GEOMATRIX

WORK PLAN FOR SITE INVESTIGATION
A Avenue Landfill

Anacortes, Washington

Prepared for:

City of Anacortes
Engineering and Development Services
P.O. Box 547
Anacortes, WA 98221

November 6, 2003

Project No. 9156.0

Geomatrix Consultants

GEOMATRIX

WORK PLAN FOR SITE INVESTIGATION
A Avenue Landfill

Anacortes, Washington

Prepared for:

City of Anacortes
Engineering and Development Services
P.O. Box 547
Anacortes, WA 98221

Prepared by:

Geomatrix Consultants, Inc.
600 University Street, Suite 1020
Seattle, Washington 98101
(206) 342-1760

November 6, 2003

Project No. 9156.0

GEOMATRIX

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

GEOMATRIX

WORK PLAN FOR SITE INVESTIGATION

A Avenue Landfill
Anacortes, Washington

1.0 INTRODUCTION

This Work Plan was prepared by Geomatrix Consultants, Inc. (Geomatrix), on behalf of the City of Anacortes, Washington (the City). This Work Plan describes Site Investigation activities at the A Avenue Landfill site in Anacortes, Washington in accordance with the requirements set forth in the Scope of Work and Consultant Agreement dated June 10, 2003 between the City and Geomatrix Consultants. The sampling activities described in the original scope of work were delayed due to dry weather conditions that resulted in a lack of seep water to sample until the wet season (November/December) starts. Geomatrix has prepared this Work Plan for evaluating potential site impacts from past municipal solid waste disposal at the facility. Findings will be reported to the Skagit County Health Department.

1.1 SITE DESCRIPTION

The A Avenue Landfill site (the Site) is situated in an area termed the Cranberry Lake Area, an area of wetlands, ponds, and hiking/biking trails that are part of the Anacortes Community Forest Lands (ACFL). The ACFL areas are owned by the City and managed by the Anacortes Parks and Recreation Department, with a five member advisory board that oversees the implementation of the Anacortes Community Forest Management Plan.

The Site is located about 700 feet west of the intersection at A Avenue and 37th Street in Anacortes, Washington. It is situated in the NE ¼ of the SE ¼ of Section 26 in T. 35 N., R. 1 E. (Figure 1), approximately 1.5 miles southwest of downtown Anacortes. According to the ACFL trail map, the Site is at an elevation approximately 300 feet above mean sea level. Drainage in the immediate area of the Site is to the northwest toward Big Beaver Pond and the northeast toward the 32nd Street Swamp.

1.2 GEOLOGY/ HYDROGEOLOGY

Geomatrix collected and reviewed published reports on the geology/hydrogeology of the Site available from public sources. Geomatrix also conducted a records search at the Washington Department of Ecology, Northwest Region, to obtain water well records for wells within a one

mile radius of the Site. During a site visit to observe the local lithology, an outcrop below the landfill revealed a slightly weathered and fractured, fine-grained volcanic rock that appears to consist of greenish-gray andesite.

Anacortes is situated on Fidalgo Island, which is in the flatlands of the Puget Sound lowland. This area was once deeply buried beneath a massive glacier that moved south from Canada. Glacial deposits cover areas of low topography and bedrock is exposed in some of the hills in the area, including the slight hill where the Site is located.

The bedrock on Fidalgo Island is part of the Decatur terrain, a mélange-type assemblage of oceanic trench rocks, comprising thick sections of sandstones and pebble conglomerates mixed with slabs of oceanic crust. The terrain formed during late Jurassic and early Cretaceous time. Thrust faults related to the Shuksan thrust fault, which follows the eastern margin of the Puget Sound lowland, extend through the general vicinity of Fidalgo Island, trending northwest/southeast and dipping to the northeast (Alt and Hyndman, 1984).

Well log records within a 0.5 mile radius of the Site show brownish-gray sandy clay and gravel to about 50 feet below ground surface (bgs), underlain by blue clay with intermittent fine sands from 50 to 120 bgs, and do not mention bedrock. However, bedrock was encountered in well logs approximately ¼ mile to the southwest of the Site at 3 feet bgs ("bedrock (green) very few fractures"), ½ mile to the southeast of the Site at approximately 92 feet bgs ("gray to black bedrock"), and approximately ¼ mile to the north of the Site at 65 feet bgs ("black shale rock").

1.3 HISTORY OF LANDFILL OPERATIONS

During the 1960s and early 1970s the City disposed of municipal solid waste at the Site. At that time the facility was operated as an open-burning dump. In approximately 1973, the City ceased using the facility for the disposal of municipal solid waste and the dump/landfill was closed. Closure operations consisted of regrading of waste materials and covering waste with a soil cover. This closure was typical for closing municipal dumps at the time and met regulatory requirements in place before 1985.

Since 1973, the City has used the facility for storage of public works materials and has continued to place additional soil cover materials on the waste. These cover materials have included street sweepings, vactor materials, and sludge; and on the eastern side, broken asphalt,

concrete and wood waste were also added. According to City staff, cover materials are expected to average five or six feet in thickness at the present time. The closed landfill has a circular shape, extends approximately 25 to 30 feet above the surrounding grade, and covers six or seven acres.

1.4 PURPOSE AND OBJECTIVES

Ms. Britt Pfaff-Dunton from the Skagit County Health Department has expressed two primary concerns about this Site. One concern is a potential safety issue. The Site is within a heavily-used public access area. As such, physical hazards within the refuse pile, such as broken glass and metal debris, can pose a potential public risk. The other expressed concern is the water that infiltrates into the refuse, potentially picking up leachable chemicals, and possibly affecting groundwater quality. Some of the groundwater exits the landfill by way of seeps at the edges, particularly on the north side. Some of the groundwater may flow beyond the Site boundaries. Because the quality of the groundwater is unknown at this time, the Skagit County Health Department requested characterization of the constituents in the water. Concurrently, the City plans to open a new public works facility at a yet-to-be-determined location and wants to evaluate possible closure options for the Site. This Work Plan addresses the Skagit County Health Department's concerns, as well as provides the City a preliminary evaluation of the closure options for the landfill site.

2.0 SCOPE OF WORK

To address the City's objectives for closure evaluation of the Site, Geomatrix has developed a detailed scope of work involving two tasks. Task 1 provides an evaluation of soil, surface water, and groundwater conditions beneath and at the edges of the landfill. Task 2 is contingent upon the results of Task 1. Should soil, surface water, or ground water contamination be discovered that requires remediation, Task 2 will provide an analysis of remedial options and associated costs for mitigating any problems.

2.1 TASK 1 – SOIL, SURFACE WATER, AND GROUNDWATER TESTING

Task 1 of this Work Plan will include sampling and testing up to five soil samples of the landfill cover soil materials, two or three surface water samples from either standing water or the small drainage basin flowing north from the Site, and one or two groundwater samples from private water wells that may exist near the Site. Sampling locations will be marked in the field

with survey stakes and flagging for later surveying by city personnel, if needed. Table 1 lists the proposed soil and seep samples, and chemical analyses. Soil and seep sampling locations are shown on Figure 2. In addition to the sampling, we will photograph accessible portions of the landfill to plot and describe areas of potential physical hazards.

Soil samples will be submitted to a Washington state certified analytical laboratory and tested for priority pollutant metals (aluminum, antimony, arsenic, beryllium, cadmium, chromium, copper, mercury, nickel, selenium, silver, thallium, and zinc), semi-volatile organic compounds (SVOCs), and total petroleum hydrocarbons (TPH). Surface water and groundwater samples will be submitted and tested for priority pollutant metals, volatile organic compounds (VOCs), and the groundwater quality and leachate identification parameters specified in WAC 173-350-500. Sampling protocol and details about the analytical methods are provided in the Sampling and Analysis Plan (SAP) in Appendix A. Samples will be collected as described in the SAP and submitted to North Creek Analytical laboratory in Bothell, Washington, for analysis. The Quality Assurance Program Plan (QAPP) is presented in Appendix B and describes the requirements for quality assurance/quality control samples.

A summary report will be prepared following receipt of sample results from the laboratory. The report will provide a comparison of testing results to State of Washington Department of Ecology (Ecology) Model Toxics Control Act (MTCA) standards, Washington State Water Quality Standards from WAC 173-200 and WAC 173-201, and published background concentration levels for Washington. The report will include a discussion of sampling techniques, sampling results, possible limitations to the use of the Site due to soil or water contamination, and recommendations for additional work (if needed). A draft report will be prepared for City review prior to a final report for submittal to the Skagit County Health Department.

2.2 TASK 2 – LONG-TERM MONITORING AND REMEDIATION

Should sampling conducted under Task 1 above identify contaminants in soil, seep water, or groundwater that exceed State of Washington prescribed limits, additional monitoring or controls will be discussed with the Skagit County Health Department.

Development of a detailed scope and budget for Task 2 would follow completion of Task 1 if conditions dictate that additional work is necessary.

3.0 PROJECT SCHEDULE

The project schedule has been developed based on discussions with the City and the Skagit County Health Department. Task 1 soil and surface water sampling is expected to require two days to complete. The initial field sampling will be completed in November 2003 when enough rainfall has occurred to initiate seep drainage from the landfill. Sampling of nearby drinking water wells will occur when access to the properties are obtained. Within three weeks after receiving the final laboratory data, a draft report of the results will be prepared and submitted to the City for review. After incorporation of the City's comments, a final report will be submitted to the Skagit County Health Department. Based upon the results of Task 1, the City and Geomatrix will discuss potential follow-on actions with Skagit County Health Department, as necessary.

4.0 REFERENCES

Alt, David D. and Donald W. Hyndman, 1984, Roadside Geology of Washington, 288 p.

TABLE 1

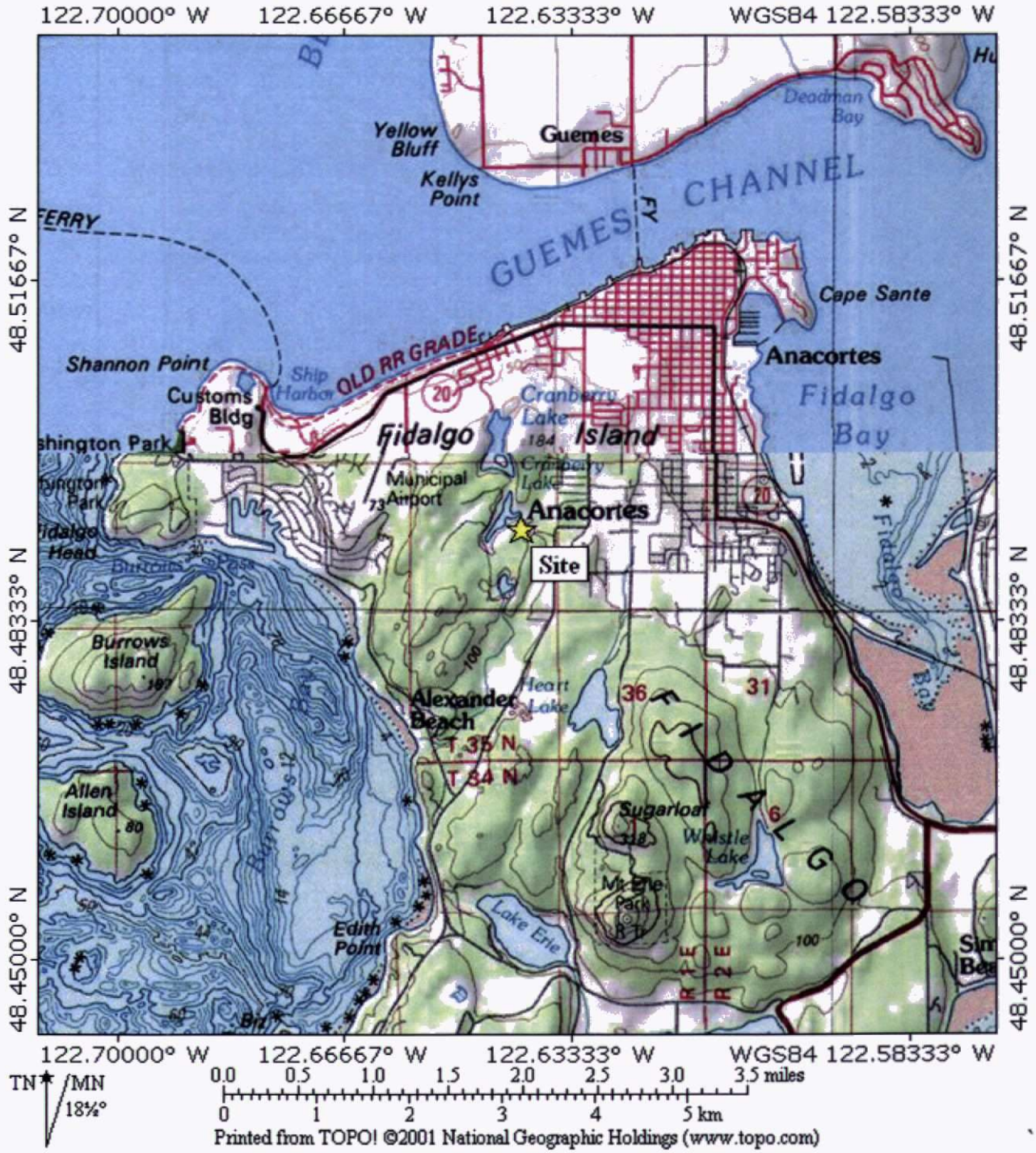
PROPOSED SOIL AND WATER SAMPLES AND CHEMICAL ANALYSES
A AVENUE LANDFILL
ANACORTES, WASHINGTON

Area	Number of Samples	Type of Sample [1]	Depth of Soil Samples (inches)	Chemical Analyses	Field Parameters
Landfill		Soil	6-24" (5 samples)	NWTPH-Dx, Semivolatile organic compounds Priority Pollutant Metals[1],	
Seeps	2 or 3 depending on recoverable water volumes	Water		Priority Pollutant Metals; Volatile Organic Compounds; groundwater/ leachate parameters	pH, Specific conductance, temperature
Drinking Water Well	1 or 2 depending on site access	Water		Priority Pollutant Metals; Volatile Organic Compounds; groundwater/leachate parameters[2]	pH, Specific conductance, temperature
Total		5 Soil 4 Water	6-24"(5 samples)	NWTPH-Dx: 5 PP Metals: 9 SVOCs: 5 (soil) VOCs: 4 (water) GW qual/leachate: 4	

Notes:

1. Priority Pollutant Metals analysis includes: aluminum, antimony, arsenic, beryllium, cadmium, chromium, copper, mercury, nickel, selenium, silver, thallium, and zinc.
2. Groundwater quality/leachate parameters (per 173-350-500) include: Alkalinity, bicarbonate, calcium, iron, magnesium, manganese, nitrate, chloride, sodium, sulfate, ammonia, total organic carbon, and total dissolved solids.

Non-GDS



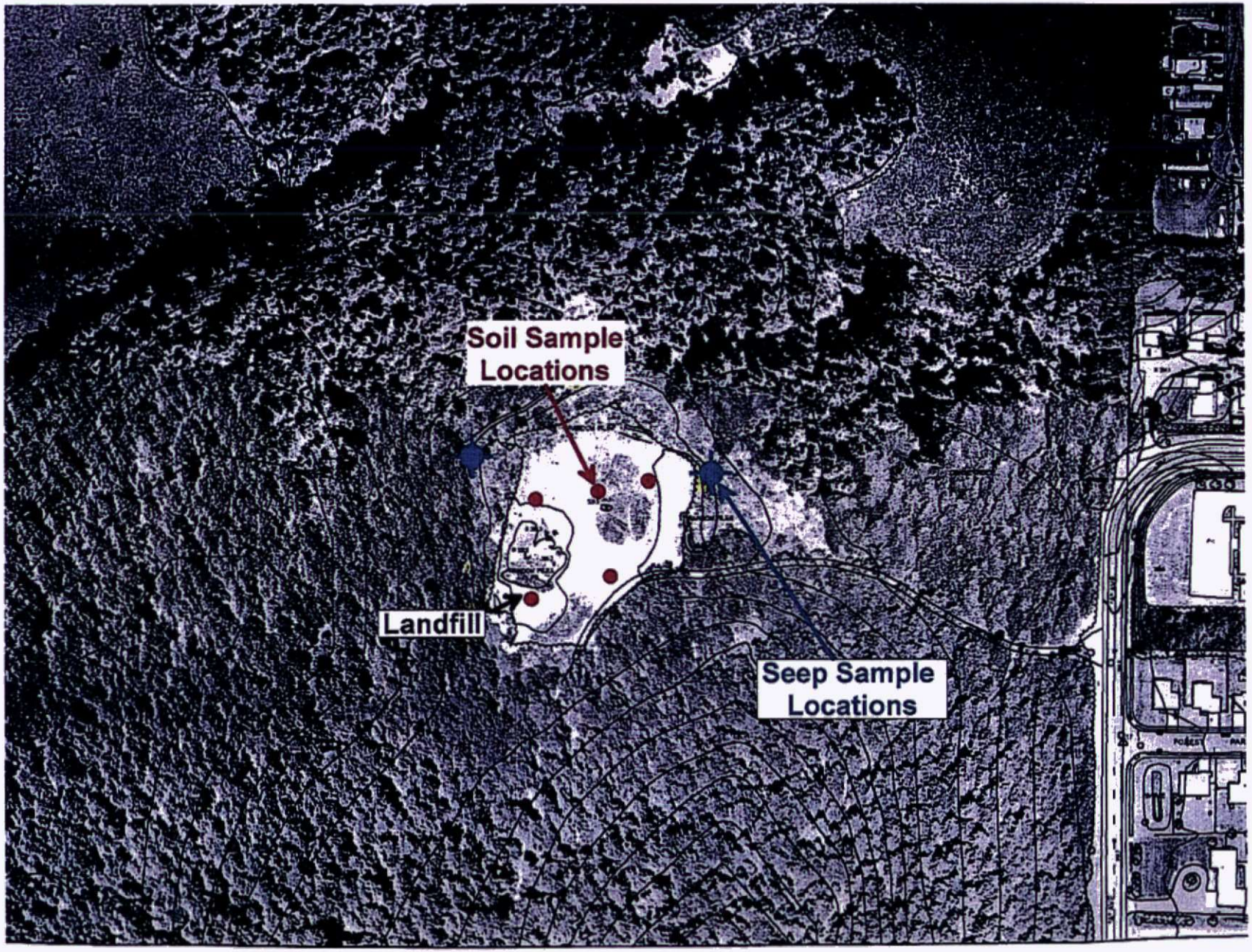
GEOMATRIX

SITE VICINITY MAP
City of Anacortes
A Avenue Landfill

Project No.
009156

Figure
1

[i:\Project\City of Anacortes\A Avenue Landfill\Work plan\Figure 1]



GEOMATRIX

MAP OF SAMPLING LOCATIONS
"A" Avenue Landfill Project
Anacortes, Washington

Project No.
009156.000

Figure
2

APPENDIX A

GEOMATRIX

Appendix A

Sampling and Analysis Plan (SAP)

GEOMATRIX

APPENDIX A

TABLE OF CONTENTS

Page

GEOMATRIX

APPENDIX A

SAMPLING AND ANALYSIS PLAN
A Avenue Landfill
Anacortes, Washington

1.0 PURPOSE

This Sampling and Analysis Plan (SAP) describes the sampling and analytical methodology that will be used during the closure evaluation at the A Avenue Landfill site in Anacortes, Washington (the Site). This evaluation is in accordance with the requirements set forth in Agreement dated May 28, 2003 between the City of Anacortes (the City) and Geomatrix Consultants, Inc. (Geomatrix). It addresses the Skagit County Health Department's concerns, as well as providing the City a preliminary evaluation of the closure options for the landfill site.

The sample collection during the evaluation will consist of: (1) soil sampling from five shallow soil borings in landfill cover materials, (2) two to three surface water samples from either standing water or the small drainage basin flowing north from the Site, and (3) one to two groundwater samples from private water wells that may exist near the Site.

2.0 FIELD METHODS

This section describes how field activities for this project will be conducted.

2.1 PREPARATIONS FOR FIELD WORK

The activities described in this section will be completed prior to any field work at the Site.

2.1.1 Preliminary Reconnaissance of Proposed Boring Locations

A preliminary reconnaissance will be conducted of all proposed boring locations. The purposes of this reconnaissance are to:

- Verify that the proposed boring locations can be safely accessed with the necessary equipment. Any spatial constraints due to buildings or overhead obstructions will be noted.

- Document potential problems associated with each location for boring or sampling.
- Document potential alternative locations.

2.1.2 Final Site Preparations

After the locations of borings have been finalized, Geomatrix will begin final site preparations. These include the following:

- If necessary, place traffic cones or barricades.
- Clear brush and debris from the location.
- Mark the final boring locations on the ground.
- Remove all equipment and materials stored in the immediate vicinity of each boring location.
- Set up a decontamination area.
- Set up receptacles for temporary (daily) storage of investigation-derived wastes (IDW).
- Set up an area to perform lithologic logging, field screening, and sample labeling.

2.2 SOIL SAMPLE COLLECTION

Up to five soil samples will be collected as listed in Table 1 and also shown on Figure 2 of the Work Plan. Soil samples will be collected by Geomatrix using a hand auger with a 6.5-inch long, 3.25-inch diameter bucket. The hand auger will be advanced to a depth of approximately 2.5 feet for each boring. Samples will be collected directly from the hand auger bucket using a stainless steel spoon to pack the sample containers. The hand auger bucket and spoon will be decontaminated prior to each sample collected using Alconox or a non-phosphate detergent wash, followed by a rinse of deionized or distilled water. Each sample location will be marked in the field with survey stakes and flagging for later surveying by City personnel, if needed.

The soil samples collected will be analyzed for total petroleum hydrocarbons (TPH) using method NWTPH-Dx with silica gel and acid wash cleanup. Soil samples will also be analyzed

for Priority Pollutant metals (aluminum, antimony, arsenic, beryllium, cadmium, chromium, copper, mercury, nickel, selenium, silver, thallium, and zinc) (EPA Method 6010B/6020/7000A), and analyzed for semi-volatile organic compounds (SVOCs) (EPA Method 8270B). The Quality Assurance Project Plan (QAPP) is presented in Appendix B and describes the requirements for quality assurance/quality control samples and sample preservation.

After sampling, the borings will be backfilled with soil cuttings.

2.3 SURFACE WATER SAMPLE COLLECTION

Two to three surface water seep samples will be collected and analyzed as listed in Table B1 (Appendix B) and shown on Figure 2 of the Work Plan. Surface water samples will be collected by Geomatrix by directly submerging the sample container in the surface water or by submerging a decontaminated glass container in the surface water and then pouring the collected sample directly into the sample container if the sample container contains preservative. Any container used in the sample collection will be decontaminated prior to each sample collected using Alconox or a non-phosphate detergent wash, followed by a rinse of deionized or distilled water. Each sample location will be marked in the field with survey stakes and flagging for later surveying by City personnel, if needed.

The surface water samples collected will be analyzed for volatile organic compounds (VOCs), dissolved priority pollutant metals, and parameters specified in WAC 173-350-500 and listed in Table B1 (Appendix B). The QAPP, as presented in Appendix B, describes the requirements for quality assurance/quality control samples and sample preservation. As specified in WAC 173-350-500, field parameters to be tested include pH, specific conductance, temperature, and static water level.

2.4 GROUNDWATER SAMPLE COLLECTION

One or two private water wells near the Site will be sampled and the samples will be analyzed for volatile organic compounds (VOCs) and the groundwater and leachate identification parameters specified in WAC 173-350-500 and listed in Table B1 (Appendix B). As specified in WAC 173-350-500, field parameters to be tested include pH, specific conductance, temperature, and static water level.

APPENDIX A

Laboratory analytical services for all soil, seep and groundwater samples will be provided by North Creek Analytical laboratory, of Bothell, Washington, a state-certified laboratory.

2.4.1 Water Level Measurements

Depth-to-water measurements will be made using an electronic water-level meter if the groundwater well(s) can be accessed. The meter consists of a permanently marked coaxial cable or plastic-coated flat wire with 0.01-foot calibrations, a detection probe, and electronic controls contained in a spool or reel. The water-level meter/sounder registers a response when the probe attached to the cable contacts an electrically conductive medium such as water, thereby completing the electrical circuit. The response is visible (e.g. red light), audible (e.g. alarm), or a combination of the two. Measurements will be collected from the north side of the well casing. The probe will be decontaminated between wells using the same decontamination methods used for surface water sampling equipment.

If submersible pumps in the well(s) are not obstructing access, water levels will be measured prior to and during purging. Wells will be purged at a low rate (approximately 200-500 ml/minute) and groundwater quality parameters will be monitored (temperature, pH, specific conductivity, and dissolved oxygen) every 3 to 5 minutes for stabilization prior to sample collection. Stabilization will be reached when all parameters have been within +/- 10% of each other for 3 consecutive readings. Once stabilization has been achieved, the groundwater samples will be collected directly from the sample discharge tube connected to the pump.

2.4.2 Groundwater Well Sampling

Groundwater well samples will be collected either from the homeowner(s)' faucets or from the well casing. It is preferable to collect the samples directly from the well casing to eliminate any incorporation of lead and other heavy metals that may be entrained as water flows through the plumbing system. Low-flow sampling technique will be used to extract any samples direct from the well casing. This procedure will enable the samples to be more representative of actual site conditions and to reduce the possibility of stripping volatile organic compounds from groundwater or mobilizing colloids that are immobile during normal groundwater flow conditions.

The following equipment is necessary to sample the private water wells:

- Well access equipment (key, socket set, etc).
- A calibrated flow-through water quality meter and calibration solutions to measure temperature, pH, specific conductivity, and dissolved oxygen.
- Decontamination equipment including Alconox or non-phosphate detergent and distilled or deionized water.

All reusable equipment that will contact the well or water samples will be decontaminated prior to its use by washing with Alconox or a non-phosphate detergent and rinsing with distilled or deionized water.

Groundwater samples will be analyzed for VOCs and the groundwater and leachate identification parameters specified in WAC 173-350-500 and listed in Table B1 (Appendix B). The QAPP, as presented in Appendix B, describes the requirements for quality assurance/quality control samples and sample preservation. As specified in WAC 173-350-500, field parameters to be tested include pH, specific conductance, temperature, and static water level.

2.5 SAMPLE LABELING AND CHAIN-OF-CUSTODY

A sample label will be affixed to each sample container. Each label includes the following information:

- Sample number
- Sampling event location
- Date and time of sample collecting
- Preservatives added to the sample
- Parameter(s) for which the sample is to be analyzed

After sampling is completed for the day, all samples will be packed for shipping and placed in iced transport containers. The transport containers consist of sturdy, insulated, commercially produced coolers. All bottle caps will be secured tightly. All glass containers will be placed secured into position within the shipping container to avoid breaking. The chain-of-custody

(COC) form should be taped to the inside lid of the cooler or shipping container in most circumstances.

During sample collection or at the end of each day and prior to shipping or storage, COC forms will be completed for all samples by Geomatrix. The COC form should include information such as sample names, sample times, the sample date, the type of media, and the analyses requested. Any necessary changes to COC forms, sample container labels, or the field logbook will be made by striking out the error with one line, initialing and dating the error, and reentering the correct information. Samples with extra volume for laboratory quality control procedures (MS/MSD and laboratory duplicates) will be designated as such on the COC form. The field team will ensure that analyte method numbers and analyte lists required for the project are listed on the COC form, attached to the COC form, or referred to on the COC form. Every person who takes possession of the samples while transporting the samples from the field to the laboratory must sign the COC form.

Geomatrix personnel will either transport the samples to the laboratory or have a lab courier come to the Site at the end of the sampling day to pick up samples for delivery to the lab. Upon receipt of the sample transport containers by the analytical laboratory, laboratory personnel will open the containers and examine the contents for problems such as damaged transport containers, missing or broken sample bottles, chain-of-custody discrepancies, and documentation errors. Problems will be reported to Geomatrix. After the samples are analyzed by the analytical laboratory, laboratory personnel will store the samples in a secure location at the laboratory for the remainder of their holding times.

2.6 INVESTIGATION-DERIVED WASTE

The sampling methods described in this SAP will generate investigation-derived waste (IDW) that may include decontamination and purge water, and disposable gloves. Based on the Site history and results of previous investigations, potential contaminants in IDW may include petroleum hydrocarbons, metals, SVOCs, and VOCs. Decontamination water and purge water generated during the soil, seep, and groundwater sampling will be disposed of in the sanitary sewer. Disposable gloves will be rinsed in the decontamination water and disposed in a garbage bin that will be sent to a controlled landfill. No soil IDW will be generated during the soil sampling because soil cuttings will be used to backfill the shallow borings.

APPENDIX B

GEOMATRIX

Appendix B

Quality Assurance Project Plan (QAPP)

GEOMATRIX

APPENDIX B

TABLE OF CONTENTS

TABLES

GEOMATRIX

APPENDIX B

QUALITY ASSURANCE PROJECT PLAN

A Avenue Landfill
Anacortes, Washington

This Quality Assurance Project Plan (QAPP) is designed to assist in gathering the most reliable and useful data possible and documenting the process of that collection during the closure evaluation at the A Avenue Landfill in Anacortes, Washington (the Site).

1.0 ORGANIZATION AND SCHEDULE

The schedule for this project is discussed in Section 3.0 of the Work Plan. Geomatrix will conduct all field sampling activities, quality assurance checks, and reporting. North Creek Analytical laboratory, in Bothell, Washington, will perform all sample analyses. City of Anacortes personnel will survey sample locations if needed.

2.0 DATA QUALITY OBJECTIVES

The sampling design, field procedures, laboratory procedures, and quality control procedures are set up to provide high-quality data for use in this project. Specific data quality factors that may affect data usability include precision, bias, accuracy, representativeness, comparability, completeness, and reporting limits.

2.1 PRECISION

Precision is the agreement among a set of replicate measurements without assumption of knowledge of the true value. Precision is optimized for this project by collecting field quality control samples as described in Section 5 (Quality Control), collecting samples at multiple locations, and adhering to strict procedural guidelines that minimize possible sample contamination.

2.2 BIAS

Bias is the systematic deviation of a measured value from the true value, often due to matrix effects. Bias can be assessed by comparing a measured value to an accepted reference value in

a sample of known concentration or by determining the recovery of a known amount of contaminant spiked into a sample. Bias is minimized for this project by standardizing sampling methodologies including equipment calibration and decontamination, sample collection methods, sample transport, and chain of custody control. Descriptions of the methodologies are described in Appendix A, the Sampling and Analysis Plan (SAP).

2.3 ACCURACY

Accuracy is the closeness of agreement between an observed value and an accepted reference value. When applied to a set of observed values, accuracy will be a combination of a random component and of a common systematic error (or bias) component. Accuracy is optimized for this project by using procedures designed to reduce potential error that might impact accuracy of results. Proper decontamination methods and equipment are used during sampling to ensure accurate results. The laboratory quality control, as described in Section 5, also reduces error in order to produce accurate results.

2.4 REPRESENTATIVENESS

Representativeness is the measure of how well data reflects the actual environment and conditions from which the data are collected. Representativeness is optimized for this project by collecting samples when seasonal effects are most prominent, maximizing seep drainage from the landfill for sample collection and by collecting samples from wells that have been properly designed and installed. The methodologies used to collect samples, as detailed in the SAP, are also designed to collect representative samples without disturbing the environment from which they are collected.

2.5 COMPARABILITY

Comparability is how well multiple data sets can be used for a common interpretation. Comparability will be optimized for this project by collecting samples using the same methods, analytical procedures, and quality assurance procedures at all locations during each sample collection event, and if the units of measurement are the same.

2.6 COMPLETENESS

Completeness is a measure of the amount of data collected that are found to be valid in relation to the total amount of data intended to be collected according to the sampling design.

Completeness will be optimized for this project by evaluating all results in correlation with the quality assurance data collected and any lab qualifications that are made. Sampling has been planned in the wet season to attempt to gather the most complete data set (groundwater, soil, and seep samples) within as short an amount of time as is feasible.

2.7 REPORTING LIMITS

The laboratory data's associated reporting limits must be low enough to compare to potential cleanup levels for the Site. Table B1 lists the potential screening levels for each compound on the SAP analyte lists, along with the analytical method that will be used to meet these reporting limit goals. The lowest possible detection limits will be reported, however some potential cleanup levels may be below the detection limits the laboratory is capable of attaining, particularly if there is matrix interference in a sample.

3.0 FIELD PROCEDURES

All field procedures as described in the SAP will be followed. All sampling personnel will have completed 40-hour HazWoper training as required in the Health and Safety Plan (Appendix C). All instruments used in the collection of samples will be properly calibrated according to the manufacturer's recommendations and decontaminated between samples if the instrument is reusable and comes in contact with samples.

4.0 LABORATORY PROCEDURES

The analytical methods that will be used by the laboratory are listed in Table B1. Sample collection details including applicable preservatives for different analyses are also listed in Table B1. The current lab Quality Assurance Manual for the laboratory is available from North Creek Analytical laboratory.

5.0 QUALITY CONTROL

5.1 LAB QUALITY CONTROL

The laboratory uses the following QC procedures to verify the validity of data being produced:

- Holding Times
- Instrument Tuning

- Initial Calibrations and Continuing Calibration Verification
- Method Blanks
- Surrogate Spike Compounds
- Matrix Spike Samples and Matrix Spike Duplicates ("MS/MSD")
- Laboratory Control Samples ("LS")
- Laboratory Duplicates ("LD")
- Internal Standards

5.2 FIELD QUALITY CONTROL

QC samples are collected as part of sampling to ensure the data gathered is representative of actual field conditions and potential field contamination or sampling method bias present in sample results. Table B1 list the QC samples, along with the regular samples, and the analytical parameters that are collected for this project. A description of each type of QC sample is described below.

5.2.1 Field Duplicates

Field duplicates will be collected at a rate of one per 10 samples collected, and used to assess the homogeneity of the samples collected in the field and the precision of the sampling method. Because it is so difficult to homogenize soil samples and there is a risk of volatilization of organic compounds, one seep water sample will be duplicated and analyzed for VOCs. Duplicates are collected by collecting two sets of samples from the same location at the same sampling time, and labeling them with two distinct sample identifications for analysis by the laboratory.

5.2.2 MS/MSD

Extra sample volume must be collected to enable the lab to run this lab QC procedure. MS/MSD sample volume is collected at a rate of one per 20 samples collected and is noted on the chain of custody ("COC") form. The MS/MSD results are used to measure accuracy and precision of analytical measurements, depending on the sample matrix.

APPENDIX B

6.0 DATA MANAGEMENT PROCEDURES

The laboratory will complete all analyses as described in the SAP and present the following, at a minimum, in a report to Geomatrix within approximately 30 days of the last day of a sampling event.

- Case Narrative: The case narrative should describe the analytical methods used and discuss any irregularities encountered during sample analyses and any resulting data qualification.
- Analyte Concentrations: A summary of analyte results should be presented for each sample.
- Method Reporting Limits: Method reporting limits achieved by the laboratory should be presented with the analyte concentrations.
- Laboratory data qualifier codes and a summary of code definition: Data qualifiers should appear next to analyte concentrations and associated definitions should be summarized in the report.
- Lab QC Results: Results for method and calibration blanks, MS/MSD, LS/LD, and surrogate recoveries should be provided with final results.

The laboratory requirements for the QC parameters described above are available in the Quality Assurance Manual of the North Creek Analytical laboratory.

7.0 DATA REVIEW, VERIFICATION, AND VALIDATION

Review and verification of all field forms and analytical data will be completed by Geomatrix for each event, along with an abbreviated data validation of each event's analytical data.

7.1 FIELD PROCEDURES

Field forms and COCs will be reviewed by Geomatrix after each sampling event. The field forms will be checked to determine if the field team followed all aspects of the SAP and QAPP methodologies and any deviations from the specified procedures will be noted and corrective measures will be implemented as necessary. Specifically, the forms will be reviewed for the following:

- Correct documentation of sample location.

- Complete and accurate procedures for sample collection and proper documentation.
- Proper COC methodology followed including sample shipment and preservation during transport.
- Evaluation of field QC results. Field QC sample contamination could result in data qualification.

7.2 ANALYTICAL DATA

The laboratory will complete a data review and verification prior to producing results for Geomatrix. This verification will include checking that QC procedures were included at the required frequencies and that the QC results meet control limits as defined in the laboratory's Quality Assurance Manual. Any quality assurance issues found by the lab will be described in the case narrative and may result in qualification of some of the results by the laboratory.

8.0 DATA QUALITY ASSESSMENT

The objectives of this SAP and associated QAPP will be reviewed on an ongoing basis as data are received and used for reporting and other interpretive uses. Data that does not meet the data quality requirements as described in the SAP and QAPP will be qualified or rejected during data validation. Rejected data will not be used for any purpose.

APPENDIX B

TABLE B1

SAMPLE AND QUALITY CONTROL REQUIREMENTS FOR SOIL, SURFACE WATER AND GROUNDWATER SAMPLES

A Avenue Landfill Site, Anacortes, Washington

Sample Type	No. of Samples	Analysis	Method No.	Reporting Limit (mg/kg)	Sample Container	Preservation Requirements	Holding Time
Soil	5	TPH-Dx	NWTPH-Dx with silica gel	10	Glass jar with PTFE seal	4° C	14 days
Soil	5	Priority Pollutant Metals	EPA 6010B/6020/7471 A	Varies	Glass or Plastic	4° C	180 days (Hg 28 days)
Soil	5	SVOCs	EPA 8270C	.330 to .500	Glass jar with PTFE seal	4° C	14 days
Surface and Groundwater	4+1 QA	VOCs	EPA 8260B	Varies	VOA Vial – HCl	4° C; add HCl to pH<2	14 days
Surface and Groundwater	4	Priority Pollutant Metals	EPA 6010B/6020/7470 A	Varies	Glass or Plastic	Add HNO_3 to pH<2	180 days (Hg 28 days)
Surface and Groundwater	4	Alkalinity	SM2320B/EPA310.1	5.0 mg/l as CaCO	Glass or Plastic	4° C; add H_2SO_4 to pH<2	14 days
Surface and Groundwater	4	Bicarbonate	SM 2320B	5 mg/l as CaCO	Glass or Plastic	4° C; add nitric acid to pH <2	180 days
Surface and Groundwater	4	Calcium	EPA 6010B	0.25 mg/l	Glass or Plastic	4° C; add nitric acid to pH <2	180 days
Surface and Groundwater	4	Chloride	EPA 300.0	.400 mg/l	Glass or Plastic	4° C	28 days
Surface and Groundwater	4	Iron	EPA 6010B	0.15 mg/l	Glass or Plastic	4° C; add nitric acid to pH <2	180 days
Surface and	4	Magnesium	EPA 6010B	0.50 mg/l	Glass or Plastic	4° C; add	180 days

APPENDIX B

TABLE B1

SAMPLE AND QUALITY CONTROL REQUIREMENTS FOR SOIL, SURFACE WATER AND GROUNDWATER SAMPLES

A Avenue Landfill Site, Anacortes, Washington

Sample Type	No. of Samples	Analysis	Method No.	Reporting Limit (mg/kg)	Sample Container	Preservation Requirements	Holding Time
Groundwater						nitric acid to pH <2	
Surface and Groundwater	4	Nitrate	EPA 353.2	.100 mg/l as N	Glass or Plastic	4° C; add $H_2SO_4$to pH<2	2 days
Surface and Groundwater	4	Sodium	EPA 6010B	0.25 mg/l	Glass or Plastic	4° C; add nitric acid to pH <2	180 days
Surface and Groundwater	4	Sulfate	EPA 300.0	.400 mg/l	Glass or Plastic	4° C	28 days
Surface and Groundwater	4	Ammonia	EPA 350.3/350.1	.100 mg/l as N	Glass or Plastic	4° C; add H_2SO_4 to pH<2	28 days
Surface and Groundwater	4	TOC	EPA 415.1	2.00 mg/l	1L Amber, unpreserved	4° C	28 days
Surface and Groundwater	4	TDS	EPA 160.1	10 mg/l	Glass or Plastic	4° C	7 days

APPENDIX C

GEOMATRIX

Appendix C

Health and Safety Plan

GEOMATRIX

SITE SPECIFIC HEALTH AND SAFETY PLAN

Approvals		
	Initials	Date
Prepared By	KSG	9/03
Approved By		

PROJECT INFORMATION

Date(s) of Field Work: *November 2003*
Project Name: *A Avenue Landfill* Project Number: *9156*
Client: *City of Anacortes* Site Phone: *none*
Site Address: *A Avenue and 37th Street* ☒ Site Plan Attached
Scope of Work: Soil and water *Sampling*

Type of Project: ☒Environmental; ☐Geotechnical; ☐Industrial Process; ☐Other: _____
☒HAZWOPER Project: Training & Medical Surveillance must conform to 29 CFR 1910.120 & Geomatrix Guidelines.
☐Client Specific Requirements (Attached)

KEY CONTACTS

Project Manager: *K. Goodman*	Phone: *206-342-1780*	Cell: *425-301-2700*
Project H&S Manager: *K. Goodman*	Phone: *206-342-1780*	Cell: *425-301-2700*
Site H&S Manager: *T. Gray*	Phone: *206-342-1786*	Cell: *206-375-0211*
Client Contact: *Jeff Miller*	Phone: *360-299-1980*	Cell: _____
Client's Site Contact: *Jeff Miller*	Phone: *360-299-1980*	Cell: _____
Other: _____	Phone: _____	Cell: _____
Other: _____		

Emergency Medical Facility: *Island Hospital*
Address: *1211 24th Street*
Phone Number (general): *360-468-3185* Phone Number (emergency): 360-*299-1311*
☒Emergency Medical Facility Confirmed ☒Map to the hospital is attached

Police: 911 Fire: 911 Paramedic/Ambulance: 911
Poison Control Center: _____

EMERGENCY PROCEDURES

Medical Emergencies

1. Remove injured or exposed person(s) from immediate danger if possible.
2. Evacuate other on-site personnel to a safe place in an upwind direction until it is safe for work to resume.
3. If serious injury or life-threatening condition exists, call 911 - Paramedics, fire department, police Hospital emergency room Clearly describe location, injury and conditions to dispatcher/hospital. Designate a person to direct emergency equipment to the injured person(s).
4. Provide first aid if necessary. Remove contaminated clothing only if this can be done without endangering the injured person.
5. Call the project manager and/or project health and safety officer.
6. Immediately implement steps to prevent recurrence of the accident.

Accidental Release of Hazardous Materials or Wastes

1. Evacuate all on-site personnel to a safe place in an upwind direction until the PM or PHSO determines that it is safe for work to resume.
2. Immediately instruct a designated person to contact the PM or PHSO.
3. Contain spill, if it is possible and it can be done safely.
4. Initiate cleanup.

General Emergencies

In the case of fire, flood, explosion, or other hazard, work shall be halted and the local police/ fire department shall be notified by calling 911. All on-site personnel will be immediately evacuated to a safe place.

Emergency Equipment Onsite

☐First Aid Kit; ☐Fire Extinguisher; ☐Eye Wash; ☐Other: _____

CHEMICAL HAZARDS

CHEMICAL	EXPOSURE LIMITS		KNOWN/EXPECTED CONCENTRATIONS	HEALTH HAZARDS
	OSHA	ACGIH		
	Pel: C: IDLH:	TWA: STEL: C	Soil: mg/kg Water: µg/l	Acute: Chronic:
Diss. metals			None known	Don't drink water, wash hands after sampling
TPH-Dx			None known	Don't drink water, wash hands after sampling

PHYSICAL HAZARDS:

☐ Heat Stress ☐ Cold Stress ☒ Wet ☐ Noise
☒ Slip,Trip, & Fall ☐ Heavy Equipment ☐ Electrical Hazards
☐ Underground Hazards: One Call Ticket # _____ Date Called: _____
☐ Private Locator Utilized: _____ ☐ Overhead Hazards
☐ Traffic ☐ Excavations/Trenching ☐ Confined Space
☒ Other: *Bicycle riders*

BIOLOGICAL HAZARDS:

☐ Pathogens: _____ ☐ Mold: _____
☐ Plants: _____ ☐ Insects: _____
☐ Other Fauna: _____ ☐ Other: _____

SITE CONTROLS: *none*

PERSONAL DECONTAMINATION PROCEDURES: _____

PERSONAL PROTECTIVE EQUIPMENT – R = REQUIRED, A = HAVE AVAILABLE

__ Eye Protection: __ Safety Glasses; __ Splash Goggles; __ Face Shield; __ Other: _____
X Hard Hat X Steel-Toed Boots __ Chemical Resistant Boots
__ Traffic Safety Vest __ Hearing Protection: _____
__ Protective Clothing: ☐ Tyvek®; ☐ Coated Tyvek®; ☐ Sarinex; ☐ Other: _____
__ Gloves: ☒ Nitrile; ☐ PVC; ☐ Neoprene; ☐ cloth/leather; ☐ Other _____
__ Respiratory: ☐ Full-Face APR; ☐ Half-Face APR
__ Filter: ☐ Organic Vapor; ☐ Acid Gas; ☐ HEPA; ☐ Other: _____
__ Other: _____

If air monitoring in the workers' breathing zone exceeds _____ for 60 seconds or longer, upgrade to Level C (APR) or vacate the immediate area.

MONITORING EQUIPMENT

☐ Photo Ionization Detector with _____ eV lamp ☐ Flame Ionization Detector
☐ Combustible Gas Indicator ☐ Oxygen Meter
☐ Detector Tube (Brand: _____) – Tubes: _____
☐ Hydrogen Sulfide Meter
☐ Passive Dosimeter _____
☐ Air Sampling Pump – Filter Media: _____
☐ Other: _____

GEOMATRIX

TAILGATE SAFETY MEETING

Date:

Project Name:

Project Number:

Site Location:

Scope of Work for Day:

Lead By:

Name (printed)	Signature

MAPQUEST

Send To Printer Back to Map

1211 24th St
Anacortes WA
98221-2557 US

Notes:

Island Hospital Location