi-volatile fuel identification by EPA Method 8015 Modified. A detailed description of analytical methods is presented in Section 3.0 of this Plan.

2.6 UNDERGROUND UTILITY INVESTIGATION

Underground utilities at the site and in the site vicinity will be investigated to aid in identifying the migration pathway of LNAPL and TPH in groundwater at the site. The stairwell sump located at the northeast corner of the Monterey Apartment building, the Apartment footing drains, the Apartment sewer line, and the sewer line that services the Manhattan Express property will be investigated by Northwest Cascade Inc. using a fiber optic cable that will be inserted into the piping to determine the depth, location, direction of flow and condition of the utilities. A transponder that transmits a signal to a receiver used above ground surface is attached to the end of the fiber optic cable to provide a backup method of determining the depth and direction of the piping in the case that the fiber optics will not provide enough information. If access is provided to the basement of the Monterey Apartments during the utility investigation, any floor drains or sumps identified inside the basement will also be investigated by inserting the fiber optic cable.

The stormwater catch basin on the Manhattan Express property will also be investigated by inserting the fiber optic cable. After the Manhattan Express catch basin and the utilities described above have been investigated, the results will be communicated to the City of Seattle, and the need for further investigation will be evaluated.

If further investigation is warranted, the City of Seattle will allow access to the stormwater catch basins at the northeast corner of the intersection of Queen Anne Avenue North and West Roy Street for investigation using dye test methods. The dye test will consist of dissolving a fluorescent green dye tablet in water to achieve the desired concentration and then flushing the dye into the stormwater catch basins with water provided by Northwest Cascade Inc.

2.7 QUALITY ASSURANCE/QUALITY CONTROL SAMPLES

Quality Assurance/Quality Control (QA/QC) soil and groundwater samples will be collected during the course of the Additional Site Investigation to provide for data validation. The following types of QA/QC samples will be collected and shipped to the laboratory with the other samples. The type and frequency of these field QA/QC samples are summarized below. The exact number of QA/QC samples will be dependent on the number of soil and groundwater samples collected during the site cleanup. However, the frequency given below will be followed.

- Split field duplicates: 1 soil sample per 10 soil samples analyzed;
- Rinsate sample: 1 field equipment rinsate sample per soil sampling event; and
- Trip blank sample: 1 trip blank sample per groundwater sampling event.

3.0 ANALYTICAL METHODS AND TURNAROUND TIMES

All soil and groundwater samples for the Additional Site Investigation will be analyzed for TPH-g and BTEX using Ecology Method NWTPH-G/BTEX, and TPH-d and TPH-oil using Ecology Method NWTPH-Dx. The method reporting limits (Practical Quantification Limit [PQL]) for all analytes will meet the data quality objectives established in the QAPP included with the Work Plan. Laboratory analysis for the soil and groundwater samples will be conducted on a standard turnaround time by Onsite Environmental, an Ecology accredited laboratory, located in Redmond, Washington.

LNAPL samples will be analyzed for volatile and semi-volatile fuel identification using EPH Method 8015 Modified. Laboratory analysis for the LNAPL samples will be conducted on a standard turnaround time by North Creek Analytical, an Ecology accredited laboratory, located in Bothell, Washington.

Farallon will obtain analytical results from the laboratory in electronic and hard copy format. The analytical results will be compiled into a database for data management. Paper copies of the analytical data will also be maintained in the project files. The necessary tables will be generated from the database and may be imported into the word-processing programs for reports. All data will undergo a QA/QC review at the time of receipt in accordance with the Work Plan.

4.0 DOCUMENTATION

Documentation of field activities will include Field Report documentation, Boring/Monitoring Well logs, Well Purging and Sampling Data forms, Chain-of-Custody forms, and sample and drum labels. Documentation generated during the field program will be included in a comprehensive report and retained in the project file.

Field Report

Field personnel will be required to keep a daily field log. Field notes will be as descriptive and as inclusive as possible, allowing independent parties to reconstruct the sampling situation from the recorded information. Language will be objective, factual, and free of inappropriate terminology. A summary of each day's events will be completed on a three-part Field Report form. At a minimum, field documentation will include the date, job number, project identification and location, weather conditions, sample collection data, field equipment used, and any activities performed in a manner other than specified in the Work Plan. In addition, if other forms are completed or used (e.g., Chain-of-Custody form, maps, etc.) they will be referred to, and attached to, the Field Report form. Field personnel will sign the Field Report form.

Chain-of-Custody

The written procedures that are followed whenever samples are collected, transferred, stored, analyzed, or destroyed are designed to create an accurate written record which can be used to trace the possession and handling of the sample from the moment of its collection through analysis and reporting of analytical values. This written record, the Chain-of-Custody form, will be filled out by the field sampling team at the time the sample is obtained.

All samples submitted to the laboratory are accompanied by the Chain-of-Custody record. This form is checked for accuracy and completeness, and then signed and dated by the laboratory sample custodian accepting the sample. At the laboratory, each sample is assigned a unique, sequential laboratory identification number that is stamped or written on the Chain-of-Custody form.

All samples are held under internal chain-of-custody procedures in the Sample Control room using the appropriate storage technique (ambient, refrigeration, frozen). The laboratory Project Manager assigned to a particular client is responsible for tracking the status of the samples throughout the laboratory. Samples are signed out of the Sample Control room in a sample control logbook by the analyst who will prepare the samples for analysis.

The Chain-of-Custody form includes the following information: site name, sample identification number (assigned by the sampler in the field), sample date, sample location, and type of analysis required (if any). Whenever the sample is transferred from one party to another, both parties sign the Chain-of-Custody form and record the date and time of the transfer. In this manner, the sample integrity is insured from collection through analysis.

Sample Label and Numbering

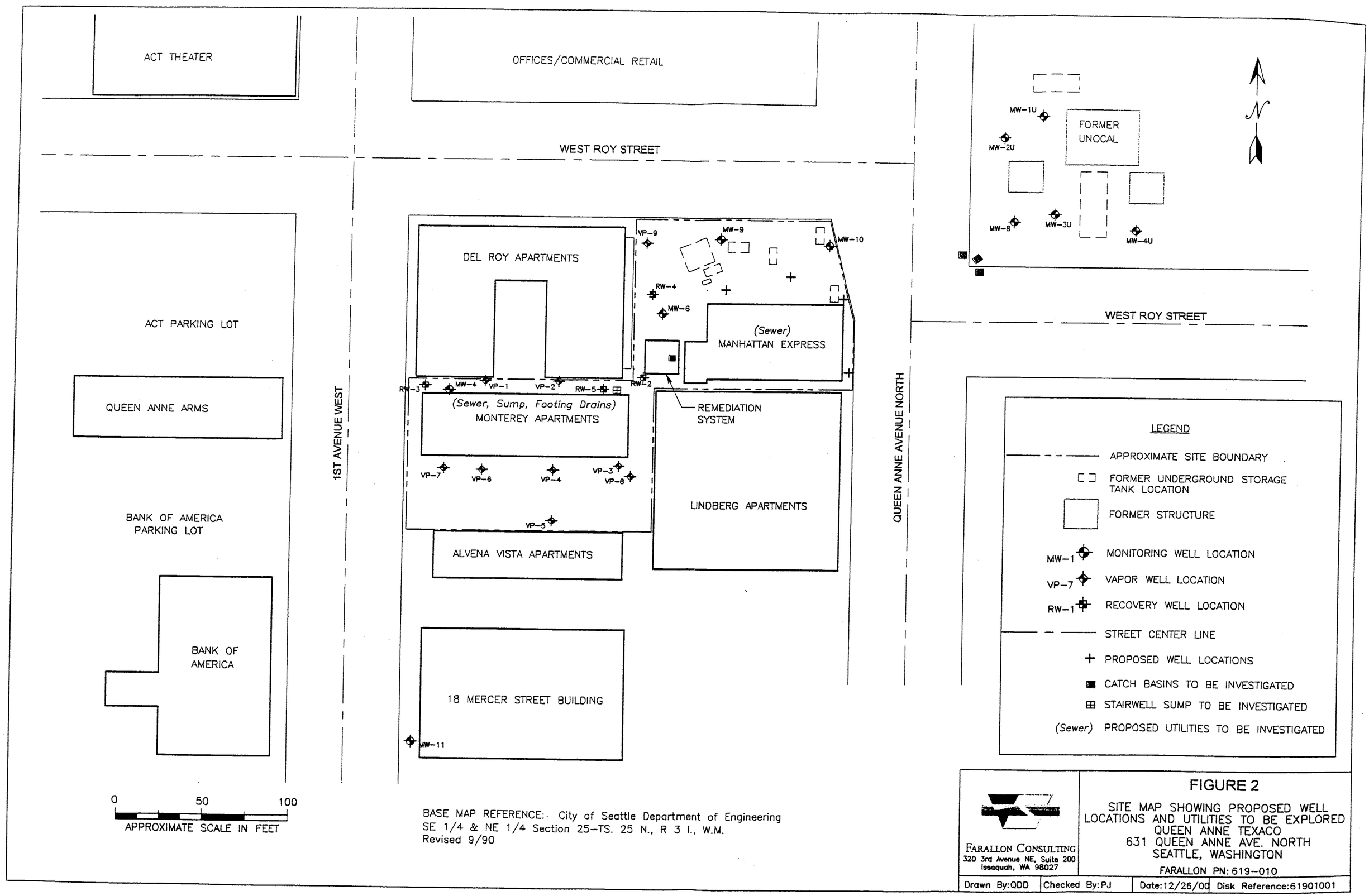
Sample labels are filled out and affixed to appropriate containers immediately prior to sample collection. The label is filled out in indelible ink and includes the following information: job number and name, sample identification number, date, analytes, preservative(s), if any, and the sampler's initials.

The collected samples will be labeled based on the specific sampling location and the depth in feet bgs where the soil sample was collected and the interval the sample was collected from if greater than five inches in length. For example, soil samples collected from the boring of monitoring well MW11, from a depth interval of four to 5.5 feet below bgs will be labeled with the format MW11-4/5.5. Duplicate samples will be labeled the same as the original samples with the exception of a "DUP-" prefix to the sample number.

Drum Labels

The drum labels are filled out and affixed to the appropriate drum immediately upon filling. The label is filled out in indelible ink and includes the following information: job number and name, address where waste was generated, contents of the container, operation, date, consultant's name and phone number, and sampler's initials.

FIGURES



BASE MAP REFERENCE:. City of Seattle Department of Engineering
SE 1/4 & NE 1/4 Section 25–TS. 25 N., R 3 I., W.M.
Revised 9/90

FARALLON CONSULTING
320 3rd Avenue NE, Suite 200
Issaquah, WA 98027

FIGURE 2

SITE MAP SHOWING PROPOSED WELL LOCATIONS AND UTILITIES TO BE EXPLORED
QUEEN ANNE TEXACO
631 QUEEN ANNE AVE. NORTH
SEATTLE, WASHINGTON

FARALLON PN: 619–010

Drawn By: QDD	Checked By: PJ	Date: 12/26/00	Disk Reference: 61901001

APPENDIX B
QUALITY ASSURANCE PROJECT PLAN

Site Investigation
Queen Anne Texaco Site
Seattle, Washington
January 12, 2001

APPENDIX B OF WORK PLAN
QUALITY ASSURANCE PROJECT PLAN
SITE INVESTIGATION
QUEEN ANNE TEXACO SITE
(MANHATTAN EXPRESS, 631 QUEEN ANNE AVEN. N. AND MONTEREY APARTMENTS, 622 FIRST AVE. W.)
SEATTLE, WASHINGTON

Farallon PN: 619-010

Submitted By
Farallon Consulting L.L.C.
320 3rd Avenue NE, Suite 200
Issaquah, WA 98027

For:
Texaco Inc.

January 12, 2001

Prepared by

DRAFT

Kim A. Saganski
Project Geologist

Reviewed by

DRAFT

Peter Jewett
Principal

TABLE OF CONTENTS

1.0 INTRODUCTION

This Quality Assurance Project Plan (herein referred to as the Plan) identifies data quality objectives and standard operating procedures to be implemented in accordance with the Work Plan for the Queen Anne Texaco site located at 631 Queen Anne Avenue North and 622 1st Avenue West in Seattle, Washington (referred to as the site in the Work Plan and in this Plan). This Plan is incorporated within the Work Plan as Appendix B.

Work to be performed under the Work Plan will be conducted in accordance with the Washington State Department of Ecology (Ecology) Model Toxics Control Act (MTCA) Chapter 173-340-810, 29 USC Sec. 651 et esq, Washington Administrative Code (WAC). The purpose of this Plan as stated in Ecology's *Guidance and Specifications for Preparing Quality Assurance Project Plans* is to:

- Help the project manager and project team focus on the factors affecting data quality during the planning stage of the project;
- Facilitate communication among field, laboratory, and management staff as the project progresses; and,
- Provide a record of the project to facilitate final report preparation.

To insure that the data quality objectives (DQOs) are achieved, this plan details aspects of sample collection and analysis including: sample collection procedures, analytical methods, quality assurance/quality control (QA/QC) procedures, and data quality reviews. This plan describes both quantitative and qualitative measures of data quality to assure that data quality objectives are achieved.

1.1 DEFINITION OF THE SITE

The site is located at the southern base of Queen Anne hill in Seattle, Washington. The site consists of a commercial property located at 631 Queen Anne Avenue North, occupied by the Manhattan Express convenience store and a multi-family residential property located at 622 First Avenue West, occupied by the Monterey Apartments. The portion of the site addressed by the Work Plan is the area where groundwater and soil potentially contains concentrations of total petroleum hydrocarbons (TPH) and benzene, toluene, ethylbenzene and xylenes (BTEX) above the MTCA cleanup levels.

Land use surrounding the site consists of commercial retail and office buildings to the north, former UNOCAL gasoline station site (currently vacant), new construction (former Orestes site) and the Marqueen Hotel to the east, commercial retail and apartment buildings to the south and west. The Del Roy Apartments are located adjacent to north of the Monterey Apartments and adjacent to the west of Manhattan Express property. Buildings in the vicinity of the site are connected to the city of Seattle water supply and both the stormwater and sanitary sewer discharge to King County Metro Treatment Plant.

The legal description for the Manhattan Express property is:

- Block 9 Lots 1 & 2 of G. Kinnear's Supplemental,
- Township 25N, Range 3E, Section 25, NE Quarter,
- Located in King County, Washington.

The legal description for the Monterey Apartments property is:

- Block 9, Lots 11 & 12 of G. Kinnear's Addition Supplemental,
- Township 25N, Range 3E, Section 25, NE Quarter,
- Located in King County, Washington.

1.2 BACKGROUND INFORMATION

The history of the site has been documented in the *Background Investigation Report* prepared by Texaco Inc. dated September 20, 2000. The following is a brief summary of the most recent site activities.

In 1993 Ecology supervised the removal of several gasoline and diesel-containing underground storage tanks (USTs) at the Manhattan Express property and installed a remediation system in response to ongoing complaints of gasoline vapors in the basement of the Monterey Apartments. The remediation system consisted of a groundwater extraction and soil vapor extraction (SVE) system. The system was deactivated in December 1997 due to lack of funds. Farallon reactivated the SVE system and has been conducting maintenance and monitoring of the SVE system and monitoring wells at the site on behalf of Texaco (former owner of the Manhattan Express property), since December 1999. The SVE system has been operating continuously since March 2000 and Farallon has been conducting quarterly groundwater monitoring at the site.

Quarterly groundwater monitoring has indicated that the highest concentrations of total petroleum hydrocarbons (TPH) as gasoline and diesel are present on the western portion of the Manhattan Express property and on the western portion of the Monterey Apartments property. Light non-aqueous petroleum liquid (LNAPL) has been present in wells VP-1, VP-4, VP-6, RW-4, and MW-6. Farallon has been recovering LNAPL from these wells on a weekly basis. LNAPL has been reduced to a sheen in wells VP-1 and VP-4 but is consistently present in wells VP-6, RW-4, and sporadically present in MW-6.

Previous investigations have not determined the source and migration pathways of LNAPL and TPH dissolved in groundwater at the site. The condition of the UST system and subsurface soil around the USTs at the Manhattan Express property was not documented when the USTs were removed.

1.3 PROJECT OBJECTIVES

The key objectives of the Work Plan are to:

- Continue monitoring groundwater conditions on a quarterly basis.
- Implement a more efficient method for LNAPL recovery from wells VP6, RW4, and MW-6.
- Determine preferential pathways for contaminant migration by underground utility investigation.
- Install monitoring wells to investigate and document soil and groundwater conditions within the limits of the former UST excavation and to investigate the potential for migration from off-site sources.

The above-listed objectives are discussed in more detail in the Work Plan. The monitoring well locations are defined in the Work Plan.

2.0 PROJECT ORGANIZATION

Chuck Read, Sr. and Dick Peasley (Monterey Apartments) and Debra Tadlock on the behalf of the Arnolds' Estate (Manhattan Express property) are identified as the property owners under RCW 70.105D.040. The primary contacts for the property owners are:

For the Arnolds Estate:

Mr. Mark Myers
Williams, Kastner & Gibbs
601 Union Street, Suite 4100
Seattle, Washington 98101
(206) 628-6633
Fax (206) 628-6611

For Mr. Read, Sr. and Mr. Peasley:

Ms. Neva Markee
622 First Avenue West
Seattle, Washington 98119
(206) 284-6541

Texaco Inc. has contracted with Farallon Consulting, L.L.C. (Farallon) to conduct the Work Plan. The Project Manager and primary contact for Farallon is:

Peter Jewett
Principal Engineering Geologist
Farallon Consulting, L.L.C.
320 3rd Avenue NE, Suite 200
Issaquah, Washington 98027
(425) 427-0061
Fax (425) 427-0067

and the QA/QC Officer is:

Mr. Clifford T. Schmitt
Principal Hydrogeologist
Farallon Consulting, L.L.C.

Ecology is acting as the lead public agency for the project. The primary contact for Ecology is:

Mr. Brian Sato
Project Manager-Toxics Cleanup Program
Washington State Department of Ecology-Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008
(425) 649-7000
Fax (425) 649-7098

3.0 DATA QUALITY OBJECTIVES

The DQOs for this project will be used to develop and implement procedures to ensure that data is of sufficient quality to produce reliable data for evaluation of the LNAPL and TPH contamination in groundwater at the site as defined in the Work Plan. All observations and measurements will be made and recorded in such a manner as to yield results representative of the media and conditions observed and/or measured. Representativeness expresses the degree to which data accurately and precisely represents a characteristic of a population, natural variation at a sampling point, or an environmental condition. Representativeness will be achieved through strict adherence to the SAP (Appendix A). Goals for representativeness will be met by ensuring that sampling locations are selected properly and that a sufficient number of samples are collected.

The quality of the laboratory data will be assessed by precision, accuracy, representativeness, comparability, and completeness (the "PARCC" parameters). Definitions of these parameters and the applicable quality control procedures are described in Subsections 3.1 through 3.5 of the Plan. Quantitative DQOs for applicable parameters (e.g., precision, accuracy, completeness) are provided following each definition. Laboratory DQOs have been established by the analytical laboratory and are specified in the analytical laboratory Quality Assurance Program that is kept on file at Farallon's offices.

3.1 PRECISION

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, it is a quantitative measure of the variability of two or more measurements compared to their average values. Precision is calculated from results of duplicate sample analyses. Precision is quantitatively expressed as the relative percent difference (RPD), and is calculated as follows:

$$RPD = \frac{(C_1 - C_2)}{(C_1 + C_2)/2} \times 100$$

Where:

RPD = relative percent difference

C_1 = larger of the two duplicate results (i.e., the highest detected concentration)

C_2 = smaller of the two duplicate results (i.e., the lowest detected concentration)

Quantitative RPD criteria for laboratory duplicate results have been developed by the U.S. Environmental Protection Agency (USEPA) for inorganic analysis. The criteria are $\pm$ 20 percent for water samples and $\pm$ 35 percent for soil. There are no specific RPD criteria for organic analyses.

3.2 ACCURACY

Accuracy is a measure of the closeness (bias) of the measured value to the true value. The accuracy of chemical analyses results is assessed by "spiking" samples in the laboratory with known standards (surrogates or matrix spikes of known concentration) and determining the percent recovery. The accuracy is measured as the percent recovery (%R) and is calculated as follows:

$$\%R = \frac{(M_{sa} - M_{ua})}{C_{sa}} x\ 100$$

Where:

% R = percent recovery

M_{sa} = measured concentration in spiked aliquot

M_{ua} = measured concentration in unspiked aliquot

C_{sa} = actual concentration of spike added

Laboratory matrix spikes and surrogates will be carried out at the analytical laboratory in accordance with USEPA SW-846 requirements for organic and inorganic analyses. Quantitative percent recovery criteria have been developed by the USEPA for laboratory matrix spikes for inorganic analysis. The criteria are 75 to 125 percent, when the sample concentration exceeds the spike concentration by a factor of four or more. There are no specific accuracy criteria for organic analyses. Where the USEPA and Ecology have not provided data validation guidelines, laboratory derived control limits will be used to assess surrogate recovery and matrix spike results.

The accuracy of sample results can also be affected by sample contamination. Sample contamination can occur because of improperly cleaned sampling equipment, exposing samples to chemical concentrations in the field or during transport to the laboratory, or because of chemical concentrations in the laboratory. To ascertain that the samples collected are not contaminated, several types of blank samples will be analyzed.

3.2.1 Equipment Rinsate Blanks

Equipment rinsate blanks, consisting of analyte-free water that has been used as a final rinse of sampling equipment (following equipment decontamination), will be used to determine if sample contamination occurred as a result of improperly cleaned sampling equipment. Where decontamination is required (e.g., soil sampling equipment), the number of equipment rinsate blanks will be at least five percent of the total number of samples collected.

3.2.2 Laboratory Method Blanks

The laboratory will run method blanks at a minimum frequency of five percent or one per batch to assess sample contamination within the laboratory.

3.3 REPRESENTATIVENESS

Representativeness is a qualitative measure of how closely the measured results reflect the actual concentration or distribution of the constituent concentrations in the matrix sampled. The sampling plan design, sampling collection techniques, sample handling protocols, sample analysis methods, and data review procedures have been developed to assure the results obtained are representative of site conditions. These issues are addressed in detail in the SAP (Appendix A) and the Plan.

3.4 COMPLETENESS

Completeness is defined as the percentage of measurements judged to be valid. Results will be considered valid if they are not rejected during data validation (see Section 6.0 Data Management, Reduction, Review and Reporting). Completeness is calculated as follows:

$$C = \frac{(Number\ of\ Valid\ Measurements)}{(Total\ Number\ of\ Measurements)} x\ 100$$

The target completeness goal for this work will be 90 percent for a given analysis.

3.5 COMPARABILITY

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. The use of standard USEPA and Ecology methods and procedures for both sample collection and laboratory analysis will make data collected comparable to both internal and other data generated.

4.0 SAMPLING PROCEDURES

Procedures that will be used to collect, preserve, transport, and store samples are described in the SAP provided in Appendix A of the Work Plan.

5.0 ANALYTICAL PROCEDURES

Chemical and physical analyses to be conducted during this project are discussed in the SAP provided in Appendix A of the Work Plan.

6.0 DATA MANAGEMENT, REDUCTION, REVIEW, AND REPORTING

This section outlines procedures to be followed for the inventory, control, storage, and retrieval of data collected during performance of the Work Plan. The procedures contained in this plan are designed to ensure that integrity of the collected data is maintained for subsequent use. Moreover, project tracking data (e.g., schedules and progress reports) will be maintained to monitor, manage, and document the progress of this cleanup action.

Farallon will maintain the project files according to the procedures outlined in this document and in accordance with MTCA. Data generated during field activities and by laboratory analyses will be submitted directly to Farallon. Laboratory documentation from the analytical laboratories will be maintained in Farallon's project file for purposes of validating analytical data collected during the cleanup action.

6.1 DATA TYPES

A variety of data will be generated by this cleanup action, including sampling and analytical data, review of published reports, and calculation results based on mathematical expressions. The laboratory analytical data will be transmitted to Farallon as an electronic file, in addition to a hard copy. This will facilitate the subsequent validation and analysis of these data while avoiding transcription errors that may occur with computer data entry.

6.2 DATA TRANSFER

Procedures controlling the receipt and distribution of incoming data packages to Farallon and outgoing data reports from Farallon are outlined below.

6.2.1 Receipt of Data and Reports

The incoming documents will be date stamped and filed as follows. Correspondence and transmittal letters for all reports, maps, and data will be filed chronologically. Data packages, such as those from field personnel, laboratories, and surveyors (such as soil analytical data, survey data, and geologic observations), will be filed by project task, subject heading and date. If distribution is required, the appropriate number of copies will be made and distributed to appropriate persons or agencies. The original document will not be distributed to project personnel.

6.2.2 Outgoing Data and Reports

A transmittal sheet will be attached to all project data and reports sent out. A copy of each transmittal sheet will be kept in the project file. All outgoing reports and maps will be reviewed by the Project Manager and QA/QC Officer.

6.3 DATA INVENTORY

Procedures for filing, storage, and retrieval of project data and reports are discussed below.

6.3.1 Document Filing and Storage

As previously discussed, project files and raw data files will be maintained at Farallon. Files will be organized by project tasks or subject heading, and maintained by the document control clerk.

6.3.2 Access to Project Files

Access to project files will be controlled and limited to Texaco Inc., and Farallon personnel. Project documents will be listed according to task. Project documents will be assigned a document control number and a log will be maintained for all documents contained in the file. When a file is removed for use, a sign-out procedure will be used to track custody.

If a document is to be used for a long period, a copy will be used, and the original will be returned to the project file.

6.4 DATA REDUCTION AND ANALYSIS

The Project Manager and Project QA/QC Officer are responsible for data review and validation. Data validation parameters are outlined in Section 3.0. The particular type of analyses and presentation method selected for any given data set will depend on the type, quantity, quality, and prospective use of the data in question. The analysis of the project data is likely to require data reduction for the preparation of tables, charts, and maps, etc. To ensure that data are accurately transferred during the reduction process, all reduced data will be checked by someone other than the person that prepared the map, table, or chart. All items checked will be initialed and dated. Any incorrect transfers of data will be highlighted and changed.

6.4.1 Data Reporting Formats

The physical and chemical characterization information developed for soil and groundwater at the site in connection with the Work Plan will be presented in the final report in the following format.

6.4.1.1 Summary Tables

The laboratory reports will be sorted according to various parameters to summarize the information for easier assimilation and presentation. Soil sampling and analysis data will be sorted several ways, including by sample number, constituent, and date of sample collection. The parameters chosen for sorting will depend on the determination of the most appropriate format, and the utility of that format in demonstrating the physical and chemical characteristics of interest.

6.4.1.2 Maps

Plan maps needed to illustrate results of the Work Plan will be prepared. They may include, but are not limited to plan maps of the site showing chemical concentration for individual chemicals and groups of chemicals.

6.4.1.3 Well Logs

Well logs will be generated from field data to display site stratigraphy, and well construction.

6.5 TELEPHONE LOGS AND MEETING NOTES

All notes from project meetings and telephone conversations will be maintained in the project file by the Project Manager. Field notes will be also be filed with project documents after completion of the field work.

7.0 QUALITY CONTROL PROCEDURES

7.1 FIELD QUALITY CONTROL

Field Quality Control samples (e.g., duplicate samples and equipment rinsate blanks) to be collected during this project are described in Section 2.2 of the SAP (Appendix A). The purpose of these samples was also discussed in Section 3.0 of the Plan.

7.2 LABORATORY QUALITY CONTROL

Analytical laboratory QA/QC procedures are provided in the laboratory Quality Assurance Plan that is maintained on file at Farallon's offices.

7.3 DATA QUALITY CONTROL

All data will undergo two levels of QA/QC evaluation: one by the laboratory and one by Farallon. Initial data reduction, evaluation, and reporting will be performed by the laboratory as specified in the laboratory Quality Assurance Plan. The analytical data will then be validated at Farallon under supervision of the QA/QC Officer. The following types of quality control information will be reviewed, as appropriate:

- Method deviations;
- Sample extraction and holding times;
- Method reporting limits;
- Blank samples (equipment rinsate and laboratory method);
- Duplicate samples;
- Matrix spike/matrix spike duplicate samples (accuracy);
- Surrogate recoveries;
- Percent completeness; and,
- RPD (precision).

Farallon will review field records and results of field observations and measurements to insure procedures were properly performed and documented. The review of field procedures will include:

- Completeness and legibility of field logs;
- Preparation and frequency of field quality control samples;
- Equipment calibration and maintenance; and,
- Chain-of-Custody forms.

8.0 PERFORMANCE AND SYSTEM AUDITS

Performance audits will be completed for both sampling and analysis work. Field performance will be monitored through regular review of Chain-Of-Custody forms, field notebooks, and field measurements. Periodic on-site review of work in progress will also be performed by the Project Manager and/or the Project QA/QC Officer.

Accreditations received from Ecology for each analysis by the analytical laboratory demonstrates the laboratory's ability to properly perform the requested methods. Therefore, a system audit of the analytical laboratory during the course of this project will not be conducted.

The Project Manager and/or Project QA/QC Officer will oversee communication with the analytical laboratory on a frequent basis while samples are being processed and analyzed at the laboratory. This will allow Farallon to assess progress toward obtaining the DQOs, and to take corrective measures as problems arise.

Corrective measures will be the joint responsibility of the Project Manager and the Project QA/QC Officer.

The analytical laboratory will be responsible for identifying, and correcting (as appropriate) any deviations from performance standards as discussed in the laboratory QA/QC Plan. The laboratory will communicate to the Project Manager or the Project QA/QC Officer, all deviations to the performance standards and the appropriate corrective measures during sample analysis. Corrective actions are discussed in Section 11.0.

9.0 PREVENTIVE MAINTENANCE

Operation and Maintenance manuals will accompany all field sampling and measurement equipment. Included in these manuals will be procedures for start-up, calibration and system checks. All maintenance activities will be documented in field logs and/or equipment log books. A schedule of preventive maintenance activities will be maintained. In addition, spare parts and tools will be included in each equipment storage case to minimize equipment downtime.

10.0 DATA ASSESSMENT PROCEDURES

The Project Manager and Project QA/QC Officer are responsible for data review and validation. Upon receipt of each data package from the laboratory, calculations using the equations presented for precision, accuracy and completeness will be performed. Results will be compared to qualitative DQOs. Data validation parameters are outlined in Section 3.0 of the Plan.

11.0 CORRECTIVE ACTION

Corrective actions will be the joint responsibility of the Project Manager and the Project QA/QC Officer. Corrective procedures can include:

- Identifying the source of the violation;
- Re-analyzing samples if holding time criteria permit;
- Re-sampling and analyzing;
- Evaluating and amending sampling and analytical procedures; and/or,
- Qualifying data to indicate the level of uncertainty.

During field operations and sampling procedures, the Project Manager and field team members will be responsible for identifying and correcting equipment malfunctions. All equipment malfunctions and corrective actions taken will be documented in the field notes. Corrective actions will be the joint responsibility of the Project Manager and the Project QA/QC Officer.

12.0 QUALITY ASSURANCE REPORTS

The final Work Plan report will include a quality assurance section, which summarizes data quality information. This summary will include:

- Assessment of data accuracy and completeness;
- Results of performance and/or system audits; and,
- Significant quality assurance problems and their impacts on the DQOs.

APPENDIX C
HEALTH AND SAFETY PLAN

Site Investigation
Queen Anne Texaco Site
Seattle, Washington
January 12, 2001

APPENDIX C OF WORK PLAN
HEALTH AND SAFETY PLAN
SITE INVESTIGATION
QUEEN ANNE TEXACO SITE
(MANHATTAN EXPRESS, 631 FIRST AVE. W. AND MONTEREY APARTMENTS, 622 FIRST AVE. W.)
SEATTLE, WASHINGTON

FARALLON PN: 619-010

Submitted by
Farallon Consulting, L.L.C.
320 3rd Avenue NE, Suite 200
Issaquah, WA 98027

For
Texaco Inc.

January 12, 2001

1.0 ADMINISTRATIVE INFORMATION

1.1 PROJECT DESCRIPTION

Project Name: Queen Anne Texaco Site (Manhattan Express and Monterey Apartments)

Project No.: Farallon Consulting No. 619-010

Site Location: 631 Queen Anne Ave N. and 622 First Ave W., Seattle, WA

Work Summary: Monitoring well installation
Soil and groundwater sampling
Light non-aqueous petroleum liquid recovery
Underground utility investigation

Comments:

Prepared by: Farallon Consulting
320 3rd Avenue NE, Suite 200
Issaquah, WA 98027

Date: 12-22-2000

Proposed Date(s) of Operation: 12-29-00 through 12-31-01

Approvals (Project Manager and one of the other two)

Farallon Consulting Project Manager: Kim Saganski Date:_____

Field Supervisor: Jim Pender Date:_____

QA/QC Officer: Peter Jewett Date:_____

1.2 SCOPE OF SAFETY PLAN

A site location map is presented as Figure 1. A site layout map is presented as Figure 2, and includes anticipated work zones. Figures 1 and 2 are incorporated at the end of this health and safety plan.

This site-specific safety plan is intended to meet the requirement of 29 CFR Part 1910.120, 8 CCR 5192 and the EPA Standard Operating Safety Guides for Hazardous Waste Operations (1986). All employees involved in field work at this site have completed the required 40 hours initial training, maintain qualification through annual refresher training, are under a program of medical monitoring,

and are certified to wear respiratory protection, as specified in 29 CFR part 1910.134 and 8 CCR 5144. In addition, an effective Illness and Injury Prevention program has been implemented in accordance with 8 CCR, sections 1509 and 3203.

This plan was prepared from the best available information concerning site conditions. It is recognized that conditions on a site may change or that more information may become available during the operation. Unless specified in this site-specific safety plan, the field team does not have the option to modify the levels of personal protection in any way. If during the operation, it is determined that the protection specified in the site-specific safety plan requires modifications, work will cease, and the Field Supervisor will contact the project manager and/or Company Safety Representative. Work will not resume until authorized.

A project orientation meeting will be held prior to commencement of the project outlining ALL work activities, safety concerns and communication measures. The project scope of work, potential known site hazards and contents of this health and safety plan will be reviewed during the project orientation meeting. In addition, daily tailgate meetings will be held prior to starting work each morning. Chain-of-communication and communication responsibilities are addressed in Section 2.2.

1.3 FIELD TEAM ASSIGNMENTS

DUTY	NAME
Team Leader/Project Manager	Kim Saganski
Site Safety/Field Supervisor	Jim Pender
Alternate Site Safety/ Field Supervisor	Tim Brown

A form documenting on-site workers that have reviewed this document and attended the project orientation meeting is included is Section 1.5 of this health and safety plan. Documentation of attendance at the daily project meeting(s) is also included in Section 1.5 of this plan.

1.4 SUBCONTRACTORS AND COMMUNICATION

The following subcontractors will perform work during this operation. All employees of subcontractors performing work with the potential for exposure to hazardous waste shall meet the requirements of 29 CFR 1910.120 and 8 CCR 5192. Each company/contractor working on this project maintains the responsibility for the safety of its employee(s). In addition, each field team member and the separate companies/contractors working on this project maintain a general responsibility to identify and correct any health and safety hazards and cooperate toward working as safely as possible.

1. Name: Cascade Drilling, Inc.
   Telephone No.: (425) 485-8908
   Address: Bothell, Washington
   Authorized Representative: John Murnane
   Services Provided: Drilling
   Contract No.:_____ Date:

2. Name: Northwest Cascade
   Telephone No.: (253) 848-2371
   Address: Puyallup, Washington 98373
   Authorized Representative: Dave Rink
   Services Provided: Underground utility investigation
   Contract No.: Date:

3. Name:
   Telephone No.:
   Address:
   Authorized Representative:
   Services Provided:
   Contract No.: Date:

A copy of this site health and safety plan will be available for review prior to commencing work and during work at the site. Subcontractors are encouraged to follow this plan or develop their own project-specific health and safety plan. If a subcontractor prepares a project-specific safety plan, it must meet the applicable requirements in 29 CFR 1910.120, 8 CCR 5192 and the EPA Standard Operating Safety Guides for Hazardous Waste Operation (1986).

1.5 SAFETY COMPLIANCE AGREEMENT FORM

Site: 631 Queen Anne Ave N. and 622 First Ave W.

Project No.: 619-010

I, the undersigned, acknowledge that I have attended the safety meeting, and received a copy of this site-specific safety plan. I have read and understood the safety plan, and do agree to adhere to the requirements specified by it. I understand that I may be prohibited from continuing work on the project for failing to comply with this safety plan.

Signature	Print Name	Company	Date

2.0 DESCRIPTION OF WORK TO BE PERFORMED

Section 2.1 contains a list of planned field activities. Section 2.2 describes communication procedures during fieldwork

2.1 FIELD ACTIVITIES

1. Install four groundwater-monitoring wells.
2. Collect soil samples from monitoring well borings.
3. Collect groundwater samples from on-site wells.
4. Measure LNAPL thickness and collect LNAPL samples from wells VP6, RW4, and MW6.
5. Conduct bail-down testing on wells VP6, RW4, and MW6.
6. Supervise underground utility investigation.

2.2 COMMUNICATION DURING SITE ACTIVITIES

Most site activities will consist of at least two on-site personnel, working in relatively close proximity. The chain-of-communication (i.e., laborer, technician, supervisor, manager) will be outlined during the project orientation meeting and reiterated during daily tailgate meetings. Each field team member (contractor or subcontractor) will maintain responsibility to identify and correct health and safety hazards. A field activity manager/supervisor will be designated prior to each on-site work project.

Identified health and safety hazards shall be communicated as soon as possible to the site supervisor or field activity manager. Appropriate corrective actions shall be implemented as specified in subsequent sections of this plan. Common hand signals shall be reviewed during this project during the project orientation meeting and daily meetings. Responsibilities for initiating emergency responses, notification of appropriate officials, buddy watch system (if appropriate) and implementation of corrective measures shall also be established during these meetings.

3.0 SITE BACKGROUND

3.1 SITE PHYSICAL DESCRIPTION

The site is located at the southern base of Queen Anne hill in Seattle, Washington (Figure 1). The site consists of a commercial property located at 631 Queen Anne Avenue North, occupied by the Manhattan Express convenience store and a multi-family residential property located at 622 1st Avenue West, occupied by the Monterey Apartments (Figure 2). Commercial properties and Apartment buildings border the site.

3.2 SITE HISTORY (ACTIVITIES, INCIDENTS, ETC)

The Manhattan Express portion of the site was historically occupied by a gasoline station. Groundwater contamination has been documented on site and floating product is present on the western portions of both the Manhattan Express property and the Monterey Apartments property.

3.3 TYPES OF MATERIALS KNOWN TO HAVE BEEN STORED ON THE SITE

Gasoline, diesel fuel, oil, and waste oil.

3.4 MATERIALS KNOWN OR SUSPECTED TO REMAIN ON THE SITE

Based on groundwater data gathered by Farallon and others and air sampling results from the soil vapor extraction system on-site, soil and groundwater containing total petroleum hydrocarbons (TPH) above the MTCA Method A cleanup levels is present at the site. (Figure 2).

3.5 SITE STATUS (ACTIVE / INACTIVE, AGENCY ACTIONS

1. Site Status: Inactive ____ Active __X___

2. Has the site been characterized to the best of your knowledge?

   Yes _X_ No ____

3. Comments: Site characterization has been performed with respect to the type of contaminants present on-site, but the extent of contamination at the site has not been fully characterized.

4.0 HAZARDS EVALUATION

Summary of anticipated hazards:

(X) Physical hazards inherent to the site (overhead electrical lines)
( ) Physical hazards related to excavation operations
(X) Chemical hazards
( ) Community hazards
(X) Electrical hazards
(X) Mechanical hazards
( ) Biohazards
( ) Heat stress
( ) Confined space entry
(X) Noise hazards
(X) Other - trip and fall hazards
(X) Other – TRAFFIC

4.1 POTENTIAL CHEMICAL HAZARDS (ATTACH REFERENCES)

	Chemical	Range of Concentrations in Groundwater	Mode of Intake 1,2,3,4	Limits (PEL/TLV)	IDLH Level of Concern (H/M/L)
1.	Benzene	ND to 16,800 ppm	1,2,3,4	0.1 ppm	H
2.	Toluene	ND to 13,500 ppm	1,2,3,4	100 ppm	H
3.	Ethylbenzene	ND to 1,890 ppm	1,2,3,4	100 ppm	M to H
4.	Xylenes	ND to 11,000 ppm	1,2,3,4	100 ppm	H

Notes: 1 = Inhalation, 2 = Ingestion, 3 = Absorption, 4 = Contact
H = High, M = Medium, L = Low

Locations where the contaminants are of greatest concern on the site include: groundwater and potentially subsurface soils.

Comments: Appropriate personal protective equipment (gloves, safety glasses, ext.) shall be worn during sampling to minimize potential contact with impacted soils and groundwater. Based upon available site data and prior experience, it is not expected that site operations will result in significant airborne concentrations of vapors and/or dust. "Significant" refers to concentrations which would exceed the site's referenced exposure action levels, or which are through to pose any potential health threat to the site workers and/or surrounding community.

4.2 PHYSICAL HAZARDS

4.2.1 Physical Hazards Inherent to the Site

____ Fire	____ Explosion	____ Anoxia
__X__ Heat Stress	___X_ Cold Stress	__X__ Noise
____ Radiation	____ Biohazards	__X__ Mechanical Equipment

4.2.1.1 Drilling/Soil and Groundwater Sampling

- Watch for traffic entering and exiting the parking lots.
- Equipment should be inspected daily by the operator to ensure that there are no operational problems.
- Adequately cover and protect all unattended borings to prevent personnel or site visitors from stepping or falling into the boring.
- Personnel shall wear steel-toed shoes, safety glasses, hearing protection and hard hats during drilling and excavation operations.

5.0 HAZARDOUS WASTE FIELD SAFETY DIRECTIVES

- No eating or smoking onsite.
- No contact lenses (if applicable to planned activities).
- Hard hats and steel-toed boots will be worn at all times (if applicable to planned activities).
- Site access will be restricted to authorized personnel only.
- All operations will have first aid kits, and fire extinguishers available.
- No facial hair is allowed that will interfere with the respirator face seal.
- Emergency information will be posted (Section 7.0).
- Safety plan will be available onsite at all times.

5.1 MECHANICAL HAZARDS

- Do not stand near rotating or hydraulic equipment while in operation.
- Verify that all equipment is in good condition.
- Do not stand or walk under elevated loads or ladders.
- Appropriate guards must be used if equipment has potentially hazardous moving parts.

5.2 ELECTRICAL HAZARDS

- Maintain a least 10-foot clearance from overhead power lines. A greater equipment distance will be maintained if required by local regulation.
- Properly ground and/or bond all electrical equipment.
- Avoid standing in water when operating electrical equipment.
- If equipment must be connected by splicing wires, make sure all connections are properly taped.
- Be familiar with specific operating instructions for each piece of equipment.
- Assure appropriate bonding of containers when pumping flammable liquids.

5.3 CHEMICAL HAZARDS

- Absorption, inhalation potential.

5.4 HEAT STRESS

- When workers exhibit symptoms of heat stress (i.e. redness of skin, profuse sweating etc.), the individual(s) will take frequent rest breaks in a shaded area. Unzip or remove coveralls during breaks. Have cool water or electrolyte replenishment solution available. Drink small amounts frequently to avoid dehydration. Count the pulse rate for 30 seconds as early as possible in the rest period. If the pulse rate exceeds 110 beats per minute at the beginning of the rest period, shorten the work cycle by one third.

5.5 COLD STRESS

- Dress according to the weather. Check the weather forecast before commencing field work. Dress in layers and bring extra clothing to change into in case your clothes become wet. Wear wool gloves under chemical protective gloves for warmth. Always wear water repellent outerwear during wet conditions.

5.5.1 Frostnip

Frostbite refers to the freezing of body tissue (usually skin), that results in loss of feeling and color in the tissue. It most commonly affects the feet and hands (which account for 90 percent of cases), the nose or the ears. There are three degrees of frostbite: frostnip, superficial frostbite and deep frostbite. Although children, older people and those with circulatory problems are at greater risk for frostbite, most cases occur in adults between the ages of 30 and 49. If you have frostbite, you may not realize at first that anything is wrong because the affected area will be numb.

- Symptoms for frostnip: White patches of skin that are numb. For frostbite (superficial or deep): Skin that is white or grayish-yellow and feels hard or waxy; numbness; possibly swelling or blistering.

- Treatment for frostnip: get out of the cold as soon as possible. If your clothes are wet, change into dry clothing. Immerse the affected area in warm water (100° to 105° Fahrenheit) to thaw the frozen tissue. (Do not use hotter water, as this may burn your skin.) If warm water is not available, warm the affected area with body heat. For instance, warm your hands by tucking them into your armpits; warm your nose, ears or face by covering them with dry hands.

- CAUTION! Do not rub the affected area because this may increase damage to the tissue. Do not use a heating pad, heat lamp, stove, fireplace or radiator to rewarm the affected area; these may warm your skin unevenly or may burn your skin, particularly if it's numb and you cannot tell how hot your skin is getting on the surface. If the skin tingles and burns as it warms, circulation is returning. The skin may turn red but

should not blister or swell. If the skin does not seem to warm, if it remains numb, or if it does blister or swell, seek immediate medical attention.

5.5.2 Frostbite

Frostbite requires emergency medical care. If you think you may have frostbite, get out of the cold as soon as possible. If you cannot get medical help immediately and there's no risk that the area might be re-frozen before you get help, warm the affected area as you would for frostnip.

- CAUTION! If the affected area might be re-frozen before you get medical help, do not warm it; this greatly increases the risk of damage. Also, do not walk on frostbitten feet or toes unless absolutely necessary.

5.6 NOISE HAZARDS

- Use earplugs or earmuffs when noise level prevents conversation in normal voice at distance of three feet; this corresponds to an action level of 85 dB for mandatory hearing protection use. Use hand signals, as defined in 40-hour health and safety, to facilitate communication when hearing protection is required. If noise levels do not allow effective communication, either shut down equipment or move away from the noise source if needed.

- Use hearing protection when working within 50 feet of any operating equipment.

5.7 CONFINED SPACE ENTRY

- Confined space entry is not anticipated to be required during this field program.

5.8 RADIATION HAZARDS

- There are no known sources of radiation present at the site.

6.0 PLANNING/SITE SETUP

6.1 SITE SETUP

On-site communication method: Line of sight, hand signals when using hearing protection or under conditions of excessive noise.

Off-site communication method: Offsite telephones.

Site Security: Not Applicable

Identify the water and electrical locations: To be discussed at onsite safety meeting.

Emergency communication: If planned activities warrant the need to potentially notify field personnel of emergency conditions, refer to the site supervisor.

6.2 LEVELS OF PROTECTION AVAILABLE OR USED

USEPA/OSHA LEVEL: A___ B___ C X D X

Modifications/Additions: N/A

Comments:

6.3 AIR MONITORING GUIDELINES

Device	Action Level	Action to be Taken
* OVA/PID	25 ppm	Don respirators
** LEL/Oxygen		
*** OVA/PID		

Comments:

6.4 CONTROL OFF-SITE MIGRATION AND EXPOSURE

Practical solutions are those normally available, which can be instituted in a reasonable time frame, by trained site personnel. The Field Supervisor or site health and safety officer will be allowed to modify procedures as determined by field conditions to ensure a safe working environment.

6.5 SPECIAL SITE CONSIDERATIONS

Work activities will be conducted in a manner, which provides for awareness of, and immediate response to, circumstances that could result in public exposures.

7.0 FIELD ACTIVITIES

Collect soil samples during drilling, and sample groundwater wells after completion of well installations.

7.1 SITE ENTRY AND SETUP

Initial level of protection: Level D protection, including hard hat, steel-toed boots, safety glasses.

Modifications: Based on work zone air monitoring, upgrade to Level C, using appropriate cartridges in respiratory equipment.

Special procedures, precautions, equipment: None anticipated.

7.2 SITE ACTIVITIES (GENERAL)

Initial level of protection: Level D protection, as above.

Modifications: Upgrade to Level C based on air monitoring.

7.2.1 Site Activities (Task Specific)

Task 1: Collect soil samples during drilling.

Task 2: Conduct groundwater sampling on all wells after installation of the new wells.

Task 3: Collect product samples for analysis and conduct bail-down test in wells containing product.

Task 4: Observe and direct underground utility investigation activities and record findings.

Modifications: Respiratory protection in accordance with section 6.3, total upgrade to Level C.

7.3 SAMPLE HANDLING AND PRECAUTIONS

Personnel will wear gloves and other protective equipment as necessary during the handling of soil, groundwater, and product samples. Any analytical laboratory used for this project will be notified prior to shipment of the suspected contaminants at this site.

The exterior of all sample containers will be cleaned prior to shipping. Sample containers will be protected from breakage by wrapping in bubble wrap, etc., if required, placed in Ziploc bags, and packed in absorbent material. Shipping containers will be clearly labeled. Samples will be shipped under full chain-of-custody procedures.

7.4 DECONTAMINATION PROCEDURES

Contact with hazardous organic chemicals is possible in the work zone. The following decontamination procedures will be implemented to minimize the movement of contaminants outside of the work zone, and to minimize the period of contact with these contaminants.

7.4.1 Personal Hygiene

Field team personnel should conduct the following to ensure that contaminants will not remain in contact with their bodies:

1. Field personnel involved in the excavating/sampling activities are instructed to wash their hands, face, neck and forearms at the end of the workday. Soap, water and towels will be provided at the site for this purpose;

2. Field personnel are instructed to take a full-body shower at home or motel at the end of the workday; particular attention should be paid to areas of the body that are typically overlooked, such as behind the ears or between the toes;

3. Disposable personal protective equipment (i.e. Tyvek suits, disposable ear plugs, gloves, booties and respirator cartridges, etc.) will be discarded in garbage bags and then placed in trash bins after each day of use; and

4. Other non-disposable protective equipment (see Section 8.0) will be washed in warm or hot soapy water after each day of use.

7.4.2 Equipment Decontamination

Equipment, samplers and parts of the drilling equipment that came into contact with contaminants will be cleaned before reuse at another location and at the end of each day. Decontamination will be with warm soapy water, steam/pressure washer, and organic solvents, if necessary. Decontamination wash and rinse water will be containerized and managed in accordance with applicable regulations.

8.0 EQUIPMENT LISTS

Place an "X" at the level chosen, and a * (U) at the upgrade alternative.

Personal Protection Equipment			
Level C		**Level D**	
Air Purifying Respirator		Surgical Gloves	
Full Face		Outer Work Gloves	X
Half Mask Cartridge Type: Dust & Chemical	U	Glove Type: NITRILE	X
Escape Air Pack		Protective Clothing Type: Long Sleeves	X
Surgical Gloves		Safety Goggles	X
Outer Work Gloves		Hard Hat	X
Glove Type: NITRILE		Neoprene Safety Boots	X
Protective Clothing Type: Flame Retardant		Steel-Toed Boots	
Polycoated Tyvek for wet conditions		Hearing Protection	X
Butyl Apron		Rain Pants (wet conditions)	X
Safety Goggles	U	First Aid Equipment/Supplies	*X
Hard Hat		Rain Suit	
Neoprene Safety Boots		Other Equipment (List):	
Steel-Toed Boots			
Hearing Protection			
Escape Pack			
Rain Pants (wet conditions)			
Boot Covers			
Other Equipment (List):			
Equipment to be Used During Field Work			
OVA/PID	X	First Aid Kit	X
HNU		Oxygen	
OVM		Eye Wash	
MINI-RAM Dust Monitor		Stretcher	

Equipment to be Used During Field Work			
Oxygen/explosimeter		Tool Kit	X
Drager Kit:		Thermometer(s)	
Tubes used:		Tables/chairs	
Low Flow Air Pumps		Sampler Rack	
High Flow Air Pumps		Fire Extinguishers	
Radiation Monitor - 4		Noise Meter	
Radiation Dosimeters		WBGT	
pH meter		Magnetometer	
GPR		EM	
Air Horn		Decontamination Equipment	
Conductivity/Temperature Meter		Blood Pressure Monitor	
Plastic Sheeting		Drinking Water	X
Large Washtubs		Camera	X
Small Washtubs	X	Film	X
Scrub Brushes	X	Drum Dolly	
Pressurized Sprayers		Trowels	
Solvent Sprayer(s)		Pick	
Plastic Trash Cans		Site Security	
Trash Bags	X	Shovels	
Water Bottles		Binoculars	
Paper Towels	X	Traffic Cones	X
Duct Tape		Megaphone	
Masking Tape		Banner Tape	
Ziploc Bags		Radio/Mobil Telephone	X
Detergent		Flagging Tape	
TSP	X	Fencing	
Sodium Hypochlorite		Warning Signs	
Sodium Bicarbonate		Thieving Rods	
Bleach		Waste Drum Levels	

Equipment to be Used During Field Work			
Hand Soap		Bung Wrench (Brass)	
Solvent Rinse		Security Guard	
Acetone		Step Ladder	
Hexane		Bailers	
Methanol		Rope	
Acetone		Security Ladder	
Other Equipment (List):			

9.0 EMERGENCY INFORMATION

(Post Onsite)

Acute Symptoms	First Aid
Dizziness, nausea, headache	Rest, shade, fresh air
Unconsciousness	Get medical help

Hospital Name: Swedish Medical Center
747 Broadway
Seattle, WA 98122
(206) 386-6000

Directions to hospital: Reference Figure 3.

Emergency Conditions: IF AN EMERGENCY CONDITION, SUCH AS FIRE, CHEMICAL RELEASE, EXPLOSION, OR OTHER PHYSICAL THREAT TO LIFE OR IMMEDIATE HEALTH OCCURS, ALL PERSONNEL ARE TO IMMEDIATELY EVACUATE THE WORK AREA. OPERATING EQUIPMENT WILL BE TURNED OFF PRIOR TO EVACUATION. PERSONNEL WILL EVACUATE TO AN ASSEMBLY AREA LOCATED AT THE NORTH ENTRANCE TO THE MANHATTAN EXPRESS STORE. EMERGENCY CONTACT WILL BE MADE IMMEDIATELY TO THE APPROPRIATE REPORTING AGENCY, OR 911, AS DETERMINED BY THE SITE SUPERVISOR OR ACTING SUPERVISOR. NEIGHBORING RESIDENTS AND BUILDING OCCUPANTS WILL BE NOTIFIED IMMEDIATELY AS DIRECTED IN THE FACT SHEET TO BE PREPARED PRIOR TO SITE MOBILIZATION.

Local Resources:	911
Ambulance:	911
Hospital Emergency Room:	Swedish Medical Center (206) 386-6000
Law Enforcement:	911
Fire Department:	911
Explosives Unit:	911
Poison Control Center	911
Agency Contact:	Brian Sato
Client Contact:	Jeff Goold

Laboratory:	OnSite Environmental
Principal Contractor:	Farallon Consulting, L.L.C.
Project Manager:	Kim Saganski – Farallon Consulting 425/427-0061
Industrial Hygienist:	Cliff Schmitt (Farallon Consulting)

10.0 COMMUNITY RELATIONS

Emergency notification procedures and guidance on sampling procedures will be provided. An on-site contact person will be identified and introduced to the notified parties. In addition, contact phone numbers will be provided for the purpose of continued communication with all of the affected parties.

Ongoing effort is being made to minimize any disturbance of the normal activities that occur on a day-to-day basis in the areas adjacent to the construction operations.

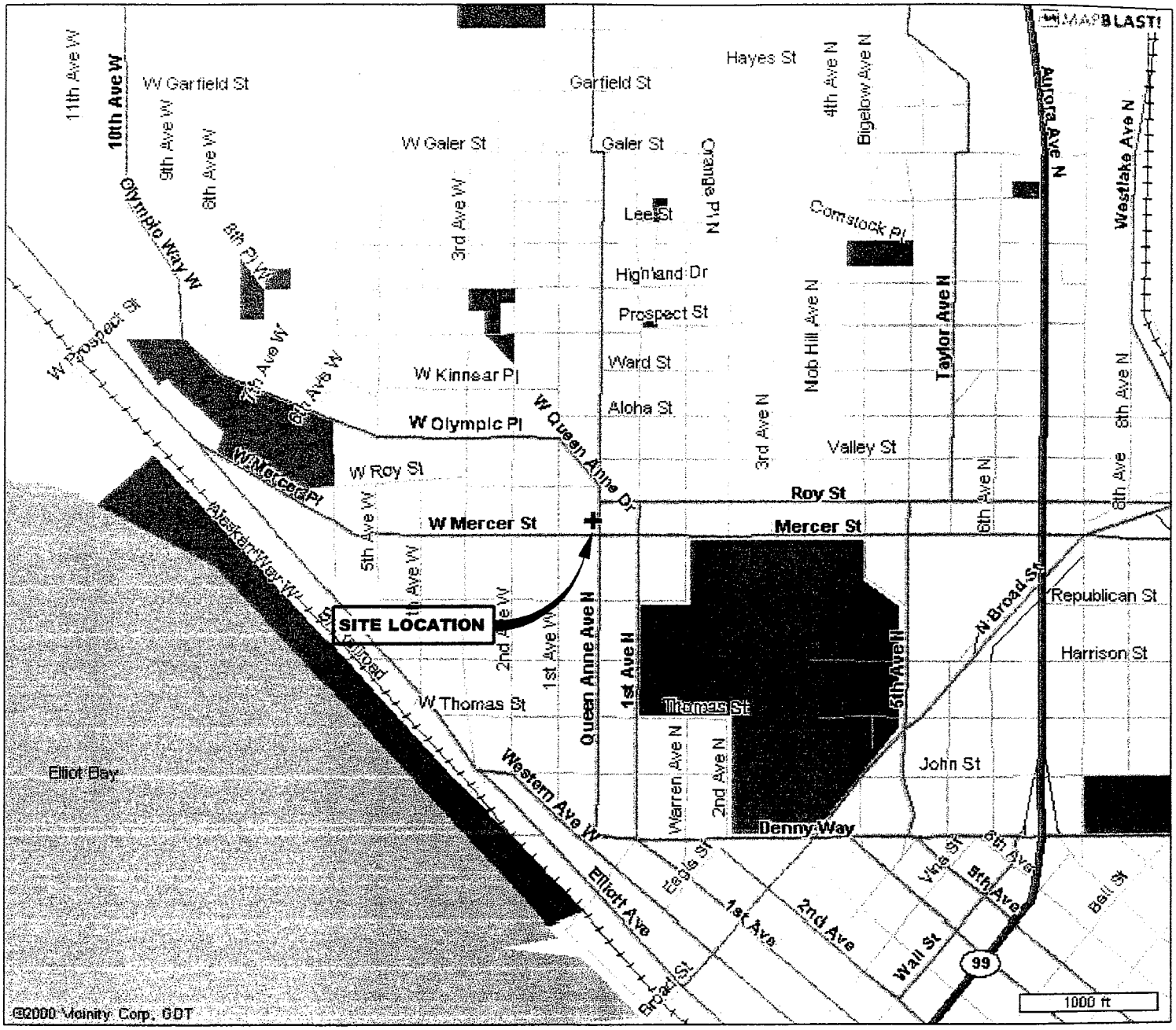
11.0 TRAINING AND MEDICAL SURVEILLANCE

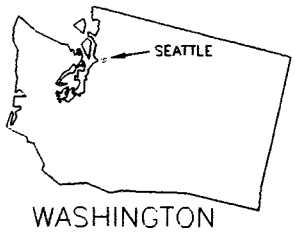
All on-site personnel will have completed 40-hour, Refresher, and Supervisor training, as appropriate, and as required by 8 CCR 5192. Additional training includes but is not limited to Hazard Communication (8 CCR 5194), Respiratory Protection (8 CCR 5144), Illness and Injury Prevention (8 CCR Sections 1509 and 3203), emergency procedures and first aid/CPR. Site-specific training will include a review of this plan and any additional information, which becomes available to the site personnel throughout the duration of the project.

Medical monitoring for Farallon Consulting includes pre-employment and annual medical examinations in compliance with 8 CCR 5144 and 8 CCR 5192. Any person injured onsite or who suffers symptoms consistent with overexposure to site materials and/or heat stress will be provided immediate medical attention.

FIGURE 1

SITE LOCATION MAP





FARALLON CONSULTING
320 3rd Ave. NE, Suite 200
Issaquah, WA 98027

FIGURE 1

SITE VICINITY MAP

QUEEN ANNE TEXACO
631 QUEEN ANNE AVE. NORTH
SEATTLE, WA.

FARALLON PN: 619-010

Drawn By: QDD	Checked By: CS	Date: 6/26/00	Disk Reference: 619-001

FIGURE 2

SITE LAYOUT MAP

ACT THEATER

OFFICES/COMMERCIAL RETAIL

WEST ROY STREET

ACT PARKING LOT

QUEEN ANNE ARMS

BANK OF AMERICA PARKING LOT

BANK OF AMERICA

1ST AVENUE WEST

DEL ROY APARTMENTS

(Sewer, Sump, Footing Drains)
MONTEREY APARTMENTS

ALVENA VISTA APARTMENTS

18 MERCER STREET BUILDING

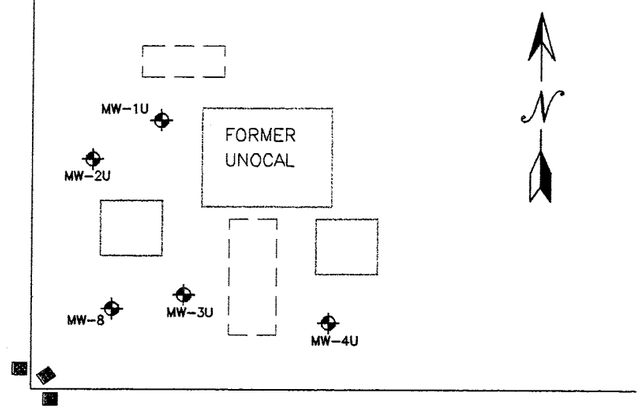
(Sewer)
MANHATTAN EXPRESS

REMEDIATION SYSTEM

LINDBERG APARTMENTS

QUEEN ANNE AVENUE NORTH

VP-9 MW-9 MW-10 RW-4 MW-6 RW-3 MW-4 VP-1 VP-2 RW-5 RW-2 VP-7 VP-6 VP-4 VP-3 VP-8 VP-5 MW-11



WEST ROY STREET

LEGEND

- APPROXIMATE SITE BOUNDARY
- FORMER UNDERGROUND STORAGE TANK LOCATION
- FORMER STRUCTURE
- MW-1 MONITORING WELL LOCATION
- VP-7 VAPOR WELL LOCATION
- RW-1 RECOVERY WELL LOCATION
- STREET CENTER LINE
- + PROPOSED WELL LOCATIONS
- CATCH BASINS TO BE INVESTIGATED
- STAIRWELL SUMP TO BE INVESTIGATED
- (Sewer) PROPOSED UTILITIES TO BE INVESTIGATED

0 50 100
APPROXIMATE SCALE IN FEET

BASE MAP REFERENCE: City of Seattle Department of Engineering
SE 1/4 & NE 1/4 Section 25–TS. 25 N., R 3 I., W.M.
Revised 9/90

FARALLON CONSULTING
320 3rd Avenue NE, Suite 200
Issaquah, WA 98027

FIGURE 2

SITE MAP SHOWING PROPOSED WELL LOCATIONS AND UTILITIES TO BE EXPLORED
QUEEN ANNE TEXACO
631 QUEEN ANNE AVE. NORTH
SEATTLE, WASHINGTON

FARALLON PN: 619–010

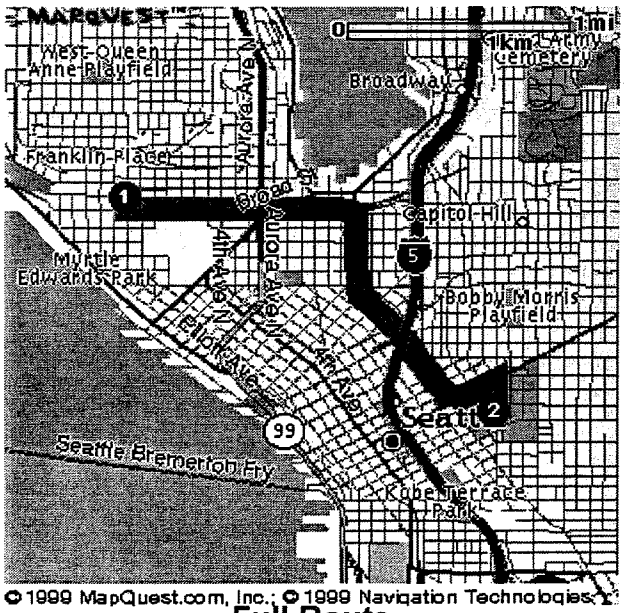
Drawn By: QDD	Checked By: PJ	Date: 12/26/00	Disk Reference: 61901001

FIGURE 3

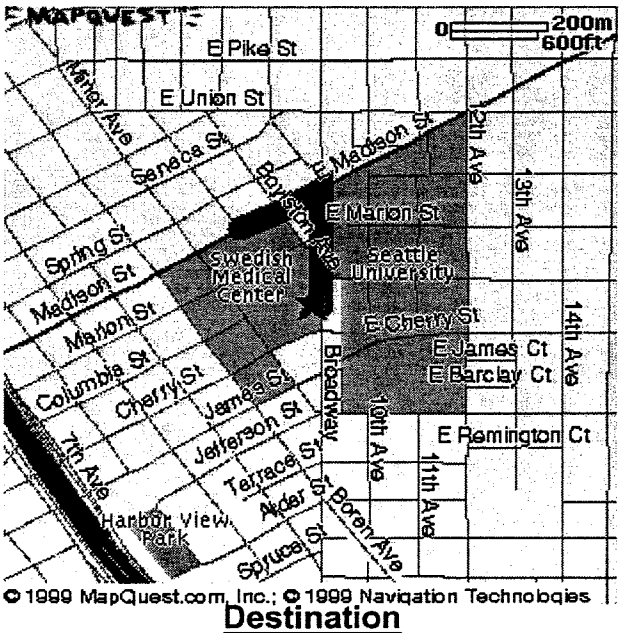
HOSPITAL LOCATION MAP

Starting From:	Arriving At:	Distance:	Approximate Travel Time:	
	Swedish Medical Center			
Queen Anne Avenue North and West Roy Street Seattle, WA	747 Boradway Seattle, WA 98122-4379	2.7 miles	10 mins	Reverse Driving Directions

	Directions	Miles
1.	Start out going SOUTH on QUEEN ANNE AVE N towards W MERCER ST.	0.1
2.	Turn LEFT onto MERCER ST.	1.0
3.	Turn RIGHT onto FAIRVIEW AVE N.	0.4
4.	Turn SLIGHT LEFT onto BOREN AVE.	0.7
5.	Turn LEFT onto MADISON ST.	0.2
6.	Turn RIGHT onto BROADWAY.	0.2



Full Route



Destination