2013 Environmental Subsurface Investigation

University of Washington - Tacoma
CPO Project No. 204277
South 17th Street to South 21st Street and
South Tacoma Avenue to Pacific Avenue
Tacoma, Washington

for
University of Washington

December 19, 2014

GeoEngineers
Earth Science + Technology

2013 Environmental Subsurface Investigation

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2013 Environmental Subsurface Investigation

University of Washington –Tacoma – CPO Project No. 204277 South 17th Street to South 21st Street and South Tacoma Avenue to Pacific Avenue Tacoma, Washington

File No. 0183-085-00

December 19, 2014

Prepared for:

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EXECUTIVE SUMMARY

ES-1.0 INTRODUCTION

This report provides the results of an environmental subsurface investigation completed in 2013 for the University of Washington (UW) at the UW – Tacoma (UWT) campus located in Tacoma, Washington. The environmental investigation was completed under the Environmental Investigation Project, UW project number 204277.

The environmental investigation was performed for two purposes. The first purpose was to evaluate soil and groundwater conditions in areas identified by UWT as priority development areas (PDA) in an effort to identify potential environmental impacts, mitigation measures and associated costs for future development. UWT identified 14 PDAs for investigation by this project. The 14 PDA locations are shown on Figure ES-1. The second purpose was to collect additional groundwater monitoring data to update the existing groundwater dataset and to evaluate potential contaminant sources of the groundwater plumes on the UWT campus related to existing Agreed Order (#DE 97HW-S238). UW is in the process of negotiating a new Agreed Order with Ecology.

ES-1.2. Report Organization

This executive summary of the report provides an overview of the findings and recommendations for future investigation and discussion of the impacts to development. The main body of this report provides details of this environmental investigation on the UWT campus as a whole including a summary of previous investigations, possible contaminant sources, subsurface investigation and chemical analytical data. The Opportunities and Approaches for the Future section provides general impacts and mitigation measures to address during design and construction associated with environmental impacts. The Opportunities and Approaches for the Future section also provides a discussion on recommended remedial investigations.

This document also includes individual reports for each PDA site, which have been developed and included in Appendix A. The individual reports summarize the findings on each PDA site and include site-specific impacts and mitigation measures for development based on the proposed development plans provided by UW. A separate letter report titled “Summary of Impacts, Mitigation Measures and Estimate Costs” dated May 20, 2014 was submitted as an individual report and is also included in Appendix A.

UWT ENVIRONMENTAL INVESTIGATION SUMMARY OF REPORTS

Report		Intended Audience			
		UW and UWT Planning	CPO and Design Team	UW EH&S	Ecology
Summary of Impacts, Mitigation Measures and Estimate Costs – Dated May 20, 2014		x		x	
2013 Environmental Subsurface Investigation Report Dated December 19, 2014	Executive Summary	x			
	Main Text			x	x
	Appendix A (Site Specific Reports)		x	x	

ES-1.2. General Setting of the Campus Area

The UWT campus is situated within an urban setting on the southern edge of downtown Tacoma. The campus is located on a steep hillside between South 17th Street and South 21st Street and Pacific Avenue and Tacoma Avenue. The UWT campus overlooks the Thea Foss Waterway and Port of Tacoma.

The existing UWT campus is located within the Union Station Historic District. The western portion of the existing campus and the area west of Jefferson Avenue is generally vacant but located in the former residential and light commercial areas.

ES-1.3. History of Campus

The Union Station Historic district was developed typically with warehouses in the late 1880s and early 1900s following development of the first transcontinental railroad (now the Prairie Line Trail). The warehouses were generally utilized to house import products and to organize export products for shipping (City of Tacoma, 1999). The buildings generally had two access points, street side and rail side. The street side included stores like grocer, stoves companies, paper companies, dry goods, etc. Loading and unloading of import and export products occurred on the rail side of the buildings.

The western portion of existing campus (primarily west of Jefferson Avenue) consisted of housing (apartments and single family), hotels, corner stores and union/societies halls since the early 1900s.

ES-2.0 INVESTIGATION FINDINGS

ES-2.1. Geologic/Hydrogeologic Conditions

Subsurface conditions encountered on the UWT campus generally consist of the following lithology from the surface to depth as shown in Figure ES-2:

- Fill. Imported material and reworked ice-contact deposits.

- Ice-contact Deposits. Generally consists of cemented glacial till (unsorted, unstratified, highly compacted mixture of clay, silt, sand, gravel, and boulders) with sand and gravel layers. This unit may contain lacustrine (fine grained sand and silts).
- Silt Layer. Dense, compacted gray sandy silt.
- Transition Zone. Interbeds of sand and silt.
- Advance Outwash. Sand and gravel with silt.
- Lawton Clay. Sandy silt.

The site-specific hydrogeology consists of two main water-bearing zones, herein referred to as the shallow and deep aquifers.

The shallow unconfined aquifer appears to be present within the ice-contact deposits. Groundwater within the shallow aquifer appears to be present in sand and gravel layers. The continuity and connectivity of the sand and gravel layers within the ice-contact deposit unit could not be identified from the relatively small number of borings. However, the overall groundwater flow appears to be to the east consistent with the topography of the hillside.

The deep semi-confined to confined aquifer appears to be present within the advance outwash unit. Groundwater within the advance outwash appears to be fairly continuous beneath the site. The overall flow appears to be to the northeast.

ES-2.2. Contaminated and Impacted Media

The chemical analytical from the 2013 investigation are described below and shown on Figure ES-3.

ES-2.2.1. cPAHs, Metals and Petroleum in Surficial Soil

Contaminated soil (metals [arsenic, cadmium, lead and/or mercury] and/or cPAHs) were identified within the fill soil generally from the ground surface to approximately 5 feet below ground surface (bgs) primarily west of Jefferson Avenue. The source of this-contaminated soil is unknown but may be related to fill placed during historic development of these areas or from other historical uses on the properties.

Gasoline-contaminated soil was encountered in fill soil between 7 and 8 feet bgs in the area within the southeast portion of PDA 1F – Fawcett Parking. The source of the petroleum contamination is unknown, but the contaminated soil may be related to either an underground storage tank (UST) reported in the area as identified in the City of Tacoma permit records, fill placed on the site and/or from the former motorcycle service shop operations.

ES-2.2.2. Trichloroethene (TCE) and Tetrachloroethene (PCE) (Solvents) in Soil and Groundwater

Trichloroethene (TCE) and Tetrachloroethene (PCE) groundwater plumes are present in the shallow, deep and the undetermined aquifers as shown on Figure ES-3. The lateral extent of the groundwater plumes is not known. The individual TCE groundwater plumes in the shallow aquifer may be connected via gravel or sand seams. It is unknown if the groundwater plumes within the shallow and deep aquifers are connected in the area of South 19th and Fawcett Avenue based on the results from the previous investigations. Further investigation will be necessary in this area to evaluate the potential for these aquifers to be connected. Soil within the PCE and TCE groundwater plumes is generally impacted or contaminated due to sorption to the soil from contaminated groundwater.

ES-2.2.3. Findings Related to Previous Groundwater Investigations

URS Corporation generated a groundwater plume map for the UWT campus based on information known about the subsurface conditions in 2010. This section describes updated information to the 2010 subsurface conditions. The approximate extent of the current groundwater plumes are shown on Figure ES-3. The groundwater dataset between 1999 and 2013 is very limited with one to three sampling events per well. Therefore, the plume extent comparison between 2010 and 2013 should be considered an estimate based on the limited dataset.

ES-2.2.3.1. WESTERLY PLUME

The TCE plume was previously considered to be located in one aquifer within the Westerly Plume. Information obtained during the 2013 investigation indicates two aquifers (shallow and deep) exist on the UWT campus separated by a semi-confining to confining silt layer. The following is an update on the extent of the contaminants within the Westerly Plume:

- The lateral extent of the plume within the deep aquifer is similar to the orientation as identified in 2010. However the plume appears to extend further to the south and north. The TCE plume also appears to comingle with the Easterly plume near South 19th Street and Jefferson Avenue. The concentrations of TCE in the deep aquifer have decreased since the groundwater sampling events in 2007 and 2009 with two exceptions. The highest TCE concentration in well UG-MW18 and the apparent downgradient edge of the plume (JS-MW2 and UG-MW3) contained similar concentrations over these two events. The reason for the apparent stability in TCE concentrations in these wells is unknown. Because the majority of the monitoring wells have been sampled only twice in the last eight years, there is not enough data to accurately evaluate concentration trends over time.
- A new PCE plume was also discovered at (PDA 1A – Upton) in the shallow aquifer.
- There appears to be three new TCE plumes within the shallow aquifer in the Westerly Plume:
    - One TCE plume that is generally oriented east/west on South 19th Street between Tacoma Avenue and Jefferson Avenue.
    - One TCE plume oriented east/west between South 17th Street/South 19th Street and Tacoma Avenue/Fawcett Avenue. This plume also contains 1,1-dichloroethane (1,1-DCA). 1,1-DCA is an indicator chemical of a similar source.
    - One TCE plume at the Y Student Center.
- A new lube oil-range petroleum hydrocarbon plume is present in the shallow aquifer at the northwest corner of Court E and South 19th Street.
- PCE was encountered in the soil at PDA 2D – Tacoma Paper and Stationary.

ES-2.2.3.2. EASTERLY PLUME

Groundwater plumes consisting of TCE, vinyl chloride, benzene and petroleum hydrocarbons were previously identified within the Easterly Plume in 2002. Additional plumes were not encountered during this investigation. We did not evaluate the geologic conditions and the presence of multiple aquifers in the Easterly Plume in the existing wells as part of this scope of work. However, new monitoring wells (paired) were installed within the shallow and deep aquifers in the Easterly Plume. The following is an update on the extent of the contaminants within the Easterly Plume:

- The eastern extent of the TCE plume has extended to the east to Pacific Avenue.
- The vinyl chloride plume appears larger, however the detection limits of previous groundwater samples were at concentrations greater than the current MTCA Method A cleanup level.
- The benzene plume and the gasoline-contaminated groundwater plume located within the Cragle Lot is significantly smaller in size. These contaminants were only detected at concentrations greater than the respective cleanup levels in one monitoring well in 2013 (CR-MW9).
- The Shaub Ellison plume is significantly smaller because groundwater remediation has occurred on the site.
- Benzene/chlorobenzene plume on Market Street is similar in size and concentration as documented in 2010.
- The diesel-range petroleum hydrocarbon plume located near the Power Parcel has slightly decreased in overall extent. The small vinyl chloride plume in this area appears to be connected to the larger vinyl chloride plume.

ES-2.3 Potential Contaminant Sources

GeoEngineers performed general research of available historical and regulatory information to identify potential sources of the TCE/PCE groundwater contamination within and adjacent to the UWT campus. The results are summarized in Figure ES-4 and further described in Table 4 of the main report. Fifteen potential sources were identified for the Westerly TCE groundwater plume. Seven potential contaminant sources were identified for the Easterly TCE groundwater plume area. One potential source of PCE was identified in the Tacoma Paper and Stationary Building (PDA-2D). However, the existence of a groundwater plume beneath this site is being investigated under UW CPO Project No. 204701has not been documented to date. One potential source was identified for the petroleum-contaminated groundwater within PDA-1B Tacoma Vacant.

ES-3.0 NEW AGREED ORDER

It is estimated that the new Agreed Order between the UW and Ecology will be completed in the near future. UW should consider the following items be included in the new Agreed Order.

- The flexibility to perform site-specific and area-wide remedial investigations, feasibility studies and interim actions without requiring a modification to the Agreed Order. The current Agreed Order requires modifications and public comment in order to complete interim actions. This requirement may impede future development on the UWT campus.
- The shallow and deep aquifers present along the western portion of the UWT campus are separated by a site-specific semi-confining to confining silt layer. The presence of the shallow and deep aquifers is important to understand from a contaminant transport perspective. We recommend UW and Ecology further investigate the contaminant transport mechanisms on the UWT campus to evaluate the connection between the shallow and deep aquifers. The results of this investigation will assist the UW in identifying

the receptors and transport mechanisms and therefore the associated risks with the contaminant transport mechanism(s) between the shallow and deep aquifers during future development and remediation on the UWT campus.

- A network of over 80 wells is currently present on the UWT campus. UW may want to consider establishing a groundwater sampling frequency as part of the monitoring program during the current negotiations of the new Agreed Order.
- Fifteen of the 23 potential sources of TCE and PCE contaminated groundwater on the UWT campus are located upgradient and west of the UWT campus' western boundary or on property not owned by UWT. The Agreed Order should establish a legal basis to investigate and remediate these upgradient properties not owned by UW in order to identify the source(s) and potential liable parties.

ES-4.0 OPPORTUNITIES AND APPROACHES FOR THE FUTURE

The presence of contaminated soil and groundwater and the requirements of the new Agreed Order will not preclude development on the UWT campus. However, it will require UWT to implement mitigation measures during future development that are protective of the human health and the environment and to preserve the ability to perform future remediation activities on a campus-wide basis. Collaboration with UW EH&S and Ecology early in development projects is vital for planning and budgeting purposes.

UW could employ several approaches to complete development of the UWT campus and within the anticipated requirements of the new Agreed Order. These approaches are listed below and discussed further in the following sections.

- Further Evaluation and Remediation Prior to Development. See Section ES-4.1 for additional discussion on this approach.
- Develop Within the Groundwater Plumes And Manage Contaminated Soil and Install Mitigation Measures Within the Building. See Section ES-4.2 for additional discussion on this approach.
- Modify Development to Avoid Contact with Contamination. See Section ES-4.3 for additional discussion on this approach.

ES-4.1 Further Evaluation and Remediation Prior to Development

Investigation will likely be required within the individual PDAs as further details are identified regarding proposed development to identify impacts and mitigation measures to the actual development. The investigation within a PDA would be focused on the impacts to the specific development project. This section discusses potential investigations on a campus wide scale to fill data gaps and potentially reduce development costs by gathering pertinent information to better understand the extent of the groundwater plumes, identify the sources of the groundwater plumes and implement the future remedial actions. The following sections describe three campus-wide approaches that we recommend to be implemented.

ES-4.1.1 Shallow Aquifer - Remedial Investigation and Feasibility Study

One alternative is to complete a remedial investigation and feasibility study (RI/FS) focused on the shallow aquifer on the UWT campus. If the shallow aquifer can be remediated prior to construction activities in the area, the impacts to construction would be significantly decreased because the shallow aquifer is in contact with the majority of the planned buildings as shown in Figure ES-2. We recommend the remedial investigation focus on the following areas:

- **Evaluate the lateral extent of the TCE-contaminated groundwater.** Four individual plumes are shown on Figure ES-3. The connectivity between the plumes is not known. Additional investigation is recommended to evaluate the lateral extent of the plumes.
- **Evaluate the connectivity of the shallow and deep aquifers in the area of South 19th Street between Court E and Market Street.** It appears the utilities and anthropogenic development of the sites may have provided a connection between the shallow and deep aquifers in the area of the South 19th Street between Court E and Market Street. Additional investigation is recommended in this area to further evaluate the vertical connection.
- **Evaluate directly upgradient sources along Tacoma Avenue.** Several potential sources were identified west of Tacoma Avenue. Two potential sources are located directly upgradient of PDA 1. The first source is the former Photo Engraving facility located at 1722 Tacoma Avenue South that operated from 1956 to at least 1996. The second potential source was operated as a former upholstery, furniture manufacturer and printing press located at 1815 South G Street between at least 1936 and 1963. Additional subsurface investigation is recommended in the area of these potential contaminant sources to further evaluate soil and groundwater conditions and possibly identify these sites as a source(s) of the TCE and PCE within the shallow aquifer.

The feasibility study will evaluate potential cleanup alternatives for soil and groundwater that may be implemented on the UWT campus including costs and viability of each cleanup alternative. The estimated cost of the remedial investigation and feasibility study focused on the shallow aquifer within the Westerly plume may range between $500,000 and $1,500,000. This cost does not include the investigation and cleanup in the vicinity of PDA 1A – Upton because a potential contaminant source exists at this site related to the former dry cleaner operations and a site-specific investigation and cleanup will likely be required.

ES-4.1.2 Identification of Sources and Complete Remediation

ES-4.1.2.1 TCE, PCE AND PETROLEUM-CONTAMINATED GROUNDWATER

Potential sources of the groundwater plumes were evaluated based on historical information. A total of 22 possible sources of the TCE contamination in groundwater were identified. Four of the potential sources of TCE were located within a PDA (PDA 1A – Upton, PDA 1C-Tacoma North, PDA 1F-Fawcett Parking, PDA2D-Tacoma Paper and Stationary). One UW-owned property, PDA 1B-Tacoma South, was identified as a potential source of petroleum contamination. One UW-owned property was also identified as a potential source of PCE contamination (PDA-2D-Tacoma Paper and Stationary).

We recommend UW coordinate with Ecology, City of Tacoma and existing property owners to further evaluate and identify the actual sources of the TCE and PCE contamination. Identification of the sources and remediation of contamination may reduce the cost of development of the campus.

The cost to perform additional investigation at each potential source property is estimated to range between $50,000 and $150,000 per site. The remediation cost will be based on the selected remedial alternative and the extent of the contamination but may range between $500,000 and $6,000,000 per potential source based on the area of influence. UWT may want to pursue cost recovery of investigation and remediation of offsite sources by identification of potential liable persons.

ES-4.1.2.2. METALS, PETROLEUM AND CPAH-CONTAMINATED SOIL

Metals-, petroleum- and cPAH-contaminated soil are present from the ground surface up to 5 feet bgs in the majority of PDA 1. Removal of this soil will likely be necessary prior to or during development of PDA 1. UW may consider completing remedial action of the contaminated surficial soil of the entire PDA 1 prior to development. The estimated cost may range between $3,400,000 and $3,750,000 for removal of the contaminated soil within PDA 1. The estimated cost range includes additional investigation to further characterize up to 23,600 tons of soil and $140 to $150 per ton for excavation, transportation and disposal.

ES-4.1.3. Develop a Comprehensive Record of Groundwater Conditions Within the Westerly Plume

We recommend that UW implement a groundwater monitoring program consisting of semi-annual monitoring of the shallow aquifer and annual monitoring of the deep aquifer to develop a comprehensive record of groundwater conditions over time and to maintain the integrity of the wells. The estimated cost to perform monitoring of the 22 shallow aquifer wells located within the Westerly Plume is approximately $16,000 to $18,000 per event. The estimated cost to perform groundwater monitoring of the 28 deep aquifer wells located within the Westerly Plume is between $22,000 and $25,000 per event.

ES-4.2. Development Within Contaminated Media and Implement Mitigation Measures

Contaminated soil (PCE, TCE, cPAHs, metals and petroleum hydrocarbons) and groundwater (PCE, TCE, and petroleum hydrocarbons and associated breakdown products) are present within the PDAs based on the results of this investigation. The impacts to potential development were evaluated due to the soil and groundwater conditions based on the following design technique:

- New buildings will be constructed with a zero lot line within the PDAs. The exterior of existing buildings would remain intact.
- The west side of the buildings will be constructed into the hillside and will be adjacent to the street at the top of the slope.
- The finished floor of the building will be constructed to a single elevation similar to the elevation of the street at the bottom of the slope.

ES-4.2.1. Typical Impacts and Mitigation Measures For Development

Typical impacts that were identified for each site included the following:

- Site is a potential source of groundwater contamination.
- A potential UST is present on the site.
- PCE and or TCE-contaminated groundwater is present on the site.

- Contaminated or impacted soil is present on the site.

General mitigation measures were developed to address these site conditions. In general, remediation may be required prior to construction activities if the development site is identified as a potential source site. If the site is located within a larger groundwater plume, mitigation measures may be required during development to protect human health and the environment and prevent cross-contamination between the shallow and deep aquifers. Examples of development mitigation measures include the following.

- Management of soil and groundwater.
- Vapor barrier mitigation systems.
- Construction methods to reduce cross contamination between the shallow and deep aquifers.

The impacts, mitigation measures and estimated development costs of the PDAs are summarized in the letter report titled "Summary of Impacts, Mitigation Measures and Estimate Costs – Final, University of Washington – Tacoma, Priority Development Areas" dated May 22, 2014. Individual reports were also developed for each PDA and are included in Appendix A of this report. The total estimated cost range to implement mitigation measures related to impacted and contaminated soil and groundwater within the PDAs ranges between $18,800,000 and $32,200,000 ($2014). The total estimated cost range is summarized in Table ES-1.

It is important to recognize these reports provide general impacts and potential mitigation measures that may be employed in design and construction. Additional environmental investigations will likely be necessary prior to selection of the final mitigation measure. The assumption is that these cost estimates should be refined following additional investigation on the individual sites. The project teams should contact UW Environmental Health & Safety (UW EH&S) to discuss the need for further investigations. UW EH&S is the liaison with the Washington State Department of Ecology (Ecology) for review and approval of mitigation measures.

ES-4.2.2. Central Treatment System for Building Drainage

UW and Ecology agreed to criteria thresholds for discharge of TCE and PCE-contaminated groundwater from building drains to the stormwater system in June 2014. However, the TCE concentrations observed in groundwater on the majority of the campus are greater than the discharge limit for TCE-contaminated stormwater criteria. Therefore, the groundwater from building footing drains will likely require discharge to the sanitary sewer including associated charges for the majority of the building footing drains. UWT may want to consider installation of a central treatment system for building drainage water. The system would consist of a pipe network from the new buildings to the treatment system. The treatment system would reduce the TCE in groundwater collected from the footing drains to concentrations less than the surface water criteria. The water could be discharged to the storm system following the treatment process. The estimated cost for the treatment system will be based on the design and is not known at this time.

ES-4.3. Modify Development to Avoid Contact with Contamination

UWT may want to consider the following development modifications to reduce the cost of mitigation measures.

ES-4.3.1. Modify Assumed Building Design

UWT may want to consider designing the proposed buildings in order to not penetrate the TCE- and/or PCE-contaminated soil and groundwater. The shallow aquifer and ice-contact deposits are generally located between 5 to 10 feet bgs and follow the general topography of the slope as shown in Figure ES-2. During evaluation of impacts to development, GeoEngineers assumed the finished floor of the building will be constructed to a single elevation similar to the elevation of the street at the bottom of the slope. We observed that the majority of the proposed buildings penetrate the TCE-contaminated soil and groundwater horizontally on the western half of the PDAs and vertically by approximately 1 to 7 feet with the maximum vertical penetration estimated at 18 feet. Building features that could reduce contact with, or proximity to, the TCE-contaminated soil and groundwater include:

- Raising the entire building elevation relative to the adjacent street
- Stepping up the western portion of the building foundation

ES-4.3.2. Develop in Areas Outside of Groundwater Plumes

Following further evaluation of the extent of the groundwater plumes, proposed buildings may be relocated and/or designed to not encounter the contaminated groundwater, therefore reducing the impact and associated mitigation measures. Each PDA investigated has some environmental liabilities. The areas within the following PDAs appear to have less environmental liabilities than others based on the available information to date:

- PDA 1C - TCE/PCE-contaminated groundwater does not appear to be present within the central portion of PDA 1C. However, additional investigation is necessary to further define the extent of the upgradient groundwater plumes.
- PDA 1G - The shallow and deep aquifers do not appear to be contaminated with TCE within the northern portion of PDA 1G – Laborers/Lot T39 and T40. TCE-contaminated groundwater is present upgradient of this site. The full lateral extent of this TCE-contaminated groundwater and the migration pathway is unknown at this time. CPAH-contaminated soil is present within the fill located in one area of PDA 1G – Laborers/Lot T39 and T40. The cPAH-contaminated soil will have to be managed appropriately.
- The northern portion of PDA 2B – Jefferson Street Parcel/Transit Turnaround does not appear to be impacted with chemicals of concern in soil and groundwater. However, additional investigation is necessary to further define the upgradient groundwater plumes.
- PDA 2C - TCE-contaminated groundwater does not appear to be present in the shallow and deep aquifers at the PDA 2C – Pinkerton Parking site. TCE-contaminated groundwater is present upgradient of the PDA 2C – Pinkerton Parking site. The full lateral extent of the TCE-contaminated groundwater at the Y-Student Center and migration pathway is unknown at this time. CPAHs-contaminated soil is present within the fill located in an area within PDA 2C – Pinkerton Parking. The cPAHs-contaminated soil will have to be managed appropriately.

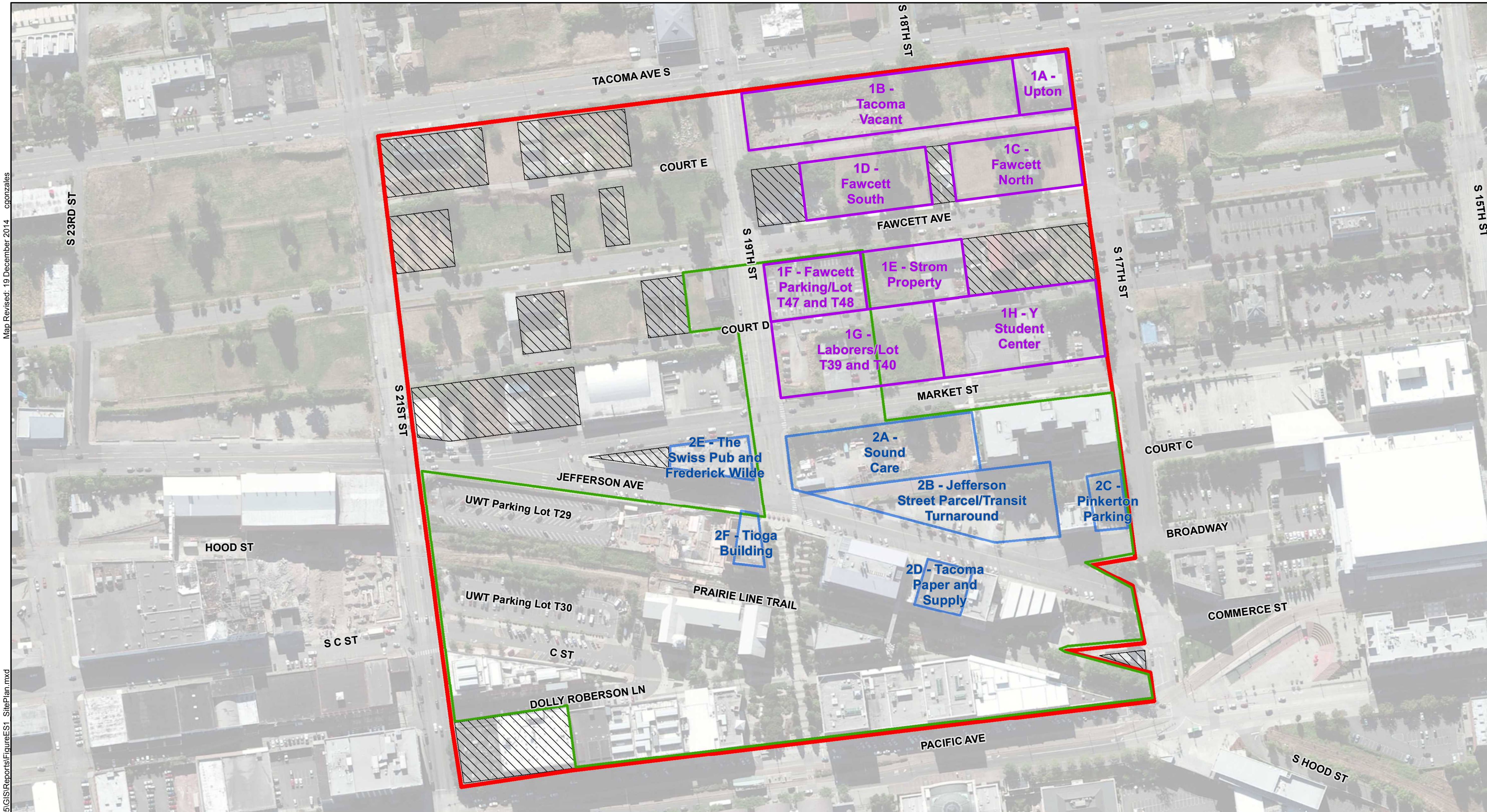
Table ES-1

Summary of Costs

2013 Environmental Subsurface Investigation - University of Washington-Tacoma
Tacoma, Washington

Priority Development Area	Range of Estimated Costs to Mitigate Environmental Impacts	
	Minimum	Maximum
1A - Upton	$2,200,000	$4,400,000
1B - Tacoma Vacant	$2,700,000	$4,700,000
1C - Fawcett North	$1,900,000	$2,800,000
1D - Fawcett South	$2,000,000	$3,100,000
1E - Strom	$600,000	$1,100,000
1F - Fawcett Parking/Lot T47/48	$1,600,000	$2,300,000
1G - Laborers/Lot T39 and T40/Undeveloped Lot - Option A (Building on Southern Portion)	$1,600,000	$2,300,000
1G - Laborers/Lot T39 and T40/Undeveloped Lot - Option B (Building on Northern Portion)	$900,000	$1,600,000
2A - Sound Care	$2,300,000	$3,500,000
2B - Jefferson Street Parcel/Transit Turnaround	$1,500,000	$2,500,000
2C - Pinkerton Parking	$300,000	$400,000
2D - Tacoma Paper Supply	$900,000	$2,800,000
2E - Swiss and Frederick Wild	$200,000	$400,000
2F - Tioga Building	$100,000	$300,000
Total Not Including PDA 1H - Y Student Center	**$18,800,000**	**$32,200,000**
1H- Y Student Center (Estimated for Comparison Purposes) - Actual Building	$900,000	$1,500,000
1H- Y Student Center (Estimated for Comparison Purposes) - Entire PDA	$1,900,000	$3,100,000

Notes: Estimated costs are in 2014 U.S. Dollars based on the available information at the time of this investigation and our experience in the Puget Sound area. Costs may change based on inflation and other factors including the actual impacts and mitigation measures during time of construction. Values are rounded up to the nearest $100,000.



Map Revised: 19 December 2014 cgonzales

Office: TAC Path: \\tac\projects\0\0183085\GIS\Reports\FigureES1_SitePlan.mxd

Notes:
PDA = Priority Development Area
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Legend

- UWT Master Plan Campus Boundary
- Existing UWT Campus Boundary
- PDA 1
- PDA 2
- Parcel Not Owned by UW But Within Master Plan Boundary

200 0 200
Feet

UWT Campus and Priority Development Areas

2013 Environmental Subsurface Investigation
University of Washington – Tacoma
Tacoma, Washington

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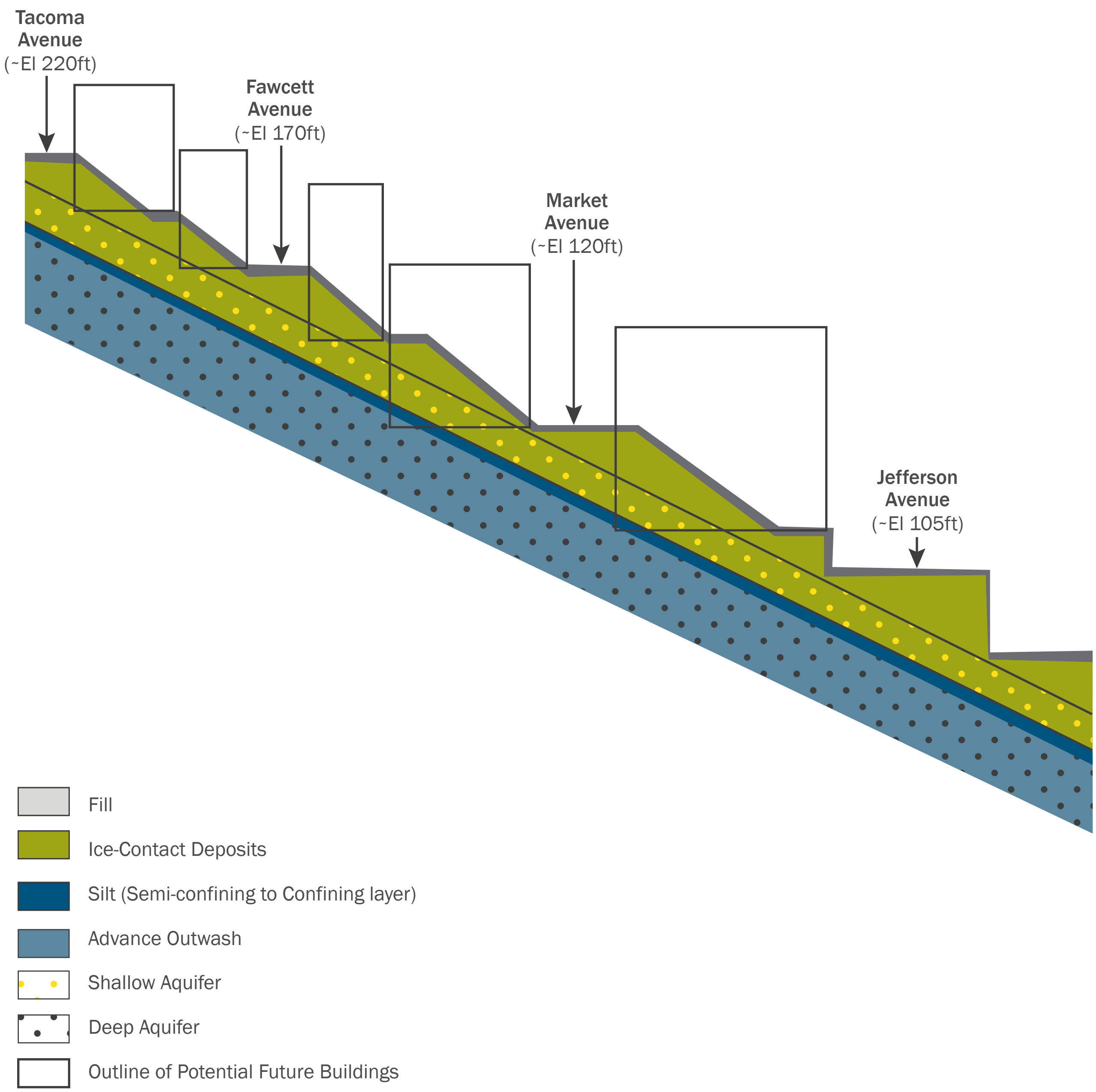
Figure ES-1



Notes

ft = feet

~ = Approximate

El= Elevation (Vertical datum NGV029)

UWT= University of Washington-Tacoma

CPO= Capital Projects Office

Building and geology shown in a general schematic and do not represent actual conditions in the area

General Schematic Cross Section

2013 Environmental Subsurface Investigation
University of Washington – Tacoma
Tacoma, Washington

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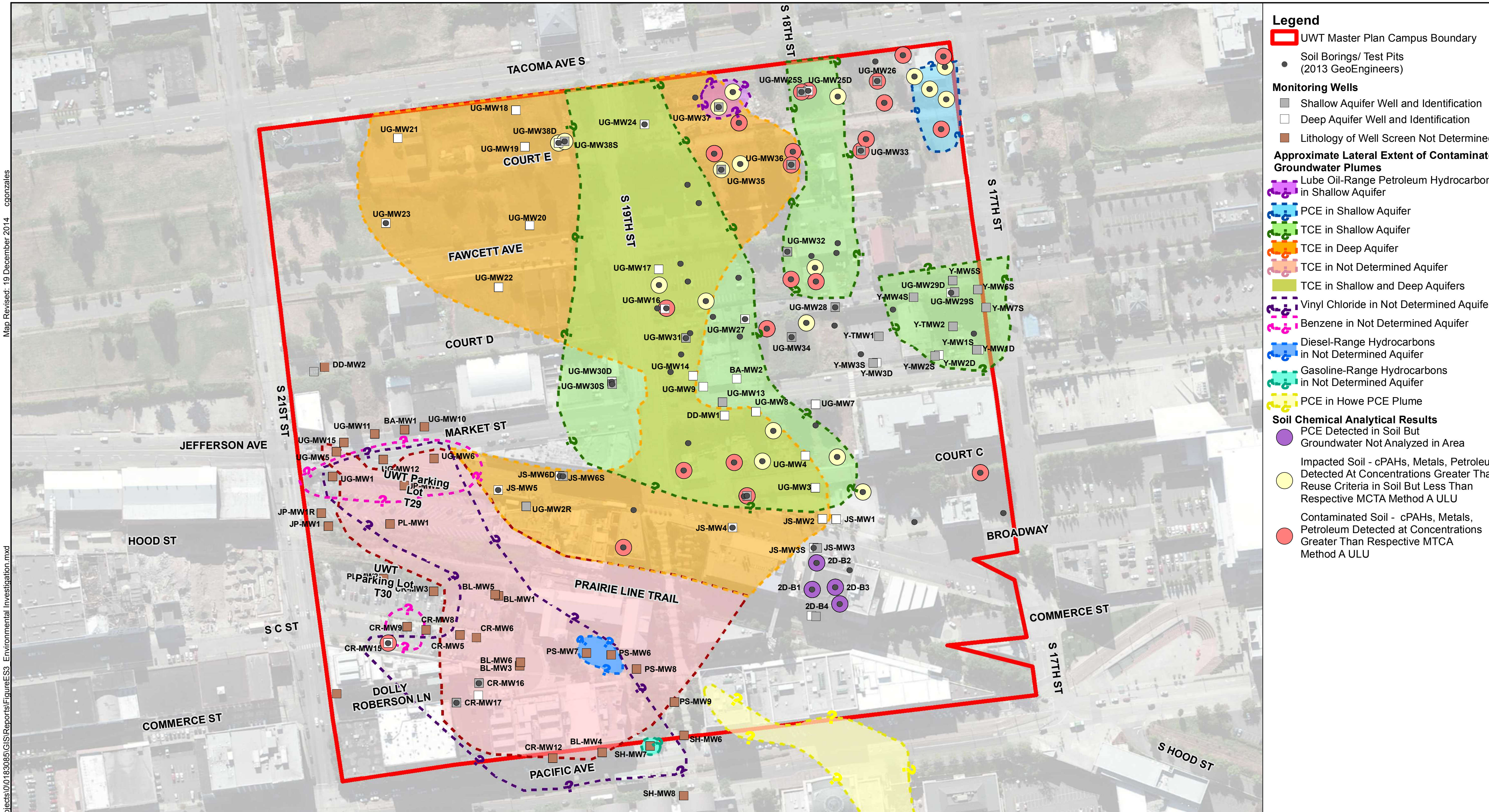
Figure ES-2



Notes:
ULU = Unrestricted Land Use
UWT = University of Washington Tacoma
COC = Chemical of Concern
TCE = Trichloroethene
PCE = Tetrachloroethene
cPAHs = Carcinogenic Polycyclic Aromatic Hydrocarbons
TTEC = Total Toxicity Equivalency Concentration
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

mg/kg = milligram per kilogram
µg/L = microgram per liter
MTCA = Model Toxics Control Act
ULU = Unrestricted Land Use

Contaminated Soil (MCTA Method A ULU)
cPAHs (TTEC) Detected ≥ 0.1 mg/kg
Arsenic Detected ≥ 20 mg/kg
Lead Detected ≥ 250 mg/kg
Cadmium Detected ≥ 2 mg/kg
Mercury Detected ≥ 2 mg/kg
Gasoline Detected ≥ 30 mg/kg
Diesel Detected ≥ 2,000 mg/kg
Lube Oil Detected ≥ 2,000 mg/kg

Groundwater MTCA Cleanup/Criteria Levels:
PCE = 5 µg/L (Method A); 24 µg/L (Indoor Air)
TCE = 5 µg/L (Method A); 1.5 µg/L (Indoor Air)
cis-1,2-DCE= 16 µg/L (Method B); 160 µg/L (Indoor Air)
trans-1,2-DCE = 160 µg/L (Method B); 110 µg/L (Indoor Air)
1,1-DCA = 7.7 µg/L (Method B);11 µg/L (Indoor Air)
Vinyl Chloride = 0.2 µg/L (Method A); 0.35 µg/L (Indoor Air)
Benzene = 5 µg/L (Method A); 2.4 µg/L (Indoor Air)
Lube Oil-Range Petroleum Hydrocarbons = 0.5 mg/L (Method A)
Arsenic = 5 µg/L (Method A)
cPAHs= 0.1 µg/L (Method A)

200 0 200
Feet

General Summary of 2013 Environmental Investigation

UWT Environmental Investigation
Priority Development Areas - CPO Project No. 204277
Tacoma, Washington

GeoEngineers

Figure ES-3

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Map Revised: 19 December 2014 cgonzales
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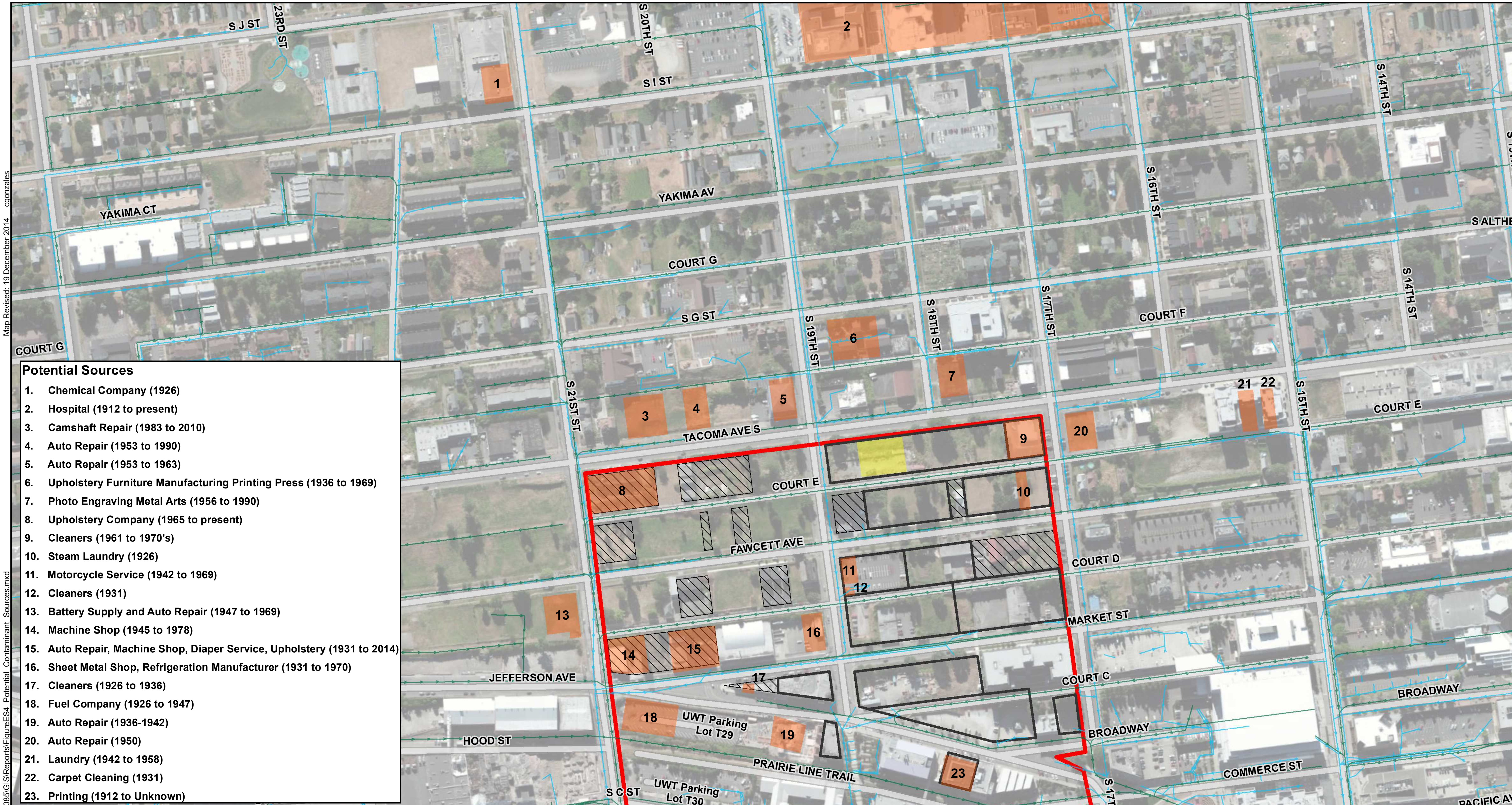


Potential Sources

1. Chemical Company (1926)
2. Hospital (1912 to present)
3. Camshaft Repair (1983 to 2010)
4. Auto Repair (1953 to 1990)
5. Auto Repair (1953 to 1963)
6. Upholstery Furniture Manufacturing Printing Press (1936 to 1969)
7. Photo Engraving Metal Arts (1956 to 1990)
8. Upholstery Company (1965 to present)
9. Cleaners (1961 to 1970's)
10. Steam Laundry (1926)
11. Motorcycle Service (1942 to 1969)
12. Cleaners (1931)
13. Battery Supply and Auto Repair (1947 to 1969)
14. Machine Shop (1945 to 1978)
15. Auto Repair, Machine Shop, Diaper Service, Upholstery (1931 to 2014)
16. Sheet Metal Shop, Refrigeration Manufacturer (1931 to 1970)
17. Cleaners (1926 to 1936)
18. Fuel Company (1926 to 1947)
19. Auto Repair (1936-1942)
20. Auto Repair (1950)
21. Laundry (1942 to 1958)
22. Carpet Cleaning (1931)
23. Printing (1912 to Unknown)

Legend

UWT Master Plan Campus Boundary
Priority Development Area
Potential Source Property of TCE/PCE Contaminated Groundwater
Potential Source Property of Petroleum-Contaminated Groundwater
Parcel Not Owned by UW But Within Master Plan Boundary
Storm Drain Utility
Sewer Utility

300 0 300
Feet

Notes:
PDA = Priority Development Area
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Potential Contaminant Sources

2013 Environmental Subsurface Investigation
University of Washington – Tacoma
Tacoma, Washington

GeoEngineers

Figure ES-4

Office: TAC Path: \\tac\projects\0\0183085\GIS\Reports\FigureES4_Potential_Contaminant_Sources.mxd Map Revised: 19 December 2014 cgonzales

Table of Contents

EXECUTIVE SUMMARY **ES-1**
1.0 INTRODUCTION **1**
2.0 GENERAL SITE DESCRIPTION **1**
2.1. Campus Master Plan 1
2.2. Priority Development Areas 1
2.3. Agreed Order 2
3.0 REPORT ORGANIZATION **2**
4.0 PROJECT PURPOSE AND GOALS **3**
5.0 GENERAL SUMMARY OF PREVIOUS INVESTIGATIONS **4**
5.1. Geology Based Existing Information 4
5.1.1. Mapped Geology 5
5.1.2 Review of Existing Boring Logs 5
5.2. Hydrogeology 6
5.3. Contaminated Media 6
6.0 REGULATORY AND HISTORICAL REVIEW **7**
6.1. PDA Review 7
6.2. Potential Contaminant Sources of TCE/PCE-Impacted Groundwater 7
7.0 SITE CHEMICALS OF CONCERN **8**
8.0 SUBSURFACE INVESTIGATION AND FIELD ACTIVITIES **9**
8.1. Overview 9
8.2. Magnetic and GPR Survey (M/GPR) 9
8.2.1 Magnetic and GPR Survey Methodology 10
8.2.3. Magnetic and GPR Survey Results and Associated Test Pit Investigation 10
8.3. Subsurface Explorations and Soil Sampling Activities 11
8.3.1 Soil Sampling and Analysis 11
8.4. Monitoring Well Installation and Development 13
8.4.1. Well Installation 13
8.4.2. Well Development 14
8.5. Groundwater Sampling and Analysis 14
8.5.1. Groundwater Investigation Locations and Sampling 14
8.5.2 Groundwater Sample Collection Methodology 14
8.5.3. Groundwater Analytical Program 15
8.6. Hydrogeological Testing 15
8.6.1. Snap-Shot Water Level Measurements 15
8.7. Soil Vapor Monitoring Well Installation 15
8.8. Monitoring Well Surveying 16
8.9. Well Repair and Decommissioning 16
9.0 ENVIRONMENTAL SETTING **16**
9.1. Physical Conditions 16
9.1.1. Topography 16
9.1.2. Site Drainage 16
9.2. Geology 17

9.2.1. Fill.....17
9.2.2. Recessional Outwash.....17
9.2.3. Ice-Contact Deposits.....18
9.2.4. Silt Layer and Transition Zone.....18
9.2.5. Advance Outwash.....19
9.2.6. Lawton Clay.....19
9.2.7. Cross-Sections.....19
9.3. Hydrogeology.....20
9.3.1. Shallow Aquifer.....20
9.3.2. Silt Layer.....21
9.3.3. Deep Aquifer.....21
9.3.4. Undetermined Aquifer.....22
9.3.5. Shallow/Deep Aquifer Vertical Hydraulic Gradients.....22
9.3.6. Connectivity Between Water Bearing Units.....22
10.0 CHEMICAL ANALYTICAL PROGRAM.....23
10.1. Analytical Results Summary Format.....23
10.2. Analytical Results Evaluation Criteria.....23
10.3. Chemical Analytical Results – Soil.....24
10.3.1 Westerly Plume Area – Soil Chemical Analytical Results.....24
10.3.2. Easterly Plume Area – Soil Chemical Analytical Results.....31
10.3.3. Soil Physical Parameters.....34
10.4. Chemical Analytical Results - Groundwater.....35
10.4.1. Westerly Plume.....36
10.4.2. Easterly Groundwater Plume.....40
10.5. Tioga Building Sump Sampling and Analytical Results.....44
11.0 SUMMARY AND FINDINGS UWT CAMPUS INVESTIGATION.....45
11.1. Westerly Plume – Results and Interpretation.....45
11.1.1. Westerly Plume - Soil.....45
11.1.2. Westerly Plume - Groundwater.....47
11.2. Easterly Plume - Results and Interpretation.....50
11.2.1. Easterly Plume - Soil.....50
11.2.2. Easterly Plume – Groundwater.....50
12.0 FUTURE STRATEGIES FOR PROPERTY DEVELOPMENT.....53
12.1. Future Natural Attenuation Evaluation Strategy for Groundwater.....53
13.0 NEW AGREED ORDER.....54
14.0 OPPORTUNITIES AND APPROACHES FOR THE FUTURE.....54
14.1. Further Evaluation and Remediation Prior to Development.....55
14.1.1. Shallow Aquifer - Remedial Investigation and Feasibility Study.....55
14.1.2. Identification of Sources and Complete Remediation.....56
14.1.2.3. Develop a Comprehensive Record of Groundwater Conditions Within the Westerly Plume.....56
14.2. Development Within Contaminated Media and Implement Mitigation Measures.....56
14.2.1. Typical Impacts and Mitigation Measures For Development.....57
14.2.2. Central Treatment System for Building Drainage.....58
14.3. Modify Development to Avoid Contact with Contamination.....58

14.3.1. Modify Assumed Building Design.....58
14.3.2. Develop in Areas Outside of Groundwater Plumes.....58

15.0 LIMITATIONS..... 59

LIST OF TABLES

Table 1. Proposed Construction Activities and Potential Impacts
Table 2. Geologic and Hydrogeologic Units
Table 3. Priority Development Areas - Historical Site Uses
Table 4. Summary of Potential Sources
Table 5. Magnetic Anomaly Investigation Summary
Table 6. Summary of Chemical Analysis - Soil
Table 7. Summary of Well Installations and Survey Data
Table 8. Summary of Chemical Analysis - Groundwater
Table 9. Water Level Snap Shot Measurements
Table 10. Monitoring Well Repair/Decommission Information
Table 11. Soil Physical Parameters for Select Samples
Table 12. Water Level Vertical Gradient Calculations
Table 13. Summary of Exceedances Greater Than MTCA for Petroleum Hydrocarbons, Metals and Carcinogenic PAHS in Test Pits and Borings - Soil
Table 14. Summary of Chemical Analytical Results for Petroleum, Total Metals and Primary PAHs - Soil
Table 15. Summary of All Chemical Analytical Results of All Samples for Selected HVOCs - Soil
Table 16. Summary of Chemical Analytical Results for Detected VOCs - Soil
Table 17. Summary of Chemical Analytical Results for Petroleum and Primary VOCs - Groundwater
Table 18. Summary Of Chemical Analytical Results For Secondary VOCs - Groundwater
Table 19. Summary of Chemical Analytical Results for Metals and PAHs - Groundwater
Table 20. Summary of Chemical Analytical Results - Sump Water

LIST OF FIGURES

Figure 1. Vicinity Map
Figure 2. UWT Campus and Priority Development Areas
Figure 3. Historic Information From Previous Investigations
Figure 4. Potential Contaminant Sources
Figure 5. Magnetic Survey and Exploration Test Pit Locations
Figure 6. Borings and Test Pit Locations
Figure 7. Monitoring Well Locations
Figure 8. Topographic Map and Cross Section Locations
Figure 9. Cross Section A-A’
Figure 10. Cross Section B-B’
Figure 11. Groundwater Elevation Contours - Shallow Aquifer - North
Figure 12. Groundwater Elevation Contours - Deep Aquifer - North
Figure 13. Water Level Elevation Contour Map - Lithology Not Determined
Figure 14. Groundwater Elevations in Paired Deep and Shallow Monitoring Wells
Figure 15. cPAH- and PAH-Detected and Contaminated Soil
Figure 16. Metal-Impacted and Metal-Contaminated Soil
Figure 17. Petroleum Hydrocarbon-Contaminated and Impacted Soil
Figure 18. PCE- and TCE- Impacted and Contaminated Soil - Fill

Figure 19. PCE- and TCE- Impacted and Contaminated Soil – Ice-Contact Deposits
Figure 20. PCE- and TCE- Impacted and Contaminated Soil – Silt and Transition Zone
Figure 21. PCE- and TCE- Impacted and Contaminated Soil – Advance Outwash
Figure 22. TCE, PCE and LORPH in Shallow Aquifer Westerly Plume
Figure 23. PCE and TCE in Easterly and Westerly Plumes - Deep Aquifer and Not Determined Aquifer
Figure 24. Benzene, Chlorobenzene, and TPH in Easterly Plume
Figure 25. Vinyl Chloride in Easterly Plume

APPENDICES

Appendix A. Summary Letter of Impacts and Mitigation
Individual Priority Development Areas Technical Reports
Summary of Impacts, Mitigation Measures and Estimate Costs, dated May 20, 2014
PDA 1A – Upton
PDA 1B – Tacoma Vacant
PDA 1C – Fawcett North
PDA 1D – Fawcett South
PDA 1E – Strom
PDA 1F – Fawcett Parking/Lot T47 and T48
PDA 1G – Laborers/Lot T39 and T40
PDA 2A – Sound Care
PDA 2B – Jefferson Street Parcel/Transit Turnaround
PDA 2C – Pinkerton Parking
PDA 2D – Tacoma Paper and and Stationary
PDA 2E – The Swiss Pub and Frederick Wild
PDA 2F – Tioga Building
Appendix B. References
Appendix C. GPR Survey Results
Appendix D. Field Program and Boring Logs
Appendix E. MTCA Method B Groundwater Screening Level Protective of Indoor Air Calculation
Appendix F. Chemical Analytical Program
Appendix G. Report Limitations and Guidelines for Use

1.0 INTRODUCTION

This report provides the results of the environmental subsurface investigation performed for the University of Washington (UW) at the UW – Tacoma (UWT) campus located in Tacoma, Washington. The environmental subsurface investigation was completed under the Environmental Assessment Project, UW project number 204277. The location of the UWT campus master plan boundary is shown on Figure 1 and herein referred to as the "site."

2.0 GENERAL SITE DESCRIPTION

The site is located just off Interstate 5 within the downtown core of Tacoma, Washington. The existing UWT campus is generally located between South 17th Street and South 21st Street and between Market Street and Pacific Avenue as shown on Figure 2. The campus consists of rehabilitated historic buildings and new modern buildings. The site extends from the western boundary of the existing campus to Tacoma Avenue.

2.1. Campus Master Plan

The Master Plan will include redevelopment of existing historical structures when feasible, construction of new buildings, parking lots and/or garages, extension of the central campus stairway and accompanying beautification. Existing facility utility upgrades will also be included as part of the Master Plan.

UW is in the process of acquiring other parcels within the site. The existing UWT campus, the site, and parcels currently not owned by UW are shown on Figure 2.

2.2. Priority Development Areas

UW identified 14 priority development properties for the focus of this environmental subsurface investigation project. The 14 properties were categorized into two priority development areas (PDAs), PDA 1 and PDA 2 based on the property locations relative to Market Street. The PDAs are shown on Figure 2 and summarized in Table 1.

PDA 1 includes eight properties that generally encompass the site west of Market Street. Properties within PDA 1 are generally undeveloped, with relatively small portions developed with single-family residences, two businesses, UWT Facilities Maintenance area, UW medical facility and parking lots. PDA 1 is considered the expansion area for the UWT campus. PDA 2 includes six properties that generally encompass the existing UWT campus east of Market Street. Present land uses include parking lots, a park and campus buildings with retail spaces.

PDA 1	PDA 2
1A - Upton	2A - Sound Care
1B - Tacoma Vacant	2B - Jefferson Street Parcel/Transit Turnaround
1C - Fawcett North	2C - Pinkerton Parking
1D - Fawcett South	2D - Tacoma Paper and Stationary
1E - Strom Property	2E - The Swiss Pub and Frederick Wild
1F - Fawcett Parking/Lot T47 and T48	2F - Tioga Building
1G - Laborers/Lot T39 and T40	
1H - Y Student Center	

2.3. Agreed Order

UW entered into an Agreed Order (#DE 97HW-S238) with the Washington State Department of Ecology (Ecology) in 1997 for known contaminated soil and groundwater on the UWT campus. UW and Ecology are currently in the process of issuing a new agreed order for the UWT campus. The current environmental investigation is located within the boundaries of the old and new agreed order.

3.0 REPORT ORGANIZATION

The executive summary of the report provides an overview of the findings and recommendations for future investigation and discussion of the impacts to development. The main body of this report provides details of this environmental investigation on the UWT campus as a whole including a summary of previous investigations, possible contaminant sources, subsurface investigation and chemical analytical data. The Opportunities and Approaches for the Future section provides general impacts and mitigation measures to address during design and construction associated with environmental impacts. The Opportunities and Approaches for the Future section also provides a discussion on recommended remedial investigations.

This document also includes individual reports for each PDA site, which have been developed and included in Appendix A. The individual reports summarize the findings on each PDA site and include site-specific impacts and mitigation measures for development based on the proposed development plans provided by UW. A separate letter report titled “Summary of Impacts, Mitigation Measures and Estimate Costs” dated May 20, 2014 was submitted as an individual report and is also included in Appendix A.

UWT ENVIRONMENTAL INVESTIGATION SUMMARY OF REPORTS

Report		Intended Audience			
		UW and UWT Planning	CPO and Design Team	UW EH&S	Ecology
Summary of Impacts, Mitigation Measures and Estimate Costs – Dated May 20, 2014		x		x	
2013 Environmental Subsurface Investigation Report Dated December 19, 2014	Executive Summary	x			
	Main Text			x	x
	Appendix A (Site Specific Reports)		x	x	

4.0 PROJECT PURPOSE AND GOALS

The purpose of this environmental investigation is to further evaluate soil and groundwater conditions at the site in order to provide UW the ability to budget for remedial mitigation actions within the PDAs during the design and construction phases of the project. The goals of this environmental investigation include the following:

- Evaluation of soil and groundwater impacts within the PDAs to assist in budgeting and planning their design and construction.
- Installation of additional monitoring wells in select areas to further evaluate the groundwater plumes lateral and vertical extent, and to help define the boundary for the new agreed order and future design and construction within the PDAs. The select areas include the following:
    - Westerly Plume – Trichloroethene (TCE)- and Tetrachloroethene (PCE)-contaminated groundwater plume near Tacoma Avenue.
    - Easterly Plume –
        - Northern portion of the benzene-contaminated groundwater plume located near Jefferson Avenue.
        - TCE-contaminated groundwater plume near Dolly Roberson Lane and C Street. A benzene- and total petroleum hydrocarbon-contaminated groundwater plume is also present within this TCE groundwater plume.
- Identification of potential sources of the contaminant groundwater plumes based on our review of existing historic information.
- Groundwater monitoring in new and existing wells to provide an updated dataset of groundwater conditions for the new agreed order and PDAs. This also included decommissioning or repair of broken existing wells as necessary.

5.0 GENERAL SUMMARY OF PREVIOUS INVESTIGATIONS

GeoEngineers compiled parcel-specific reports provided by UW related to previous studies and investigations completed on the UWT campus. The environmental reports completed on various properties within the UWT campus included numerous Phase I Environmental Site Assessments (ESAs), subsurface investigations and remedial activities, the remedial investigation/feasibility study (RI/FS) completed on several parcels located within the UWT campus (URS, 2003), and several other subsurface investigations associated with redevelopment, including the Science Building, Joy Building, and the Tioga Library Building. Appendix B includes references for the reports reviewed.

A total of 65 groundwater monitoring wells were installed primarily within the UWT campus area but also east and west of the campus over the course of the previous investigations and remediation efforts. The locations of the existing monitoring wells and sites with property-specific reports are shown on Figure 3.

5.1. Geology Based Existing Information

GeoEngineers conducted an initial interpretation of geology and hydrogeology beneath the site based on our preliminary review of existing information. Geologic information included existing boring logs, current and historical topographic maps, an artist's rendering of the historical site, and geologic maps. Additional information following completion of the subsurface investigation is described in Section 9.0.

The site is located within the Puget Lowlands. The Puget Lowlands lie between the Olympic Peninsula to the west and the Cascade mountains to the east. Multiple periods of continental glaciation occurred in the region during the Pleistocene Epoch (2.5 million to 11,000 years ago) as Cordilleran glaciers advanced into the Puget Lowlands. The Puget Sound area is filled with deep deposits of glacial debris, which can reach thicknesses of 2,000 feet in the Tacoma Area (Alt and Hyndman, 1984).

The most recent period of the glaciation in the Puget Sound was the Vashon Stade of Fraser Glaciation. The ice was approximately 5,000 feet thick near Seattle and approximately 1,500 feet thick in the Tacoma Area. The terminus of the glaciers was approximately 12 miles south of Olympia (Borden and Troost, 2001).

As the glacier advanced, a proglacial lake was formed over the entire Puget Sound (Lake Russell). Fine-grained sand and silts deposited in Lake Russell formed the Lawton Clay formation. As the glacier pushed south, advance outwash (Esperance sands/Colvos sands) were deposited throughout the Puget Sound. Ice-contact deposits were deposited at the base and sidewalls of the glacier, likely during retreat. Ice-contact deposits consist of intermixed outwash (sand and gravel), lacustrine (fine grained sand and silts) and till (unsorted, unstratified, highly compacted mixture of clay, silt, sand, gravel, and boulders). As the glacier retreated, recessional outwash (consisting of sand and gravel) was deposited near the toe of the glacier. Deposits from the Vashon Stade have been characterized as Vashon Drift (Borden and Troost, 2001).

Typical stratigraphic sections of Vashon Drift in Tacoma consists of older silt overlain by advance outwash, till and recessional outwash (Borden and Troost, 2001). Incision of the valleys in the

Puget Sound Lowlands and the subsequent deposition of fluvial and alluvial deposits have occurred to the present after the end of the last glacier retreat (approximately 10,000 to 13,000 years ago). Surficial deposits have also been reworked by human activity. Additional human activity that affects site geology includes the import, placement and grading of non-native fill.

5.1.1. *Mapped Geology*

The City of Tacoma, Pierce County, Washington (Timothy J. Walsh, 1987) geologic map indicates that the site is underlain by glacial till (Qdvt). This material is described on the map as an unsorted, unstratified, highly compacted mixture of clay, silt, sand, gravel, and boulders.

We also reviewed an updated geologic map (Troost, 2004, currently in United States Geological Survey [USGS] review) to further evaluate the geologic formations at the site. Additional information related to subsurface investigations completed within the Tacoma area was used to update the geologic map. The updated geologic map indicates that ice-contact deposits (Qvi) from the Vashon Stade of glaciation are present within the Tacoma area. The mapped Qvi in downtown Tacoma likely represents ice-margin deposits during the Glacial Lake Puyallup Stage (Troost, 2004). Ice-contact deposits consist of intermixed outwash (sand and gravel), lacustrine (fine grained sand and silts) and till (unsorted, unstratified, highly compacted mixture of clay, silt, sand, gravel, and boulders).

5.1.2 Review of Existing Boring Logs

GeoEngineers reviewed the lithology in existing boring logs located within and immediately south of the PDAs (Westerly Plume). Available boring logs of select wells installed within the Easterly Plume were reviewed only in relation to the location of the new wells to be installed during this subsurface investigation. GeoEngineers did not conduct a full review of existing wells within the Easterly Plume because interpretation of the geology in this area was not in the scope of the project.

The existing boring logs generally indicate that the typical Vashon Drift stratigraphic section described above was present with a few exceptions. The site-specific geology observed consisted of the following as described in Table 2.

- Fill. Imported material and reworked ice-contact deposits.
- Ice-contact deposits. Intermixed outwash (sand and gravel), lacustrine (fine grained sand and silts) and till (unsorted, unstratified, highly compacted mixture of clay, silt, sand, gravel, and boulders).
- Silt layer. Dense, compacted gray sandy silt.
- Transition zone. Interbeds of sand and silt.
- Advance outwash. Sand and gravel with silt.
- Lawton clay. Sandy silt.

5.2. Hydrogeology

GeoEngineers developed our hydrogeologic interpretation on the UWT campus based on review of the boring logs and water level information from the previous investigations completed on the campus. GeoEngineers conducted this evaluation prior to beginning this subsurface investigation program.

It appears there is a shallow and deep aquifer on the site based on the preliminary review of the geologic information discussed above. A shallow unconfined water-bearing unit appears to be present within the ice-contact deposits. A deeper semi-confined to confined aquifer appears to be present within the advance outwash unit. A dense silt layer was observed between the ice-contact deposits and advance outwash unit in some of the boring logs completed by others although soil samples were typically collected at 10-foot depth intervals.

The shallow aquifer is located within the ice-contact deposits and appears to be likely discontinuous across PDA 1 and PDA 2. The depth of the shallow aquifer is anticipated to extend to a depth between the ground surface and 10 to 40 feet below ground surface (bgs).

The deep aquifer unit is anticipated to be within the advance outwash. The deep aquifer appears to be semi-confined to confined based on the groundwater elevations observed in monitoring wells screened within the advance outwash. The vertical extent of the advance outwash was not fully evaluated.

The Lawton Clay is considered the regional aquitard (Jones, 1999). This indicates on a regional scale, the shallow and deep aquifer on the UWT campus is considered one unconfined aquifer. However, the presence of the shallow and deep aquifers on the UWT campus is important to better understand contaminant transport pathways.

5.3. Contaminated Media

Contaminated soil and groundwater are present on the site. Our review of previous investigations focused on impacted and contaminated soil within PDA 1 and PDA 2. Previous investigations were completed on four PDA sites as listed below. The findings are summarized in Table 3 and in the site-specific reports provided in Appendix A.

- Area 1E - Strom
- Area 1F - Fawcett Parking/Lot T47and T48
- Area 2A - Sound Care
- Area 2E - The Swiss Pub and Frederick Wild

The groundwater plumes relevant to this investigation beneath the site include:

- The Westerly Plume consists primarily of TCE and PCE. The known extent of the Westerly Plume generally trends from south of South 19th Street and Tacoma Avenue to north of South 19th Street and Jefferson Avenue prior to this investigation. The source(s), along with the vertical and lateral extents, of the Westerly Plume are not known at this time.

- The Easterly Plume consists of multiple contaminants of concern. The main groundwater plume consists of a TCE and vinyl chloride, with two smaller areas with benzene/petroleum-contaminated groundwater and an area with vinyl chloride/petroleum-contaminated groundwater. The Easterly Plume is located within the existing UWT campus and located south of the PDAs. The plume generally trends from north of South 21st Street and Market Street to south of the South 19th Street Stairs and Pacific Avenue. The source(s) and the lateral extents of the Easterly Plume to the north are not known at this time.

6.0 REGULATORY AND HISTORICAL REVIEW

6.1. PDA Review

GeoEngineers completed a review of regulatory and historical documents in conjunction with a site reconnaissance to evaluate the historical conditions and potential environmental concerns within the PDAs prior to completion of the subsurface investigation. The general history of the site and potential areas of concern is summarized in Table 3. The history of each PDA is included within the site-specific reports in Appendix A. The complete list of reviewed documents is presented in Appendix B.

6.2. Potential Contaminant Sources of TCE/PCE-Impacted Groundwater

The potential sources of contamination related to the Easterly and Westerly Plumes are not known at this time. GeoEngineers performed general research of historical and regulatory information to identify potential sources of the TCE/PCE contamination within and adjacent to the UWT campus. The historical and regulatory methodology of the potential sources for the TCE/PCE-contaminated groundwater plumes consisted of the following:

- City of Tacoma Sanitary and Storm Sewer Utilities. The extents and flow directions of the City of Tacoma sanitary and storm sewers were reviewed for evaluation as potential preferential pathways.
- Site Screening Review/Regulatory Database Study. The results of a federal, state, local and tribal environmental database search within a 1-mile radius of campus were reviewed. Sites on the Confirmed and Suspected Contaminated Site List with known soil and groundwater contaminated with halogenated solvents were reviewed. The Resource Conservation and Recovery Act (RCRA) hazardous waste generation database was also reviewed to identify sites where hazardous waste has been generated.
- Tacoma-Pierce County Health Department (TPCHD) Records. GeoEngineers reviewed records related to Underground Storage Tank (UST) Removal Permit sites, Abandoned Commercial Tank sites, and Site Hazard Assessment Initial Investigation obtained from TPCHD.
- Field Reconnaissance/Windshield Survey. A field reconnaissance was completed on properties owned by UW. GeoEngineers also conducted a windshield survey on nearby properties not owned by UW, including the areas upgradient of the UWT campus and from the campus to South J Street between South 15th Street and South 21st Street. The windshield surveys were limited to features readily observed from public access corridors and did not include entering or viewing conditions within buildings.

- **Sanborn Map and City Directory Review.** The Sanborn Maps and city directories were reviewed for properties between South 15th Street and South 21st Street and South J Street and Market Street to identify potential sources to the TCE/PCE groundwater plumes.
- **City of Tacoma Permit Records and Ecology Records.** The City of Tacoma permit records and the records obtained from Ecology for sites that were identified as suspected sites during the regulatory database searches described above were reviewed.

The results of our review are shown on Figure 4 and summarized in Table 4. A total of 22 sites were identified as potential sources of TCE groundwater contamination on the UWT campus. Seven of the sources are located on properties that are currently owned by UW:

- Cleaners (1961 to 1970s)
- Steam Laundry (1926)
- Motorcycle Service (1942 to 1969)
- Cleaners (1931)
- Sheet Metal Shop, Refrigeration Manufacturer (1931 to 1970)
- Fuel Company (1926 to 1947)
- Auto Repair (1950)

One potential source was identified in the Tacoma Paper and Stationary Building (PDA 2D). However, the existence of a groundwater plume beneath this site is being investigated under UW CPO Project No. 204701.

7.0 SITE CHEMICALS OF CONCERN

Chemicals of concern (COC) for this investigation were based on historical uses within the PDAs and requirements of the Agreed Order for the UWT campus. The initial COC within the two PDAs include the following based on past facilities' uses and operations:

- Diesel- and lube oil-range petroleum hydrocarbons.
- Gasoline-range petroleum hydrocarbons.
- Model Toxics Control Act (MTCA) metals for soil that will remain at each site following construction and RCRA metals for soil to be excavated and removed from the site during construction to evaluate soil conditions.
- Volatile organic compounds (VOCs).
- Polycyclic aromatic hydrocarbons (PAHs). Semivolatile organic compounds (SVOCs) have historically been analyzed as a COC as part of the Agreed Order (#DE97HW-S238). PAHs (a subset of SVOCs) are identified as a COC for this project because PAHs typically have been the only compounds detected when the full suite of SVOCs has been analyzed during previous investigations.

- Polychlorinated biphenyls (PCBs). PCB analysis was limited to PDAs 1A, 1D and 1F because PCBs are COC on these PDAs based on historical use.

8.0 SUBSURFACE INVESTIGATION AND FIELD ACTIVITIES

8.1. Overview

The 2013 subsurface investigation was performed to further evaluate soil and groundwater conditions primarily within the PDAs but also within and near the Westerly Plume and the northern and eastern portion of the Easterly Plume. Additionally, information obtained during this subsurface investigation and the previous investigations were used to further define the complex geologic and hydrogeologic conditions that exist within the site.

The subsurface investigation activities were completed in general accordance with the Ecology-approved Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP) and the supplemental SAP/QAPP prepared for the project (GeoEngineers, 2013).

The investigation activities included the following:

- Completed magnetic and ground penetrating radar (M/GPR) survey and investigative test pits within the PDA 1 and select areas within PDA 2 to identify any anomalies that may be indicative of potential USTs. The M/GPR survey was completed around the footprint of the existing buildings.
- Advanced 45 soil borings using direct-push drilling methods, 30 soil borings using sonic core drilling methods (one well was decommissioned and replaced), two hand augers and 14 test pits using a rubber-tired backhoe.
- Submitted 402 soil samples for chemical analysis.
- Converted the 30 soil borings advanced using sonic core methods into permanent groundwater monitoring wells. Eleven wells were completed within the advance outwash and 19 wells were set within the ice-contact deposits. Additionally, four temporary monitoring wells were completed within four of the soil borings using direct-push methods.
- Collected groundwater samples for chemical analysis from 85 monitoring wells, including the 29 newly installed permanent monitoring wells, four temporary groundwater monitoring wells and 52 previously installed monitoring wells.
- Collection and analysis of a water sample from a sump within the Tioga Building.
- Hydrogeological testing that included “snapshot” groundwater level measurements.
- Repair of four monuments and concrete casings, and new bolts tapped on 14 monument lids.
- Decommissioning of one monitoring well (CR-MW11) due to unrepairable well casing damage.

8.2. Magnetic and GPR Survey (M/GPR)

An M/GPR survey was conducted in select areas near and within PDA 1 and PDA 2. The M/GPR survey was not performed within existing structures.

Historic research results indicate the need for an initial magnetic survey primarily due to the size and the quantity of historic structures observed within the PDAs. Heating conversion permits were listed in the majority of the sites. These historic structures either potentially contained heating oil tanks at some point in the past based on the age and type of the structure, or were documented to contain a heating oil tank through permit records.

8.2.1 Magnetic and GPR Survey Methodology

GeoEngineers subcontracted with Global GeoPhysics to complete magnetic and GPR surveys between June 1 and June 7, 2013. Magnetic surveys and GPR surveys are used to measure variations in Earth's magnetic field and are commonly used to locate buried drums, USTs, pilings and reinforced concrete. A drawing is developed showing areas with high magnetic fields by mapping the magnetic anomalies along parallel transects. These anomalies generally indicate buried steel objects. GPR is a similar technology and can give more accurate results; however, due to the size of some of the areas to be surveyed, it is cost prohibitive as an initial survey method. GPR was used in areas where the magnetic survey indicated a magnetic anomaly.

The surveys were completed on the following PDA properties:

- 1A – Upton
- 1B – Tacoma Vacant
- 1C – Fawcett North
- 1D – Fawcett South
- 1E – Strom
- 1F – Fawcett Parking
- 1G – Laborers
- 1H – Y Student Center
- 2A – Sound Care
- 2B –Jefferson/Transit Turnaround
- 2C – North of Pinkerton

Spray paint markings and stakes were used in the field to signify anomalies. Test pit excavation activities were conducted in areas where USTs may be present based on the magnetic anomalies shown in the surveys.

8.2.3. Magnetic and GPR Survey Results and Associated Test Pit Investigation

A total of twenty anomalies were identified during the magnetic survey as shown in Figure 5 and included in Appendix C. The magnetic anomalies were identified based on the PDA location and order of the anomaly. For example, 1B-A1 was the first anomaly investigated in PDA 1B. A GPR survey was completed within some of the magnetic anomaly areas and revealed similar results. The results of the magnetic survey are included in Appendix C. Thirteen of the 22 magnetic anomalies were further investigated in areas of former commercial buildings or apartments using exploratory test pits between June 24 and June 25, 2013. Nine of the anomalies were not investigated because they were located in existing asphalt or concrete or the anomalies were near former houses.

The test pits were completed by excavating a trench until native soil conditions were observed. The results of the magnetic anomaly investigation are summarized in Table 5. USTs were not encountered in any of the test pits completed during this investigation. In general, metal of various types (buckets, pipes, chicken wire, construction debris and fencing) was observed in the test pits. However, piping material observed in test pits 1B-A2, 1B-A3, 1B-A4, 1B-A5, 1C-A1, 1C-A2, 1D-A3, and 1D-A4 may be indicative that a former UST was present in these areas in the past.

8.3. Subsurface Explorations and Soil Sampling Activities

GeoEngineers conducted drilling and soil sampling activities in two phases between May and October 2013. The first phase was completed between May to July 2013. The second phase was completed between September 2013 and January 2014. The investigation consisted of 45 direct-push explorations, two hand augers, 14 test pit explorations and 36 sonic core borings installed as monitoring wells. The borings and test pits completed and soil samples submitted for chemical analysis are summarized in Table 6. The boring and test pits locations are shown on Figure 6. Field protocols are described in Appendix D.

8.3.1 Soil Sampling and Analysis

8.3.1.1. SOIL INVESTIGATION LOCATIONS AND SAMPLING

Soil samples were collected from 91 locations as part of the subsurface investigation as shown on Figure 6. A summary of the investigation locations and soil samples that were collected is provided in Table 6. Soil samples were obtained during the subsurface investigation from soil borings and test pits using mechanical and manual methods.

Mechanical equipment used to collect soil samples included the following:

- Excavator;
- Direct-push coring rig; and
- Sonic core drill rig.

Direct-push coring techniques involved advancement of a 5-foot-long core sampler with an acetate liner. Core samples were continuously collected from the surface to an approximate total depth of 20 feet or drill refusal, whichever was encountered first. Upon retrieval, the core sampler was opened so that a geologist could examine the soil, perform field screening tests and collect soil samples for chemical analysis.

Sonic core drilling techniques involved advancement of an 8-inch to 10-inch-diameter casing and sample collection using a 6-inch to 8-inch-diameter core barrel. The core samples were continuously collected in either 5-foot or 10-foot sample intervals. The casing was telescoped when the shallow aquifer was penetrated during well installation. The core barrel was advanced ahead of the casing into the undisturbed soil deposits. Samples collected in the core barrel were retrieved and then extruded so that a geologist could examine the soil, perform field screening tests and collect soil samples for chemical analysis.

Test pits were completed using a backhoe. The test pits were completed by excavating a trench to the desired depth. Excavated soil was stockpiled on the side of the trench. The excavated soil was placed back in the excavation following sampling and tamped with the back of the excavator bucket.

A manual hand auger was used to complete one boring in the Tioga Building (PDA 2F – Tioga Building) due to cast iron utilities in the area that were not locatable. The hand auger was advanced in 6-inch depth increments using a 3-inch-diameter auger. Soil removed was placed on a new plastic bag.

Soil samples were collected in accordance with the SAP/QAPPs. The soil samples collected were logged by a geologist on boring log forms following the ASTM International (ASTM) D 2487 Unified Soil Classification System (USCS) and ASTM D 2488 Visual-Manual Procedure. The boring logs prepared as part of the subsurface investigation are provided in Appendix D.

Soil samples collected for chemical analysis at each location were thoroughly homogenized and then placed in laboratory-supplied sample containers (i.e., glass jars). The soil samples were logged on a chain-of-custody form and placed in coolers with ice for transport and delivery to the analytical laboratory.

8.3.1.2. SOIL SAMPLE ANALYSES

A total of 402 soil samples were submitted for chemical analysis as summarized on Table 6. Chemical analysis of soil samples was completed by OnSite Environmental, Inc., (OnSite) in Redmond, Washington. All soil samples were collected and analyzed in general accordance with the project SAP/QAPP. Soil samples collected during the initial investigation were analyzed for the following:

- Petroleum hydrocarbon identification with appropriate follow-up with NWTPH-Gx and/or NWTPH-Dx as applicable;
- Total RCRA metals by Environmental Protection Agency (EPA) method 6000/7000 series;
- VOCs by EPA method 8260C;
- PAHs by EPA method 8270D/SIM; and
- Select soil samples were analyzed for PCBs by EPA method 8081.

The chemical analysis protocol was modified during the investigation activities in accordance with the SAP Addendum. Soil samples were submitted for chemical analysis as follows:

- **Within Development Areas (i.e., not Right-of-Way [ROW]).** Fill material near the surface in areas to be developed was analyzed for petroleum hydrocarbon identification with appropriate follow-up by gasoline- and/or diesel- and lube oil-range petroleum hydrocarbons as applicable, total metals, VOCs and PAHs. Native soils were only analyzed for VOCs. Native soil samples may be analyzed as follow-up analysis for gasoline- and/or diesel- and lube oil-range petroleum hydrocarbons, total metals and PAHs to evaluate the vertical extent of contaminated soil in the fill material or based on field screening results.
- **Easterly Groundwater Plume Within the ROW.** Soil samples collected were analyzed for VOCs and petroleum hydrocarbon identification with appropriate follow-up by NWTPH-Gx and/or NWTPH-Dx as applicable.
- **Westerly Groundwater Plume Within the ROW:** Soil samples were analyzed for VOCs.

Select soil samples also included the following analyses as summarized in Table 6. The following analysis was performed on these soil samples to provide data for the development of contaminant partition models and for a preliminary evaluation of whether soil conditions could be conducive to natural attenuation:

- Particle Grain Size was performed on 15 soil samples collected from five borings by ASTM Method D422.
- Total Solids was performed on 15 soil samples collected from five borings by Standard Method (SM) 2540G.
- Total Organic Carbon was performed on eight soil samples collected from five borings by SM 9060.
- Bulk Density was performed on seven soil samples collected from five borings by SM 2710.
- Soil pH was performed on eight soil samples collected from five borings by ASTM D 4972.
- Synthetic Precipitation Leaching Procedure (SPLP) was performed on four soil samples collected from four borings by EPA method 1312/8260C.
- Cation Exchange Capacity was performed on five soil samples collected from four borings by SM9081.

8.4. Monitoring Well Installation and Development

8.4.1. *Well Installation*

A total of 30 permanent monitoring wells (29 new wells and one replacement well) and four temporary monitoring wells were installed to evaluate groundwater conditions as shown on Figure 6. Nineteen permanent monitoring wells and four temporary monitoring wells were installed within the shallow aquifer. Eleven permanent monitoring wells were installed within the deep aquifer.

The well installation program included six sets of well pairs in select locations. The well pairs consisted of installing two wells: one well screened within the shallow aquifer and the paired well screened within the deep aquifer.

In general, the placement of the monitoring wells was to evaluate the following environmental concerns as described in Table 7.

- Evaluate the lateral extent of VOCs including chlorinated VOCs (CVOCs) and benzene within and near the PDAs.
- Replace monitoring wells that were decommissioned in the past along Dolly Roberson Lane within the Easterly Plume.
- Evaluate the geology and hydrogeology at the site within the boundaries of PDA 1 and PDA 2 and other nearby properties.
- Decommission new well JS-MW7 and install the replacement well.

Well installation methodology is summarized in Appendix D. The screen interval depths, lithology and elevations are summarized in Table 7.

8.4.2. Well Development

Each groundwater monitoring well sampled as part of the investigation (new or existing) was developed prior to the initial groundwater sampling event. Well development for the new monitoring wells was completed to remove water that may have been introduced into the well during drilling, stabilize the filter pack and formation materials surrounding the well screen and restore the hydraulic connection between the well screen and the surrounding soil. Well development for the preexisting monitoring wells was performed to remove soil or solids that may have accumulated in the well since the last time the well had been sampled and to restore the hydraulic connection between the well screen and the surrounding soil. The well development protocol is summarized in Appendix D. Groundwater sample results are summarized in Section 10.0.

8.5. Groundwater Sampling and Analysis

8.5.1. Groundwater Investigation Locations and Sampling

Groundwater samples were collected from a total of 85 existing and new monitoring wells as part of the subsurface investigation. The monitoring wells sampled to evaluate groundwater conditions included the 29 permanent new wells, four temporary new wells, and 52 existing wells. The monitoring well locations where groundwater samples were collected are shown on Figure 7. Groundwater sampling activities occurred between June 2013 and January 2014.

8.5.2 Groundwater Sample Collection Methodology

Groundwater sampling activities were completed at least 72 hours following well development. Groundwater elevations were measured and recorded upon initiation of sampling at each well using an electronic water level indicator. Groundwater purging and sample collection was completed using low-flow/low-turbidity sampling techniques to minimize the suspension of sediment in the groundwater samples. The wells were purged and groundwater samples were obtained from the wells using dedicated polyethylene tubing and a bladder pump. Groundwater was purged from the wells at a rate of 0.5 liters per minute or less.

A water quality measuring system (i.e., Horiba U-22, YSI 556 or YSI Professional Plus) with a flow-through cell was used to monitor water quality parameters during purging including pH, electrical conductivity, dissolved oxygen, temperature, and oxidation-reduction potential. Turbidity was measured using a separate turbidimeter (Hach 2100P or LaMotte 2020e). Samples were collected from the wells after the water quality parameter measurements varied by less than 10 percent on three consecutive readings. The water quality parameters measured in the field were documented on field logs.

Groundwater samples were collected into laboratory-prepared containers following completion of the well purging. The samples collected for analysis of dissolved parameters were filtered in the field using disposable 0.45-micron filters. The groundwater samples were logged on the chain-of-custody form and placed in coolers with ice for transport and delivery to the analytical laboratory.

Groundwater samples were collected and analyzed in general accordance with the project SAP/QAPP.

8.5.3. Groundwater Analytical Program

The groundwater analytical program was developed to identify the chemicals of concern for the new permanent wells installed as part of this investigation and the existing permanent wells based on the historic data. The groundwater analytical program is briefly listed below and summarized in Table 8.

Analyses performed on groundwater samples collected from new wells included a combination of the following:

- VOCs by EPA method 8260B;
- Diesel- and lube oil-range petroleum hydrocarbons by Ecology-approved method NWTPH-Dx;
- Gasoline-range petroleum hydrocarbons by Ecology-approved method NWTPH-Gx;
- Total MTCA metals (arsenic, cadmium, chromium, lead, and mercury) by EPA method 200 series. Follow-up analysis of dissolved metals was completed if total metals were detected at a concentration greater than the respective MTCA cleanup level; and
- PAHs by EPA method 8270D.

Analysis performed on existing monitoring wells consisted of the following based on the chemical of concern in the area:

- VOCs by EPA method 8260B;
- Diesel- and lube oil-range petroleum hydrocarbons by Ecology-approved method NWTPH-Dx; and
- Gasoline-range petroleum hydrocarbons by Ecology-approved method NWTPH-Gx.

8.6. Hydrogeological Testing

8.6.1. Snap-Shot Water Level Measurements

Groundwater levels were measured within the existing monitoring wells in July and November 2013. The groundwater level measurements were performed within a 4-hour period to provide a snapshot of groundwater levels. The monitoring wells where the snapshot water level measurements were performed are identified in Table 9. The water level measurement protocol is summarized in the field program included in Appendix D. The groundwater elevations were used to develop groundwater contour maps to determine groundwater flow direction and gradient. The results from the snapshot water level measurements are presented in Section 8.3.

8.7. Soil Vapor Monitoring Well Installation

A soil vapor sample was scheduled for collection during subsurface investigation activities. Several attempts to collect the soil vapor sample at PDA H – Y Student Center were performed on June 14, 2013. No soil vapor sample was collected due to either low permeability soil or shallow groundwater (3 to 7 feet bgs) being drawn into the vapor sampling equipment when pressure was applied to the soil matrix. The UW project team made the decision to not complete additional soil vapor sampling as part of this investigation.

8.8. Monitoring Well Surveying

The licensed surveying firm AHBL was retained to survey the monitoring wells installed by GeoEngineers. The survey consisted of elevation and coordinates of the wells casing and monument rim. The results of the survey are included in Table 7.

8.9. Well Repair and Decommissioning

Numerous well monuments were observed to be in poor condition or damaged. These monuments were either repaired or the well was decommissioned. The specifics of the individual wells repairs are summarized in Table 10. In general, the concrete around four monuments was removed because the seals were observed to be damaged. The area around the well was excavated by hand or a vacuum truck until bentonite was observed. The concrete and monument were then replaced.

The bolts on 14 monuments were replaced (tapped) with new bolts. At least one bolt was retapped on every monument; however, GeoEngineers was unable to replace the bolts for every bolt hole because the metal tab on the monuments were broken.

One monitoring well (CR-MW11) was decommissioned due to damage to the well casing. The casing of the monitoring well was removed by overdrilling the well because the Ecology well tag and identification were not available. Following removal of the casing, the hole was backfilled with bentonite.

9.0 ENVIRONMENTAL SETTING

9.1. Physical Conditions

9.1.1. Topography

The UWT campus is located on the side of a slope in downtown Tacoma. The top of the slope is located west of the campus along South J Street. The bottom of the slope is located east of the campus on the Thea Foss Waterway. The elevation of the campus ranges between 50 and 220 feet (North American Vertical Datum 1929 [NAVD]) between Tacoma Avenue and Pacific Avenue. The topography is generally a constant slope east toward Pacific Avenue with the exception of cut-and-fills for development of buildings and parking lots as shown in the topography on Figure 8.

9.1.2. Site Drainage

The UWT campus is a mix of developed/paved parcels and undeveloped grass parcels, and includes features that contain and convey stormwater runoff such as ditches, culverts and pipes. The source of stormwater runoff is from precipitation falling on the campus, including runoff from paved and unpaved surfaces at the site. Stormwater drained from the UWT campus discharges from outfalls located on the shoreline of the Thea Foss Waterway (marine water body).

Perennial groundwater seeps were observed year-round during field reconnaissance in two locations. Both seeps were observed along Market Street where the natural grade has been cut back for development. The seeps appear to occur in areas where the groundwater level was intersected by the excavation. One seep was located in PDA 1H - Y Student Center. The Y Student Center is currently under construction and the intent is to direct the seep discharge to the building underslab drainage system. The second seep was observed on PDA 1G - Laborers/Lot T39 and T40. This seep occurs on a vertically cut soil face. The seep discharge is directed to a nearby catchbasin. Intermittent groundwater seeps were also observed during our investigation originating from the upgradient slope along the Fawcett Avenue sidewalk and appear to occur only after heavy precipitation events.

9.2. Geology

The geology and landforms at the site are largely shaped by the advance and retreat of glaciers during late Pleistocene glaciations approximately 300,000 to 10,000 year ago. Up to 1,800 feet of unconsolidated sediments are mapped in the Tacoma area (Jones et al., 1999). Geologic units pertinent to this study were deposited during the most recent glaciation (Vashon Stade of Frasier Glaciation) that retreated between 13,000 and 10,000 years ago. The entire surface of the UWT campus was recently mapped as ice-contact deposits (Qvi) (Troost in review). The typical geologic sequence in the Tacoma area consists of Vashon Drift, composed of, from youngest to oldest: recessional outwash deposits, recessional lacustrine deposits, Steilacoom Gravel, ice-contact deposits, Vashon till, advance outwash deposits, Lawton Clay and pre-Fraser deposits (Troost in review).

Based on subsurface investigations within the UWT campus, the relevant geology sequence for this investigation consists of fill, recessional outwash, ice-contact deposits, a silt layer and transition zone, advance outwash, and an older silt (Lawton Clay). Recessional outwash deposits were not encountered at the PDAs, but may have been encountered within the existing UWT campus boundary along Dolly Roberson Lane. The deposits within the site-specific sequence are discussed below and shown on Table 2.

9.2.1. Fill

Fill, the youngest deposit, was encountered in the majority of the borings completed at the site. The fill appeared to generally consist of locally derived, reworked ice-contact deposits and recessional outwash. We observed what appeared to be imported fill in the boring (2F-B2) located at the Tioga Building, Tacoma Paper and Stationary Building (2D-B1 through 2D-B5) and in the area of Dolly Roberson Lane (CR-MW16 and CR-MW17).

9.2.2. Recessional Outwash

Recessional outwash is deposited in the front of the glacier as the glacier recedes. Recessional outwash typically consists of unconsolidated sands and gravel with silt. Recessional outwash may have been observed along Dolly Roberson Lane; however, the material was difficult to discern from imported fill. Recessional outwash was not encountered within either PDA 1 or PDA 2.

9.2.3. Ice-Contact Deposits

The surface geology of UWT campus is mapped as either Vashon ice-contact deposits, mapped by Troost (in review) with the symbol Qvi or Vashon till by Walsh (1987) using the map symbol of Qvt. Ice-contact deposits were likely deposited at the site along the ice margin (Troost in review). The ice-contact deposits consist of, glacial till, with interbedded sand and gravel (outwash) and fine grained sand and silts (lacustrine beds). The ice-contact deposits are capable of maintaining very steep slopes, such as the slope in PDA 1G - Laborers/Lot T39 and T40. Glacial till is a very dense, unsorted mixture of clay- through boulder-sized materials deposited directly by the advancing glacier (Walsh, 1987). The geology within the PDAs has been interpreted as ice-contact deposits due to the heterogeneous nature and presence of multiple sand and gravel seams within the glacial till.

The ice-contact deposits within PDAs 1 and 2 generally consist of cemented glacial till with interbeds of sand, gravel and silt. The glacial till within the ice-contact deposits is classified as fine gravel with sand (GM) or fine gravel with silt and sand (GP-GM). The glacial till within the ice-contact deposits are cemented and have relatively low permeability. However, the ice-contact deposits contain numerous sand, gravel and cobble seams that readily contain and transmit groundwater. The gravel fraction of the ice-contact deposits is typically 50 percent and the sand fraction is approximately 35 percent, with the D_{10} size ranging between 0.005 and 0.032 millimeters, as summarized in Table 11. D_{10} is the particle size corresponding to 10 percent finer on the cumulative particle-size distribution curve. The ice-contact deposits beneath the PDAs are generally unweathered, but are weathered where encountered at the ground surface.

Ice-contact deposits consisting of glacial till with sand and gravel interbeds were encountered in every boring and test pit completed during this investigation, with the exception of monitoring well JS-MW3S and existing wells completed by others near JS-MW3S (JS-MW1, JS-MW2 and JS-MW3). The ice-contact deposits consisted of a thick layer (approximately 20 feet) of fine silty sand in this area near the ground surface. Ice-contact deposits were not encountered in existing wells UG-MW17 and UG-MW22. It appears the ice-contact deposits were excavated and removed during the development of these sites or were eroded away during natural geologic processes.

9.2.4. Silt Layer and Transition Zone

The ice-contact deposits are underlain by a distinct gray to gray/brown silt layer at the site. The depositional environment of the silt layer has not been documented in the reviewed literature, but may have been deposited by a proglacial or glacial margin lake. The silt layer thickness ranges between 0.5 and 8 feet. The average thickness of the silt layer is 2 to 3 feet. Particle sizes observed were typically fine to medium sand within the silt layer with a few exceptions where coarse sand and fine gravel content was observed in soil borings UG-MW31, UW-MW32, UG-MW35, UG-MW36 and UG-MW37.

A transition zone was observed beneath the silt layer in most of the soil borings completed near CR-MW15, CR-MW17, JS-MW4, JS-MW5, JS-MW7, UG-MW21, UG-MW24, UG-MW28, UG-MW29D, UG-MW29S, UG-MW35, UG-MW36 and UG-MW37 during this investigation. The transition layer consists of interbedded fine sand and silt with a general thickness between 1 and 14 feet when encountered.

The silt layer was identified in some of the soil boring logs completed by others during the previous investigations. However, the silt layer may exist in these areas and not be observed as a result of the typical sampling interval (a 3-inch to 18-inch sample every 5 to 10 feet).

9.2.5. Advance Outwash

Vashon advance outwash was encountered beneath the ice-contact deposits, silt layer and transition zone. Advance outwash is typically stratified sand with silt and gravel layers. The Vashon advance outwash consisted of deposited melt water streams flowing ahead of the advancing Vashon glacier (Smith, 1977). The outwash is likely thicker than 50 feet and forms an extensive aquifer (Jones, 1999).

Based on information within the site, the contact between the outwash, and the overlying silt and ice-contact deposits dips to the east at generally the same slope as the natural topography. However, the existing topography has been modified by humans.

The advance outwash unit was encountered in every monitoring well completed during this investigation except for CR-MW16, CR-MW17, JS-MW3S, JS-MW6S, JS-MW7A, and UG-MW30S. Beneath the site, the advance outwash is a generally thick layer of light gray fine- to course-grained gravel with sand and silt. The outwash also contains sand layers and interbeds of silt and higher percentages of gravel, cobbles and boulders. The advance outwash encountered within the project boreholes was typically classified as fine gravel with silt and sand (GP-GM) or silty gravel with sand (GM). This classification is the same as the ice-contact deposits. However the gravel fraction and D_{10} size is typically greater in the advance outwash. The advance outwash unit is not cemented. The gravel fraction of the advance outwash is typically 70 percent and the sand fraction is approximately 20 percent, with the D_{10} size ranging between 0.006 and 0.425 millimeters, as summarized in Table 11. However, the advance outwash was observed to consist of fine to course sand with lower gravel content along Court D.

9.2.6. Lawton Clay

The advance outwash unit is underlain by a proglacial lacustrine silt (Lawton Clay) layer. A proglacial lake was formed over the entire Puget Sound (Lake Russell) as the glacier advanced. Fine-grained sand and silts that were deposited within Lake Russell formed the Lawton Clay formation. The Lawton Clay is a thick silt layer identified as a regional confining layer Qf1 (Jones, 1999). The elevation of the top of the Lawton Clay is mapped at Elevation 100 feet (Jones, 1999) in the area south of the UWT campus. The Lawton Clay may have been encountered in one location (UG-MW30D) during this investigation at Elevation 75 feet NAVD which is lower than the mapped elevation. UG-MW30D is located within the central portion of the UWT Master Plan Campus boundary. The Lawton Clay was not fully penetrated in boring UG-MW30D.

9.2.7. Cross-Sections

Geologic cross-sections were prepared to graphically present the conditions in areas of the UWT campus based on information documented in the boring logs during the previous and current investigations completed for UW. The geologic cross-section locations and borings used for the cross-sections are shown on Figure 8. The geologic cross-sections are presented on Figures 9 and 10.

Cross-Section A-A' on Figure 9 trends southwest-northeast from Tacoma Avenue and South 19th Street to the Hood Corridor and South 17th Street. Cross Section B-B' on Figure 10 trends southeast-northwest from Tacoma Avenue and South 17th Street to Jefferson Avenue and South 19th Street.

Note that information (i.e., elevations, level of detail, etc.) on the boring logs from more recent investigations appears to be more reliable as compared to the older boring logs.

9.3. Hydrogeology

The hydrogeology of the site consists of two main water-bearing zones based on soil borings completed within the PDAs, herein referred to as the shallow and deep aquifers. The shallow aquifer is present within the ice-contact deposits and the deep aquifer is located within the advance outwash. The hydrogeologic units and associated aquifers are summarized in Table 2.

Hydrogeologic testing consisted of two snapshot groundwater level monitoring events performed on July 17 and November 8, 2013. The July 2013 snapshot groundwater level monitoring event was completed in 56 monitoring wells. The November 2013 snapshot groundwater level monitoring event was completed in 89 wells including Y-Student Center wells installed as part of UW CPO Project 204286. The results of the snapshot water level monitoring events are presented in Table 9. Figures 11 through 13 show the results for snapshot water level measurements on November 8, 2013 of wells completed within the shallow aquifer, the deep aquifer and the undetermined aquifers.

9.3.1. Shallow Aquifer

A total of 27 monitoring wells (including the Y Student Center wells) were screened within the shallow aquifer during this and other investigations at the site. Water was observed in 16 of the 19 wells in September 2013. The three dry monitoring wells were JS-MW7A, UG-MW35 and UG-MW36 in September 2013. Water was present in each of the 19 monitoring wells in November 2013 indicating the shallow aquifer is likely primarily recharged by precipitation.

The majority of soils in the ice-contact deposits encountered at the depths of the well screen intervals were observed to be moist during drilling, with saturated areas in the sand and gravel lenses. Groundwater within the ice-contact deposits appears to be present in generally discontinuous sand and gravel seams. The hydraulic connection of the sand and gravel seams within the ice-contact deposit unit is unknown. However, a 1- to 4-foot sand and gravel seam was typically observed at or near the base of the ice-contact deposits. The groundwater within the ice-contact deposits likely provides a contaminant transport pathway.

The general groundwater flow direction in the shallow aquifer is to the east towards the Thea Foss (Figure 11). In general, average horizontal groundwater gradients in the shallow aquifer are consistent across the site and are very steep, approximately between 0.12 and 0.15 feet/foot. The minor variations in gradient are likely related to the local variations in topography. Additionally, surface drainage features, heterogeneity in the fill, and modification of land through addition of fill and/or removal of natural deposits likely contribute to the variations in hydraulic gradient.

9.3.2. Silt Layer

The silt layer acts as a semi-confining to confining unit that likely provides separation between the shallow and deep aquifers. The silt layer was encountered in the soil borings advanced at the site during this investigation. The silt layer was observed to be dry to moist during the drilling activities with thicknesses ranging between approximately 0.5 and 4 feet.

Interbedded sand and silt units (transition zone) were observed underlying the silt layer. The thickness of the transition zone varied between approximately 4 and 6 feet, when encountered. Groundwater percolating vertically through the overlying ice-contact deposits likely is impeded by the silt layer and flows laterally on top of the silt layer to the east.

The silt layer was identified in some of the soil boring logs completed by others during the previous investigations. However, the silt layer may exist in these areas and not observed as a result of the typical sampling interval (a 3-inch to 18-inch sample every 5 to 10 feet). Groundwater may migrate vertically downward directly into the deep aquifer in areas where the silt layer is either thin or non-existent.

9.3.3. Deep Aquifer

The deep aquifer is located within the advance outwash. The advance outwash primarily consists of light gray fine- to course-grained gravel with sand and silt with some layers of sand, silt, cobbles and boulders that are typically not cemented. The advance outwash is underlain by the Lawton Clay as discussed in Section 8.2.

A total of 31 monitoring wells (including Y Student Center wells) were screened within the deep aquifer during this and other investigations at the site. It appears that borings completed during previous investigations at the site did not identify the thickness of the advance outwash. However, the Lawton Clay was encountered at Elevation 75 feet in one boring (UG-MW30D) during the recent subsurface investigation. The thickness of the advance outwash is approximately 10 feet at the location of UG-MW30D near the central portion of the UWT Master Plan Campus boundary. The advance outwash was observed to be up to 70 feet thick at the location of UG-MW24 near the intersection of South 19th Street and Tacoma Avenue. The advance outwash was observed to be saturated from below the silt layer/transition zone to the drilled depth in the borings advanced into the advance outwash during this investigation.

The deep aquifer within the advance outwash appears to be a semi-confined to confined aquifer based on the water levels observed during drilling and subsequent to well installation and development at these locations. The advance outwash unit was observed fully saturated to the upper confining unit during drilling and the water levels observed in the wells following installation were at elevations above the well screen interval.

The sources of recharge into the deep aquifer are from overlying units or from precipitation at locations where the silt unit is either thin or nonexistent (UG-MW17, UG-MW22, UG-MW23 and UG-MW33). Additionally, there may be locations where existing wells (DD-MW1) penetrate the silt layer allowing water from the shallow aquifer to percolate directly into the underlying advance outwash deposits.

The general groundwater flow direction in the deep aquifer is generally to the east, with a slight variation near Jefferson Avenue as shown in Figure 12. Average horizontal groundwater gradients in the deep aquifer are relatively flat in the western portion of site than in the central and eastern portions. The gradient observed between Tacoma Avenue and Fawcett Avenue was 0.024 feet/feet between monitoring wells UG-MW18 and UG-MW20. A steeper gradient was observed between Fawcett Avenue and Jefferson Avenue at 0.18 feet/foot between monitoring wells UG-MW7 and JS-MW4.

9.3.4. Undetermined Aquifer

The scope of this investigation did not include a review of boring logs of wells installed within the Easterly Plume boundary. Therefore, the aquifer (shallow or deep) were combined for 31 monitoring wells located within the Easterly Plume for purposes of snap shot water level measurements. The general groundwater flow direction is generally to the northeast as shown in Figure 13.

9.3.5. Shallow/Deep Aquifer Vertical Hydraulic Gradients

Vertical hydraulic gradients can be calculated by measuring groundwater levels in two wells located in close proximity but with well screens completed at different depth intervals. Nine monitoring well pairs are present with well screens installed in the shallow and deep aquifers on the UWT campus. Three of the well pairs (Y-MW1S/D, Y-MW2S/D and Y-MW3S/D) were completed during the development of the Y Student Center CPO Project No. 204286. The paired wells provide water level data for analysis of vertical hydraulic gradients at the site.

The groundwater level measurements from the groundwater level monitoring event on November 8, 2013 were evaluated to characterize the vertical hydraulic gradients between the shallow and deep aquifers. Vertical gradients were calculated for each well pair measured as part of each snapshot groundwater monitoring event. The vertical hydraulic gradients for the shallow and deep aquifers based on the snapshot groundwater level measurements are presented on Figure 14 and in Table 12. The vertical hydraulic gradient is downward from the shallow aquifer to the deep aquifer as indicated by the positive values in Table 12. An upward gradient would have been indicated by a negative value.

9.3.6. Connectivity Between Water Bearing Units

The vertical gradient was calculated in locations within the well pairs (shallow and deep) at each location to evaluate change in the groundwater head over a given distance. The vertical gradient calculation results indicate that the silt layer is providing the separation between the shallow and deep aquifers based on the vertical separation of the shallow and deep aquifer at these locations.

However, some wells completed in one aquifer have similar water level elevations as the other aquifer when comparing interpreted water levels in Figures 11 and 12, as seen near Fawcett Avenue. The silt layer was not observed near Fawcett Avenue (DD-MW1, UG-MW16, UG-MW17 and UG-MW22), the silt was less than 6 inches (UG-MW20, UG-MW23, and UG-MW33), or the silt contained gravel (UG-MW32). In this area, there appears to be no shallow aquifer.

10.0 CHEMICAL ANALYTICAL PROGRAM

Soil, groundwater and water samples were submitted to OnSite Environmental, Inc., in Redmond, Washington for chemical analysis. Copies of the laboratory reports are presented in Appendix E.

The format of the tables and the comparison criteria is described in the following sections. The chemical analytical results are summarized relative to soil and groundwater in the Westerly Plume and the Easterly Plume.

10.1. Analytical Results Summary Format

The samples submitted for chemical analysis are summarized in Table 6 and 8. The chemical analytical results where chemicals of concern were detected are summarized in Tables 13 through 20 and presented in Figures 15 through 25. However, Tables 13 through 20 only contain chemical analytical data where a chemical was detected in the analyzed samples due to the large dataset. The full dataset is provided on a compact disc in Appendix E. Information provided in each table is discussed in the following list.

- **Table 13.** Results of petroleum hydrocarbons, metals or cPAHs when at least one of the analytes was detected at a concentration greater than the respective MTCA Method A cleanup level.
- **Table 14.** Results of petroleum hydrocarbons, metals or cPAHs when detected where detected greater than the laboratory reporting limit.
- **Table 15.** Results of PCE, TCE and breakdown products in all soil samples analyzed.
- **Table 16.** Results of various detected VOCs in soil.
- **Table 17.** Results of petroleum hydrocarbons and primary VOCs (PCE, TCE and associated breakdown products, benzene, toluene, ethylbenzene and xylenes [BTEX], chlorobenzene and naphthalene) in groundwater.
- **Table 18.** Results of secondary VOCs detected in groundwater.
- **Table 19.** Results of metals and PAHs detected in groundwater.

10.2. Analytical Results Evaluation Criteria

The following criteria were used to evaluate impacted and contaminated soil and groundwater.

- PCE- and TCE-Impacted and Contaminated Soil
  - PCE, TCE and breakdown products at concentrations detected in the analyzed soil samples.
- Contaminated Soil
  - Petroleum hydrocarbons, cPAHs, metals and VOCs were detected at concentrations greater than the MTCA Method A Unrestricted Land Use (ULU) cleanup level or MTCA B screening level.

- Impacted Soil
  - Petroleum hydrocarbons, cPAHs and lead were at concentrations greater than Ecology Guidance for Remediation of Petroleum Contaminated Sites (Ecology, 2011) regarding reuse of soil as commercial fill (Ecology, 2011) but less than the respective MTCA Method A ULU cleanup level.
  - Arsenic, cadmium and mercury were detected at concentrations greater than the respective Puget Sound Background levels (Ecology, 1994) but less than the respective MTCA Method A cleanup levels or MTCA Method B criteria. Chromium was not compared to the Puget Sound background levels in soil based on the historic soil analytical results indicating chromium is not a prevalent chemical of concern on the UWT campus.
  - Guidance for Remediation of Petroleum Contaminated Sites (Ecology, 2011) regarding reuse of soil as commercial fill and Puget Sound Background levels are herein referred to as the "Reuse Criteria."
- Contaminated Groundwater
  - Petroleum hydrocarbons, PAHs and metals were detected at concentrations greater than the respective MTCA Method A groundwater cleanup levels. Method B criteria were used for comparison of specific compounds if Method A groundwater cleanup levels are not established for those compounds.
  - VOCs were detected at concentrations greater than the respective MTCA Method A groundwater cleanup levels and MTCA Method B groundwater screening levels protective of indoor air. The updated TCE/PCE screening levels were calculated using Equation 1 from Ecology's review draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action" dated October 2009 (Ecology, 2009) and EPA's TCE and PCE toxicity factors updated in 2011 and available on EPA's online Integrated Risk Information System (IRIS). The other values were obtained from Ecology's review draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action." The calculation to update screening levels is included in Appendix E.

10.3. Chemical Analytical Results – Soil

A total of 402 soil samples were submitted for chemical analysis. In general, soil samples were analyzed for VOCs and only near-surface soil samples were analyzed for petroleum hydrocarbons, metals and PAHs. Select soil samples were also analyzed for PCBs and Synthetic Precipitation leaching procedure (SPLP).

Soil analytical results are discussed in the following sections as it relates to the chemicals of concern detected within each lithologic unit (fill, ice-contact deposits, silt layer/transition zone and advance outwash, as applicable) in the Easterly Plume and the Westerly Plume areas.

10.3.1 Westerly Plume Area – Soil Chemical Analytical Results

Soil samples were collected and submitted for chemical analysis from the fill ice-contact deposits, silt, transition zone and advance outwash in the Westerly Plume.

10.3.1.1. WESTERLY PLUME - FILL

A total of 82 soil samples were collected within the fill soil for chemical analysis within the Westerly Plume area. Samples were submitted for chemical analysis of VOCs by EPA method 8260, RCRA metals by EPA method 6000/7000 series, PAHs by EPA method 8270SIM and/or petroleum hydrocarbon identification by Ecology-approved method NWTPH-HCID with appropriate follow-up of diesel- and lube oil-range petroleum hydrocarbons by Ecology-approved method NWTPH-Dx within the fill soil. Analytical results are discussed below by COC. The chemical analytical results are summarized in Tables 13 through 16. A summary for each of these COC are discussed below.

<u>Westerly Plume - Fill - CPAHs and PAHs</u>. CPAHs were detected at concentrations greater than the MTCA Method A ULU cleanup level (0.1 milligrams per kilogram [mg/kg]) in the following 16 soil samples collected from the ground surface to approximately 3.5 feet bgs in areas 1A, 1B, 1C, 1D, 1E, 1G, 2A, 2B and 2C. Soil sample locations where cPAHs were either detected or were detected at concentrations greater than the MTCA Method A ULU cleanup level are shown on Figure 15.

- The 16 soil samples where cPAHs were detected at concentrations greater than or equal to the MTCA Method A ULU cleanup level are provided in the table below with the concentrations (in mg/kg) detected identified in parenthesis.

1A-B5-1-2 (0.64)	1D-TP3-0-1 (0.10)
1B-TP2-2-3 (0.16)	1E-B6-0-1 (0.42)
1B-TP5-0-1 (0.11)	1G-TP2-0-1 (0.12)
1B-TP5-2-3 (0.12)	2A-B1-1-2 (0.23)
UG-MW25S-1-2 (0.14)	2A-B7-2.5-3.5 (0.64)
UG-MW25D-1-2 (0.40)	2C-B2-1-2 (1.4)
UG-MW26-0-1 (0.14)	2F-B2-0-0.5 (0.12)
1C-TP1-0-1 (0.13)	JS-MW7A-0-1 (3.49)

CPAHs were either not detected or were detected at concentrations less than the Reuse Criteria and the MTCA Method A ULU cleanup level in the remaining analyzed soil samples. PAHs were either not detected or were detected at concentrations less than the MTCA Method A ULU cleanup level and the Reuse Criteria in the remaining analyzed soil samples. Soil sample locations where PAHs were detected greater than the laboratory reporting limit are also shown on Figure 15.

<u>Westerly Plume - Fill - Metals</u>. Arsenic, cadmium and lead were detected at concentrations greater than the respective MTCA Method A ULU cleanup levels in soil samples collected from within the fill soil. Soil sample locations where arsenic, cadmium and lead were either detected at concentrations greater than the Reuse Criteria and the respective MTCA Method A ULU cleanup levels are shown on Figure 16. Soil samples with detections at concentrations greater than the respective MTCA cleanup levels are discussed below for arsenic, cadmium and lead.

- **Arsenic.** Arsenic was detected at concentrations greater than the MTCA Method A ULU cleanup level (20 mg/kg) in two soil samples (1B-TP2-2-3 [20 mg/kg] and 1C-TP1-0-1 [24 mg/kg]). The soil samples were collected from the ground surface to approximately 3 feet bgs in PDAs 1B and 1C.

- **Cadmium.** Cadmium was detected at concentrations greater than the MTCA Method A ULU cleanup level (2 mg/kg) in two soil samples (1C-TP1-0-1 [3.5 mg/kg] and 1E-B1-0-1 [4.5 mg/kg]). The soil samples were collected from the ground surface to approximately 1 foot bgs in PDAs 1C and 1E.
- **Lead.** Lead was detected at concentrations greater than the MTCA Method A ULU cleanup level (250 mg/kg) in 12 soil samples. The majority of the soil samples were collected between the ground surface and approximately 3 feet bgs in PDAs 1A, 1B, 1C, 1D, 1E, 1G, 2B and 2C. One soil sample from area PDA 1A was collected from approximately 11 to 12 feet bgs within a large fill prism. The 12 soil samples where lead was detected at concentrations greater than or equal to than MTCA Method A ULU cleanup level are provided in the following list with the concentration (in mg/kg) detected identified in parenthesis.

1A-B4-11-12 (760)	1D-TP3-2-3 (250)
1A-B5-1-2 (400)	UG-MW36-0-1 (290)
1B-TP2-2-3 (350)	UG-MW36-1-3 (390)
1C-TP1-0-1 (800)	1E-B6-0-1 (610)
1C-TP2-3-4 (750)	1G-TP2-0-1 (250)
1D-TP2-0-1 (280)	2C-B2-1-2 (730)
1D-TP3-0-1 (950)	JS-MW7A-0-1 (1,100)

Lead, cadmium and/or arsenic were detected at concentrations greater than the Reuse Criteria in 36 soil samples collected within the fill in the Westerly Plume. The soil samples were collected from the ground surface to depths ranging between 3 to 4 feet bgs in borings 1A-B1, 1A-B2, 1A-B3, 1A-B5, 1A-B6, 1B-TP2, 1B-TP5, 1C-TP1, 1C-TP2, 1D-TP1, 1D-TP2, 1D-TP3, 1E-B6, 1G-TP1, 1G-TP2, 2A-B1, 2A-B7, 2C-B2, 2F-B1, 2F-B2, JS-MW7A, UG-MW23, UG-MW26, UG-MW33, UG-MW35, UG-MW36, UG-MW38D and UG-MW38S. Lead, cadmium, and arsenic were either not detected or were detected at concentrations less than the Reuse Criteria in the remaining analyzed soil samples.

Other metals were either not detected or were generally detected at concentrations less than the Reuse Criteria and the respective MTCA Method A ULU cleanup levels in the remaining analyzed soil samples.

<u>Westerly Plume - Fill - Petroleum Hydrocarbons</u>. Petroleum hydrocarbons were detected in the fill as described below. A summary of the locations of the detections are shown on Figure 17.

- **Gasoline-Range Petroleum Hydrocarbons.** Gasoline-range petroleum hydrocarbons were detected at concentrations greater than the MTCA Method A ULU cleanup level (100 mg/kg) in soil sample 1F-B2-7-8 (940 mg/kg) collected within the fill. The gasoline-range petroleum hydrocarbons-contaminated soil was collected from boring 1F-B2 from approximately 7 to 8 feet bgs. Gasoline-range petroleum hydrocarbons were not detected in the remaining analyzed soil samples.

- **Diesel- and Lube-Oil Range Petroleum.** Diesel- and lube oil-range petroleum hydrocarbons were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels in the analyzed soil samples.

  Lube oil-range petroleum hydrocarbons were detected in 17 samples at concentrations greater than Reuse Criteria (200 mg/kg, fill for commercial above the water table) as shown in Tables 13 and 14. The soil samples collected from borings 1A-B3, 1A-B4, 1A-B5, 1B-TP2, 1B-TP3, 1B-TP5, 1D-TP1, 1D-TP3, 1E-B2, 1F-B2, JS-MW7A, UG-MW38D, UG-MW37, and UG-MW26. The lube oil-range petroleum hydrocarbons-impacted soil samples ranged in depth between the ground surface and approximately 8 feet bgs.

  Diesel- and lube oil-range petroleum hydrocarbons were not detected in the remaining analyzed soil samples.

Westerly Plume – Fill – VOCs. PCE and TCE including breakdown products were detected within the fill soil in three general locations within the Westerly Plume as shown on Figure 18. VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A ULU or Method B criteria in the remaining analyzed soil samples. VOCs that were detected in these remaining analyzed soil samples are either considered common laboratory contaminants or are chemicals related to gasoline-range petroleum hydrocarbons in soil samples where gasoline-range petroleum hydrocarbons were detected. The VOC analytical results are summarized in Tables 15 and 16.

The three general locations include PDAs 1A – Upton/1C – Fawcett North; PDA 2D –Tacoma Paper and Stationary; and wells UG-MW38S/UG-MW38D. Results for each of the three general locations are discussed further in the following list.

PDAs 1A (Upton)/1C (Fawcett North). PDAs 1A and 1C are generally located on the northwest portion of site near the southeast corner of the South 17th Street and Tacoma Avenue South intersection. Approximately 29 feet of fill was observed during the subsurface explorations on PDA 1A (former dry cleaner site). PDA 1C is located directly downgradient of PDA 1A.

- PCE was detected at concentrations greater than the MTCA Method A ULU cleanup level in two soil samples (1A-B1-18-19 [0.051 mg/kg]) and 1A-B1-25-26 [0.098 mg/kg]) collected in the fill between approximately 18 and 26 feet bgs. PCE was detected at concentrations less than the MTCA Method A ULU cleanup level in five soil samples (1A-B2-14-15, 1A-B3-0-2, 1A-B6-0-1, 1A-B6-10-11, and 1C-TP2-3-4) collected at depths ranging between the ground surface and approximately 15 feet bgs. PCE was not detected in the remaining analyzed soil samples.
- TCE was detected in three soil samples (1A-B1-18-19, 1A-B2-14-15, and 1A-B2-25-26) at concentrations less than the MTCA Method A ULU cleanup level. TCE was not detected in the remaining analyzed soil samples.
- Cis-1,2-dichloroethene (DCE) was detected at concentrations less than the MTCA Method A ULU cleanup level in two soil samples (1A-B2-14-15 and 1A-B2-25-26) collected from approximately 14 to 26 feet bgs. DCE was not detected in the remaining analyzed soil samples.
- Trans-1,2-DCE and vinyl chloride were detected at concentrations less than the respective MTCA Method A ULU cleanup level in one soil sample (1A-B2-25-26) collected from

approximately 25 to 26 feet bgs. Trans-1,2-DCE and vinyl chloride were not detected in the remaining analyzed soil samples.

PDA 2D – Tacoma Paper and Stationary. PDA 2D is located near the northeast portion of site along Jefferson Avenue.

- PCE was detected at concentrations less than the MTCA Method A ULU cleanup level in four soil samples (2D-B1-0-1, 2D-B2-0-1, 2D-B3-0-1, and 2D-B4-0-1) collected from PDA 2D – Tacoma Paper and Stationary. These four soil samples were collected from the ground surface to approximately 1 foot bgs. PCE was not detected in the remaining analyzed soil samples.
- Other VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels or Method B criteria in the analyzed soil samples.

Wells UG-MW38S and UG-MW38D. These monitoring wells are located within the west-central portion of the site near Tacoma Avenue South.

- PCE was detected at concentrations less than the MTCA Method A ULU cleanup level in two soil samples (UG-MW38D-1-2 and UG-MW38S-2-3) collected in borings UG-MW38S and UG-MW38D from approximately 1 to 3 feet bgs. PCE was not detected in the remaining analyzed soil samples collected in the fill.
- Other VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels or Method B criteria in the analyzed soil samples.

Westerly Plume – Fill - PCBs. PCBS were analyzed in 17 soil samples collected from Areas 1A, 1D and 1F. PCBs were not detected in the analyzed soil samples.

10.3.1.2. WESTERLY PLUME - ICE-CONTACT DEPOSITS

A total of 163 soil samples were collected within the ice-contact deposits in the Westerly Plume for chemical analysis of VOCs by EPA method 8260. A subset of the soil samples were also submitted for RCRA metals by EPA method 6000/7000 series, PAHs by EPA method 8270SIM and/or petroleum hydrocarbon identification by Ecology-approved method NWTPH-HCID with appropriate follow-up of diesel- and lube oil-range petroleum hydrocarbons by Ecology-approved method NWTPH-Dx. The chemical analytical results are summarized in Tables 13 through 16. Soil analytical results are discussed below.

Westerly Plume - Ice-Contact Deposits - CPAHs and PAHs. PAHs were either not detected or were detected at concentrations less than MTCA Method A ULU Cleanup level and the Reuse Criteria in soil samples collected from the ice-contact deposits.

Westerly Plume - Ice-Contact Deposits - Metals. Lead was detected at a concentration greater than the Reuse Criteria in one soil sample collected from boring 1G-TP1 from 3 to 4 feet bgs. Lead and other metals were either not detected or were detected at concentrations less than the MTCA Method A ULU cleanup level and the Reuse Criteria.

<u>Westerly Plume - Ice-Contact Deposits - Petroleum Hydrocarbons</u>. Lube oil-range petroleum hydrocarbons were detected at a concentration greater than the Reuse Criteria but less than the MTCA Method A ULU cleanup level in one soil sample collected from 5 to 6 feet bgs in the ice-contact deposits in well UG-MW38D. Lube oil-range petroleum hydrocarbons were either not detected or were detected at concentrations less than the MTCA Method A ULU cleanup level and the Reuse Criteria in the remaining analyzed soil samples.

Gasoline- and diesel-range petroleum hydrocarbons were not detected in the analyzed soil samples collected in the ice-contact deposits.

<u>Westerly Plume - Ice-Contact Deposits - VOCS.</u> VOCs were detected within the ice-contact deposits in the Westerly Plume in PDA 1A through 1H, 2A, 2D and within UG-MW28, UG-MW30S, UG-MW30D, UG-MW38S and UG-MW38D. The following sections summarize the chemical analytical results. The chemical analytical detection are summarized in Tables 15 and 16 and shown on Figure 19.

- **PCE.** PCE was detected in eight soil samples collected from borings UG-MW24, UG-MW31, 1A-B6, 1C-TP2, 2D-B1, 2D-B2 and 2D-B3 as described in Table 15. The soil samples were collected from approximately 4 to 21 feet bgs. PCE was detected at concentrations greater than the MTCA Method A ULU cleanup level in two soil samples (2D-B1-8-9 [0.083 mg/kg] and 2D-B2-4-5 [0.12 mg/kg]) collected within the ice-contact deposits.

  PCE was not detected in the remaining analyzed soil samples.

- **TCE.** TCE was detected in 41 soil samples collected UG-MW24, UG-MW25S, UG-MW25D, UG-MW27, UG-MW28, UG-MW29D, UG-MW31, 1A-B6, 1D-B1, 1F-B1, 1F-B4, 1F-B5, 1F-B7, 1G-B5, 1H-B3, 2A-B3, 2A-B4, and 2A-B5. The soil samples were collected from approximately 5 to 25 feet bgs. TCE was detected at concentrations greater than the MTCA Method A ULU cleanup level in the following 14 soil samples collected within the ice-contact deposits within the Westerly Plume with the TCE concentration (in mg/kg) in parenthesis.

UG-MW24-9-10 (0.075)	UG-MW25S-7.5-8.5 (0.44)
UG-MW24-12-13 (0.34)	UG-MW25S-8.5-9.5 (0.47)
UG-MW25D-6-7 (0.076)	UG-MW25S-10-11 (0.37)
UG-MW25D-12-13 (3.2)	UG-MW25S-11-12 (1.3)
UG-MW25D-13-14 (2.3)	UG-MW25S-15-16 (0.39)
UG-MW30S-11-12 (0.32)	UG-MW30S-19-20 (0.45)
UG-MW30S-13-14 (0.092)	2A-B5-7-8 (0.11)

  TCE was not detected in the remaining analyzed soil samples.

- **DCE and Vinyl Chloride.** Cis-1,2-DCE was detected in seven soil samples collected within PDA 1B and 2A from borings UG-MW24, UG-MW25D, UG-MW25S, and 2A-B5 as described in Table 15. The soil samples were collected from approximately 7 to 14 feet bgs. Trans-1,2-DCE and vinyl chloride were not detected in the analyzed soil samples within the ice-contact deposits.

- **Other VOCs.** 1,1,1-trichloroethane (1,1-TCA), 1,1-dichloroethane (1,1-DCA), 1,1-DCE and benzene were detected at concentrations less than the MTCA Method A ULU cleanup level and MTCA Method B criteria in nine soil samples collected from borings UG-MW25S and UG-MW25D. The depth of the impacted soil ranges between approximately 6 to 18 feet bgs. Other VOCs that were detected in the remaining analyzed soil samples are considered laboratory contaminants. The chemical analytical results (detections only) are summarized in Table 16.
- **SPLP VOCs.** Two soil samples were submitted for chemical analysis of SPLP VOCs. SPLP VOCs were not detected in the two soil samples (UG-MW25D-12-13 and UG-MW31-20-21) collected within the ice-contact deposits.

10.3.1.3. WESTERLY PLUME - SILT LAYER/TRANSITION ZONE

A total of 33 soil samples were collected within the silt unit and the transition zone for analysis of VOCs or halogenated volatile organic compounds (HVOCs) within the Westerly Plume. A subset of the soil samples submitted for RCRA metals by EPA method 6000/7000 series, PAHs by EPA method 8270SIM and/or petroleum hydrocarbon identification by Ecology-approved method NWTPH-HCID with appropriate follow-up of diesel- and lube oil-range petroleum hydrocarbons by Ecology-approved method NWTPH-Dx. Chemical analytical results are summarized in Tables 13 through 16.

<u>Westerly Plume - Silt Layer/Transition Zone - PAHS, Petroleum and Metals.</u> Metals were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup level and the Reuse Criteria. PAHs and petroleum hydrocarbons were not detected in the analyzed soil samples.

<u>Westerly Plume - Silt Layer/Transition Zone - VOCS.</u> VOCs were detected within the silt layer/transition zone in the Westerly Plume in UG-MW31, UG-MW30D and UG-MW38S. The chemical analytical results (detections only) are summarized in Tables 15 and 16 and shown on Figure 20.

- **TCE.** TCE was detected at a concentration greater than the MTCA Method A ULU cleanup level in soil sample UG-MW38S-16-16.5 (0.033 mg/kg) collected within the silt layer from 16 to 16.5 feet bgs in well UG-MW38S. TCE was detected in one soil sample collected from UG-MW30D at a depth of 35 feet bgs within the silt/transition layer. TCE was not detected in the remaining analyzed soil samples collected within the silt in the Westerly Plume.

Other VOCS were not detected in the remaining analyzed soil samples.

10.3.1.4. WESTERLY PLUME - ADVANCE OUTWASH

A total of 68 soil samples were collected in the advance outwash in the Westerly Plume and submitted for chemical analysis of VOCs by EPA method 8260. A subset of the soil samples submitted for RCRA metals by EPA method 6000/7000 series, PAHs by EPA method 8270SIM and/or petroleum hydrocarbon identification by Ecology-approved method NWTPH-HCID with appropriate follow-up of diesel- and lube oil-range petroleum hydrocarbons by Ecology-approved method NWTPH-Dx. The chemical analytical results are summarized in Tables 13 through 16. Soil analytical results indicated the following:

Westerly Plume - Advance Outwash - PAHs, Petroleum Hydrocarbons, Metals. PAHs, petroleum hydrocarbons, and metals were either not detected or were detected at concentrations less than the respective MTCA Method A cleanup level and Reuse Criteria in the analyzed soil samples collected within the advance outwash.

Westerly Plume - Advance Outwash - VOCS. VOCs were detected within the advance outwash in borings JS-MW4D, UG-MW23, UG-MW25D, UG-MW31, UG-MW35, UG-MW37, UG-MW38D, and UG-MW38S within the Westerly Plume. The chemical analytical results are summarized in the following sections. The chemical analytical results (detections only) are summarized in Tables 15 and 16 and presented on Figure 21.

- **PCE.** PCE was detected in one soil sample collected in boring UG-MW38D from 49 to 50 feet bgs within the advance outwash.
- **TCE.** TCE was detected in 32 soil samples collected in borings JS-MW4D, UG-MW23, UG-MW25D, UG-MW31, UG-MW36, UG-MW35, UG-MW37, UG-MW38D, and UG-MW38S. The soil samples were collected from approximately 12 to 46 feet bgs. TCE was detected at a concentration (0.050 mg/kg) greater than the MTCA Method A ULU cleanup level in one soil sample collected from UG-MW38D at a depth of 33 to 34 feet bgs. TCE was not detected in the remaining analyzed soil samples.
- **Other VOCs.** Other VOCs that were detected in the remaining analyzed soil samples are considered laboratory contaminants.
- **SPLP VOCs.** One soil sample collected from the advance outwash in well UG-MW38D-49-50 was submitted for chemical analysis of SPLP VOCs. SPLP VOCs were not detected in the analyzed soil sample.

10.3.2. Easterly Plume Area – Soil Chemical Analytical Results

Soil samples were collected and submitted for chemical analysis from the fill, ice-contact deposits, silt, transition zone and advance outwash in the Easterly Plume.

10.3.2.1. EASTERLY PLUME - FILL

A total of seven soil samples were collected in the fill soil for chemical analysis within the Easterly Plume area. Samples were submitted for chemical analysis of VOCs by EPA method 8260, RCRA metals by EPA method 6000/7000 series, PAHs by EPA method 8270SIM and/or petroleum hydrocarbon identification by Ecology-approved method NWTPH-HCID with appropriate follow-up of diesel- and lube oil-range petroleum hydrocarbons by Ecology-approved method NWTPH-Dx within the fill soil. Analytical results are discussed below by the COC. The chemical analytical results are summarized in Tables 13 through 16. A summary for each of these COC are discussed below.

Easterly Plume - Fill - PAHs, Petroleum Hydrocarbons, Metals. PAHs, petroleum hydrocarbons, and metals were either not detected or were detected at concentrations less than the respective MTCA Method A cleanup level and Reuse Criteria in the analyzed soil samples collected within the fill.

Easterly Plume - Fill - VOCs. TCE was detected at concentrations less than the MTCA Method A ULU cleanup level in three soil samples collected from approximately 9 to 16 feet bgs in boring CR-MW16 as shown on Figure 18. TCE was not detected in the remaining analyzed soil samples.

Other VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels or Method B criteria in the analyzed soil samples.

10.3.2.2. EASTERLY PLUME - ICE-CONTACT DEPOSITS

A total of 20 soil samples were collected in the ice-contact deposits in the Westerly Plume for chemical analysis of VOCs by EPA method 8260 and petroleum hydrocarbon identification Ecology-approved method NWTPH-HCID. The chemical analytical results are summarized in Tables 13 through 16. Soil analytical results are discussed below.

Easterly Plume - Ice-Contact Deposits - Petroleum Hydrocarbons. Lube oil-, gasoline-, and diesel-range petroleum hydrocarbons were not detected in the analyzed soil samples collected within the ice-contact deposits.

Easterly Plume - Ice-Contact Deposits - VOCS. VOCs were detected within the ice-contact deposits in the Easterly Plume in borings CR-MW16 and CR-MW17. The chemical analytical results are summarized in the following sections. The chemical analytical results (detections only) are summarized in Tables 15 and 16 and shown on Figure 19.

- **TCE.** TCE was detected in five soil samples collected within the ice-contact deposits from borings CR-MW16 and CR-MW17 located within the Easterly Plume. These soil samples were collected from depths ranging between approximately 18 and 26 feet bgs. TCE was detected at concentrations greater than the MTCA Method A ULU cleanup level in the following three soil samples with the TCE concentration (in mg/kg) identified in parenthesis: CR-MW16-18-19 (0.051); CR-MW16-20-21 (0.034) and CR-MW16-24-25 (0.31).

  TCE was not detected in the remaining analyzed soil samples.

- **DCE and Vinyl Chloride.** Cis-1,2-DCE (DCE) and/or trans-1,2-DCE were detected in five soil samples collected in borings CR-MW16 and CR-MW17 from depths ranging between 18 and 26 feet bgs. DCE was not detected in the remaining analyzed soil samples.

- **Other VOCs.** Other VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels or Method B criteria in the analyzed soil samples. Other VOCs that were detected in these samples are considered laboratory contaminants.

10.3.2.3. EASTERLY PLUME - SILT LAYER/TRANSITION ZONE

A total of 11 soil samples were collected in the silt layer/transition zone within the Easterly Plume for chemical analysis of VOCs by EPA method 8260 and petroleum hydrocarbon identification by Ecology-approved method NWTPH-HCID with appropriate follow-up of diesel- and lube oil-range petroleum hydrocarbons by Ecology-approved method NWTPH-Dx and gasoline-range petroleum hydrocarbons by Ecology-approved method NWTPH-Gx. The chemical analytical results are summarized in Tables 13 through 16. Soil analytical results are discussed below.

Easterly Plume - Silt Layer/Transition Zone - Petroleum Hydrocarbons. Gasoline-, diesel- and lube oil--range petroleum hydrocarbons were not detected in the analyzed soil samples collected within the silt layer/transition zone.

Easterly Plume - Silt Layer/Transition Zone - VOCS. VOCs were detected within the silt layer/transition zone in the Easterly Plume in borings CR-MW16 and CR-MW17. The following sections summarize the chemical analytical results. The chemical analytical detections are summarized in Tables 15 and 16 and shown on Figure 20.

- **TCE.** TCE was detected in six soil samples collected within the silt layer/transition zone from borings CR-MW16 and CR-MW17 located within the Easterly Plume. These soil samples were collected from depths ranging between approximately 27 and 31 feet bgs. TCE was detected at concentrations greater than the MTCA Method A ULU cleanup level in in soil sample CR-MW16-28-29 (0.61 mg/kg). TCE was not detected in the remaining analyzed soil samples.
- **DCE and Vinyl Chloride.** Cis-1,2-DCE (DCE) and/or trans-1,2-DCE were detected in five soil samples collected in borings CR-MW16 and CR-MW17 from depths ranging between 27 and 31 feet bgs. Vinyl chloride was detected in two soil samples collected from boring CR-MW16 and CR-MW17 from depths ranging between 28 and 29 feet bgs. DCE and vinyl chloride were not detected in the remaining analyzed soil samples.
- **Other VOCs.** Other VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels or Method B criteria in the analyzed soil samples. Other VOCs that were detected in these samples are considered laboratory contaminants.

10.3.2.4. EASTERLY PLUME - ADVANCE OUTWASH

A total of 19 soil samples were collected in the advance outwash deposits within the Easterly Plume for chemical analysis of VOCs by EPA method 8260 and petroleum hydrocarbon identification by Ecology-approved method NWTPH-HCID with appropriate follow-up of gasoline-range petroleum hydrocarbons by Ecology-approved method NWTPH-Gx. The chemical analytical results are summarized in Tables 13 through 16. Soil analytical results are discussed below.

Easterly Plume – Advance Outwash - Petroleum Hydrocarbons. Gasoline-range petroleum hydrocarbons were detected at a concentration greater than the MTCA Method A ULU cleanup level (100 mg/kg) in soil sample CR-MW15-19.5-20 (3,000 mg/kg) collected from approximately 19.5 to 20 feet bgs. Gasoline-range petroleum hydrocarbons were not detected in the remaining analyzed soil samples.

Diesel- and lube oil-range petroleum hydrocarbons were not detected in the analyzed soil samples collected within the advance outwash.

Easterly Plume – Advance Outwash - VOCS. VOCs were detected within the advance outwash deposits within the Easterly Plume in borings JS-MW5 and JS-MW6D. The chemical analytical results are summarized in the following sections. The chemical analytical results (detections only) are summarized in Tables 15 and 16 and shown on Figure 21.

- **TCE.** TCE was detected at concentrations less than the MTCA Method A ULU cleanup level in three soil samples collected in boring JS-MW5 located within the Easterly Plume. The soil samples were collected from depths ranging between approximately 37 and 55 feet bgs. TCE was not detected in the remaining soil samples analyzed.

- **Chlorobenzene.** Chlorobenzene was detected at concentrations less than the MTCA Method A ULU cleanup level in three soil samples collected in boring JS-MW5 that range in depth from 37 to 40 feet bgs. Chlorobenzene was not detected in the remaining analyzed soil samples.
- **Other VOCs.** Other VOCs that were detected in remaining analyzed soil samples are considered laboratory contaminants.

10.3.3. Soil Physical Parameters

GeoEngineers collected data to evaluate the physical characteristics of soil encountered to facilitate the development of a phase partitioning model. Soil containing concentrations of TCE contamination may or may not pose a threat to groundwater, and simply having a value of the TCE contamination present in the soil is not always sufficient by itself to evaluate whether or not a threat exists. A phase partitioning model is a tool that uses a site's physical characteristics and contamination profile to predict whether soil contamination present will or will not cause an exceedance of groundwater cleanup levels. In the case of non-aqueous phase liquids such as TCE, the model can also predict whether it will accumulate in groundwater beneath the site.

A phase partitioning model consists of several equations using site-specific physical data to show how much of a given contaminant concentration is likely to remain in one phase versus another (in the case of TCE, vapor vs. liquid in soil and groundwater), and to analyze these equations in a range of scenarios to predict how likely it is the TCE detected could affect groundwater beneath the site. Modeling the data could assist with future design and construction considerations throughout the development area, but its greater benefit would likely be as a tool to comparatively evaluate potential remediation technologies for portions of the areas that undergo consideration for remedial action as part of a feasibility study. Therefore, the development of a detailed phase partitioning model is premature at this point of the subsurface characterization process, but the soil characteristics data (primarily total organic carbon [TOC], bulk density, and soil pH results) will have beneficial use as portions of the site undergo consideration for possible action, no action, or monitoring activities in the future. In addition, the soil characteristics data can offer some insight on whether soil conditions may be favorable or unfavorable for supporting natural attenuation, either through biodegradation or anaerobic dehalogenation of PCE and its breakdown constituents (TCE, DCE and vinyl chloride).

Physical parameters were submitted on 15 soil samples collected from five borings locations (CR-MW16, JS-MW5, UG-MW25D, UG-MW31 and UG-MW38D). The soil physical parameter analysis consisted of total organic carbon, pH, bulk density, grain density, and grain size analysis. Chemical analytical results are summarized in Table 11.

10.3.3.1. TOTAL ORGANIC CARBON (TOC)

TOC was detected at a concentration of 0.5 percent in one soil sample collected within the ice-contact deposits from UG-MW25D at a depth of 12 to 13 feet bgs. TOC was not detected in the remaining analyzed soil samples.

The result suggests that localized pockets of TOC are available in the soil, but likely scattered and not in a continuous fashion or consistently across a given lithology. The value of the TOC is used to evaluate site-specific distribution coefficients for a partitioning model, and these results indicate a small coefficient of distribution, which negatively impacts the partitioning model (small soil concentration could still result in hypothetically contaminating groundwater in and beneath the soil column).

10.3.3.2. SOIL ACIDITY (SOIL PH)

The measurement of soil acidity was fairly uniform throughout the area, with an overall average pH of 8.3. The lowest pH detected was in UG-MW25D from 12 to 13 feet bgs (pH = 7.9) within the ice-contact deposits. The highest reported was also in UG-MW25D from 42 to 43 feet bgs (pH = 8.7) within the advance outwash.

The soil pH would generally be considered neutral or slightly alkaline in nature. Typically, organic compounds such as TCE have an inverse relationship with acidity; i.e., the more acidic the environment is, the higher the organic carbon-water partitioning coefficient is, and therefore the higher the distribution coefficient. For this site, the neutral pH values indicate a low partitioning coefficient, which would make the distribution coefficient even smaller, causing a further negative impact on the partitioning model.

10.3.3.3. BULK DENSITY

Bulk density values did not vary significantly with the exception of one outlier in well UG-MW38D at a depth of 49 to 50 feet bgs with a reported bulk density of 1.768 grams per cubic centimeter (g/cm^3). The other six bulk density results ranged between 1.285 g/cm^3 and 1.448 g/cm^3 with an average of 1.341 g/cm^3.

Bulk density across the area is reported as being considerably lower than typical literature values (approximately 1.5) with the one exception mentioned above from UG-MW38D. The development area's lower reported bulk density data indicates a greater retention potential for the soil to "hold" contamination and therefore these results have a positive impact on what the partitioning model would likely calculate.

10.3.3.4. GRAIN SIZE ANALYSIS

The grain size analysis produced results consistent with the lithologic classifications of the soils encountered throughout the area. Samples analyzed in the advance outwash had the highest gravel fraction, while the ice-contact deposits lithologic unit had the highest overall sand fraction. Only one sample reported clay at higher than 10 percent, and this was in an area of imported fill or recessional outwash in boring CR-MW16 at a depth of approximately 10 to 11 feet bgs.

There was enough of a distinction in the grain size analysis to indicate that the potential residual saturation (accumulation potential) of the soil types would be considerably different, and so these data suggest that partition modeling should be performed by treating each of the main lithologic units separately for the purposes of establishing specific soil contamination threshold value.

10.4. Chemical Analytical Results - Groundwater

Groundwater samples were collected from the 28 new permanent monitoring wells, four temporary monitoring wells and 52 existing monitoring wells. The wells were located in the following plumes and screened lithology:

- Westerly Plume
    - Ice-contact deposits (16 permanent and four temporary monitoring wells)

  - Advance outwash (26 permanent monitoring wells)
- Easterly Plume
  - Ice-contact deposits (three permanent monitoring wells)
  - Advance outwash (three permanent monitoring wells)
  - Existing monitoring wells installed previously where lithology of the well screen interval was not within the scope of this project (32 permanent monitoring wells)

Groundwater samples were submitted for chemical analysis of VOCs, petroleum hydrocarbons, PAHs and metals as described in Table 8. The chemical analytical data for groundwater are discussed below and summarized in Tables 17 through 19. The chemical analytical data are described relative to MTCA Method A to the criteria discussed in Section 10.0.

10.4.1. Westerly Plume

Groundwater samples collected from 20 existing wells within the Westerly Plume were submitted for chemical analysis of VOCs. GeoEngineers installed 22 permanent wells and four temporary well during this investigation, and groundwater of each well was analyzed for petroleum hydrocarbons, VOCS, metals and PAHs. However, three of the wells had limited water and were only submitted for gasoline-range petroleum hydrocarbons and VOCs (JS-MW7A, UG-MW35 and UG-MW36). One well (JS-MW3S) was resampled for VOCs due to anomalous results.

Chemical analytical results are discussed below by COC for the shallow and deep aquifers in the following sections.

10.4.1.1. WESTERLY PLUME - SHALLOW AQUIFER

Groundwater sampling was completed in 16 permanent and four temporary monitoring wells completed within the shallow aquifer. Two groundwater samples were collected from monitoring well UG-MW30S, which was sampled twice from locations near the top and the bottom of the well screen. The samples results are summarized in Tables 17 through 19.

<u>Westerly Plume - Shallow Aquifer - Petroleum Hydrocarbons.</u> Lube-oil range petroleum hydrocarbons were detected in the groundwater sample collected from monitoring well UG-MW37 at a concentration (0.55 milligrams per liter [mg/L]) greater than the respective MTCA Method A groundwater cleanup level (0.5 mg/L). Lube oil-range petroleum hydrocarbons were also detected in monitoring wells UG-MW26 and 1F-B5 at concentrations slightly less than the MTCA Method A groundwater cleanup level. Lube oil-range petroleum hydrocarbons were not detected in the remaining analyzed groundwater samples. The estimated extent of the petroleum-contaminated groundwater plume is shown in Figure 22.

Diesel-range petroleum hydrocarbons were detected at concentrations less than the MTCA Method A groundwater cleanup level in two groundwater samples collected from monitoring well 1F-B5 and JS-MW3S. Diesel-range petroleum hydrocarbons were not detected in the remaining analyzed groundwater samples.

Gasoline-range petroleum hydrocarbons were not detected in the analyzed groundwater samples collected from the shallow aquifer within the Westerly Plume.

<u>Westerly Plume - Shallow Aquifer - VOCs</u>. The chemical analytical results are summarized in the following sections. The chemical analytical results (detections only) are summarized in Tables 17 and 18 presented on Figure 22.

- **PCE.** PCE was detected at a concentration (6.5 micrograms per liter [μg/L]) greater than the MTCA Method A groundwater cleanup level (5 [μg/L), but less than the MTCA Method B groundwater screening level protective of indoor air (24 μg/L) in the groundwater sample collected from temporary well 1A-B2. PCE was either not detected or was detected at concentrations less than the MTCA Method cleanup and MTCA Method B groundwater screening level screening level in the remaining analyzed groundwater samples.
- **TCE.** TCE was detected at concentrations greater than the MTCA Method A groundwater cleanup level (5 μg/L) and the MTCA Method B groundwater screening level protective of indoor air (1.5 μg/L) in the following groundwater samples with the detected concentrations (in μg/L) identified in parenthesis.

1F-B7 (30)	1F-B3 (180)
UG-MW32 (35)	UG-MW25S (290)
UG-MW29S (42)	1F-B5 (35)
UG-MW13 (110)	UG-MW31 (120)
UG-MW30S (130 and 130 [sampled at different depth intervals])	

TCE was detected at concentrations less than the MTCA Method A groundwater cleanup level (5 μg/L]) but greater than the MTCA Method B groundwater screening level protective of indoor air (1.5 μg/L) in the groundwater samples collected from monitoring wells JS-MW7A (1.8 μg/L) and 1A-B2 (4.8 μg/L).

TCE was either not detected or was detected at a concentration less than the MTCA Method A groundwater cleanup level and MTCA Method B groundwater screening level protective of indoor air in the remaining analyzed groundwater samples collected from the shallow aquifer.

- **Cis-1,2-DCE, 1,1-DCE and Trans-1,2-DCE.** Cis-1,2-DCE was detected at a concentration (45 μg/L) greater than the MTCA Method B Groundwater criteria (16 μg/L), but less than the MTCA Method B groundwater screening level protective of indoor air (160 μg/L) in one groundwater sample collected from temporary well 1A-B2. Cis-1,2-DCE was either not detected or was detected at concentrations less than the MTCA Method B groundwater criteria and the MTCA Method B groundwater screening level protective of indoor air in the remaining analyzed groundwater samples. 1,1-DCE and trans-1,2-DCE were either not detected or were detected at concentrations less than the respective MTCA Method B groundwater criteria and MTCA Method B groundwater screening level protective of indoor air in groundwater samples collected from the shallow aquifer within the Westerly Plume.
- **Vinyl Chloride.** Vinyl chloride was detected at a concentration (6.9 μg/L) greater than the MTCA Method A groundwater cleanup level (0.2 μg/L) and MTCA Method B groundwater screening level protective of indoor air (0.35 μg/L) in the groundwater sample collected from temporary

well 1A-B2. Vinyl chloride was not detected in the remaining analyzed groundwater samples. However, analytical results indicate that the laboratory reporting limits on some samples were listed at a concentration greater than the MTCA Method A cleanup level and MTCA B screening level protective of indoor air.

- **Miscellaneous Solvents.** 1,1-dichloroethane (1,1-DCA) was detected at a concentration (15 µg/L) greater than the respective MTCA Method B groundwater criteria (7.7 µg/L) and the MTCA Method B groundwater screening level protective of indoor air (11 µg/L) in the groundwater sample collected from monitoring well UG-MW25S. 1,1-DCA was also detected at a concentrations less than the MTCA Method B groundwater criteria and MTCA Method B groundwater screening level protective of indoor air in the groundwater sample collected from monitoring well UG-MW32. The 1,1-DCA detection is an indication the source of the contamination in the two monitoring wells may be the same.

  Other solvents were either not detected, or were detected at concentrations less than the respective cleanup levels in the remaining analyzed groundwater samples.

- **VOCs. Byproducts of Chlorinated Water.** Bromodichloromethane was detected at a concentration greater than the MTCA Method B groundwater cleanup level (0.71 µg/L) in the groundwater sample collected from monitoring well JS-MW3S (0.98 µg/L). Chloroform and dibromochloromethane were also detected at concentrations less than the respective groundwater cleanup level in the groundwater sample collected from monitoring well JS-MW3S on September 13, 2013.

  City of Tacoma supplied water was utilized during development of well JS-MW3S due to low recharge of the aquifer observed during development. Bromodichloromethane, chloroform and dibromochloromethane are typical byproducts of the chlorine used to disinfect municipal supply water. Following receipt of the chemical analytical data from JS-MW3S, a groundwater sample was collected from the municipal water supply. Bromodichloromethane was detected at a concentration (2.2 µg/L) greater than the MTCA Method B groundwater cleanup level collected from the municipal supply water. Chloroform and dibromochloromethane were also detected at concentrations less than the respective cleanup levels in the sample of municipal supply water.

  Monitoring well JS-MW3S was resampled on January 22, 2014. Bromodichloromethane and dibromochloromethane were not detected in the analyzed groundwater sample collected in January 2014. Chloroform was detected but at concentration approximately 300 times less than the groundwater sample collected in September 2013. The chemical concentrations in September appear to be related to the use of municipal water during development. Other VOCs were not detected in the analyzed groundwater samples.

- **VOCs - Other.** Other VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A cleanup level of B criteria.

<u>**Westerly Plume - Shallow Aquifer - Metals.**</u> Metals were either not detected or were detected at concentrations less than the respective MTCA Method A groundwater cleanup level in the analyzed groundwater samples.

<u>Westerly Plume - Shallow Aquifer - PAHs</u>. PAHs were either not detected or were detected at concentrations less than the respective MTCA Method A groundwater cleanup level in the analyzed groundwater samples.

10.4.1.2. WESTERLY PLUME - DEEP AQUIFER

GeoEngineers conducted groundwater sampling in 26 permanent monitoring wells within the deep aquifer. The sample results are summarized in Tables 17 through 19.

<u>Westerly Plume - Deep Aquifer - Petroleum Hydrocarbons</u>. Petroleum hydrocarbons were not detected in the analyzed groundwater samples.

<u>Westerly Plume - Deep Aquifer - VOCs</u>. The chemical analytical results are summarized in the following sections. The chemical analytical results (detections only) are summarized in Tables 17 and 18 and presented on Figure 23.

- **PCE.** PCE was detected at concentrations greater than both the MTCA Method A groundwater cleanup level (5 µg/L) and the MTCA Method B groundwater screening level protective of indoor air (24 µg/L) in the following three groundwater samples with the detected concentrations identified in parenthesis: UG-MW18 (12 µg/L); UG-MW38D (6.7 µg/L) and UG-MW19 (5.6 µg/L).

  PCE was either not detected or was detected less than the MTCA Method A groundwater cleanup level (5 µg/L) and the MTCA Method B groundwater screening level protective of indoor air (24 µg/L) in the remaining analyzed groundwater samples.

- **TCE.** TCE was detected at concentrations greater than the MTCA Method A groundwater cleanup level (5 µg/L) and the MTCA Method B groundwater screening level protective of indoor air (1.5 µg/L) in the following 14 groundwater samples with the detected concentrations (in µg/L) identified in parenthesis.

UG-MW18 (1,200)	UG-MW20 (170)
DD-MW1 (130)	UG-MW21 (7.7)
JS-MW2 (14)	UG-MW22 (14)
UG-MW14 (110)	UG-MW23 (5.5)
UG-MW16 (170)	UG-MW3 (13)
UG-MW17 (250)	UG-MW38D (160)
UG-MW19 (300)	UG-MW* (56)

  TCE was either not detected or was detected at concentrations less than the MTCA Method A groundwater cleanup level (5 µg/L]) and the MTCA Method B groundwater screening level protective of indoor air (1.5 µg/L) in the remaining analyzed groundwater samples.

- **VOCs - Trans-1,2-DCE, Cis-1,2-DCE 1,1-DCE, and Vinyl Chloride.** Trans-1,2-DCE, cis-1,2-DCE, 1,1-DCE and vinyl chloride were either not detected or were detected at concentrations less than the MTCA Method A groundwater cleanup level, the MTCA Method B groundwater criteria or the MTCA Method B groundwater screening level protective of indoor air.

- **VOCs – Miscellaneous Solvents.** 1,1,1-TCA, 1,1-DCA and benzene were either not detected or were detected at concentrations less than the MTCA Method A groundwater cleanup level, the MTCA Method B groundwater criteria or the MTCA Method B groundwater screening level protective of indoor air.
- **VOCs - Other.** Other VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A groundwater cleanup level or Method B criteria.

Westerly Plume - Deep Aquifer - Metals. Total arsenic was detected at a concentration (6.2 µg/L) greater MTCA Method A groundwater cleanup level (5 µg/L) in the groundwater sample collected from monitoring well UG-MW25D. Dissolved arsenic was also detected at a concentration (5.7 µg/L) greater than the MTCA Method A groundwater cleanup level in the groundwater sample from monitoring well UG-MW25D.

Other metals were either not detected or were detected at concentrations less than the respective MTCA Method A groundwater cleanup levels.

Westerly Plume - Deep Aquifer - PAHs. PAHs were not detected in the analyzed groundwater samples.

10.4.2. Easterly Groundwater Plume

Thirty-eight groundwater samples collected from existing wells within the Easterly Groundwater Plume were submitted for chemical analysis of petroleum hydrocarbons and VOCs. Wells installed during this investigation were submitted for chemical analysis of petroleum hydrocarbons, VOCS, metals and PAHs.

The scope of this investigation did not include evaluating the geology within the Eastern Plume relative to existing well screen interval. Three wells installed during the 2013 investigation are known to be installed within the shallow aquifer (CR-MW16, CRMW17 and JS-MW6S). Three wells (CR-MW16, CRMW17 and JS-MW6D) were also within the deep aquifer during the 2013 investigation. Multiple water-bearing units may be present within the Easterly Plume based on water levels observed in wells and the lithologic units observed during the drilling activities. Additional investigation may be necessary to further define the water-bearing units within the Easterly Plume to better understand the geology in order to further delineate the lateral and vertical extent within the Easterly Plume. For this report, the groundwater chemical analytical results for the Easterly Plume are described as one water-bearing unit.

Easterly Plume - Petroleum Hydrocarbons. The chemical analytical results are summarized in the following sections. The chemical analytical results (detections only) are summarized in Tables 17 through 19 and presented on Figure 24.

- **Gasoline-Range Petroleum Hydrocarbons.** Gasoline-range petroleum hydrocarbons were detected at concentrations greater than the MTCA Method A groundwater cleanup level (800 µg/L) in samples collected in the following three monitoring wells with the detected concentrations identified in parenthesis: CR-MW9 (3,300 µg/L), SH-MW7 (1,100 µg/L) and UG-MW6 (890 µg/L). The laboratory indicated the gasoline-range petroleum hydrocarbon concentration detected in the groundwater sample from monitoring well UG-MW6 is attributed to chlorobenzene being present in the sample.

Gasoline-range petroleum hydrocarbons were not detected in the remaining analyzed groundwater samples.

- **Diesel-Range Petroleum Hydrocarbons.** Diesel-range petroleum hydrocarbons were detected at concentrations greater than the MTCA Method A groundwater cleanup level (0.5 mg/L) in groundwater samples collected from PS-MW6 (1.0 mg/L) and PS-MW7 (1.2 mg/L). Diesel-range petroleum hydrocarbons were either not detected or were detected at concentrations less than the MTCA Method A groundwater cleanup level in the remaining analyzed groundwater samples.
- **Lube Oil-Range Petroleum Hydrocarbons.** Lube oil-range petroleum hydrocarbons were not detected in the analyzed groundwater samples.

<u>Easterly Plume - VOCs</u>. The chemical analytical results are summarized in the following sections. The chemical analytical results (detections only) are summarized in Tables 17 and 18 and presented on Figure 23 through 25.

- **TCE.** TCE was detected at concentrations greater than the MTCA Method A groundwater cleanup level (5 µg/L) and the MTCA Method B groundwater screening level protective of indoor air (1.5 µg/L) in the groundwater samples collected from the following 14 wells located within the Easterly Plume with reported concentrations (in µg/L) identified in parenthesis.

BL-MW5 (910)	BL-MW6 (120)
UG-MW6 (700)	CR-MW17 (93)
JP-MW2 (500)	BL-MW1 (89)
CR-MW16 (300)	PS-MW6 (50)
PS-MW7 (180)	BL-MW3 (40)
PL-MW1 (17)	PS-MW8 (12)
UG-MW5 (5.8)	CR-MW6 (5.5)

TCE was detected at concentrations less than the MTCA Method A groundwater cleanup level (5 µg/L) but greater than the MTCA Method B groundwater screening level protective of indoor air (1.5 µg/L) in the groundwater samples collected from the following five wells located within the Easterly Plume with reported concentrations (in µg/L) identified in parenthesis.

CR-MW12 (4.7)	CR-MW5 (2.9)
JS-MW5 (3.8)	JS-MW6D (2.8)
PS-MW9 (3.3)	

TCE was either not detected or was detected at concentrations less than the MTCA Method A groundwater cleanup level and the MTCA Method B groundwater screening level protective of indoor air in the remaining analyzed groundwater samples collected from within the Easterly Plume. The approximate extent of the TCE groundwater plume is shown on Figure 23.

- **cis-1,2-DCE; 1,1-DCE; trans-1,1-DCE.** Cis-1,2-DCE was detected at concentrations greater than the MTCA Method B groundwater criteria (16 µg/L) and greater than the MTCA Method B groundwater screening level protective of indoor air (160 µg/L) in the groundwater samples collected from the following five monitoring wells located within the Easterly Plume with reported concentrations (in µg/L) identified in parenthesis.

JP-MW2 (600)	BL-MW5 (220)
BL-MW6 (240)	UG-MW6 (180)
CR-MW16 (240)	

- Cis-1,2-DCE was detected at concentrations greater than the MTCA Method B groundwater criteria (16 µg/L) but less than the MTCA Method B screening level protective of indoor air (160 µg/L) in the groundwater samples collected from the following seven monitoring wells located within the Easterly Plume with reported concentrations (in µg/L) identified in parenthesis.

BL-MW1 (86)	CR-MW17 (120)
BL-MW3 (22)	PS-MW6 (20)
CR-MW5 (22)	PS-MW7 (38)
UG-MW1 (19)	

Cis-1,2-DCE was either not detected or was detected at concentrations less than the MTCA Method B groundwater cleanup level and MTCA Method B groundwater screening level protective of indoor air in the remaining analyzed groundwater samples collected within the Easterly Plume. 1,1-DCE and trans-1,1-DCE were either not detected or were detected at concentrations less than the MTCA Method B groundwater cleanup level and MTCA Method B groundwater screening level protective of indoor air in the analyzed groundwater samples collected within the Easterly Plume.

- **Vinyl Chloride.** Vinyl chloride was detected at concentrations greater than both the MTCA Method A groundwater cleanup level (0.2 µg/L) and the MTCA Method B groundwater screening level protective of indoor air (0.35 µg/L) in the groundwater samples collected from the following seventeen Easterly Plume monitoring wells with the detected concentrations (in µg/L) identified in parenthesis.

JP-MW2 (120)	PL-MW1 (2.2)
BL-MW6 (61)	CR-MW15 (1.3)
UG-MW6 (33)	CR-MW5 (1.1)
BL-MW5 (24)	SH-MW7 (1.0)
CR-MW16 (17)	BL-MW4 (0.75)

CR-MW17 (12)	UG-MW12 (0.93)
UG-MW1 (9.7)	CR-MW12 (0.64)
PS-MW7 (5.9)	CR-MW6 (0.52)
PS-MW6 (4.7)	

Vinyl chloride was either not detected or was detected at concentrations less than the MTCA Method B groundwater cleanup level and MTCA Method B groundwater screening level protective of indoor air in the remaining analyzed groundwater samples collected from within the Easterly Plume. Note that the laboratory reporting limit was greater than the MTCA Method A groundwater cleanup level in the groundwater samples collected in monitoring wells CR-MW9 and BL-MW1. The approximate lateral extent of the vinyl chloride plume is shown on Figure 25.

- **Benzene.** Benzene was detected at concentrations greater than the MTCA Method A groundwater cleanup level (5 µg/L) and the MTCA Method B groundwater screening level protective of indoor air (2.4 µg/L) in the groundwater samples collected from the following five monitoring wells located within the Easterly Plume with the detected concentrations (in µg/L) identified in parenthesis.

CR-MW9 (130)	UG-MW1 (56)
JP-MW2 (57)	UG-MW12 (30)
UG-MW6 (18)	

Benzene was either not detected or was detected at concentrations less than the MTCA Method A groundwater cleanup level (5 µg/L) and the MTCA Method B groundwater screening level protective of indoor air (2.4 µg/L) in the remaining analyzed groundwater samples. The approximate lateral extent of the benzene plume is shown on Figure 24.

- **Chlorobenzene.** Chlorobenzene was detected at a concentration greater than the MTCA Method A groundwater cleanup level (160 µg/L) and the MTCA Method B groundwater screening level protective of indoor air (290 µg/L) in the groundwater sample collected from monitoring well UG-MW6 (310 µg/L). Chlorobenzene was detected at a concentration greater than the MTCA Method A groundwater cleanup level (160 µg/L) but less than the MTCA Method B groundwater screening level protective of indoor air (290 µg/L) in the groundwater sample collected from monitoring well JP-MW2 (170 µg/L). Chlorobenzene was either not detected or was detected at concentrations less than the respective MTCA Method A groundwater cleanup level and the MTCA Method B groundwater screening level protective of indoor air in the remaining analyzed groundwater samples.

- **Total Xylenes.** Total xylenes were detected at a concentration (340 µg/L) less than the MTCA Method A groundwater cleanup level (1,000 µg/L) but greater than the MTCA Method B groundwater screening level protective of indoor air (210 µg/L) in the groundwater sample collected from monitoring well CR-MW9. Total xylenes were either not detected or were detected at concentrations less than the respective MTCA Method A groundwater cleanup level and the MTCA Method B groundwater screening level protective of indoor air in the remaining analyzed groundwater samples.

Naphthalene and 1,2,4-Trimethylbenzene. Naphthalene was detected at a concentration (22 µg/L) less than the MTCA Method A groundwater cleanup level (160 µg/L) but greater than the MTCA Method B groundwater screening level protective of indoor air (8.9 µg/L) in the groundwater sample collected from monitoring well CR-MW9. A MTCA groundwater cleanup level has not been established for 1,2,4-Trimethylbenzene. However 1,2,4-Trimethylbenzene was detected at a concentration (110 µg/L) greater than the MTCA Method B groundwater screening level protective of indoor air (28 µg/L) in the groundwater sample collected from CR-MW9. Naphthalene and 1,2,4-Trimethylbenzene were either not detected or were detected at concentrations less than the respective MTCA Method A groundwater cleanup level and the MTCA Method B groundwater screening level protective of indoor air in the remaining analyzed groundwater samples.

- **Other VOCs.** Other VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A groundwater cleanup level and MTCA Method B groundwater screening level protective of indoor air in the analyzed groundwater samples.

<u>Easterly Plume - Metals</u>. Total arsenic was detected at a concentration (8.6 µg/L) greater than the MTCA Method A groundwater cleanup level (5 µg/L) in the groundwater sample collected from monitoring well BL-MW3. Dissolved arsenic was not detected in this sample during follow-up analysis.

Other metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver) were either not detected or were detected at concentrations less than the respective MTCA Method A groundwater cleanup level or Method B criteria in the analyzed groundwater samples.

<u>Easterly Plume - PAHs</u>. PAHS were not detected in the analyzed groundwater samples collected from within the Easterly Groundwater Plume.

10.5. Tioga Building Sump Sampling and Analytical Results

A sample of water within a sump in the Tioga building was sampled and analyzed for petroleum hydrocarbons, metals, PAHs and VOCs. The chemical analytical results are summarized in Table 20. The water sample was collected within the sump because drilling was not practical in the vicinity of the elevator pit due to a network of piping in July 2013. The following metals and petroleum hydrocarbons were detected in the sump water at concentrations greater than the respective MTCA Method A groundwater cleanup level with the detected concentration identified in parenthesis.

- Arsenic (160 µg/L)
- Cadmium (16 µg/L)
- Chromium (80 µg/L)
- Lead (5,700 µg/L)
- Mercury (2.5 µg/L)
- Lube Oil-Range Petroleum Hydrocarbons (2.2 mg/L)

Other metals, PAHs and VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A groundwater cleanup level or Method B criteria.

A hand auger (2A-B2) was completed in the area of the sump following receipt of the sump water chemical analytical results. The hand auger was completed within 1-foot of the existing sump to a depth of 3.25 feet bgs. Two concrete slabs were observed in the area of 2F-B2 with the approximate thickness of the top slab at 2 inches and the lower slab at 3 inches. These slabs were vertically separated by approximately 4 inches of fill.

Three soil samples were submitted for chemical analysis of petroleum hydrocarbons, metals, PAHs and VOCs as described in Table 6. The chemical analytical results are summarized in Tables 13 and 14. In general, cPAHs were detected at a concentration (TTEC = 0.12 mg/kg) greater than the MTCA Method A ULU cleanup level.in the soil sample collected between the two concrete slabs Lead was detected at a concentration (130 mg/kg) greater than the Reuse Criteria in this soil sample as well.

CPAHs and lead were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels or Method B criteria in the remaining analyzed soil samples analyzed. Other metals, petroleum hydrocarbons and VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A groundwater cleanup level or Method B criteria in the analyzed soil samples.

11.0 SUMMARY AND FINDINGS UWT CAMPUS INVESTIGATION

The environmental subsurface investigation was completed at the site between May 2013 and January 2014. Contaminated soil and groundwater are present within the Westerly Plume and the Easterly Plume at the site. The soil and groundwater results as it relates to contaminated and impacted soil and contaminated groundwater for the Westerly and Easterly Plumes are briefly summarized in the following sections.

11.1. Westerly Plume – Results and Interpretation

The Westerly Plume extends from Tacoma Avenue to Jefferson Avenue and from just south of South 19th Street to South 17th Street. A portion of the Westerly Plume is located within PDA 1 and PDA 2.

11.1.1. Westerly Plume - Soil

11.1.1.1. WESTERLY PLUME - FILL

Metals. Contaminated soil (metals [arsenic, cadmium, lead and/or mercury] and/or cPAHs) was identified within the fill soil generally from the ground surface to approximately 5 feet bgs primarily within the Westerly Plume in the area of the PDAs. The source of the contaminated soil is unknown but may be related to fill placed on the site or from other historical uses on the properties.

Petroleum Hydrocarbons. Gasoline-contaminated soil was identified within the fill soil in the area within the southeast portion of PDA 1F – Fawcett Parking where gasoline-contaminated soil was encountered between 7 and 8 feet bgs. The source of the petroleum-contaminated soil is unknown, but the contaminated soil may be related to the following: a UST reported in the area as identified in the City of Tacoma permit records; or fill placed on the site or from the former motorcycle service shop operations. Lube oil-range petroleum hydrocarbons were also detected in the fill soil in the area within the southeast portion of PDA 1F – Fawcett Parking at concentrations less than the MTCA cleanup level but greater than the Reuse Criteria.

PCE. PCE-contaminated soil is present on PDA 1A - Upton and PDA 2D – Tacoma Paper and Stationary Building properties. The source of the PCE at PDA 1A – Upton may be related to the former dry cleaner. Former operations on PDA 2D – Tacoma Paper and Stationary appear to be a possible source of PCE-contaminated soil. It is unknown if the PCE-contaminated soil has impacted groundwater. PCE (contaminated and impacted) is present in soil beneath the building from below the slab to the full depth explored (12 feet bgs). PCE-contaminated soil may extend deeper than 12 feet bgs. Groundwater was not encountered in the borings completed inside the building during this investigation. PCE and TCE were not detected in the shallow and deep aquifers in the monitoring wells (JS-MW3S and JS-MW3) indicating the source of PCE in the soil does not appear to originate from an upgradient source. The source of the PCE is likely from within the building, but the exact location is unknown. A wholesale paper company operated in the building between 1911 and 1953 and a sign printing shop was located in the southern portion of the building in at least 1912. Historical operations of printing or coating paper may be the source of the PCE within the building; however the actual source is unknown. Due to storage of materials, we were unable to inspect the entire first floor for potential areas where PCE may have been disposed in the past (drywells or cisterns). The PCE in the soil in PDA-2D – Tacoma Paper and Stationary is being investigated under CPO Project No. 204701.

PCE-impacted soil was identified within the fill soil in three general areas of the Westerly Plume boundary as shown on Figure 18. The three areas include PDA 1A – Upton and PDA 1C – Fawcett North, PDA 2D – Tacoma Paper and Stationary, and in wells UG-MW38S and UG-MW-38S. The PCE-impacted soil is a possible indication that groundwater in the shallow aquifer may also contain PCE and associated breakdown products.

TCE. TCE-impacted soil was encountered within the fill soil in borings completed on PDA 1A – Upton. The TCE-impacted soil is a possible indication that groundwater in the shallow aquifer may also contain PCE and associated breakdown products.

11.1.1.2. WESTERLY PLUME - ICE-CONTACT DEPOSITS

PCE. PCE–contaminated soil was identified in the southern portion (PDA 2D – Tacoma Paper and Stationary) of the Westerly Plume. The source of the PCE in the PDA 2D – Tacoma Paper and Stationary is not known but may be related to former sign printing within the building as discussed above.

PCE-impacted soil was identified within the ice-contact deposits in four general areas of the Westerly Plume boundary as shown on Figure 19. The four areas include PDA 2D – Tacoma Paper and Stationary (see discussion above), PDA 1G – Laborers/Lot T39 and T40, PDA 1B – Tacoma Vacant and the adjacent areas PDA 1A – Upton and PDA 1C – Fawcett North. The PCE-impacted soil is a possible indication that groundwater in the shallow aquifer may also contain PCE and associated breakdown products.

TCE. TCE-contaminated soil was identified in three general areas in the ice-contact deposits within the Westerly Plume as shown on Figure 19. The three areas include PDA 1B – Tacoma Vacant, PDA 2A – Sound Care, and wells UG-MW30S and UG-MW30D. The source of the TCE is unknown in these three areas.

TCE-impacted soil was identified within the ice-contact deposits in areas throughout a majority of the Westerly Plume boundary as shown on Figure 19. The TCE-impacted soil is a possible indication that groundwater in the shallow aquifer may also contain TCE and associated breakdown products.

11.1.1.3. WESTERLY PLUME - SILT/TRANSITION ZONE

TCE. TCE-contaminated soil was identified within the silt/transition zone in well UG-MW-38S located on the eastern portion of the Westerly Plume near Tacoma Avenue as shown in Figure 20. The TCE-contaminated soil was observed from approximately 16 to 16.5 feet bgs in well UG-MW38S.

TCE-impacted soil was identified in the silt/transition zone in well UG-MW30D located within the central portion of the Westerly Plume near South 19th Street and Market Street intersection. The TCE-impacted soil was observed from approximately 35 to 36 feet bgs in well UG-MW30D.

11.1.1.4. WESTERLY PLUME - ADVANCE OUTWASH

TCE. TCE-contaminated soil was identified in one sample collected in UG-MW38D collected at approximately 33 to 34 feet bgs. The source of the TCE is likely from former operations located across Tacoma Avenue to the west.

TCE-impacted soil was identified within the advance outwash in areas PDA 1B – Tacoma Vacant, PDA 1E – Strom Property, PDA 1G – Laborers/Lot T39 and T40 and well JS-MW4 within the Westerly Plume boundary as shown on Figure 21. The TCE-impacted soil is a possible indication that groundwater in the shallow aquifer may also contain TCE and associated breakdown products.

11.1.2. Westerly Plume - Groundwater

Contaminated groundwater exists in the shallow and deep aquifers within the Westerly Plume. Additional monitoring wells were installed to further evaluate the lateral and vertical extent of the TCE- and PCE-contaminated groundwater plume. Groundwater monitoring of the new and existing monitoring wells was conducted to provide an updated dataset of groundwater conditions for the Agreed Order. This section provides a summary and interpretation of the findings in the shallow and deep aquifers within the entire Westerly Plume.

11.1.2.1. WESTERLY PLUME - SHALLOW AQUIFER

The general direction of the groundwater flow within the shallow aquifer is to the east. Groundwater within the shallow aquifer likely flows through seams of sand and gravel interbedded in cemented glacial till. The boundaries and connectivity of individual flows is not known at this time due to the heterogeneous nature of the shallow aquifer. Groundwater flow within the shallow aquifer may also be influenced by underground utilities in the area. These underground utilities also provide a preferential pathway for contaminates and contaminated groundwater. The estimated lateral extent of contaminated groundwater plumes in the shallow aquifer is shown on Figure 22 and discussed below.

Petroleum Hydrocarbons. Petroleum-contaminated groundwater (lube oil-range) is present in the shallow aquifer near the southern portion of PDA 1B - Tacoma Vacant. The source of the lube oil-range petroleum hydrocarbons is unknown. However, the source may be within PDA 1B, because petroleum hydrocarbons typically do not migrate as far as solvents, often traveling only 100 feet or less from the original source. The former laydown yard on PDA 1B that may be a source of the petroleum-contaminated groundwater identified.

PCE. PCE-contaminated groundwater was encountered in the shallow aquifer in temporary well 1A-B2 within PDA 1A – Upton. The lateral extent of the PCE contaminated groundwater is not known, but appears to extend east to the PDA 1C – Fawcett North based on detections of PCE soil on this adjacent property as shown on Figure 22. The former dry cleaner on Upton is a potential source of the PCE contaminated groundwater because of historical activities and the distribution of contaminated soil and groundwater on the site.

TCE and Other Indicator Solvents. TCE-contaminated groundwater is present in three general areas within the Westerly Plume based on the results if this investigation. The boundaries and connectivity of these three TCE plumes is not known at this time due to the heterogeneous nature of the shallow aquifer. Groundwater flow within the shallow aquifer is likely influenced by the underground utilities in the area that may provide a preferential pathway for contaminants and contaminated groundwater. The three TCE plumes within the shallow aquifer are discussed below.

- One large linear TCE plume is located within the shallow aquifer in central portion of the UWT campus from Tacoma Avenue on the west to Jefferson Avenue on the east as shown on Figure 22. The approximate plume boundary encompasses the area north and south of South 19th Street to Jefferson Avenue including all or portions of PDAs 1B, 1D, 1F, 1G, 2A, 2B and 2E. The results indicate that the highest concentration of TCE in a shallow aquifer was detected at 180 µg/L in temporary well 1F-B3 located on the south side of PDA 1F – Fawcett Parking/Lot T47 and T48 in PDA 1B – Tacoma Vacant. Former operations of motorcycle service shop (1942 to 1969) and dry cleaner (1931) on PDA 1F – Fawcett Parking appear to be a possible source of PCE and TCE groundwater contamination, and may be contributing to the groundwater plumes. However, PDA 1F – Fawcett Parking is located within a portion of the larger TCE-plume.
- A narrow TCE Plume is located within the shallow aquifer near the northwest portion of the UWT campus from Tacoma Avenue to just beyond Fawcett Avenue as shown on Figure 22. The approximate plume boundary encompasses portions of PDAs 1B, 1C, 1D and 1E. The results indicate that the highest concentration of TCE in a shallow aquifer was detected at 290 µg/L in well UG-MW25S located in PDA 1B-Tacoma Vacant. 1,1-DCA was also detected in UG-MW25S and UG-MW32. The concentrations of 1,1-DCA in UG-MW25S were higher than the concentrations in the downgradient well UG-MW32. The 1,1-DCA is an indicator chemical that the source of the TCE/1,1-DCA contaminated groundwater within UG-MW25S and UG-MW32 are the same. A potential source to the contaminated groundwater is a former photo engraving/metal arts facility located 1722 Tacoma Avenue South. The former photo engraving/metal arts facility is located directly upgradient of the wells and operated between 1956 and 1996. The facility have used TCE and 1,1-DCA during its operations.

- A TCE Plume was also discovered within the shallow aquifer at PDA 1H – Student Y facility as shown on Figure 22. This TCE Plume appears to encompass the northern portion of PDA 1H – Y-Student Center. The results indicate that the highest concentration of TCE in this shallow aquifer was detected at 47 µg/L in well UG-MW29S located on the north side of PDA 1H – Y-Student Center.

11.1.2.2. WESTERLY PLUME - DEEP AQUIFER

PCE- and TCE-contaminated groundwater is present in the deep aquifer within the Westerly Plume.

PCE. PCE was detected at concentrations greater than the MTCA cleanup level in groundwater from three wells (UG-MW18, UG-MW19 and UG-MW38D) near the western (upgradient) portion of the Westerly Plume near South 19th Street and Tacoma Avenue. The highest concentration of PCE is present in monitoring well UG-MW18 (12 µg/L) located near Tacoma Avenue. Well UG-MW18 is the furthermost upgradient well indicating the source of the PCE is likely from an off-site property west of Tacoma Avenue. PCE appears to decrease in concentration to less than MTCA cleanup levels eastward along the plume near Fawcett Avenue.

TCE. TCE-contaminated groundwater comprises the majority of the deep aquifer contamination within the Westerly Plume. The highest concentration of the TCE is present in monitoring well UG-MW18 (1,200 µg/L). The TCE concentration generally decreases eastward along the plume towards Jefferson Street (JS-MW3 and JS-MW4). The approximate lateral extent of the TCE-contaminated groundwater within the deep aquifer in the Westerly Plume is shown on Figure 23.

TCE was detected at a concentration less than the MTCA Method A groundwater cleanup level, but greater than the MTCA Method B groundwater screening level protective of indoor air in one monitoring well (JS-MW4). The chemical analytical results for wells between the Westerly and Easterly plumes (JS-MW4, JS-MW5, and JS-MW6D) indicate the two plumes appear to comingle in the area of South 19th Street and Jefferson Avenue. The TCE concentrations are less than the MTCA Method A groundwater cleanup level but greater than the MTCA Method B groundwater screening level protective of indoor air in the area of the comingling plumes.

The general lateral boundary of the deep aquifer appears to be defined to the north and east but is still unknown south of the plume towards South 21st Street. TCE was detected at concentrations greater than the MTCA groundwater cleanup level in three wells (UG-MW21, UG-MW-22 and UG-MW23) installed on the southern edge of the plume. The concentrations of TCE in the deep aquifer have decreased since the groundwater sampling events in 2007 and 2009 with two exceptions. The highest TCE concentration in well UG-MW18 and the apparent downgradient edge of the plume (JS-MW2 and UG-MW3) contained similar concentrations over these two events. The reason for the apparent stability in TCE concentrations in these wells is unknown. Because the majority of the monitoring wells have been sampled only twice in the last eight years, there is not enough data to accurately evaluate concentration trends over time.

The TCE and PCE in the deep aquifer may be related to multiple sources or a single contaminate source. Potential sources are shown on Figure 4 and described in Table 4.

TCE-contaminated groundwater from the shallow aquifer may also be migrating into the deep aquifer in areas where the silt layer has either been removed (utilities or cuts for development), has a thickness of 6-inches or less or contains gravel allowing a pathway through the silt layer and therefore not providing a confined condition. The area near South 19th Street and Fawcett Avenue appears to possibly be where the shallow and deep aquifers may merge solely based on the groundwater water levels collected during this investigation and the boring logs completed by others. It is not known at this time if human modification or geologic processes were the cause for the potential connection between the shallow and deep aquifers in this area.

11.2. Easterly Plume - Results and Interpretation

The Easterly Plume is generally located on the southeast portion of the UWT campus between Jefferson Avenue on the west to Pacific Avenue on the east and from South 21st Street on the south to approximately South 19th Street on the north. A portion of the Easterly Plume is located within PDA 2E – Swiss Pub and Frederick Wild and PDA 2F – Tioga Building.

11.2.1. Easterly Plume - Soil

11.2.1.1. EASTERLY PLUME - FILL

TCE-impacted soil was identified in the fill material in well CR-MW16 as shown on Figure 18. The TCE-impacted soil was encountered from approximately 9 to 16 feet bgs. Well CR-MW16 is located on Dolly Roberson Lane on the southeast portion of the UWT campus.

11.2.1.2. EASTERLY PLUME - ICE-CONTACT DEPOSITS

TCE-contaminated soil was identified in the ice-contact deposits in well CR-MW16 from approximately 18 to 25 feet bgs. TCE- and other breakdown products were detected in the soil in well CR-MW16 and CR-MW17 from approximately 18 to 26 feet bgs. Well CR-MW17 is located on Dolly Roberson on the southeast portion of the UWT campus.

11.2.1.3. EASTERLY PLUME - SILT/TRANSITION ZONE

TCE-contaminated soil was identified in one sample collected in the silt in CR-MW16 from approximately 28 to 29 feet bgs. TCE- and other breakdown products were detected in the soil in well CR-MW16 and CR-MW17 from approximately 26 to 31 feet bgs.

11.2.1.4. EASTERLY PLUME - ADVANCE OUTHWASH

Gasoline-contaminated soil was identified within the advance outwash deposits from approximately 19.5 to 20 feet bgs in well CR-MW15 located on C Street as shown on Figure 17. The gasoline-contaminated soil encountered at depth in this area is likely related to the known gasoline-contaminated groundwater plume produced from the historical activities at the Cragle Parking lot.

11.2.2. Easterly Plume – Groundwater

Contaminated groundwater exists within the Easterly Plume. Additional monitoring wells were installed to further evaluate the lateral and vertical extent of the benzene-contaminated groundwater plume, replace the decommissioned wells along Dolly Roberson and C Street to further evaluate the contaminant plumes in this area in conjunction with groundwater monitoring of the new and existing monitoring wells to provide an updated dataset of groundwater conditions for the Agreed Order (#DE 97HW-S238).

The Easterly Groundwater Plume consists of a main TCE plume and vinyl chloride plume with a few smaller plumes (benzene, gasoline, chlorobenzene and diesel) located within the general boundary of the main TCE plume. This section provides a summary and interpretation of the findings in the Easterly Plume.

The source of the TCE/vinyl chloride plume is unknown although several upgradient sources have been identified as shown in Figure 4 and Table 4. TCE and vinyl chloride were not detected in the monitoring wells located on the west side of Market Street. However, this may not necessarily preclude the upgradient sources because the geology and hydrogeology in this area in not well understood and the wells may be screened in a different water-bearing unit. Additional investigation in this area would be necessary to identify the sources.

11.2.2.1. EASTERLY PLUME GROUNDWATER - MAIN TCE/VINYL CHLORIDE PLUME (MARKET STREET TO PACIFIC AVENUE)

The main groundwater plume consists of TCE and breakdown products (i.e., cis-1,2-DCE and vinyl chloride. The lateral extent of the TCE/vinyl chloride in groundwater at concentrations greater than the MTCA Method B groundwater screening level protective of indoor air is generally shown on Figures 23 and 25. The northern boundary of the main TCE plume through campus appears to possibly merge with the deep aquifer (advance outwash) in the area of South 19th Street and Market Avenue within the Westerly Plume. The vertical extent of TCE was not evaluated within the Easterly Plume as part of this investigation.

TCE. TCE-contaminated groundwater is present between Market Street and Pacific Avenue just north of South 21st Street as shown on Figures 23 and 25. The Easterly Plume is generally oriented from the southwest near Jefferson Avenue to the northeast at Pacific Avenue. The highest concentrations of TCE within the Easterly Plume were located in wells UG-MW6 (700 µg/L) and JP-MW2 (500 µg/L) located near the intersection of Jefferson Avenue and Market Street and well BL-MW5 (910 µg/L) located within the central portion of the plume. The general lateral boundary of the main TCE plume appears to be defined to the southwest, northeast, and to some extent to the east based on the results of this investigation. The boundary of the TCE plume is not well defined along Pacific Avenue in the area of wells CR-MW12 and BL-MW4 and on the northeast portion of the plume along the Prairie Line Trail near PDA 2D – Tacoma Paper and Stationary.

Vinyl Chloride. Vinyl chloride-contaminated groundwater is also present between Market Street and Pacific Avenue as shown on Figure 25. The highest concentration of vinyl chloride was 120 µg/L observed in well JP-MW2 with the lowest concentrations of vinyl chloride observed in the wells located along Pacific Avenue. The general lateral boundary of the vinyl chloride plume appears to be defined upgradient to the west but not to the south, north and east along Pacific Avenue.

Cis-1,2-DCE. Cis-1,2-DCE was also detected at concentration greater than the MTCA Method B groundwater screening level protective of indoor air in the following five wells: BL-MW5, BL-MW6, CR-MW16, UG-MW6 and JP-MW2.

11.2.2.2. EASTERLY PLUME GROUNDWATER - INTERSECTION OF MARKET STREET AND JEFFERSON AVENUE

Benzene/chlorobenzene-contaminated groundwater is present near the intersection of the Market Street and Jefferson Avenue as shown on Figure 24. The plume is generally located near the intersection and portion of the adjacent UWT Parking Lot T29. Benzene was detected at concentrations greater than the MTCA Method A groundwater cleanup level (5 µg/L) and greater than the MTCA Method B groundwater screening level protective of indoor air (2.4 µg/L) in five monitoring wells (JP-MW2, UG-MW6, UG-MW1 and UG-MW12). The benzene concentration ranged between 18 µg/L and 57 µg/L. The greatest concentration of benzene was detected in wells JP-MW2 and UG-MW1. Chlorobenzene was detected at concentrations greater than the MTCA Method A groundwater cleanup level (160 µg/L) and/or the MTCA Method B groundwater screening level protective of indoor air (290 µg/L) in two groundwater sample collected from monitoring wells UG-MW6 (310 µg/L) and JP-MW2 (170 µg/L). Gasoline-range petroleum hydrocarbons were detected at a concentration greater than the MTCA Method A groundwater cleanup level in the groundwater sample collected from UG-MW6. However, the laboratory indicated the gasoline-range petroleum hydrocarbon concentration in monitoring well UG-MW6 is attributed to chlorobenzene in the sample. Chlorobenzene and benzene were not detected in the monitoring wells located on the west side of Market Street.

The lateral extent of the benzene/chlorobenzene plume appears to be well defined to the north, west and east. The lateral extent to the northeast and the south is not well defined. The vertical extent of the chlorobenzene/benzene plume within the Easterly Plume was not evaluated as part of this scope.

Chlorobenzene is often used in the production of pesticides and typically breaks down relatively fast, converting to chlorophenol within a matter of months in oxygen-rich environments where soil microorganisms can readily attack the chlorobenzene. Exposure to air and direct sunlight can accelerate the biodegradation process. However, under certain conditions, chlorobenzene can persist in soil and groundwater and degrade much more slowly, over a course of several years. Chlorobenzene can also breakdown into benzene. The source of the chlorobenzene/benzene plume is unknown; however, several upgradient sources have been identified as shown in Figure 4. Chlorobenzene and benzene were not detected in the monitoring wells located on the west side of Market Street. However, this may not necessarily preclude the upgradient sources because the geology and hydrogeology in this area in not well understood and the wells may be screened in a different water bearing unit. Additional investigation in this area would be necessary to identify the sources.

11.2.2.3. EASTERLY PLUME GROUNDWATER - C STREET (WELL CR-MW9 AND CR-MW15)

Gasoline and benzene-contaminated groundwater are present at concentration greater than the MTCA Method A groundwater cleanup level and the MTCA Method B groundwater screening level protective of indoor air and the in the vicinity of monitoring well CR-MW9 (3,300 and 130 µg/L) as shown on Figure 24. Gasoline-contaminated soil is present in CR-MW15 from 19.5 to 20 feet bgs. However, gasoline-range petroleum hydrocarbons were not detected in the groundwater sample collected from CR-MW15. The source of the gasoline and benzene-contaminated groundwater is documented in the 2002 Remedial Investigation (RI) and is related to historical activities within the Cragle parking lot.

11.2.2.4. EASTERLY PLUME GROUNDWATER - POWER STATION

Diesel-range petroleum hydrocarbons were detected at concentrations greater than the respective MTCA Method A groundwater cleanup level (0.5 mg/L) in two groundwater samples collected from PS-MW6 (1.0 mg/L) and PS-MW7 (1.2 mg/L). The groundwater samples were collected from one area on the northern portion of Easterly Plume as shown in Figure 24. This area was previously documented as a petroleum-contaminated groundwater area in the 2002 RI (URS, 2003).

11.2.2.5. EASTERLY PLUME GROUNDWATER - SHAUB ELLISON (SH-MW7)

Gasoline-contaminated groundwater was present in monitoring well SH-MW7 at a concentration that slightly exceeds the MTCA cleanup level. SH-MW7 is located near the intersection of the 19th Street stairwell and Pacific Avenue as shown on Figure 24. This area was treated with an in-situ remediation system that was removed in 2012. The elevated concentration may be a rebound that occurred after removal of the treatment system.

12.0 FUTURE STRATEGIES FOR PROPERTY DEVELOPMENT

The following sections summarize possible strategies within the Westerly Plume to address contamination concerns while progressing forward with the campus development projects. Fourteen PDAs were identified by UWT that are located within the Westerly Plume. A summary of developmental impacts and mitigation measures and separate PDA specific reports are included in Appendix A. Remedial and developmental strategies for the Easterly Plume are not included within the scope of this project.

12.1. Future Natural Attenuation Evaluation Strategy for Groundwater

The historical groundwater data, in conjunction with the recent investigation results and limited physical parameter testing, provide an improved understanding of the TCE-contaminated groundwater within the Westerly Plume.

The limited chemical analytical groundwater data collected in the deep aquifer since 1999 was compared to the 2013 groundwater sampling results within the Westerly Plume. The groundwater data was limited with the majority the wells only having two data points and the interval between sampling events in some cases being more than six years. In general, concentrations of TCE in the deep aquifer have decreased since the groundwater sampling in 2007 or 2009 with two exceptions. The greatest TCE-concentration UG-MW18 and the downgradient edge of the plume (JS-MW2 and UG-MW3) maintained approximately the same concentration. The majority of the monitoring wells on UWT property were sampled twice in the past eight years, which is not a suitable data set to evaluate concentrations over time. The historical groundwater data in the shallow aquifer was only available in one monitoring well (UG-MW13).

Soil samples were also collected during this investigation to evaluate the presence of TCE contamination in soil for possible source areas or areas that could contribute to groundwater contamination beneath UWT. GeoEngineers also collected data to evaluate the physical characteristics of soil encountered to facilitate the development of a phase partitioning model. Soil containing concentrations of TCE contamination may or may not pose a threat to groundwater, and simply having a value of the TCE contamination present in the soil is not always sufficient by itself to determine whether or not a threat exists. In general, attempting to implement a broad natural attenuation strategy to deal with groundwater contamination beneath the UWT campus is premature. In fact, some of the physical parameters collected in the soil suggest that conditions are unfavorable for natural attenuation. However, this strategy should not be abandoned without collecting additional specific physical parameters to better evaluate natural attenuation potential in the limited areas where the initial physical data indicates conditions could be more favorable for a monitored natural attenuation approach.

13.0 NEW AGREED ORDER

It is estimated that the new Agreed Order between the UW and Ecology will be completed in the near future. UW should consider the following items be included in the new Agreed Order.

- The flexibility to perform site-specific and area-wide remedial investigations, feasibility studies and interim actions without requiring a modification to the Agreed Order. The current Agreed Order requires modifications and public comment in order to complete interim actions. This requirement may impede future development on the UWT campus.
- The shallow and deep aquifers present along the western portion of the UWT campus are separated by a site-specific semi-confining to confining silt layer. The presence of the shallow and deep aquifers is important to understand from a contaminant transport perspective. We recommend UW and Ecology further investigate the contaminant transport mechanisms on the UWT campus to evaluate the connection between the shallow and deep aquifers. The results of this investigation will assist the UW in identifying the receptors and transport mechanisms and therefore the associated risks with the contaminant transport mechanism(s) between the shallow and deep aquifers during future development and remediation on the UWT campus. For example, if the receptors for the deep aquifer are different from the shallow aquifer, then the deep aquifer receptors may be considered less of a risk.
- A network of over 80 wells is currently present on the UWT campus. UW may want to consider establishing a groundwater sampling frequency as part of the monitoring program during the current negotiations of the new Agreed Order.
- Seventeen of the 21 potential sources of TCE and PCE contaminated groundwater on the UWT campus are located upgradient and west of the UWT campus' western boundary. The Agreed Order should establish a legal basis to investigate and remediate these upgradient properties not owned by UW in order to identify the source(s) and potential liable parties.

14.0 OPPORTUNITIES AND APPROACHES FOR THE FUTURE

The presence of contaminated soil and groundwater and the requirements of the new Agreed Order will not preclude development on the UWT campus. However, it will require UWT to implement mitigation measures during future development that are protective of the human health and the environment and to preserve the ability to perform future remediation activities on a campus-wide basis. Collaboration with UW EH&S and Ecology early in development projects is vital for planning and budgeting purposes.

UW could employ several approaches to complete development of the UWT campus and within the anticipated requirements of the new Agreed Order. These approaches are listed below and discussed further in the following sections.

- Further Evaluation and Remediation Prior to Development. See Section 4.1 for additional discussion on this approach.
- Develop Within the Groundwater Plumes And Manage Contaminated Soil and Install Mitigation Measures Within the Building. See Section 4.2 for additional discussion on this approach.
- Modify Development to Avoid Contact with Contamination. See Section 4.3 for additional discussion on this approach.

14.1. Further Evaluation and Remediation Prior to Development

Investigation will likely be required within the individual PDAs as further details are identified regarding proposed development to identify impacts and mitigation measures to the actual development. The investigation within a PDA would be focused on the impacts to the specific development project. This section discusses potential investigations on a campus wide scale to fill data gaps and potentially reduce development costs by gathering pertinent information to better understand the extent of the groundwater plumes, identify the sources of the groundwater plumes and implement the future remedial actions. The following sections describe three campus-wide approaches that we recommend to be implemented.

14.1.1. Shallow Aquifer - Remedial Investigation and Feasibility Study

One alternative is to complete a remedial investigation and feasibility study (RI/FS) focused on the shallow aquifer on the UWT campus. If the shallow aquifer can be remediated prior to construction activities in the area, the impacts to construction would be significantly decreased. We recommend the remedial investigation focus on the following areas:

- **Evaluate the lateral extent of the TCE-contaminated groundwater.** Four individual plumes are shown on Figure ES-3. The connectivity between the plumes is not known. Additional investigation is recommended to evaluate the lateral extent of the plumes.
- **Evaluate the connectivity of the shallow and deep aquifers in the area of South 19th Street between Court E and Market Street.** It appears the utilities and anthropogenic development of the sites may have provided a connection between the shallow and deep aquifers in the area of the South 19th Street between Court E and Market Street. Additional investigation is recommended in this area to further evaluate the vertical connection.
- **Evaluate directly upgradient sources along Tacoma Avenue.** Several potential sources were identified west of Tacoma Avenue. Two potential sources are located directly upgradient of PDA 1. The first source is the former Photo Engraving facility located at 1722 Tacoma Avenue South that operated from 1956 to at least 1996. The second potential source was operated as a former upholstery, furniture manufacturer and printing press located at 1815 South G Street between at least 1936 and 1963. Additional subsurface investigation is recommended in the area of these potential contaminant sources to further evaluate soil and groundwater conditions and possibly identify these sites as a source(s) of the TCE and PCE within the shallow aquifer.

The feasibility study will evaluate potential cleanup alternatives for soil and groundwater that may be implemented on the UWT campus including costs and viability of each cleanup alternative. The estimated cost of the remedial investigation and feasibility study focused on the shallow aquifer within the Westerly plume may range between $500,000 and $1,500,000. This cost does not include the investigation and cleanup in the vicinity of PDA 1A – Upton because a potential contaminant source exists at this site related to the former dry cleaner operations and a site-specific investigation and cleanup will likely be required.

14.1.2. Identification of Sources and Complete Remediation

14.1.2.1. TCE, PCE AND PETROLEUM-CONTAMINATED GROUNDWATER

Potential sources of the groundwater plumes were evaluated based on historical information. A total of 22 possible sources of the TCE contamination in groundwater were identified. Four of the potential sources of TCE were located within a PDA (PDA 1A – Upton, PDA 1C-Tacoma North, PDA 1F-Fawcett Parking, PDA2D-Tacoma Paper and Stationary). One UW-owned property, PDA 1B-Tacoma South, was identified as a potential source of petroleum contamination. One UW-owned property was also identified as a potential source of PCE contamination (PDA-2D-Tacoma Paper and Stationary).

We recommend UW coordinate with Ecology, City of Tacoma and existing property owners to further evaluate and identify the actual sources of the TCE and PCE contamination. Identification of the sources and remediation of contamination may reduce the cost of development of the campus. The cost to perform additional investigation at each potential source property is estimated to range between $50,000 and $150,000 per site. The remediation cost will be based on the selected remedial alternative and the extent of the contamination but may range between $500,000 and $6,000,000 per potential source. UWT may want to pursue cost recovery of investigation and remediation of offsite sources by identification of potential liable persons.

14.1.2.2. METALS, PETROLEUM AND CPAH-CONTAMINATED SOIL

Metals-, petroleum- and cPAH-contaminated soil are present from the ground surface up to 5 feet bgs in the majority of PDA 1. Removal of this soil will likely be necessary prior to or during development of PDA 1. UW may consider completing remedial action of the contaminated surficial soil of the entire PDA 1 prior to development. The estimated cost may range between $3,400,000 and $3,750,000 for removal of the contaminated soil within PDA 1. The estimated cost range includes additional investigation to further characterize up to 23,600 tons of soil and $140 to $150 per ton for excavation, transportation and disposal.

14.1.3. Develop a Comprehensive Record of Groundwater Conditions Within the Westerly Plume

We recommend that UW implement a groundwater monitoring program consisting of semi-annual monitoring of the shallow aquifer and annual monitoring of the deep aquifer to develop a comprehensive record of groundwater conditions over time and to maintain the integrity of the wells. The estimated cost to perform monitoring of the 22 shallow aquifer wells located within the Westerly Plume is approximately $16,000 to $18,000 per event. The estimated cost to perform groundwater monitoring of the 28 deep aquifer wells located within the Westerly Plume is between $22,000 and $25,000 per event.

14.2. Development Within Contaminated Media and Implement Mitigation Measures

Contaminated soil (PCE, TCE, cPAHs, metals and petroleum hydrocarbons) and groundwater (PCE, TCE, and petroleum hydrocarbons and associated breakdown products) are present within the

PDAs based on the results of this investigation. The impacts to potential development were evaluated due to the soil and groundwater conditions based on the following design technique:

- New buildings will be constructed with a zero lot line within the PDAs. The exterior of existing buildings would remain intact.
- The west side of the buildings will be constructed into the hillside and will be adjacent to the street at the top of the slope.
- The finished floor of the building will be constructed to a single elevation similar to the elevation of the street at the bottom of the slope.

14.2.1. Typical Impacts and Mitigation Measures For Development

Typical impacts that were identified for each site included the following:

- Site is a potential source of groundwater contamination.
- A potential UST is present on the site.
- PCE and or TCE-contaminated groundwater is present on the site.
- Contaminated or impacted soil is present on the site.

General mitigation measures were developed to address these site conditions. In general, remediation may be required prior to construction activities if the development site is identified as a potential source site. If the site is located within a larger groundwater plume, mitigation measures may be required during development to protect human health and the environment and prevent cross-contamination between the shallow and deep aquifers. Examples of development mitigation measures include the following.

  - Management of soil and groundwater.
  - Vapor barrier mitigation systems.
  - Construction methods to reduce cross contamination between the shallow and deep aquifers.

The impacts, mitigation measures and estimated development costs of the PDAs are summarized in the letter report titled “Summary of Impacts, Mitigation Measures and Estimate Costs – Final, University of Washington – Tacoma, Priority Development Areas” dated May 22, 2014. Individual reports were also developed for each PDA and are included in Appendix A of this report. The total estimated cost range to implement mitigation measures related to impacted and contaminated soil and groundwater within the PDAs ranges between $18,800,000 and $32,200,000 ($2014). The total estimated cost range is summarized in Table ES-1.

It is important to recognize these reports provide general impacts and potential mitigation measures that may be employed in design and construction. Additional environmental investigations will likely be necessary prior to selection of the final mitigation measure. The assumption is that these cost estimates should be refined following additional investigation on the individual sites. The project teams should contact UW Environmental Health & Safety (UW EH&S)

to discuss the need for further investigations. UW EH&S is the liaison with the Washington State Department of Ecology (Ecology) for review and approval of mitigation measures.

14.2.2. Central Treatment System for Building Drainage

UW and Ecology agreed to criteria thresholds for discharge of TCE and PCE-contaminated groundwater from building drains to the stormwater system in June 2014. However, the TCE concentrations observed in groundwater on the majority of the campus are greater than the discharge limit for TCE-contaminated stormwater criteria. Therefore, the groundwater from building footing drains will likely require discharge to the sanitary sewer including associated charges for the majority of the building footing drains. UWT may want to consider installation of a central treatment system for building drainage water. The system would consist of a pipe network from the new buildings to the treatment system. The treatment system would reduce the TCE in groundwater collected from the footing drains to concentrations less than the surface water criteria. The water could be discharged to the storm system following the treatment process. The estimated cost for the treatment system will be based on the design and is not known at this time.

14.3. Modify Development to Avoid Contact with Contamination

UWT may want to consider the following development modifications to reduce the cost of mitigation measures.

14.3.1. Modify Assumed Building Design

UWT may want to consider designing the proposed buildings in order to not penetrate the TCE-and/or PCE-contaminated soil and groundwater. The shallow aquifer and ice-contact deposits are generally located between 5 to 10 feet bgs and follow the general topography of the slope as shown in Figure ES-2. During evaluation of impacts to development, GeoEngineers assumed the finished floor of the building will be constructed to a single elevation similar to the elevation of the street at the bottom of the slope. We observed that the majority of the proposed buildings penetrate the TCE-contaminated soil and groundwater horizontally on the western half of the PDAs and vertically by approximately 1 to 7 feet with the maximum vertical penetration estimated at 18 feet. Building features that could reduce contact with, or proximity to, the TCE-contaminated soil and groundwater include:

- Raising the entire building elevation relative to the adjacent street
- Stepping up the western portion of the building foundation

14.3.2. Develop in Areas Outside of Groundwater Plumes

Following further evaluation of the extent of the groundwater plumes, proposed buildings may be relocated and/or designed to not encounter the contaminated groundwater, therefore reducing the impact and associated mitigation measures. Each PDA investigated has some environmental liabilities. The areas within the following PDAs appear to have less environmental liabilities than others based on the available information to date:

- PDA 1C - TCE/PCE-contaminated groundwater does not appear to be present within the central portion of PDA 1C. However, additional investigation is necessary to further define the upgradient groundwater plumes.

- PDA 1G - The shallow and deep aquifers do not appear to be contaminated with TCE within the northern portion of PDA 1G – Laborers/Lot T39 and T40. TCE-contaminated groundwater is present upgradient of this site. The full lateral extent of this TCE-contaminated groundwater and the migration pathway is unknown at this time. CPAHs-contaminated soil is present within the fill located in one area of PDA 1G – Laborers/Lot T39 and T40. The cPAHs-contaminated soil will have to be managed appropriately.
- The northern portion of PDA 2B – Jefferson Street Parcel/Transit Turnaround does not appear to be impacted with chemicals of concern in soil and groundwater. However, additional investigation is necessary to further define the upgradient groundwater plumes.
- PDA 2C - TCE-contaminated groundwater does not appear to be present in the shallow and deep aquifers at the PDA 2C – Pinkerton Parking site. TCE-contaminated groundwater is present upgradient of the PDA 2C – Pinkerton Parking site. The full lateral extent of the TCE-contaminated groundwater and migration pathway is unknown at this time. CPAH-contaminated soil is present within the fill located in an area within PDA 2C – Pinkerton Parking. The cPAHs-contaminated soil will have to be managed appropriately.

15.0 LIMITATIONS

This report has been prepared for the University of Washington Tacoma Environmental Assessment Project located in Tacoma, Washington.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

Please refer to Appendix G titled "Report Limitations and Guidelines for Use" for additional information pertaining to use of this report.

Table 1

Proposed Construction Activities and Potential Impacts

2013 Environmental Subsurface Investigation - University of Washington-Tacoma
Tacoma, Washington

Priority Development Area	Subarea Descriptions	Design and Construction Timeframe	Construction Plan
1	Comprised of eight subareas with varying degrees of development:		
	1A - Upton	Design and construction anticipated within the next seven years	Three to six stories buildings are planned. The construction will entail cutting into the hillside so the elevation of the first floor is similar to the elevation of the adjacent downslope street. Foundations may extend up to 5 feet below the new cut surface.
	1B - Tacoma Vacant		
	1C - Fawcett North		
	1D - Fawcett South		
	1E - Strom		
	1F - Fawcett Parking/Lot T47/48		
	1G- Laborers/Lot T39 and T40		
	1H - Y Student Center/Lot T44	Building currently under construction	See Subsurface Investigation report for UWT Y project.
2	Comprised of six subareas also with varying degrees of development:		
	2A - Sound Care	Design and construction in 2016+	One 3- to 5- story building planned. The construction will likely be built into the hillside so the elevation of the first floor is similar to the elevation of the Court C. Foundations may extend up to 5 feet below Court C.
	2B - Jefferson Street Parcel/Transit Turnaround	Design and construction in 2016+	Three to five story buildings planned. The construction will likely be built into the hillside so the elevation of the first floor is similar to the elevation of the Jefferson Avenue. Foundations may extend up to 5 feet below Jefferson Avenue.
	2C - Pinkerton Parking	Design and construction in 2016+	Three to six story buildings planned. The construction will likely be built into the hillside so the elevation of the first floor is similar to the elevation of the Jefferson Avenue. Foundations may extend up to 5 feet below Jefferson Avenue.
	2D - Tacoma Paper Supply/Old Spaghetti Factory	Project started design March 2014 Construction is planned for 2016	Complete restoration (similar to Cherry Parkes) to include seismic upgrades. Elevator will likely be shared with existing Dougan Building.
	2E - Swiss and Frederick Wilde	Design and construction 2014+	Work would involve seismic upgrades that may require new footings, shear walls and elevator shafts along with upgraded utilities.
	2F - Tioga Building	Design and construction in 2014	Generally tenant improvements (primarily only impacting interior of the building) but may need access to underground for utilities.

Table 2

Geologic and Hydrogeologic Units

2013 Environmental Subsurface Investigation - University of Washington-Tacoma

Tacoma, Washington

Geologic Unit	Hydrogeologic Unit	Stratigraphic Unit
Fill and Reworked Ice-Contact Deposits	NA	Man-Made
Ice-Contact Deposits	Water Bearing Unit	Vashon Drift
Silt Layer and Transition Zone	Semi-Aquitard	
Advance Outwash	Water Bearing Unit	
Older Silt	Regional Aquitard	Lawton Clay

Notes:

NA = Not applicable

Table 3

Priority Development Areas - Historical Site Uses

2013 Environmental Subsurface Investigation - University of Washington-Tacoma

Tacoma, Washington

PDA Site Name	Summary of History	Initial Environmental Concern
1A - Upton	The site was initially developed as an ice house in 1888 which was adjacent to the alley on the west side of the property. A boarding house was located in the northeast corner of the property between 1896 through at least 1912 and potentially through the 1930's. The western portion of the current building was constructed in 1961 and operated as a dry cleaner until the early 1970s. Upton Electric (sales and rental) operated from 1974 to 1988 and expanded the building into the current footprint. The property was purchased by UW in the 1990's. A recording studio currently operates in the building.	Three catch basins were observed on the property which appear to be dry wells. Appears to be at least 20 feet of fill on the property. Pile of soil observed at the intersection of the alley and South 17th Street. Floor drain was present in initial building permits but could not be located during visual reconnaissance. Former dry cleaning operation. Potential heating oil or solvent UST.
1B - Tacoma Vacant	The Tacoma Vacant site was developed with residences and stables (later garages) in the late 1800's in the central portion of the property. An iron works facility was also present in at least 1896 in the central portion of the property. A Japanese School with a garage was present in the northern portion of property between at least 1927 and 2005. Storage of wood and miscellaneous debris occurred south of the Japanese School between 2001 and 2005. Apartment buildings/residences were present on the northern boundary between at least 1912 and 1965. A wood fuel company was present on the southern portion of the property from at least 1936 to 1961. A laydown yard was constructed on the southern portion of the property in at least 2005 which stored wood and miscellaneous debris until 2012. The northern and central portions of the property are currently vegetated with grass and trees while the southern portion of the property is used as a storage area by UW facilities.	Multiple historic residences were present on the property. Heating oil tanks are typically associated with residences of this age. Area of distressed vegetation was observed in the central portion of the property (area of former stables). Historic iron works facility located on the property. Fill is likely present on the property that may need to be removed during construction. Storage area present associated with the Japanese School.
1C - Fawcett North and 1D - Fawcett South	The Fawcett North site was developed in the early 1900's with various single family residences and associated garages along with three apartment buildings and a store. The address 1710 Fawcett was listed as a steam laundry in 1926. Since at least 1953, several businesses have occupied the building located on the northwest corner of Fawcett Avenue and South 19th Street including an industrial refrigeration company, a trucking company, and a marble supply company. This corner property is currently for sale, but is not owned by the UW. Storage and operations associated with the corner lot extend onto the UW owned parcel. Heating permits for the former residences located along the west side of Fawcett were generally noted between the late 1960's to the early 1980's where a conversion to gas occurred, indicating the former residence was on oil heat. Evidence of UST removals at the residences was not documented. The majority of the buildings were removed in the 1990's when UW purchased the properties along Fawcett Avenue. Three buildings remain on the site, where one is presently owned by UW (a single family residence) and the other two are not (one single family residence and the marble company on the corner lot).	Multiple historic residences were present on the property. Heating oil tanks are typically associated with residences of this age. Fill is likely present on the property that may need to be removed during construction. Former apartment building permit describes plumbing for nine gas openings indicating that the heat source may have been heating oil prior to 1955. Refrigeration and marble company site operations extend onto UW property.
1E - Strom	The Strom property was developed with residences in at least 1888. The City Stables were present on the southern portion of the site in 1896 and 1912. Later uses included an apartment building north of the stables from at least 1912 until 1962 when the building was burned to the ground. Nuclear Packaging (a package manufacturer) was listed at the 1733 address (former apartment building) in 1978; however, it appears the operations were in the current building since a building was not present at the 1733 address in 1973. The existing building was constructed in 1958 and was owned and operated by Norman Strom until the mid-2000's when UW purchased the property. Strom operated a construction company and car restoration shop from the building. Four bays under the building were used for auto restoration and storage. General poor housekeeping was observed prior to purchase of the property. A previous investigation and cleanup was completed in the area of a former sink discharge near Bay 1 and near the southern storage area. Diesel-, lube oil-range petroleum hydrocarbons, lead and PAHs were detected in the soil greater than the MTCA method A cleanup level. The soil was reportedly excavated by the owner and confirmation soil samples were collected by UW. The confirmation soil samples were not analyzed for PAHs. Surface staining was observed within the excavation as well. Surface staining was observed during a recent site visit in the area of the southern storage area. The northern bay was also observed to be approximately 1 foot higher in elevation than the southern bays.	Remedial excavation was completed at the property; however, some chemicals of concern were not included in the confirmation soil sampling. Surficial soil staining was observed near the southern bay during the 2013 visual reconnaissance. Former historic residences and sheds were located on the property and heating oil tanks are typically associated with residences of this age. The northern bay was observed to be approximately 1 foot higher in elevation than the southern bay.

PDA Site Name	Summary of History	Initial Environmental Concern
1F - Fawcett Parking/Lot T47/48	Between 1888 and 1912, multiple residences and associated sheds/stables were constructed on the site. The last residence was demolished by at least 1974. An area noted as "City Yard" was present on the northern portion of the site in 1896 and appears to have been associated with City Stables to the north [see Strom]. An apartment building was constructed on the northern portion of the site in 1925. City records indicate a conversion burner permit was issued in 1964 for the apartment building. The apartment building was demolished in 1995. Aerial photography reviewed from 1940 indicated a large building was present on the southern portion of the site which operated as a winery, indoor golf and grocer between 1931 and 1936. By 1942, a motorcycle sales and service shop was present on the southern portion of site through at least 1969 with an address listed at 1755 Fawcett Avenue. Two garages with miscellaneous storage and debris were either located on historic maps or observed in the aerial photographs between 1961 and 1990. The historic maps indicate 415 South 19th Street operated from the southeast portion of the same building. E I Cleaners was listed at the 415 South 19th Street address in 1931. The southern building was demolished in 1992. City records indicate a UST was left in place and is potentially located 4 feet from the alley, 4 feet from the sidewalk and 2 feet deep.	Multiple historic residences were present on the property. Heating oil tanks are typically associated with these residences. Conversion burner permit was issued for the northern apartment building. Conversion permits are typically issued to convert heating systems from oil to natural gas. No UST removal records were located.
		Motorcycle repair shop and dry cleaner operated on southern portion of the site.
		Fill is likely present on the property that will likely need to be removed during construction.
		City records indicate a UST was left in place during demolition of the southern building.
		PID and solvent odor were observed from 5 to 15 feet below ground surface in the area of boring UG-MW-16 completed by others. Soil samples were not collected for chemical analysis. PCE and TCE were detected at concentrations greater than the respective cleanup levels in groundwater.
1G- Laborers/Lot T39 and T40	The site was developed with multiple single family residences in the early 1900's built on the west side of Market Street and sheds and stables typically located on the east side of Court D with the exception of the southern most parcel. At this parcel, residences were located on all sides with sheds in the central portion. A hand laundry is listed in city directly at 1738 Market Street in 1926. The majority of the residences were demolished in the 1950's to 1960's with the exception of the residences on the southern parcel and at 1732 Market Street. The 1732 Market residence with electric as the heat source was demolished in 2003 based on information provided in a Phase I ESA completed prior to demolition. The residences on the southern portion were demolished by 1973. The current Laborers Building (1742 Market Street) was constructed in 1961. Natural gas has been the heat source for building since construction according to City of Tacoma permit records.	Former residence and shed were present on the property. UST may have been associated with the former residences.
		Fill is likely present on the property that will likely need to be removed during construction.
		TCE was not detected in a seep sample collected adjacent to the cut slope behind the existing building.
		A hand laundry is listed in city directly at 1738 Market Street in 1926.
1H - YMCA/Lot T44	The site was developed in the early 1900's with multiple single family houses with sheds and an apartment building (Lam Property, 1726 Market Street) that was heated by a boiler according to City of Tacoma records. A store was present on the northeast portion of the site in 1912. All of the structures except the apartment building on the southern portion of the site were demolished by the 1950's when the existing Longshoreman Building was built. The apartment building continued operating through the 2000's. A subsurface investigation was completed in the area of the former apartment building in 2013. The investigation consisted of a GPR survey and associated test pits. Petroleum-contaminated soil was reportedly not encountered during a UST excavation southwest of the existing Longshoreman's Building.	Heating oil USTs are typically associated with boiler and apartment buildings. URS investigated for a potential UST and found piping leading into the Longshoreman's parking lot and Market Street.
		Fill on the Lam Property will likely need to be removed during construction.
2A - Sound Care	Single family homes and associated sheds/stables were noted on the site from at least 1888 to the 1940s. In the early development history, a mattress factory was located on the central portion of the site along Court C. On the southeast corner of the site a Japanese Hand Laundry facility in 1912, followed by a barber shop from 1921 to 1942. During the same timeframe, a marble/stone company was located adjacent to the barber shop. A residence and work shop for shoe and umbrella repair was present on the southwest portion of the site from 1912 to 1936. All of the buildings were demolished in the 1940's when the Jefferson House/Sound Care (nursing home) was constructed in 1945. The nursing home operated until 2000 when it was demolished. Presently, the site is vacant and has since operated as a contractor's construction yard for activities on the UW campus.	Former residences and sheds were present on the property. USTs can be associated with former residences of this age. A 300-gallon backup generator diesel UST was removed in 2000. The Sound Care facility operated on a broiler and a heater conversion permit was issued in 1961 indicating the building was heated with oil prior to 1961. Records of a heating oil UST removal were not located.
		A laundry facility, shoe repair workshop, a marble/stone shop, and a gas tank were all located on the southern portion of the property.
		Fill is likely present on the property that may need to be removed during construction.

PDA Site Name	Summary of History	Initial Environmental Concern
2B - Jefferson Street Parcel	Between 1888 and the 1930's residences were located on the site. A transit turnaround and associated restaurant and coffee shop operated on the northern portion from at least 1931 to 1993. A Standard Oil fuel station and tire repair facility was located on the southern portion of the site between approximately 1932 and the 1960's. One pump island with fuel dispensers, a repair/service area with hydraulic lift and floor drain/sump were located on the southern corner of the site. The former service station and fuel dispenser island were demolished by at least 1973. Former USTs and service station components were removed and approximately 447 tons of petroleum-contaminated soil were excavated from the site. Chemicals of concern were either not detected or were detected at concentrations less than cleanup levels in all confirmation soil samples except soil sample collected along Jefferson Street approximately 6 feet below ground surface. Gasoline-range petroleum hydrocarbons and benzene were detected at concentrations greater than the MTCA cleanup level at this location.	Former residences and sheds were present on the property. USTs are typically associated with residences of this age.
		Gasoline and benzene soil are present in the right-of-way at concentrations greater than the cleanup levels.
		Fill is likely present on the property that will may need to be removed during construction.
2B - Transit Turnaround	Between 1888 and the 1930's residences were located on the site. A transit turnaround and associated restaurant and coffee shop operated on the northern portion from at least 1931 to 1993.	Former residences and sheds were present on the property. USTs are typically associated with residences of this age.
		Fill is likely present on the property that will may need to be removed during construction.
2C - Pinkerton Parking	A residence was present on the site in at least 1885. The residence was demolished by 1888 and the Massasoit Hotel was constructed. Permit and historic map records indicate a private auto garage was erected on the southwestern portion of the site in 1923. The Massasoit Hotel burned in a fire and was later demolished prior to 1950. The present use of the site is a parking lot for the Pinkerton Building. A woolen cleaner was listed at 305 South 17th Street in 1921.	Fill is likely present on the property that will need to be removed during construction. Additionally, the southwest side of parcel formerly contained a private garage (street level of Court C) and a single storm drain was located on the east side of the parking lot.
		A fire occurred on the site.
2D - Tacoma Paper Supply/Old Spaghetti Factory	Residences were present on the site between at least 1888 and 1896. The existing building was constructed between 1904 and 1905 by the Tacoma Biscuit and Candy Company. Boilers and ovens were located on the first floor in the warehouse and storeroom. A freight elevator serviced all four floors. Offices and the shop were located on the second floor at the elevation of Jefferson Avenue. The third floor was utilized as the main stockroom. The production area was on the 4th floor. The following summarizes the historical use of the building ■ 1906 - Union Pacific Railroad purchased the building and Tacoma Biscuit and Candy Company vacated the building. ■ 1907 - A spice company used the building as temporary quarters. ■ 1911 to 1942 - Tacoma Paper and Stationary Company (wholesale paper company) operated their business ■ 1943 to 1953 - Blake, Moffitt and Towne Inc. (wholesale paper company) operated their business ■ 1953 to 1957 - Vacant ■ 1957 to 1961 - McCormack Distributing ■ 1961 to 1968 - Vacant ■ 1969 to 1971 - Pacific Storage Company ■ 1971 to Present - Old Spaghetti Factory Permit records indicate that repairs from fire damage took place in 1928 which followed with installation of an oil burner in 1929. Permit records also show that as recent as 1999, a 3,000-gallon grease interceptor tank was installed on the east side of the building near the existing rail.	South end of building was previously used as a sign printing shop in the 1912 Sanborn map. The 1950 Sanborn map indicates the space was utilized as merchandise warehouse. Solvents may be associated with ink printing.
		A freight elevator is located in the northeast portion of the building.
		A hole in the concrete (potential drain) was observed in the northwestern corner of building filled with Styrofoam shavings. Soil was present beneath shavings.
		Historic maps indicate a trapped stairway was present inside the building. This stairway was believed to be discovered during the site reconnaissance on the lowest floor, however no access to the inside of the stairway could be observed at this level.
		City of Tacoma permits indicate an oil burner was installed within the building but removal documentation was not located.
		Fill is likely present and may require removal during construction.
2E - Swiss and Buzzard	The Swiss building was constructed in 1918 and was utilized as a meeting hall for the Swiss Society and beer parlor until the 1960's when the building was converted to a tavern sometime on or before 1963. Additionally, building permit records indicate that the Swiss property included a garage on the southern portion in 1937. Constructed between 1896 and 1912, the Buzzard Building's upper floors contained the Jefferson Hotel which operated with shops below on the Market Street level including an auto school, bake shop, and a restaurant. Permit records indicate a loading dock was added to the 1914 Market Street address in 1963 and that fire tubes were replaced at the same address twice in the building's oil boiler in 1981.	Permit records indicate alterations were performed on the garage located at the Swiss in 1937. Although not documented by a permit, due to the age, an underground heating oil tank may be associated with the Swiss.
		Permit records also indicate a loading dock was added to the 1914 Market Street address at the Buzzard Building in 1963 and that fire tubes were replaced at the same address twice in the building's oil boiler in 1981.
		At some time in the recent past, UW staff observed a petroleum-like material seeping out of a sidewalk in front of the Buzzard Building.
		The former garage area of the Swiss is approximately 2 feet higher in elevation and may contain fill.
2F - Tioga Building	Constructed in 1889, the Tioga Building was primarily a storage warehouse for paper, cereal, grain and hay. Records from 1950 indicate the building was used as an asbestos wholesaler which was serviced by the rail spur immediately east and an elevated wood platform at the rear of the building. The city directories indicate an automobile equipment companies operated within the building from 1963 to 1970. An industrial equipment company operated within the building between 1970 and 1993. Permit history did not indicate past uses or construction.	Historic maps indicate a former hoist/elevator was present in the southeast building.
		A floor drain observed under the sidewalk on west side of building.
		Floors inside of the room under the sidewalk were observed to wet but no obvious seeps were discovered during the site reconnaissance.

Table 4

Summary of Potential Sources

2013 Environmental Subsurface Investigation - University of Washington-Tacoma
Tacoma, Washington

Map ID	Map Name	Address	Potential Environmental Concerns	Current Owner	Chemicals of Concern	UW-Owned Property	Development Area
Hydrologically Upgradient							
1	Chemical Company	2102 South I Street	N & H Chemical H G Wilcox Acids, and Battery Separators, Tinning and repairing is listed in city directories in 1926. The property has since been developed as a school. No additional information is known.	Tacoma Public Schools	Unknown	No	No
2	Hospital	1812 South I Street	St. Joseph Medical Center first opened the hospital in at the current location in 1915. The hospital has since been expanded to the current extent. TCE and PCE were used in medical operations until the 1960's. PCE may have also been used with on-site laundering.	Franciscan Medical Group	PCE and TCE	No	No
3	Camshaft Repair	1936/1938 Tacoma Avenue South	Delta Camshaft is listed in the city directories at 1938 Tacoma Avenue between 1983 and 2010. According to http://www.deltacam.com/ the company repairs camshafts and the process involves cleaning the camshafts prior to repair. TCE is a typical solvent used to clean automobile parts. The building has since been demolished and Delta Camshaft has moved to another location.	1920 Tacoma Avenue LLC	TCE	No	No
4	Auto Repair	1922 Tacoma Avenue South	The property was developed in 1953 as a 2,000 square foot tire shop with brake and alignment services. The tire shop operated under various owners until 1999 when the building was demolished. Final inspection permit record from the City of Tacoma indicated that the contractor found an underground tank and the soil was impacted with fuel. TPCHD does not maintain a file for this site and additional information was available.	Gerhard Troger	TCE, Petroleum Products	No	No
5	Auto Repair	1902 to 1906 Tacoma Avenue South	A multi-story building was constructed in 1891 with storefronts along Tacoma Avenue and apartments on the upper floors. Various uses of concern include Walls Transmission Service (1963), Allen Motorcycle Sales (1953 to 1958), M&G Garage Automobile Repair (1963), K W Factory Warehouse Auto Supplies (1942 to 1947). The building was demolished in 1988 and the existing building was constructed.	Alder Washington Commercial Properties	PCE, TCE, Petroleum Products	No	No
6	Upholstery, Furniture Manufacturer, and Printing Press	1815 South G Street	A commercial building is mapped as a furniture repair and upholstery company in the 1950 Sanborn map. The city directories indicate an upholstery business operated on the property in 1936, a cabinet maker operated on the property between 1931 and 1942, a printing press operated in 1947 and a furniture manufacturer operated between 1947 and 1963. The commercial building was demolished in 1974 and apartments were constructed. The apartments were demolished between 2012 and 2014 as part of the Hillside Terrace Redevelopment project.	Tacoma Housing Authority	PCE, TCE, Benzene	No	No
7	Photo Engraving/Metal Arts	1722 Tacoma Avenue South	The existing building was constructed as a photo engraving plant in 1956 according to City of Tacoma permit records. Photoengraving is used to make printing plates for various printing processes, reproducing a wide variety of graphics such as lettering, line drawings and photographs. Solvents are used in the photoengraving process. West Coast Engravers is listed in the city directories until 1988 and Pac Therm (use unknown) in 1993. Ecology maintains Western Metal Arts as a hazardous waste generator between 1986 and 1996.	Gerhard and Christine Troger	PCE, TCE, Benzene	No	No
8	Upholstery Furniture	1943 Tacoma Avenue South	An automotive repair garage was constructed in 1955 based on City of Tacoma permit records. The auto repair operated until 1963 when City Glass and Upholstery started operation within the building. The existing building was constructed in 1976 with an additional in 1998 based on City of Tacoma permit records. City Glass and Upholstery started as auto glass and upholstery business and has expanded to residential. Prior to Tacoma City and Glass an auto repair facility was present between at least 1958 and 1965.	KLS Properties LLC	TCE, Benzene, Petroleum Products	No	No
9	Cleaners	1701 Tacoma Avenue South	The western portion of the current building was constructed in 1961 and operated as a dry cleaner until the early 1970s. Upton Electric (sales and rental) operated from 1974 to 1988 and expanded the building into the current footprint.	UW	PCE	Yes	Yes
10	Steam Laundry	1710 Fawcett Avenue	A laundry is listed in the 1926 city directory as "Francis Yamamoto bkbr Union Steam". The property is mapped as a dwelling in the 1912, 1950 and 1969 Sanborn maps. It is unclear if Mr. Yamamoto operated a dry cleaning business from his dwelling and for what time period.	UW	PCE, TCE, Benzene	Yes	Yes

Map ID	Map Name	Address	Potential Environmental Concerns	Current Owner	Chemicals of Concern	UW-Owned Property	Development Area
11	Motorcycle Service	1755 Fawcett Avenue	Between 1888 and 1912, multiple residences and associated sheds/stables were constructed on the site. Union Steam Laundry was listed in the Tacoma building index in 1926 for obtaining a permit. The residences were demolished and a large building was constructed on the southern portion of the site by the 1931 aerial photograph. In at least 1942, a motorcycle sales and service shop (Montgomery Motorcycle) was present on site through at least 1969. Two garages with miscellaneous storage and debris were either located on historic maps or observed in the aerial photographs between 1961 and 1990. The building was demolished in 1992. City records indicate a oil UST was left in place and is potentially located 4 feet from the alley, 4 feet from the sidewalk and 2 feet deep. The UST was not observed during the GPR survey completed in 2013, but this area was difficult to access due to vegetation and a fence. The parking lot was developed by Diamond Parking Lot in the 1990's. Records related to development were not available for review by UW or Diamond Parking Lot.	UW	PCE, TCE, Petroleum Products	Yes	Yes
12	Cleaners	415 South 19th Street	The historic maps indicate 415 South 19th Street operated from the southeast portion of the 1755 Fawcett Avenue building. E I Cleaners was listed at the 415 South 19th Street address in 1931.	UW	PCE, TCE, Benzene	Yes	Yes
13	Battery Supply and Automobile Repair	414 South 21st Street	Multiple automobile service related business operated on the site between 1947 and 1988 based on the city directories and Sanborn maps. Tacoma Battery Supply operated between 1947 and 1969. A1 Oil Service operated between 1965 and 1970. L&M/Star Enterprises operated an automobile repair facility between 1983 and 1988. These former uses were not identified in the subsurface investigation completed by the City of Tacoma in January 2013 and borings were not completed on the site.	City of Tacoma	TCE, Petroleum Products	No	No
14	Machine Shop	1956 Jefferson Avenue	A machine shop that repairs electric motors was present on the site between 1945 and 1978. American Equipment and Tools (merchandise sales of machine tools) has operated on the site since 1988.	George and Marian See	TCE, Petroleum Products	No	No
15	Auto Repairs, Machine Shop and Diaper Service	1930 to 1938 Market Street	The building was first developed in 1925 according to the assessor records. The building contains multiple floor drains and sumps based on City of Tacoma permit records. Operations of environmental concern include automobile repair/parts store/machine shop (1931 to 1974), diaper service (1983 to 1993), refrigeration parts manufacturing (1978 to 1988) and upholstering (2004). Two gasoline (500 gallons), one heating oil (550 gallons) and one waste oil/gasoline (675 gallons) USTs were removed in 2000. The gasoline USTs were located in the Market Street sidewalk. The heating and waste oil/gasoline USTs were located on the west side of the building. Approximately 44.95 tons of petroleum-contaminated soil was removed from the gasoline USTs. The product sample from the waste oil UST contained chlorobenzene (684 µg/L), TCE (979 µg/L) and PCE (26 µg/L). Groundwater was encountered during removal of the 675 gallon waste oil/gasoline UST during excavation of the waste oil tank, the footing drain for the wall was observed. Confirmation soil samples were collected at the base and sidewalls of the excavation with the exception of the waste oil tank. Samples were only collected on the sidewalls of the waste oil tank excavation due to water in the base of the excavation. Chemicals of concern were either not detected or were detected at concentrations less than the respective MTCA cleanup level. The site was granted an NFA following removal of the USTs.	MC Market Street LLC	PCE, TCE, Petroleum Products, Chlorobenzene, Benzene, CFCs	No	No
16	Sheet Metal Shop/ Refrigeration Manufacturer	1906/1908 Market Street	A welding/machine shop was present on the property between 1929 and 1942. Capital Coil and Equipment Company and Refrigeration (Manufacturers) is listed in the city directory between 1953 and 1970, however the cabinet and sheet metal shop is mapped at the address in the 1969 Sanborn map.	UW	TCE, Petroleum Products, CFCs	Yes	No
17	Cleaners	1926 Jefferson Avenue	A cleaner operated on the site between at least 1926 and 1936 based on city directories. The location was vacant in 1942 and later utilized by a amusement company (arcade games/vending machines), publication company and merchandise.	Didente Family LLC	PCE, TCE, Benzene	No	No
18	Fuel Company	1947 Jefferson Avenue	City Garage/City Fuel Company operated on the facility between at least 1926 and 1950. Two USTs (110-gallon and 350 gallon) and adjacent petroleum-contaminated soil was removed in August 1996. The use of the USTs were unknown, but appeared to contain heating oil and gasoline. The depth of excavation extended to 11 feet bgs and groundwater was not encountered. One area of petroleum contaminated soil remained on the eastern boundary adjacent to the railroad right of way. Gasoline was detected at a concentration of 1,930 mg/kg in the confirmation soil sample. A remedial excavation was completed in 2014 during development of the Prairie Line Trail within the former railroad right of way. The gasoline-range petroleum hydrocarbons were either not detected or detected at concentrations less than the MTCA Method A ULU cleanup level.	UW	TCE, Benzene, Petroleum Products	Yes	No
19	Automobile Repairs	1923 Jefferson Avenue	An automobile repair facility operated under the name Lawrence Hoffman in 1936 to 1942.	UW	TCE, Petroleum Products	Yes	No

Map ID	Map Name	Address	Potential Environmental Concerns	Current Owner	Chemicals of Concern	UW-Owned Property	Development Area
Utility Upgradient							
20	Automobile Repair	1553 to 1555 Tacoma Avenue South	Automobile repair is mapped on the east side of the property in the 1950 Sanborn map. The map indicates the floor is "earth". The property is currently vacant.	Tacoma Renaissance LLC	PCE, TCE, Petroleum Products,	No	No
21	Laundry	1511 Tacoma Avenue South	Puget Sound Laundry is listed in the city directory at this location between 1947 and 1958. The property has been redeveloped into condominiums in 2006.	Reverie at Marcato Homeowners Association	PCE, TCE	No	No
22	Carpet Cleaning	1509 Tacoma Avenue South	Houck Carpet Cleaning Company was listed at this location in 1931. The property has been redeveloped into condominiums in 2006.	Reverie at Marcato Homeowners Association	PCE, TCE	No	No
Potential Source Within PDA - Not Upgradient of a Known Groundwater Plume							
23	Printing and Paper Company	1735 Jefferson Avenue	Tacoma Paper and Stationary Company (wholesale paper company) operated their business between 1911 to 1942. Sign printing occurred on the southern portion of the building in at least 1912, based on the Sanborn map. A distributing company (type unknown) operated in the building between 1957 and 1961. A storage company operated between 1969 and 1971.	UW	PCE, TCE	Yes	Yes

Notes:

UW = University of Washington
PCE = Tetrachloroethylene
TCE = Trichloroethylene
μg/L = Microgram per liter
UST = Underground storage tank
MTCA = Model Toxics Control Act
NFA = No further action
mg/kg = milligram per kilogram
ULU = unrestricted land use

Table 5

Magnetic Anomaly Investigation Summary

2013 Environmental Subsurface Investigation - University of Washington-Tacoma
Tacoma, Washington

Site Location	Anomaly Identification	General Location Within PDA	Test Pit Completed	Findings
1B - Tacoma Vacant	1B-A1	Southwest corner	Yes	Old propane tanks and barbed wire
	1B-A2	Southeast corner	Yes	Chicken wire, 1" pipe and construction debris
	1B-A3	Northwest corner	Yes	3/4" pipe and construction debris
	1B-A4	North Side - Middle	Yes	3/4" pipe and construction debris
	1B-A5	Northeast corner	Yes	Various pipe and metal debris
	1B-A6	Central East	No	N/A
1C - Fawcett North	1C-A1	North side - Middle	Yes	Various pipe and metal debris
	1C-A2	South side - Middle	Yes	Old metal buckets and metal 1.5" pipe
1D - Fawcett South	1D-A1	North side - Middle east	Yes	1.5" metal pipe
	1D-A2	North side - Middle	Yes	Chicken wire, chocker cable and various metal debris
	1D-A3	Central East	Yes	Metal pipe and old metal 5-gallon bucket
	1D-A4	Central West	Yes	Metal Pipe, concrete slab and construction debris
	1D-A5	South East	No	N/A
1G - Laborer/Lot T39 and T40	1G-A1	Southwest Portion	No	N/A
	1G-A2	Northeast Portion	No	N/A
2A - Sound Care	2A-A1	Northeast corner	Yes	No metal observed
	2A-A2	Northeast corner	Yes	Metal fence debris
2B	2B-A1	Northern Portion	No	N/A
	2B-A2	Northern Portion	No	N/A
	2B-A3	Northern Portion	No	N/A
	2B-A4	Northeast corner	No	N/A
2C	2C-A1	Southeast corner	No	N/A

Notes:

N/A = Not applicable

Table 6

Summary of Chemical Analysis - Soil

2013 Environmental Subsurface Investigation - University of Washington-Tacoma
Tacoma, Washington

Location ID	Type of Investigation Method	Date Investigation Completed	Sample ID	Sample Starting Depth (feet)	Sample Ending Depth (feet)	HCID[1]	Gasoline[2]	Diesel[3]	VOCs[4]	SVOCs[5]	Metals[6]	PCBs[7]	Particle Grain Size[8]	TOC[9]	pH[10]	CEC[11]	Bulk Density[12]	SPLP Select VOCs[13]
1A-B1	Direct-Push	06/13/2013	1A-B1-3-4	3	4	X			X	X	X	X						
			1A-B1-18-19	18	19				X									
1A-B2	Direct-Push	06/13/2013	1A-B2-2-3	2	3	X			X	X	X	X						
			1A-B2-14-15	14	15	X			X	X	X	X						
			1A-B2-25-26	25	26	X			X	X	X	X						
1A-B3	Direct-Push	07/18/2013	1A-B3-0-2	0	2	X		X	X	X	X							
1A-B4		06/13/2013	1A-B4-0-1	0	1	X		X	X	X	X	X						
			1A-B4-11-12	11	12	X			X	X	X	X						
1A-B5	Direct-Push	06/13/2013	1A-B5-1-2	1	2	X		X	X	X	X	X						
			1A-B5-9-10	9	10	X			X	X	X	X						
			1A-B5-11-12	11	12	X			X	X	X	X						
1A-B6	Direct-Push	06/13/2013	1A-B6-0-1	0	1	X			X	X	X	X						
			1A-B6-10-11	10	11	X			X	X	X	X						
			1A-B6-20-21	20	21				X									
1B-TP1	Test Pit	06/24/2013	1B-TP1-0-1	0	1	X		X	X	X	X							
1B-TP2	Test Pit		1B-TP2-0-1	0	1	X		X	X	X	X							
			1B-TP2-2-3	2	3	X		X	X	X	X							
			1B-TP2-5-6	5	6	X			X	X	X							
			1B-TP2-7-8	7	8	X			X	X	X							
1B-TP3	Test Pit		1B-TP3-0-1	0	1	X		X	X	X	X							
			1B-TP3-2-3	2	3	X			X	X	X							
			1B-TP3-3-4	3	4	X			X	X	X							
1B-TP4	Test Pit		1B-TP4-0-1	0	1	X			X	X	X							
1B-TP5	Test Pit		1B-TP5-0-1	0	1	X		X	X	X	X							
			1B-TP5-2-3	2	3	X			X	X	X							
			1B-TP5-7-8	7	8	X			X	X	X							
1B-TP6	Test Pit		1B-TP6-0-1	0	1	X			X	X	X							
			1B-TP6-2-3	2	3	X			X	X	X							
1C-TP1	Test Pit	06/25/2013	1C-TP1-0-1	0	1	X			X	X	X							
			1C-TP1-2-3	2	3	X			X	X	X							
1C-TP2	Test Pit		1C-TP2-0-1	0	1	X			X	X	X							
			1C-TP2-3-4	3	4	X			X	X	X							
			1C-TP2-6-7	6	7	X			X	X	X							
1D-B1	Direct-Push	06/14/2013	1D-B1-0-1	0	1	X			X	X	X	X						
			1D-B1-6-7	6	7	X			X	X	X	X						
1D-B2	Direct-Push	06/14/2013	1D-B2-0-1	0	1	X			X	X	X	X						
			1D-B2-6-7	6	7	X			X	X	X	X						
1D-TP1	Test Pit	06/24/2013	1D-TP1-0-1	0	1	X		X	X	X	X							
			1D-TP1-2-3	2	3	X			X	X	X							
1D-TP2	Test Pit	06/25/2013	1D-TP2-0-1	0	1	X			X	X	X							
			1D-TP2-3.5-4.5	3.5	4.5	X			X	X	X							
1D-TP3	Test Pit	06/24/2013	1D-TP3-0-1	0	1	X		X	X	X	X							
			1D-TP3-2-3	2	3	X			X	X	X							
			1D-TP3-5-6	5	6						X							
1E-B1	Direct-Push	06/13/2013	1E-B1-0-1	0	1	X			X	X	X							
			1E-B1-7-8	7	8	X			X	X	X							
1E-B2	Direct-Push		1E-B2-0-1	0	1	X		X	X	X	X							
			1E-B2-6-7	6	7				X									
1E-B3	Direct-Push	06/20/2013	1E-B3-1-2	1	2	X			X	X	X							
			1E-B3-6-7	6	7	X			X	X	X							
1E-B4	Direct-Push	06/12/2013	1E-B4-2-3	2	3	X			X	X	X							
			1E-B4-7-8	7	8	X			X	X	X							
1E-B5	Direct-Push	06/13/2013	1E-B5-0-1	0	1	X			X	X	X							
			1E-B5-5-6	5	6	X			X	X	X							
1E-B6	Direct-Push		1E-B6-0-1	0	1	X			X	X	X							
			1E-B6-5-6	5	6	X			X	X	X							
1F-B1	Direct-Push	07/18/2013	1F-B1-0.3-1.3	0.3	1.3	X			X	X	X							
			1F-B1-4-5	4	5	X			X	X	X							
			1F-B1-9-10	9	10	X			X	X	X							
1F-B2	Direct-Push		1F-B2-0.3-1.3	0.3	1.3	X			X	X	X							
			1F-B2-7-8	7	8	X	X	X	X	X	X							
			1F-B2-9-10	9	10	X			X	X	X							
1F-B3	Direct-Push	06/12/2013	1F-B3-2-3	2	3	X			X	X	X	X						
			1F-B3-5-6	5	6	X			X	X	X	X						
1F-B4	Direct-Push	06/11/2013	1F-B4-2-3	2	3	X			X	X	X							
			1F-B4-13-14	13	14	X			X	X	X							
1F-B5	Direct-Push	06/13/2013	1F-B5-3-4	3	4	X			X	X	X							
			1F-B5-7-8	7	8	X			X	X	X							
1F-B6	Direct-Push	06/11/2013	1F-B6-4-5	4	5	X			X	X	X							
			1F-B6-12-13	12	13	X			X	X	X							
1F-B7	Direct-Push		1F-B7-3-4	3	4	X			X	X	X							
			1F-B7-9-10	9	10				X									
			1F-B7-14-15	14	15	X			X	X	X							
1G-B1	Direct-Push	06/10/2013	1G-B1-2-3	2	3	X			X	X	X							
			1G-B1-7-8	7	8				X									
1G-B2	Direct-Push		1G-B2-2-3	2	3	X			X	X	X							
			1G-B2-9-10	9	10	X			X	X	x							
1G-B3	Direct-Push		1G-B3-2-3	2	3	X			X	X	X							

Location ID	Type of Investigation Method	Date Investigation Completed	Sample ID	Sample Starting Depth (feet)	Sample Ending Depth (feet)	HCID[1]	Gasoline[2]	Diesel[3]	VOCs[4]	SVOCs[5]	Metals[6]	PCBs[7]	Particle Grain Size [8]	TOC [9]	pH[10]	CEC [11]	Bulk Density [12]	SPLP Select VOCs[13]
1G-B4	Direct-Push	06/17/2013	1G-B4-1-2	1	2	X		X	X	X	X							
1G-B5	Direct-Push	06/11/2013	1G-B5-3-4	3	4	X			X	X	X							
			1G-B5-10-11	10	11				X									
1G-TP1	Test Pit	06/25/2013	1G-TP1-0-1	0	1	X			X	X	X							
			1G-TP1-2-3	2	3	X			X	X	X							
			1G-TP1-4-5	4	5	X			X	X	X							
1G-TP2	Test Pit		1G-TP2-0-1	0	1	X			X	X	X							
			1G-TP2-3-4	3	4	X		X	X	X	X							
			1G-TP2-6-7	6	7	X			X	X	X							
1H-B1	Direct-Push	06/10/2013	1H-B1-4-5	4	5	X			X	X	X							
			1H-B1-9-9.5	9	9.5	X			X	X	X							
1H-B2	Direct-Push		1H-B2-7-7.5	7	7.5	X			X	X	X							
			1H-B2-9-10	9	10				X									
1H-B3	Direct-Push		1H-B3-4-5	4	5	X			X	X	X							
			1H-B3-7-8	7	8	X			X	X	X							
1H-TP1	Test Pit	06/25/2013	1H-TP1-0-1	0	1	X			X	X	X							
			1H-TP1-5-6	5	6	X			X	X	X							
2A-B1	Direct-Push	06/17/2013	2A-B1-1-2	1	2	X			X	X	X							
			2A-B1-6-7	6	7	X			X	X	X							
2A-B2	Direct-Push		2A-B2-0.5-1.5	0.5	1.5	X		X	X	X	X							
			2A-B2-7-8	7	8	X			X	X	X							
2A-B3	Direct-Push		2A-B3-0-1	0	1	X			X	X	X							
			2A-B3-2-3	2	3	X			X	X	X							
			2A-B3-10-11	10	11				X									
2A-B4	Direct-Push		2A-B4-0.5-1.5	0.5	1.5	X			X	X	X							
			2A-B4-5-6	5	6	X			X	X	X							
			2A-B4-7-8	7	8				X									
2A-B5	Direct-Push		2A-B5-1-2	1	2	X		X	X	X	X							
			2A-B5-7-8	7	8	X			X	X	X							
2A-B6	Direct-Push		2A-B6-1-2	1	2	X			X	X	X							
			2A-B6-4-5	4	5				X									
2A-B7	Direct-Push		2A-B7-2.5-3.5	2.5	3.5	X			X	X	X							
			2A-B7-4-5	4	5	X			X	X	X							
			2A-B7-8-9	8	9				X									
2B-B2	Direct-Push	06/18/2013	2B-B2-1-2	1	2	X			X	X	X							
			2B-B2-5-6	5	6	X			X	X	X							
2B-B3	Direct-Push		2B-B3-1-2	1	2	X			X	X	X							
2C-B1	Direct-Push	06/18/2013	2C-B1-1-2	1	2	X			X	X	X							
			2C-B1-8-9	8	9	X			X	X	X							
2C-B2	Direct-Push		2C-B2-1-2	1	2	X		X	X	X	X							
			2C-B2-7-8	7	8	X			X	X	X							
			2C-B2-13-14	13	14	X			X	X	X							
2D-B1	Direct-Push	06/18/2013	2D-B1-0-1	0	1	X			X	X	X							
			2D-B1-8-9	8	9	X			X	X	X							
2D-B2	Direct-Push		2D-B2-0-1	0	1	X			X	X	X							
			2D-B2-4-5	4	5	X			X	X	X							
2D-B3	Direct-Push	06/20/2013	2D-B3-0-1	0	1	X			X	X	X							
			2D-B3-11-12	11	12	X			X	X	X							
2D-B4	Direct-Push		2D-B4-0-1	0	1	X			X	X	X							
2D-B5	Direct-Push		2D-B5-0-1	0	1	X			X	X	X							
			2D-B5-6-7	6	7	X			X	X	X							
2F-B1	Direct-Push	06/20/2013	2F-B1-0-1	0	1	X			X	X	X							
2F-B2	Hand Auger		2F-B2-0-0.5	0	0.5	X			X	X	X							
			2F-B2-1-2.5	1	2.5	X			X	X	X							
			2F-B2-2.5-3.25	2.5	3.25	X			X	X	X							
CR-MW15	Sonic Core	08/28/2013	CR-MW15-10-11	10	11	X			X	X	X							
			CR-MW15-12-13	12	13	X			X									
			CR-MW15-14-15	14	15	X			X									
			CR-MW15-18-19	18	19	X			X									
			CR-MW15-19.5-20	19.5	20	X	X		X									
			CR-MW15-21-22	21	22	X			X									
			CR-MW15-23.5-24	23.5	24	X			X									
			CR-MW15-29-30	29	30	X			X									
			CR-MW15-32-33	32	33	X			X									
			CR-MW15-34-35	34	35	X			X									
CR-MW16	Sonic Core	08/27/2013	CR-MW16-9-10	9	10	X			X									
			CR-MW16-10-11	10	11	X			X	X			X	X	X			
			CR-MW16-15-16	15	16	X			X	X								
			CR-MW16-18-19	18	19	X			X				X					
			CR-MW16-20-21	20	21	X			X									
			CR-MW16-24-25	24	25	X			X									
			CR-MW16-26-27	26	27	X			X									
			CR-MW16-28-29	28	29	X			X				X				X	
			CR-MW16-30-31	30	31	X			X									
CR-MW17	Sonic Core	08/27/2013	CR-MW17-11-12	11	12	X			X	X								
			CR-MW17-15-16	15	16	X			X	X								
			CR-MW17-17-18	17	18	X			X									
			CR-MW17-19-20	19	20	X			X									
			CR-MW17-23-24	23	24	X			X									
			CR-MW17-25-26	25	26	X			X									
			CR-MW17-27-28	27	28	X			X									
			CR-MW17-28-28.5	28	28.5	X			X									
			CR-MW17-29-30	29	30	X			X									

Location ID	Type of Investigation Method	Date Investigation Completed	Sample ID	Sample Starting Depth (feet)	Sample Ending Depth (feet)	HCID[1]	Gasoline[2]	Diesel[3]	VOCs[4]	SVOCs[5]	Metals[6]	PCBs[7]	Particle Grain Size[8]	TOC[9]	pH[10]	CEC[11]	Bulk Density[12]	SPLP Select VOCs[13]
JS-MW3S	Sonic Core	09/04/2013	JS-MW3S-8-9	8	9				X									
			JS-MW3S-10.5-11.5	10.5	11				X									
			JS-MW3S-12-12.5	12	12.5				X									
			JS-MW3S-13-14	13	14				X									
			JS-MW3S-18-19	18	19				X									
			JS-MW3S-21-22	21	22				X									
			JS-MW3S-23-24	23	24				X									
			JS-MW3S-24-25	24	25				X									
JS-MW4	Sonic Core	09/04/2013	JS-MW4D-7-8	7	8				X									
			JS-MW4D-9-10	9	10				X									
			JS-MW4D-13-14	13	14				X									
			JS-MW4D-14-15	14	15				X									
		09/05/2013	JS-MW4D-17-18	17	18				X									
			JS-MW4D-18-19	18	19				X									
			JS-MW4D-22-23	22	23				X									
			JS-MW4D-29.5-30	29.5	30				X									
			JS-MW4D-29-29.3	29	29.3				X									
			JS-MW4D-31-32	31	32				X									
			JS-MW4D-32-32.3	32	32.3				X									
			JS-MW4D-36-37	36	37				X									
			JS-MW4D-37-38	37	38				X									
			JS-MW4D-38.5-39.5	38.5	39.5				X									
			JS-MW4D-43-44	43	44				X									
			JS-MW4D-45.5-46	45.5	46				X									
			JS-MW4D-49-50	49	50				X									
			JS-MW4D-52-53	52	53				X									
			JS-MW4D-53-54	53	54				X									
JS-MW5	Sonic Core	08/29/2013	JS-MW5-9-10	9	10	X			X									
			JS-MW5-10-11	10	11	X			X									
			JS-MW5-14-15	14	15	X			X				X					
			JS-MW5-15-15.5	15.5	15.5	X			X									
			JS-MW5-16-17	16	17	X			X									
			JS-MW5-22-23	22	23	X			X									
			JS-MW5-24-25	24	25	X			X									
			JS-MW5-29-30	29	30	X			X				X	X	X	X	X	X
			JS-MW5-34-35	34	35	X			X									
			JS-MW5-37-38	37	38	X			X									
			JS-MW5-38-39	38	39	X			X									
			JS-MW5-39-40	39	40	X			X									
JS-MW6D	Sonic Core	08/30/2013	JS-MW6D-11-12	11	12	X			X									
			JS-MW6D-16-17	16	17	X			X									
			JS-MW6D-18-19	18	19	X			X									
			JS-MW6D-20.5-21.5	20.5	21.5	X			X									
			JS-MW6D-24-25	24	25	X			X									
			JS-MW6D-27.5-28	27.5	28	X			X									
			JS-MW6D-29-29.5	29	29.5	X			X									
			JS-MW6D-33-34	33	34	X			X									
			JS-MW6D-39-40	39	40	X			X									
			JS-MW6D-46-47	46	47	X			X									
			JS-MW6D-48-49	48	49	X			X									
JS-MW6S	Sonic Core	8/30/2013	JS-MW6S-10-11	10	11	X			X									
			JS-MW6S-14-15	14	15	X			X									
			JS-MW6S-16-17	16	17	X			X									
			JS-MW6S-17-17.5	17	17.5	X			X									
			JS-MW6S-18-19	18	19	X			X									
JS-MW7	Sonic Core	09/03/2013	JS-MW7-7-8	7	8				X									
			JS-MW7-8-9	8	9				X									
			JS-MW7-11-12	11	12				X									
			JS-MW7-13-14	13	14				X									
			JS-MW7-18-19	18	19				X									
			JS-MW7-22-23	22	23				X									
			JS-MW7-24-25	24	25				X									
JS-MW7A	Sonic Core	09/12/2013	JS-MW7A-0-1	0	1	X		X	X	X								
			JS-MW7A-1-2	1	2	X			X	X								
			JS-MW7A-3-4	3	4				X									
			JS-MW7A-5-6	5	6				X									
UG-MW23	Sonic Core	09/17/2013	UG-MW23-0-2	0	2	X			X	X								
			UG-MW23-2-3	2	3	X			X	X								
			UG-MW23-4-5	4	5	X			X	X								
			UG-MW23-6-7	6	7				X									
			UG-MW23-9-10	9	10				X									
			UG-MW23-12-13	12	13				X									
			UG-MW23-16-17	16	17				X									
			UG-MW23-17.5-18.5	17.5	18.5				X									
			UG-MW23-18.5-19	18.5	19				X									
			UG-MW23-19-20	19	20				X									
			UG-MW23-20.5-21.5	20.5	21.5				X									
			UG-MW23-20-20.5	20	20.5				X									
			UG-MW23-21.5-22	21.5	22				X									

Location ID	Type of Investigation Method	Date Investigation Completed	Sample ID	Sample Starting Depth (feet)	Sample Ending Depth (feet)	HCID[1]	Gasoline[2]	Diesel[3]	VOCs[4]	SVOCs[5]	Metals[6]	PCBs[7]	Particle Grain Size[8]	TOC[9]	pH[10]	CEC[11]	Bulk Density[12]	SPLP Select VOCs[13]
UG-MW24	Sonic Core	06/27/2013	UG-MW24-9-10	9	10		X	X	X	X								
			UG-MW24-12-13	12	13		X	X	X	X								
		06/28/2013	UG-MW24-27-28	27	28		X	X	X	X								
			UG-MW24-40-41	40	41		X	X	X	X								
			UG-MW24-54-55	54	55		X	X	X	X								
			UG-MW24-72-73	72	73		X	X	X	X								
			UG-MW24-79-80	79	80		X	X	X	X								
			UG-MW24-99-100	99	100		X	X	X	X								
UG-MW25D	Sonic Core	08/22/2013	UG-MW25D-1-2	1	2	X			X	X								
			UG-MW25D-6-7	6	7				X									
			UG-MW25D-12-13	12	13				X				X	X	X	X	X	X
			UG-MW25D-13-14	13	14		X	X	X									
			UG-MW25D-17-18	17	18		X	X	X									
			UG-MW25D-18-19	18	19		X	X	X				X					
			UG-MW25D-2.5-3.5	2.5	3.5	X			X	X								
			UG-MW25D-24-25	24	25		X	X	X									
			UG-MW25D-34-35	34	35		X	X	X	X								
		08/23/2013	UG-MW25D-37-38	37	38				X									
			UG-MW25D-42-43	42	43				X				X	X	X		X	
			UG-MW25D-43-44	43	44				X									
			UG-MW25D-48.5-49	48.5	49				X									
			UG-MW25D-48-48.5	48	48.5				X									
			UG-MW25D-54-55	54	55				X									
UG-MW25S	Sonic Core	08/23/2013	UG-MW25S-1-2	1	2					X								
			UG-MW25S-3-4	3	4					X								
			UG-MW25S-7.5-8.5	7.5	8.5				X									
			UG-MW25S-8.5-9.5	8.5	9.5				X									
			UG-MW25S-10-11	10	11				X									
			UG-MW25S-11-12	11	12				X									
			UG-MW25S-15-16	15	16				X									
			UG-MW25S-19-20	19	20				X									
UG-MW26	Sonic Core	09/11/2013	UG-MW26-0-1	0	1	X		X	X	X								
			UG-MW26-2-3	2	3	X			X	X								
			UG-MW26-6.5-7.5	6.5	7.5				X									
			UG-MW26-6-6.3	6	6.3				X									
			UG-MW26-11-12	11	12				X									
			UG-MW26-15-16	15	16				X									
			UG-MW26-19-20	19	20				X									
			UG-MW26-23-24	23	24				X									
			UG-MW26-24-25	24	25				X									
UG-MW27	Sonic Core	06/26/2013	UG-MW27-16-17	16	17		X	X	X	X								
			UG-MW27-25-26	25	26		X	X	X	X								
		06/27/2013	UG-MW27-30-31	30	31		X	X	X	X								
			UG-MW27-54-55	54	55		X	X	X	X								
UG-MW28	Sonic Core	06/24/2013	UG-MW28-23-24	23	24		X	X	X	X								
			UG-MW28-27-28	27	28		X	X	X	X								
			UG-MW28-39-40	39	40		X	X	X	X								
UG-MW29D	Sonic Core	06/25/2013	UG-MW29D-7-7.25	7	7.25		X	X	X	X								
			UG-MW29D-9-9.5	9	9.5		X	X	X	X								
			UG-MW29D-17-18	17	18		X	X	X	X								
			UG-MW29D-20-20.5	20	20.5		X	X	X	X								
			UG-MW29D-22-23	22	23		X	X	X	X								
			UG-MW29D-34.5-35	34.5	35		X	X	X	X								
			UG-MW29D-37.5-38	37.5	38		X	X	X	X								
UG-MW30D	Sonic Core	07/01/2013	UG-MW30D-10-11.5	10	11		X	X	X	X								
			UG-MW30D-29-30	29	30		X	X	X	X								
			UG-MW30D-35-36	35	36		X	X	X	X								
			UG-MW30D-47-48	47	48		X	X	X	X								
			UG-MW30D-52-53	52	53		X	X	X	X								
UG-MW30S	Sonic Core	07/02/2013	UG-MW30S-9-10	9	10	X			X	X								
			UG-MW30S-11-12	11	12	X			X	X								
			UG-MW30S-13-14	13	14	X			X	X								
			UG-MW30S-17.5-18.5	17.5	18.5	X			X	X								
			UG-MW30S-19-20	19	20	X			X	X								
UG-MW31	Sonic Core	08/26/2013	UG-MW31-0.5-1	0.5	1	X			X	X								
			UG-MW31-4-5	4	5	X			X	X								
			UG-MW31-6-7	6	7				X									
			UG-MW31-11-12	11	12				X									
			UG-MW31-15-16	15	16				X									
			UG-MW31-16.5-17	16.5	17				X									
			UG-MW31-20-21	20	21				X				X	X	X	X	X	X
			UG-MW31-22-23	22	23				X									
			UG-MW31-29.5-30	29.5	30				X									
			UG-MW31-32-33	32	33				X				X	X	X	X		
UG-MW32	Sonic Core	09/12/2013	UG-MW32-1-2	1	2	X			X	X								
			UG-MW32-3.5-4.5	3.5	4.5	X			X	X								
			UG-MW32-7-8	7	8				X									
			UG-MW32-8-9	8	9				X									
			UG-MW32-12-13	12	13				X									
			UG-MW32-14-15	14	15				X									

Location ID	Type of Investigation Method	Date Investigation Completed	Sample ID	Sample Starting Depth (feet)	Sample Ending Depth (feet)	HCID[1]	Gasoline[2]	Diesel[3]	VOCs[4]	SVOCs[5]	Metals[6]	PCBs[7]	Particle Grain Size[8]	TOC[9]	pH[10]	CEC[11]	Bulk Density[12]	SPLP Select VOCs[13]
UG-MW33	Sonic Core	09/18/2013	UG-MW33-0-1	0	1	X		X	X	X								
			UG-MW33-2-3	2	3	X			X	X								
			UG-MW33-6-7	6	7				X									
			UG-MW33-8-9	8	9				X									
			UG-MW33-11-12	11	12				X									
			UG-MW33-12-12.5	12	12.5				X									
			UG-MW33-13-13.5	13	13.5				X									
			UG-MW33-13.5-14	13.5	14				X									
			UG-MW33-14-15	14	15				X									
UG-MW34	Sonic Core	09/06/2013	UG-MW34-1-2	1	2	X			X	X								
			UG-MW34-5-6	5	6	X			X	X								
			UG-MW34-11-12	11	12				X									
			UG-MW34-14-15	14	15				X									
			UG-MW34-15-16	15	16				X									
			UG-MW34-20-21	20	21				X									
			UG-MW34-24-25	24	25				X									
			UG-MW34-30-31	30	31				X									
			UG-MW34-34-35	34	35				X									
UG-MW35	Sonic Core	09/18/2013	UG-MW35-0-2	0	2	X			X	X								
			UG-MW35-4-5	4	5	X			X	X								
			UG-MW35-5.5-6	5.5	6				X									
			UG-MW35-7-8	7	8				X									
			UG-MW35-11.5-12.5	11.5	12.5				X									
			UG-MW35-13-13.5	13	13.5				X									
			UG-MW35-13.5-14	13.5	14				X									
			UG-MW35-15-16	15	16				X									
			UG-MW35-16-17	16	17				X									
			UG-MW35-18-19	18	19				X									
			UG-MW35-19-19.5	19	19.5				X									
			UG-MW35-19.5-20	19.5	20				X									
UG-MW36	Sonic Core	09/18/2013	UG-MW36-0-1	0	1	X		X	X	X								
			UG-MW36-1-3	1	3	X		X	X	X								
			UG-MW36-4-5	4	5	X			X	X								
			UG-MW36-6-7	6	7				X									
			UG-MW36-8-9	8	9				X									
			UG-MW36-10.5-11	10.5	11				X									
			UG-MW36-11-11.5	11	11.5				X									
			UG-MW36-12-12.5	12	12.5				X									
			UG-MW36-12.5-13	12.5	13				X									
			UG-MW36-13-14	13	14				X									
UG-MW37	Sonic Core	09/19/2013	UG-MW37-0-1	0	1	X		X	X	X								
			UG-MW37-1-2	1	2	X			X	X								
			UG-MW37-3-4	3	4				X									
			UG-MW37-5.5-6.5	5.5	6.5				X									
			UG-MW37-7-8	7	8				X									
			UG-MW37-9-10	9	10				X									
			UG-MW37-11-12	11	12				X									
			UG-MW37-13-14	13	14				X									
			UG-MW37-14-15	14	15				X									
			UG-MW37-15-16	15	16				X									
			UG-MW37-16-17	16	17				X									
			UG-MW37-18-19	18	19				X									
UG-MW38D	Sonic Core	09/16/2013	UG-MW38D-1-2	1	2	X		X	X	X								
			UG-MW38D-3.5-4.5	3.5	4.5	X			X	X								
			UG-MW38D-5-6	5	6	X		X	X	X			X					
			UG-MW38D-6-7	6	7			X	X									
			UG-MW38D-10-11	10	11			X	X									
			UG-MW38D-14-15	14	15				X									
			UG-MW38D-15.5-16	15.5	16				X				X					
			UG-MW38D-18-19	18	19				X									
		09/17/2013	UG-MW38D-20-21	20	21				X									
			UG-MW38D-23-24	23	24				X									
			UG-MW38D-26-27	26	27				X									
			UG-MW38D-27-28	27	28				X									
			UG-MW38D-33-34	33	34		X	X	X	X			X	X	X		X	
			UG-MW38D-35.5-36.5	35.5	36.5				X									
			UG-MW38D-35-35.5	35	35.5				X									
			UG-MW38D-39-40	39	40				X				X					
			UG-MW38D-44-45	44	45				X									
			UG-MW38D-49-50	49	50				X				X	X	X	X	X	X
			UG-MW38D-51-52	51	52				X									
			UG-MW38D-52-53	52	53				X									
			UG-MW38D-54-55	54	55				X									
UG-MW38S	Sonic Core	09/16/2013	UG-MW38S-0.5-1.5	0.5	1.5	X		X	X	X								
			UG-MW38S-2-3	2	3	X			X	X								
			UG-MW38S-5-6	5	6	X			X	X								
			UG-MW38S-9-10	9	10				X									
			UG-MW38S-11-12	11	12				X									
			UG-MW38S-13.5-14	13.5	14				X									
			UG-MW38S-16-16.5	16	16.5				X									
			UG-MW38S-17-18	17	18				X									
			UG-MW38S-24-25	24	25				X									

Notes:

X = Sample submitted for chemical analysis

[1] Northwest Total Petroleum Hydrocarbons - Hydrocarbon Identification (HCID) by Washington State Department of Ecology (Ecology)-approved method NWTPH-HCID

[2] Gasoline-range petroleum hydrocarbons by Ecology-approved method NWTPH-Gx

[3] Diesel and Lube oil-range petroleum hydrocarbons by Ecology-approved method NWTPH-Dx

[4] Volatile Organic Compounds (VOCs) by Environmental Protection Agency (EPA) method 8260C

[5] Semivolatile Organic Compounds (SVOCs) by EPA method 8260D SIM

[6] Total metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver) by EPA methods 6010C, 7196A, 7196AMOD and 7471B

[7] Polychlorinated biphenyls (PCBs) by EPA method 8082

[8] Grain Size Distribution by ASTM D 422 and total solids by Standard Method (SM) 2540G

[9] Total Organic Carbon (TOC) by EPA method 9060

[10] pH by EPA method 8045D

[11] Cation Exchange Capacity (CEC) by SW-846 9081

[12] Bulk Density by SM 2710

[13] Synthetic Precipitation Leaching Potential (SPLP) select VOCs by EPA method 1312/8260C

Table 7

Summary of Well Installations and Survey Data

2013 Environmental Subsurface Investigation - University of Washington-Tacoma
Tacoma, Washington

Well Identification	Type of Well	Lithology of Well Screen Interval	Longitude[1]	Latitude[1]	Ground Surface Elevation[1] (feet, AMSL)	Elevation of Top of Casing[1] (feet, AMSL)	Elevation of Top of Screen[2] (feet, AMSL)	Elevation of Bottom of Screen[2] (feet, AMSL)	Depth of Top of Screen (bgs)	Depth of Bottom of Screen (bgs)	Length of Screen (feet)	Purpose of Well Installation
CR-MW15	Permanent	Advance Outwash	1159169.442	702471.5274	79.84	79.45	65	50	15	30	15	Replacement of Decommissioned Wells in the Area
CR-MW16	Permanent	Qvi	1159252.752	702660.0142	65.36	64.71	50	35	15	30	15	Replacement of Decommissioned Wells in the Area
CR-MW17	Permanent	Qvi	1159293.707	702613.4016	64.32	64.11	54	39	10	25	15	Replacement of Decommissioned Wells in the Area
JS-MW3S	Permanent	Qvi	1158971.687	703355.0723	89.36	88.86	77	67	12	22	10	Till and Outwash
JS-MW4	Permanent	Advance Outwash	1158929.594	703186.8563	94.21	93.66	51	41	43	53	10	Evaluate Lateral and Vertical Extent of TCE Plume
JS-MW5	Permanent	Advance Outwash	1158851.376	702700.2832	105.03	104.67	78	68	27	37	10	Evaluate Lateral and Vertical Extent of TCE and Benzene Plume and Hydrogeologic Connection Between Till and Outwash
JS-MW6D	Permanent	Advance Outwash	1158822.071	702827.6884	102.32	101.99	77	62	25	40	15	Till and Outwash
JS-MW6S	Permanent	Qvi	1158822.935	702834.7615	102.15	101.85	94	84	8.5	18.5	10	Evaluate Lateral and Vertical Extent of TCE and Benzene Plume and Hydrogeologic Connection Between Till and Outwash
JS-MW7[3]	Permanent	Qvi	Decommissioned									Evaluate Lateral Extent of TCE Plume
JS-MW7A	Permanent	Qvi	1158863.792	703216.4866	97.00	96.75	90	85	7	12	5	Replacement Well for JS-MW7
UG-MW23	Permanent	Advance Outwash	1158296.944	702466.6345	171.45	171.18	160	153	11	18	7	Evaluate Lateral and Vertical Extent of TCE Plume
UG-MW24	Permanent	Advance Outwash	1158091.387	703003.7716	197.08	196.80	132	117	65	80	15	Evaluate Lateral and Vertical Extent of TCE Plume
UG-MW25D	Permanent	Advance Outwash	1158021.779	703343.9878	202.64	202.05	158	148	45	55	10	Evaluate Lateral and Vertical Extent of TCE Plume and Hydrogeologic Connection Between Till and Outwash
UG-MW25S	Permanent	Qvi	1158024.189	703329.7398	203.08	202.60	195	185	8	18	10	Evaluate Lateral and Vertical Extent of TCE Plume and Hydrogeologic Connection Between Till and Outwash
UG-MW26	Permanent	Qvi	1158001.846	703487.3794	202.62	202.18	196	186	7	17	10	Evaluate Lateral and Vertical Extent of TCE Plume
UG-MW27	Permanent	Advance Outwash	1158496.127	703212.7196	149.28	148.68	108	93	41	56	15	Evaluate Lateral and Vertical Extent of TCE Plume
UG-MW28	Permanent	Qvi	1158471.613	703399.6974	151.80	151.14	143	128	9	24	15	Evaluate Lateral and Vertical Extent of TCE Plume
UG-MW29D	Permanent	Advance Outwash	1158441.949	703640.5021	149.61	149.26	122	112	28	38	10	Evaluate Lateral and Vertical Extent of TCE Plume and Hydrogeologic Connection Between Till and Outwash
UG-MW29S	Permanent	Qvi	1158440.582	703647.8553	149.40	149.04	140	130	9.5	19.5	10	Outwash
UG-MW30D	Permanent	Advance Outwash	1158626.656	702935.8692	123.24	122.94	85	75	38	48	10	Outwash
UG-MW30S	Permanent	Qvi	1158631.509	702936.7633	123.10	122.70	114	104	9	19	10	Evaluate Lateral and Vertical Extent of TCE Plume and Hydrogeologic Connection Between Till and Outwash
UG-MW31	Permanent	Qvi	1158535.9	703090.1236	143.35	142.92	135	125	8	18	10	Evaluate Lateral and Vertical Extent of TCE Plume
UG-MW32	Permanent	Qvi	1158356.112	703300.2841	160.38	159.88	150	145	10	15	5	Evaluate Lateral and Vertical Extent of TCE Plume
UG-MW33	Permanent	Qvi	1158146.629	703453.4093	183.91	183.57	177	172	6.5	11.5	5	Evaluate Lateral and Vertical Extent of TCE Plume
UG-MW34	Permanent	Qvi	1158533.696	703309.0892	142.23	142.03	133	123	9	19	10	Evaluate Lateral and Vertical Extent of TCE Plume
UG-MW35	Permanent	Qvi	1158185.732	703163.6049	181.91	181.60	176	169	6	12.5	6.5	Evaluate Lateral and Vertical Extent of TCE Plume
UG-MW36	Permanent	Qvi	1158175.504	703308.7842	180.57	180.24	175	170	6	11	5	Evaluate Lateral and Vertical Extent of TCE Plume
UG-MW37	Permanent	Qvi	1158055.838	703157.6823	197.78	197.29	192	184	6	14	8	Evaluate Lateral and Vertical Extent of TCE Plume
UG-MW38D	Permanent	Advance Outwash	1158130.475	702825.4502	192.91	192.47	152	142	41	51	10	Outwash
UG-MW38S	Permanent	Qvi	1158127.326	702837.6895	193.60	193.17	188	179	6	15	9	Evaluate Lateral and Vertical Extent of TCE Plume and Hydrogeologic Connection Between Till and Outwash
1A-B2	Temporary	Fill	NS	NS	220[4]	NS	195	190	25	30	5	Evaluate Lateral and Vertical Extent of TCE Plume
1F-B3	Temporary	Qvi	NS	NS	154[4]	NS	149	144	5	10	5	Evaluate Lateral and Vertical Extent of TCE Plume
1F-B5	Temporary	Qvi	NS	NS	158[4]	NS	151	146	7	12	5	Evaluate Lateral and Vertical Extent of TCE Plume
1F-B7	Temporary	Qvi	NS	NS	158[4]	NS	146	141	12	17	5	Evaluate Lateral and Vertical Extent of TCE Plume

Notes:

[1] Based on survey completed by AHBL November 6, 2013. Horizontal datum - NAD 83/91 Washington State Plane - South Zone (City of Tacoma Horizontal control Holding City Monument Numbers 411 and 414). Vertical datum NGVD 29 (brass monument at South 19th and Fawcett Avenue, Elevation 165.15).

[2] Calculated from survey ground surface elevation.

[3] Well Decommissioned due to lack of water in well.

[4] Temporary wells not surveyed.

Qvi = Ice-contact deposit
AMSL = Above mean sea level
NAVD = North American Vertical Datum
NS = Not surveyed
TCE = Trichloroethene
BTOC = Below top of well casing
NAD = North American Datum

Table 8

Summary of Chemical Analysis - Groundwater

2013 Environmental Subsurface Investigation - University of Washington-Tacoma

Tacoma, Washington

Well Identification	Date Sampled	Sample Identification	Permanent or Temporary Well or Other Structure	New Well	Lithology of Well Screen Interval	Gasoline[1]	Diesel[2]	VOCs[3]	SVOCs[4]	Total Metals[5]	Dissolved Metals[6]	PCBs[7]
1A-B2	06/13/2013	1A-B2-W	Temporary Well	Yes	Fill	X	X	X	X		X	X
1F-B3	06/12/2013	1F-B3-W	Temporary Well	Yes	Qvi	X	X	X	X		X	X
1F-B5	06/12/2013	1F-B5-W	Temporary Well	Yes	Qvi	X	X	X	X		X	X
1F-B7	06/11/2013	1F-B7-W	Temporary Well	Yes	Qvi	X	X	X	X		X	
2F-S1	06/20/2013	2F-SUMP	Sump	N/A	N/A	X	X	X	X	X		X
BA-MW1	07/11/2013	BA-MW1-130711	Permanent Well	No	ND	X	X	X				
BA-MW2	06/17/2013	BA-MW2-130617	Permanent Well	No	Advance Outwash			X				
BL-MW1	07/09/2013	BL-MW1-130709	Permanent Well	No	ND	X	X	X				
BL-MW3	09/11/2013	BL-MW3-130911	Permanent Well	No	ND	X	X	X	X	X	X	
BL-MW4	07/08/2013	BL-MW4-130708	Permanent Well	No	ND	X	X	X				
BL-MW5	07/09/2013	BL-MW5-130709	Permanent Well	No	ND	X	X	X				
BL-MW6	07/11/2013	BL-MW6-130711	Permanent Well	No	ND	X	X	X				
CR-MW12	07/08/2013	CR-MW12-130708	Permanent Well	No	ND	X	X	X				
CR-MW15	09/05/2013	CR-MW15S-130905	Permanent Well	Yes	Advance Outwash	X	X	X	X	X		
CR-MW16	09/05/2013	CR-MW16S-130905	Permanent Well	Yes	Qvi	X	X	X	X	X		
CR-MW17	09/05/2013	CR-MW17S-130905	Permanent Well	Yes	Qvi	X	X	X	X	X		
CR-MW3	07/09/2013	CR-MW3-130709	Permanent Well	No	ND	X	X	X				
CR-MW5	07/09/2013	CR-MW5-130709	Permanent Well	No	ND	X	X	X				
CR-MW6	07/09/2013	CR-MW6-130709	Permanent Well	No	ND	X	X	X				
CR-MW8	07/02/2013	CR-MW8-130702	Permanent Well	No	ND	X	X	X				
CR-MW9	07/08/2013	CR-MW9-130708	Permanent Well	No	ND	X	X	X				
DD-MW1	06/19/2013	DD-MW1-130619	Permanent Well	No	Advance Outwash			X				
DD-MW2	07/09/2013	DD-MW2-130709	Permanent Well	No	ND	X	X	X				
JP-MW1	07/12/2013	JP-MW1-130712	Permanent Well	No	ND	X	X	X				
JP-MW1R	07/12/2013	JP-MW1R-130712	Permanent Well	No	ND	X	X	X				
JP-MW2	07/02/2013	JP-MW2-130702	Permanent Well	No	ND	X	X	X				
JS-MW1	06/18/2013	JS-MW1-130618	Permanent Well	No	Advance Outwash			X				
JS-MW2	06/18/2013	JS-MW2-130618	Permanent Well	No	Advance Outwash			X				
JS-MW3	06/25/2013	JS-MW3-130625	Permanent Well	No	Advance Outwash			X				
JS-MW3S	01/22/2014	JS-MW3S-140122	Permanent Well	No	Qvi	X		X				
JS-MW3S	09/13/2013	JS-MW3S-130913	Permanent Well	Yes	Qvi	X	X	X	X	X		
JS-MW4	09/19/2013	JS-MW4D-130919	Permanent Well	Yes	Advance Outwash	X	X	X	X	X		
JS-MW5	09/12/2013	JS-MW5S-130912	Permanent Well	Yes	Advance Outwash	X	X	X	X	X		
JS-MW6D	09/13/2013	JS-MW6D-130913	Permanent Well	Yes	Advance Outwash	X	X	X	X	X		
JS-MW6S	09/12/2013	JS-MW6S-130912	Permanent Well	Yes	Qvi	X	X	X	X	X		
JS-MW7A	01/22/2014	JS-MW7A-140122	Permanent Well	Yes	Qvi	X		X				
PL-MW1	07/12/2013	PL-MW1-130712	Permanent Well	No	ND	X	X	X				
PL-MW2	07/10/2013	PL-MW2-130710	Permanent Well	No	ND	X	X	X				
PS-MW6	07/11/2013	PS-MW6-130711	Permanent Well	No	ND	X	X	X				
PS-MW7	07/15/2013	PS-MW7-130715	Permanent Well	No	ND	X	X	X				
PS-MW8	07/11/2013	PS-MW8-130711	Permanent Well	No	ND	X	X	X				
PS-MW9	07/11/2013	PS-MW9-130711	Permanent Well	No	ND	X	X	X				
SH-MW6	07/08/2013	SH-MW6-130708	Permanent Well	No	ND	X	X	X				
SH-MW7	07/08/2013	SH-MW7-130708	Permanent Well	No	ND	X	X	X				
UG-MW1	07/02/2013	UG-MW1-130702	Permanent Well	No	ND	X	X	X				
UG-MW2R	07/15/2013	UG-MW2R-130715	Permanent Well	No	Qvi	X	X	X				
UG-MW3	06/18/2013	UG-MW3-130618	Permanent Well	No	Advance Outwash			X				
UG-MW4	06/19/2013	UG-MW4-130619	Permanent Well	No	Advance Outwash			X				
UG-MW5	07/10/2013	UG-MW5-130710	Permanent Well	No	ND	X	X	X				
UG-MW6	07/10/2013	UG-MW6-130710	Permanent Well	No	ND	X	X	X				
UG-MW7	06/19/2013	UG-MW7-130619	Permanent Well	No	Advance Outwash			X				
UG-MW8	06/19/2013	UG-MW8-130619	Permanent Well	No	Advance Outwash			X				
UG-MW9	06/17/2013	UG-MW9-130617	Permanent Well	No	Advance Outwash			X				
UG-MW10	07/11/2013	UG-MW10-130711	Permanent Well	No	ND	X	X	X				
UG-MW11	07/10/2013	UG-MW11-130710	Permanent Well	No	ND	X	X	X				
UG-MW12	07/10/2013	UG-MW12-130710	Permanent Well	No	ND	X	X	X				
UG-MW13	06/25/2013	UG-MW13-130625	Permanent Well	No	Qvi			X				
UG-MW14	06/17/2013	UG-MW14-130617	Permanent Well	No	Advance Outwash			X				
UG-MW15	07/10/2013	UG-MW15-130710	Permanent Well	No	ND	X	X	X				
UG-MW16	06/17/2013	UG-MW16-130617	Permanent Well	No	Advance Outwash			X				X
UG-MW17	06/17/2013	UG-MW17-130617	Permanent Well	No	Advance Outwash			X				X
UG-MW18	06/14/2013	UG-MW18-130614	Permanent Well	No	Advance Outwash			X				
UG-MW19	06/14/2013	UG-MW19-130614	Permanent Well	No	Advance Outwash			X				
UG-MW20	06/14/2013	UG-MW20-130614	Permanent Well	No	Advance Outwash			X				
UG-MW21	06/18/2013	UG-MW21-130618	Permanent Well	No	Advance Outwash			X				
UG-MW22	06/14/2013	UG-MW22-130614	Permanent Well	No	Advance Outwash			X				
UG-MW23	10/03/2013	UG-MW23-131003	Permanent Well	Yes	Advance Outwash	X	X	X	X	X		
UG-MW24	07/15/2013	UG-MW24-130715	Permanent Well	Yes	Advance Outwash	X	X	X	X	X		
UG-MW25D	09/04/2013	UG-MW25D-130904	Permanent Well	Yes	Advance Outwash	X	X	X	X	X	X	
UG-MW25S	09/04/2013	UG-MW25S-130904	Permanent Well	Yes	Qvi	X	X	X	X	X		
UG-MW26	09/30/2013	UG-MW26-130930	Permanent Well	Yes	Qvi	X	X	X	X	X		
UG-MW27	07/02/2013	UG-MW27-130702	Permanent Well	Yes	Advance Outwash	X	X	X	X	X		
UG-MW28	07/02/2013	UG-MW28-130702	Permanent Well	Yes	Qvi	X	X	X	X	X		
UG-MW29D	07/01/2013	UG-MW29D-130701	Permanent Well	Yes	Advance Outwash	X	X	X	X	X		

Well Identification	Date Sampled	Sample Identification	Permanent or Temporary Well or Other Structure	New Well	Lithology of Well Screen Interval	Gasoline[1]	Diesel[2]	VOCs[3]	SVOCs[4]	Total Metals[5]	Dissolved Metals[6]	PCBs[7]
UG-MW29S	07/01/2013	UG-MW29S-130701	Permanent Well	Yes	Qvi	X	X	X	X	X		
UG-MW30D	07/12/2013	UG-MW30D-130712	Permanent Well	Yes	Advance Outwash	X	X	X	X	X		
UG-MW30S	07/15/2013	UG-MW30S-130715	Permanent Well	Yes	Qvi	X	X	X	X	X		
UG-MW30S	07/15/2013	UG-MW30S-130715-VOC	Permanent Well	Yes	Qvi			X				
UG-MW31	09/04/2013	UG-MW31-130904	Permanent Well	Yes	Qvi	X	X	X	X	X		
UG-MW32	10/03/2013	UG-MW32-131003	Permanent Well	Yes	Qvi	X	X	X	X	X		
UG-MW33	10/02/2013	UG-MW33-131002	Permanent Well	Yes	Qvi	X	X	X	X	X		
UG-MW34	09/23/2013	UG-MW34-130923	Permanent Well	Yes	Qvi	X	X	X	X	X		
UG-MW35	01/22/2014	UG-MW35-140122	Permanent Well	Yes	Qvi	X		X				
UG-MW36	01/22/2014	UG-MW36-140122	Permanent Well	Yes	Qvi	X		X				
UG-MW37	09/30/2013	UG-MW37-130930	Permanent Well	Yes	Qvi	X	X	X	X	X		
UG-MW38D	10/02/2013	UG-MW38D-131003	Permanent Well	Yes	Advance Outwash	X	X	X	X	X		
UG-MW38S	10/01/2013	UG-MW38S-131001	Permanent Well	Yes	Qvi	X	X	X	X	X		

Notes:

X = Sample submitted for chemical analysis

[1] Gasoline-range petroleum hydrocarbons by Washington State Department of Ecology (Ecology)-approved method NWTPH-Gx

[2] Diesel and lube oil-range petroleum hydrocarbons by Ecology-approved method NWTPH-Dx

[3] Volatile Organic Compounds (VOCs) by Environmental Protection Agency (EPA) method 8260C

[4] Semivolatile Organic Compounds (SVOCs) by EPA method 8260D SIM

[5] Total metals (arsenic, cadmium, chromium, lead and mercury) by EPA methods 200.8 and/or 7470A

[6] Dissolved Metals (select) by EPA methods 200.8 and/or 7470A

[7] Polychlorinated biphenyls (PCBs) by EPA method 8082

Qvi = Ice-contact deposits

ND = Not determined

Table 9

Water Level Snap Shot Measurements

2013 Environmental Subsurface Investigation - University of Washington-Tacoma

Tacoma, Washington

Monitoring Well Identification	Lithology of Water Bearing Unit	Ground Surface Elevation (feet, AMSL)[1]	Top of Casing Elevation[1]	Screen Intervals				Water Level Measured on July 17, 2013		Water Level Measured on November 8, 2013	
				Top of Well Screen Elevation (feet, AMSL)[2]	Bottom of Well Screen Elevation (feet, AMSL)[2]	Depth of Top of Well Screen (bgs)	Depth of Bottom of Well Screen (bgs)	DTW (feet, BTOC)	WL Elevation (feet, AMSL)	DTW (feet, BTOC)	WL Elevation (feet, AMSL)
BA-MW1	ND	114.66	114.44	93	78	22	37	7.46	106.98	5.43	109.01
BA-MW2	Advance Outwash	124.60	124.28	80	65	45	60	27.98	96.30	28.44	95.84
BL-MW1	ND	75.05	74.69	68	53	7.5	22.5	8.53	66.16	17.66	57.03
BL-MW3	ND	67.57	66.76	58	43	10	25	--	--	12.55	54.21
BL-MW4	ND	48.39	47.80	37	17	11	31	13.32	34.48	12.88	34.92
BL-MW5	ND	75.13	74.71	50	35	25	40	12.42	62.29	12.12	62.59
BL-MW6	ND	68.10	67.11	35	30	33	38	20.26	46.85	20.15	46.96
CR-MW3	ND	79.34	78.56	72	57	7.5	22.5	9.10	69.46	8.92	69.64
CR-MW5	ND	74.91	74.13	67	57	8	18	10.05	64.08	9.98	64.15
CR-MW6	ND	73.24	72.83	65	55	8	18	12.31	60.52	12.10	60.73
CR-MW8	ND	77.67	76.28	73	60	5	18	10.32	65.96	8.42	67.86
CR-MW9	ND	79.09	78.25	72	59	7	20	8.52	69.73	11.65	66.60
CR-MW12	ND	48.26	47.54	38	23	10	25	11.69	35.85	10.31	37.23
CR-MW15	Advance Outwash	79.84	79.45	65	50	15	30	--	--	17.13	62.32
CR-MW16	Qvi	65.36	64.71	50	35	15	30	--	--	16.45	48.26
CR-MW17	Qvi	64.32	64.11	54	39	10	25	--	--	18.57	45.54
DD-MW1	ND	121.83	122.12	77	62	45	60	19.91	102.21	20.33	101.79
DD-MW2	ND	140.60	140.30	101	86	40	55	1.92	138.38	1.73	138.57
JP-MW1	ND	97.24	95.77	82	67	15	30	12.20	83.57	Decommissioned	
JP-MW1R	ND	101.96	101.64	87	77	14.5	24.5	18.09	83.55	17.67	83.97
JP-MW2	ND	104.79	101.45	90	78	15	27	17.70	83.75	17.36	84.09
JS-MW1	Advance Outwash	90.27	90.15	56	41	34	49	34.64	55.51	34.81	55.34
JS-MW2	Advance Outwash	90.56	90.33	57	42	34	49	34.76	55.57	34.92	55.41
JS-MW3	Advance Outwash	89.97	89.35	51	36	39	54	36.47	52.88	36.52	52.83
JS-MW3S	Qvi	89.36	88.86	77	67	12	22	--	--	18.81	70.05
JS-MW4	Advance Outwash	94.21	93.66	51	41	43	53	--	--	40.18	53.48
JS-MW5	Advance Outwash	105.03	104.67	78	68	27	37	--	--	21.87	82.8
JS-MW6D	Advance Outwash	102.32	101.99	77	62	25	40	--	--	19.22	82.77
JS-MW6S	Qvi	102.15	101.85	94	84	8.5	18.5	--	--	5.56	96.29
JS-MW7A	Qvi	97.00	96.75	90	85	7	12	--	--	11.02	85.73
PL-MW1	ND	101.32	101.02	88	73	13	28	17.80	83.22	17.25	83.77
PL-MW2	ND	83.19	82.92	77	57	6	26	7.51	75.41	7.13	75.79
PS-MW6	ND	67.89	66.20	57	42	10.5	25.5	19.16	47.04	19.09	47.11
PS-MW7	ND	66.75	66.03	59	44	8	23	13.84	52.19	13.85	52.18
PS-MW8	ND	65.36	64.84	54	39	11	26	19.70	45.14	19.81	45.03
PS-MW9	ND	56.89	55.33	45	30	12	27	12.25	43.08	12.06	43.27
SH-MW6	ND	49.16	48.82	35	20	14	29	12.15	36.67	12.05	36.77
SH-MW7	ND	48.94	48.41	33	18	16	31	12.41	36.00	12.22	36.19
UG-MW1	ND	104.41	103.76	88	65	16	39	20.03	83.73	19.62	84.14
UG-MW2R	Qvi	97.53	97.90	83	62	15	36	17.10	80.80	16.56	81.34
UG-MW3	Advance Outwash	100.28	99.63	63	47	37	53	--	--	44.35	55.28
UG-MW4	Advance Outwash	105.31	105.67	60	45	45	60	50.42	55.25	50.52	55.15
UG-MW5	ND	116.47	115.10	88	73	28	43	31.40	83.70	21.87	93.23
UG-MW6	ND	111.27	110.27	91	76	20	35	44.07	66.20	23.48	86.79
UG-MW7	Advance Outwash	124.29	123.97	69	54	55	70	35.26	88.71	35.68	88.29
UG-MW8	Advance Outwash	123.29	123.50	68	53	55	70	32.62	90.88	33.01	90.49
UG-MW9	Advance Outwash	129.60	123.80	80	65	50	65	29.80	94.00	30.06	93.74
UG-MW10	ND	115.70	114.25	96	81	20	35	-1.43	115.68	-1.53	115.78
UG-MW11	ND	116.65	114.59	97	82	20	35	8.29	106.30	7.88	106.71
UG-MW12	ND	113.72	112.29	94	79	20	35	15.89	96.40	15.76	96.53
UG-MW13	Qvi	123.26	122.96	99	79	24	44	20.72	102.24	21.15	101.81
UG-MW14	Advance Outwash	134.47	133.75	112	97	22.5	37.5	21.43	112.32	21.41	112.34
UG-MW15	ND	116.43	116.43	91	76	25	40	12.21	104.22	11.82	104.61
UG-MW16	Advance Outwash	151.39	150.99	144	129	7	22	9.27	141.72	9.30	141.69
UG-MW17	Advance Outwash	155.98	155.46	153	138	3	18	3.72	151.74	3.80	151.66
UG-MW18	Advance Outwash	204.28	203.95	170	155	34	49	33.89	170.06	34.19	169.76
UG-MW19	Advance Outwash	192.12	191.75	168	153	24	39	24.73	167.02	25.06	166.69
UG-MW20	Advance Outwash	170.12	169.64	163	148	7	22	5.09	164.55	5.95	163.69
UG-MW21	Advance Outwash	196.63	196.31	174	159	23	38	24.68	171.63	25.20	171.11
UG-MW22	Advance Outwash	159.26	158.82	144	129	15	30	18.76	140.06	18.68	140.14
UG-MW23	Advance Outwash	171.45	171.18	160	153	11	18	--	--	10.55	160.63
UG-MW24	Advance Outwash	197.08	196.80	132	117	65	80	30.88	165.92	31.33	165.47
UG-MW25D	Advance Outwash	202.64	202.05	158	148	45	55	--	--	36.73	165.32
UG-MW25S	Qvi	203.08	202.60	195	185	8	18	--	--	2.07	200.53
UG-MW26	Qvi	202.62	202.18	196	186	7	17	--	--	-0.25	202.43
UG-MW27	Advance Outwash	149.28	148.68	109	93	40	56	23.05	125.63	23.16	125.52
UG-MW28	Qvi	151.80	151.14	143	128	9	24	18.88	132.26	18.62	132.52
UG-MW29D	Advance Outwash	149.61	149.26	122	112	28	38	19.62	129.64	19.81	129.45
UG-MW29S	Qvi	149.40	149.04	140	130	9	19	11.33	137.71	11.11	137.93
UG-MW30D	Advance Outwash	123.24	122.94	85	75	38	48	5.92	117.02	5.81	117.13
UG-MW30S	Qvi	123.10	122.70	114	104	9	19	4.56	118.14	4.44	118.26
UG-MW31	Qvi	143.35	142.92	135	125	8	18	--	--	5.20	137.72
UG-MW32	Qvi	160.38	159.88	150	145	10	15	--	--	6.91	152.97
UG-MW33	Qvi	183.91	183.57	177	172	6.5	11.5	--	--	6.61	176.96
UG-MW34	Qvi	142.23	142.03	133	123	9	19	--	--	16.71	125.32

Monitoring Well Identification	Lithology of Water Bearing Unit	Ground Surface Elevation (feet, AMSL)[1]	Top of Casing Elevation[1]	Screen Intervals				Water Level Measured on July 17, 2013		Water Level Measured on November 8, 2013	
				Top of Well Screen Elevation (feet, AMSL)[2]	Bottom of Well Screen Elevation (feet, AMSL)[2]	Depth of Top of Well Screen (bgs)	Depth of Bottom of Well Screen (bgs)	DTW (feet, BTOC)	WL Elevation (feet, AMSL)	DTW (feet, BTOC)	WL Elevation (feet, AMSL)
UG-MW35	Qvi	181.91	181.60	176	169	6	12.5	--	--	8.39	173.21
UG-MW36	Qvi	180.57	180.24	175	170	6	11	--	--	8.22	172.02
UG-MW37	Qvi	197.78	197.29	192	184	6	14	--	--	1.51	195.78
UG-MW38D	Advance Outwash	192.91	192.47	152	142	41	51	--	--	26.11	166.36
UG-MW38S	Qvi	193.60	193.17	188	179	6	15	--	--	9.31	183.86
Y-MW1D	Advance Outwash	127.48	126.31	99	84	28	43	--	--	8.73	117.58
Y-MW1S	Qvi	127.37	126.24	120	115	7	12	--	--	6.17	120.07
Y-MW2D	Advance Outwash	126.67	125.36	92	77	35	50	--	--	22.02	103.34
Y-MW2S	Qvi	126.68	125.45	117	107	10	20	--	--	11.12	114.33
Y-MW3D	Advance Outwash	125.76	124.33	91	76	35	50	--	--	12.73	111.6
Y-MW3S	Qvi	125.80	124.46	119	109	7	17	--	--	9.39	115.07
Y-MW4S	Qvi	150.76	150.20	142	132	9	19	--	--	13.69	136.51
Y-MW5S	Qvi	151.63	151.29	143	133	8.5	18.5	--	--	0.58	150.71
Y-MW6S	Qvi	147.74	147.50	136	126	12	22	--	--	9.54	137.96
Y-MW7S	Qvi	142.08	141.61	133	128	9	14	--	--	0.58	141.03

Notes:

[1] Based on survey completed by AHBL November 6, 2013. Horizontal datum - NAD 83/91 Washington State Plane - South Zone (City of Tacoma Horizontal control Holding City Monument Numbers 411 and 414). Vertical datum NGVD 29 (brass monument at South 19th and Fawcett Avenue, elevation 165.15).

[2] Calculated from survey ground surface elevation.

Qvi = Ice-contact deposits

AMSL = Above mean sea level

BGS = Below ground surface

BTOC = Below top of casing

ND = Not determined

WL = Water level

DTW = Depth to water

Table 10

Monitoring Well Repair/Decommission Information

2013 Environmental Subsurface Investigation - University of Washington-Tacoma

Tacoma, Washington

Well ID	Comment
UG-MW9	Old monument and concrete removed. Soil around well was removed with a vacuum truck until bentonite was observed and then repaired.
UG-MW10	New bolts tapped on monument.
UG-MW11	New bolts tapped on monument.
UG-MW7	New bolts tapped on monument.
UG-MW8	New bolts tapped on monument.
UG-MW3	Old monument and concrete removed, soil around well was removed with a vacuum truck until bentonite was observed and then repaired.
BA-MW1	New bolts tapped.
UG-MW12	New bolts tapped.
UG-MW6	Old monument and concrete removed. Soil around well was removed with a vacuum truck until bentonite was observed and then repaired.
UG-MW15	New bolts tapped on monument.
UG-MW5	New bolts tapped on monument.
CR-MW9	New bolts tapped on monument.
CR-MW8	New bolts tapped on monument.
CR-MW5	New bolts tapped on monument.
CR-MW6	New bolts tapped on monument.
BL-MW6	Soil removed from interior of monument by hand and new bolts tapped on monument.
BL-MW3	Soil removed from interior of monument with a vacuum truck and new bolts tapped on monument.
CR-MW11	Decommissioned due to damaged well casing.
UG-MW19	Old monument and concrete removed. Soil around well was removed by hand until bentonite was observed and then repaired.

Table 11

Soil Physical Parameters for Select Samples

2013 Environmental Subsurface Investigation - University of Washington-Tacoma
Tacoma, Washington

Boring ID	Sample ID	Interpreted Lithology	Soil Description	Group Symbol	Gravel Fraction (percent)[1]	Sand Fraction (percent)[1]	Silt Fraction (percent)[1]	Clay Fraction (percent)[1]	Confirm Sieve	Total Fines (percent)[1]	Estimated D_{10} (mm)[1]	Estimated D_{50} (mm)[1]	Total Organic Carbon (% Carbon)[2]	pH[3]	Cation Exchange Capacity (meq/100g)[4]	Total Solids (percent)[5]	Bulk Density (unit)[6]	SPLP HVOCs[7]
CR-MW16	CR-MW16-10-11	Fill	Silty fine gravel with sand	GM	49.3	23.1	16.9	10.8	100.1	27.7	0.002	38.100	0.043 U	8.1	--	95.5	--	--
CR-MW16	CR-MW16-18-19	Qvi	Fine to coarse silty sand with gravel	SM	5.1	77.6	13.1	4.3	100.1	17.4	0.032	0.250	--	--	--	85.1	--	--
JS-MW5	JS-MW5-14-15	Qvi	Silty fine gravel with sand	GM	48.7	34.8	9.8	6.8	100.1	16.6	0.005	38.100	--	--	--	90.9	--	--
UG-MW25D	UG-MW25D-12-13	Qvi	Silty fine gravel with sand	GM	42.1	36.7	17.8	3.5	100.1	21.3	0.016	0.250	0.5	7.9	4.0	91.6	1.383	ND
UG-MW31	UG-MW31-20-21	Qvi	Fine gravel with silt and sand	GP-GM	64.3	24.2	7.2	4.5	100.2	11.7	0.032	4.750	0.042 U	8.5	4.7	91.8	1.283	ND
UG-MW38D	UG-MW38D-5-6	Qvi	Silty fine to coarse sand with gravel	SM	30.6	40	22.5	6.8	99.9	29.3	0.008	0.300	--	--	--	89.9	--	--
CR-MW16	CR-MW16-28-29	Silt	Silty fine sand	SM	0	65.7	30.1	4.3	100.1	34.4	0.016	0.090	--	--	--	80.3	1.359	--
UG-MW25D	UG-MW25D-18-19	Silt	Silty fine to coarse gravel with sand	GM	53.1	23.9	16.8	6.1	99.9	22.9	0.006	4.750	--	--	--	95.1	--	--
UG-MW38D	UG-MW38D-15.5-16	Silt	Silty fine to coarse sand with gravel	SM	30.6	44.7	16.6	7.8	99.7	24.4	0.008	0.400	--	--	--	80.6	--	--
UG-MW38D	UG-MW38D-33-34	Outwash	Silty fine gravel with sand	GM	66.7	17.7	8.8	6.7	99.9	15.5	0.016	> 38.100	0.042 U	8.2	--	90.9	1.448	--
JS-MW5	JS-MW5-39-40	Outwash	Fine gravel with silt and sand	GP-GM	76.1	14.7	6.0	3.2	100.0	9.2	0.125	> 38.100	0.042 U	8.6	4.6	92.7	1.285	ND
UG-MW25D	UG-MW25D-42-43	Outwash	Silty fine gravel with sand	GM	68.7	16.1	9.7	5.5	100.0	15.2	0.006	4.750	0.043 U	8.7	--	93.1	1.288	--
UG-MW31	UG-MW31-32-33	Outwash	Fine gravel with silt and sand	GP-GM	85	8.9	3.3	2.8	100.0	6.1	0.425	15.875	0.044 U	8.6	1.2	92.3	--	--
UG-MW38D	UG-MW38D-39-40	Outwash	Silty fine gravel with sand	GM	67.4	20.1	7.9	4.5	99.9	12.4	0.016	> 38.100	--	--	--	90.4	--	--
UG-MW38D	UG-MW38D-49-50	Outwash	Fine gravel with silt and sand	GP-GM	54.2	35.6	5.8	4.4	100.0	10.2	0.032	> 38.100	0.042 U	8.3	4.8	89.8	1.768	ND

Notes:

[1] Grain Size Distribution by ASTM International (ASTM) D422 and total solids by Standard Method (SM) 2540G

[2] Total Organic Carbon (TOC) by Environmental Protection Agency (EPA) method 9060

[3] pH by EPA method 8045D

[4] Cation Exchange Capacity (CEC) by SW9081

[5] Total Solids by SM2540G

[6] Bulk Density by SM 2710

[7] Synthetic Precipitation Leaching Potential (SPLP) select VOCs by EPA method 1312/8260C

-- = Not analyzed

ND = Not detected

Qvi = Ice-contact deposits

mm = Millimeters

meq = Milliequivalent of hydrogen

SPLP = Synthetic precipitation leaching procedure

HVOCs = Halogenated volatile organic compounds

Table 12

Water Level Vertical Gradient Calculations

2013 Environmental Subsurface Investigation - University of Washington-Tacoma

Tacoma, Washington

Monitoring Well Identification	Lithology	Top of Screen Elevation [1] (feet, AMSL)	Bottom of Screen Elevation (feet, AMSL)	Water Level Measured on July 17, 2013: DTW (feet, BTOC)	Water Level Measured on July 17, 2013: WL Elevation (feet, AMSL)	Water Level Measured on July 17, 2013: Difference In Head (feet)	Water Level Measured on November 8, 2013: DTW (feet, BTOC)	Water Level Measured on November 8, 2013: WL Elevation (feet, AMSL)	Water Level Measured on November 8, 2013: Difference In Head (feet)	Distance Between Screen Intervals (feet)	Vertical Gradient (feet/feet)
JS-MW3	Advance Outwash	51	36	36.47	52.88	--	36.52	52.83	17.22	16	1.1
JS-MW3S	Qvi	77	67	--	--	--	18.81	70.05			
JS-MW6D	Advance Outwash	77	62	--	--	--	19.22	82.77	13.52	6	2.1
JS-MW6S	Qvi	94	84	--	--	--	5.56	96.29			
UG-MW25D	Advance Outwash	158	181	--	--	--	36.73	165.32	35.21	27	1.3
UG-MW25S	Qvi	195	185	--	--	--	2.07	200.53			
UG-MW29D	Advance Outwash	122	112	19.62	129.64	8.07	19.81	129.45	8.48	8	1.0
UG-MW29S	Qvi	140	130	11.33	137.71		11.11	137.93			
UG-MW30D	Advance Outwash	85	75	5.92	117.02	1.12	5.81	117.13	1.13	19	0.061
UG-MW30S	Qvi	114	104	4.56	118.14		4.44	118.26			
UG-MW38D	Advance Outwash	152	142	--	--	--	26.11	166.36	17.5	27	0.66
UG-MW38S	Qvi	188	179	--	--	--	9.31	183.86			
Y-MW1D	Advance Outwash	99	84	--	--	--	8.73	117.58	2.49	16	0.16
Y-MW1S	Qvi	120	115	--	--	--	6.17	120.07			
Y-MW2D	Advance Outwash	92	77	--	--	--	22.02	103.34	10.99	15	0.73
Y-MW2S	Qvi	117	107	--	--	--	11.12	114.33			
Y-MW3D	Advance Outwash	91	76	--	--	--	12.73	111.60	3.47	18	0.19
Y-MW3S	Qvi	119	109	--	--	--	9.39	115.07			

Notes:

[1] Calculated based on survey completed by AHBL. Vertical datum NGVD 29.

Qvi = Ice-contact deposits

AMSL = Above mean sea level

BGS = Below ground surface

BTOC = Below top of casing

WL = Water level

DTW = Depth to water

Table 13

Summary of Exceedances Greater Than MTCA for Petroleum Hydrocarbons, Metals and Carcinogenic PAHS in Test Pits and Borings[1] - Soil

2013 Environmental Subsurface Investigation - University of Washington-Tacoma

Tacoma, Washington

Area Identification	1A		1B						1C		1D					1E		MTCA Method A ULU Cleanup Level	Reuse Criteria [12]
Sample Location	1A-B4	1A-B5	1B-TP2	1B-TP5		UG-MW25S	UG-MW25D	UG-MW26	1C-TP1	1C-TP2	1D-TP2	1D-TP3		UG-MW36		1E-B1	1E-B6		
Sample Identification [2]	1A-B4-11-12	1A-B5-1-2	1B-TP2-2-3	1B-TP5-0-1	1B-TP5-2-3	UG-MW25S-1-2	UG-MW25D-1-2	UG-MW26-0-1	1C-TP1-0-1	1C-TP2-3-4	1D-TP2-0-1	1D-TP3-0-1	1D-TP3-2-3	UG-MW36-0-1	UG-MW36-1-3	1E-B1-0-1	1E-B6-0-1		
Sample Depth (feet bgs)	11 to 12	1 to 2	2 to 3	0 to 1	2 to 3	1 to 2	1 to 2	0 to 1	0 to 1	3 to 4	0 to 1	0 to 1	2 to 3	0 to 1	1 to 3	0 to 1	0 to 1		
Soil Type	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill		
Petroleum Hydrocarbons (NWTPH-HCID) [3] (mg/kg)																			
Gasoline-Range	25 U	24 U	27 U	23 U	24 U	--	22 U	49 U	27 U	25 U	25 U	27 U	25 U	23 U	22 U	23 U	24 U	30/100[8]	30
Diesel-Range	62 U	DET	68 U	57 U	60 U	--	55 U	120 U	69 U	62 U	63 U	67 U	62 U	58 U	56 U	57 U	60 U	2,000	200
Lube Oil-Range	120 U	DET	DET	DET	120 U	--	110 U	DET	140 U	120 U	130 U	DET	120 U	DET	DET	110 U	120 U	2,000	200
NWTPH-Gx [4] (mg/kg)																			
Gasoline-Range Petroleum Hydrocarbons	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	30/100[8]	30
NWTPH-Dx [5] (mg/kg)																			
Diesel-Range Petroleum Hydrocarbons	--	87 J	61 J	28 U	--	--	--	150 U	--	--	--	45 J	--	29 U	31 U	--	--	2,000	200
Lube Oil-Range Petroleum Hydrocarbons	--	560	410	310 J	--	--	--	1,900	--	--	--	370	--	160	170	--	--	2,000	200
PAHs [6] (mg/kg)																			
1-Methylnaphthalene	0.0082 U	0.031	0.010	0.0075 U	0.013	0.0073 U	0.0074 U	0.040 U	0.036	0.011	0.016	0.044	0.056	0.014	0.017	0.0076 U	0.025	35[9]	NE
2-Methylnaphthalene	0.0082 U	0.037	0.012	0.0075 U	0.013	0.0073 U	0.0090	0.040 U	0.037	0.011	0.018	0.054	0.073	0.015	0.019	0.0076 U	0.025	320[9]	NE
Acenaphthene	0.0082 U	0.086	0.0093	0.0075 U	0.0079 U	0.0073 U	0.0074 U	0.040 U	0.0091 U	0.0082 U	0.0084 U	0.0090 U	0.0082 U	0.0077 U	0.0075 U	0.0076 U	0.054	4,800[9]	NE
Acenaphthylene	0.0086	0.015	0.010	0.021	0.0079 U	0.021	0.14	0.040 U	0.024	0.012	0.011	0.042	0.0082 U	0.0077 U	0.012	0.0076 U	0.032	NE	NE
Anthracene	0.019	0.19	0.031	0.023	0.021	0.026	0.070	0.048	0.029	0.031	0.011	0.030	0.012	0.0083	0.019	0.0076 U	0.11	24,000[9]	NE
Benzo[g,h,i]perylene	0.031	0.29	0.12	0.052	0.058	0.064	0.13	0.069	0.069	0.038	0.039	0.068	0.024	0.027	0.041	0.014	0.21	NE	NE
Fluoranthene	0.086	0.71	0.15	0.12	0.14	0.17	0.37	0.14	0.17	0.11	0.063	0.13	0.060	0.061	0.11	0.021	0.51	3,200[9]	NE
Fluorene	0.0088	0.086	0.0095	0.0075 U	0.0079 U	0.0073 U	0.0088	0.040 U	0.012	0.013	0.0084 U	0.011	0.0082 U	0.0077 U	0.0094	0.0076 U	0.044	3,200[9]	NE
Naphthalene	0.014	0.057	0.033	0.018	0.018	0.014	0.024	0.060	0.072	0.019	0.022	0.061	0.064	0.018	0.029	0.0076 U	0.051	5[10]	5[10]
Phenanthrene	0.089	0.86	0.11	0.059	0.11	0.11	0.090	0.15	0.13	0.093	0.039	0.091	0.065	0.042	0.092	0.015	0.47	NE	NE
Pyrene	0.099	0.90	0.16	0.14	0.18	0.18	0.47	0.17	0.16	0.11	0.065	0.12	0.060	0.057	0.10	0.018	0.0076	2,400[9]	NE
Carcinogenic PAHs [6] (mg/kg)																			
Benzo (a) anthracene (TEF 0.1)	0.039	0.38	0.10	0.080	0.094	0.094	0.30	0.077	0.10	0.053	0.043	0.074	0.034	0.032	0.054	0.010	0.25	MTCA ULU cleanup level for the TTEC of cPAHs is 0.1 mg/kg	Ecology reuse criteria for the sum of all cPAHs is 0.1 mg/kg
Benzo (a) pyrene (TEF 1)	0.048	0.51	0.11	0.080	0.086	0.11	0.31	0.11	0.090	0.054	0.048	0.071	0.029	0.043	0.069	0.014	0.32		
Benzo (b) fluoranthene (TEF 0.1)	0.051	0.46	0.23	0.10	0.10	0.11	0.33	0.13	0.14	0.064	0.073	0.13	0.045	0.058	0.087	0.020	0.37		
Benzo (J,k) fluoranthene (TEF 0.1)	0.018	0.15	0.059	0.028	0.032	0.036	0.080	0.044	0.043	0.022	0.019	0.030	0.011	0.015	0.024	0.0076 U	0.12		
Chrysene (TEF 0.01)	0.053	0.49	0.12	0.083	0.098	0.093	0.22	0.12	0.11	0.053	0.056	0.096	0.040	0.048	0.081	0.013	0.32		
Dibenz (a,h) anthracene (TEF 0.1)	0.0082 U	0.078	0.021	0.011	0.014	0.017	0.033	0.040 U	0.020	0.0095	0.012	0.015	0.0082 U	0.0077 U	0.0095	0.0076 U	0.050		
Indeno (1,2,3-cd) pyrene (TEF 0.1)	0.025	0.23	0.10	0.046	0.052	0.060	0.12	0.054	0.065	0.033	0.033	0.056	0.021	0.024	0.037	0.010	0.18		
TTEC of cPAHs (detect only)	0.062	0.64	0.16	0.11	0.12	0.14	0.40	0.14	0.128	0.073	0.067	0.10	0.041	0.056	0.091	0.018	0.42	0.1	0.1
Metals [7] (mg/kg)																			
Arsenic	12 U	12 U	20	13	12 U	--	11 U	15	24	17	13 U	14	12 U	12 U	11 U	11 U	12 U	20	7
Barium	1,100	380	460	120	130	--	97	140	680	440	240	480	220	200	200	280	340	16,000[9]	NE
Cadmium	0.75	0.96	1.0	1.2	0.60 U	--	0.55 U	0.82	3.5	0.81	1.0	1.6	0.80	0.62	0.66	4.5	1.2	2.0	1
Chromium	34	52	34	41	44	--	36	50	64	60	48	51	51	61	58	43	57	2,000[11]	48
Lead	760	400	350	140	140	--	22	220	800	750	280	950	250	290	390	30	610	250	50
Mercury	0.31 U	0.31 U	0.34 U	0.28 U	0.32	--	0.28 U	0.30 U	0.72	0.50	1.1	0.51	0.35	1.1	0.28 U	0.28 U	0.30 U	2.0	0.07 or DET
Selenium	12 U	12 U	14 U	11 U	12 U	--	11 U	12 U	14 U	12 U	13 U	13 U	12 U	12 U	11 U	11 U	12 U	400[9]	NE
Silver	1.2 U	1.2 U	1.4 U	1.1 U	1.2 U	--	1.1 U	1.2 U	1.4 U	1.2 U	1.3 U	1.3 U	1.2 U	1.2 U	1.1 U	1.5	1.2 U	400[9]	NE

Area Identification	1F	1G	2A		2B	2C	2F	CR-MW15	UG-MW38D	MTCA Method A ULU Cleanup Level	Reuse Criteria [12]
Sample Location	1F-B2	1G-TP2	2A-B1	2A-B7	JS-MW7A	2C-B2	2F-B2				
Sample Identification [2]	1F-B2-7-8	1G-TP2-0-1	2A-B1-1-2	2A-B7-2.5-3.5	JS-MW7A-0-1	2C-B2-1-2	2F-B2-0-0.5	CR-MW15-19.5-20	UG-MW38D-1-2		
Sample Depth (feet bgs)	7 to 8	0 to 1	1 to 2	2.5 to 3.5	0 to 1	1 to 2	0 to 0.5	19.5 to 20	1 to 2		
Soil Type	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Outwash	Fill		
Petroleum Hydrocarbons (NWTPH-HCID) [3] (mg/kg)											
Gasoline-Range	DET	23 U	23 U	26 U	23 U	22 U	23 U	DET	23 U	30/100[8]	30
Diesel-Range	55 U	57 U	57 U	65 U	DET	56 U	58 U	650 U	57 U	2,000	200
Lube Oil-Range	DET	110 U	110 U	130 U	DET	DET	120 U	110 U	DET	2,000	200
NWTPH-Gx [4] (mg/kg)											
Gasoline-Range Petroleum Hydrocarbons	940 J	--	--	--	--	--	--	3,000	--	30/100[8]	30
NWTPH-Dx [5] (mg/kg)											
Diesel-Range Petroleum Hydrocarbons	94 J	--	--	--	29 U	28 U	--	--	28 U	2,000	200
Lube Oil-Range Petroleum Hydrocarbons	200	--	--	--	210	190	--	--	310	2,000	200
PAHs [6] (mg/kg)											
1-Methylnaphthalene	0.016	0.013	0.015	0.045	0.21	0.057	0.044	--	0.016	35[9]	NE
2-Methylnaphthalene	0.027	0.013	0.016	0.048	0.22	0.072	0.031	--	0.026	320[9]	NE
Acenaphthene	0.0073 U	0.012	0.040	0.012	0.21	0.12	0.012	--	0.0076 U	4,800[9]	NE
Acenaphthylene	0.0073 U	0.0075 U	0.012	0.097	0.59	0.066	0.0095	--	0.016	NE	NE
Anthracene	0.0073 U	0.038	0.074	0.078	0.74	0.22	0.027	--	0.018	24,000[9]	NE
Benzo[g,h,i]perylene	0.0073 U	0.069	0.093	0.32	1.3	0.72	0.072	--	0.063	NE	NE
Fluoranthene	0.0073 U	0.17	0.33	0.74	6.4	1.8	0.20	--	0.086	3,200[9]	NE
Fluorene	0.0073 U	0.010	0.036	0.018	0.38	0.087	0.016	--	0.0083	3,200[9]	NE
Naphthalene	0.030	0.018	0.035	0.063	0.36	0.079	0.031	--	0.032	5[10]	5[10]
Phenanthrene	0.011	0.14	0.39	0.26	6.4	1.2	0.22	--	0.066	NE	NE
Pyrene	0.0073 U	0.22	0.37	0.91	6.1	2.1	0.19	--	0.099	2,400[9]	NE
Carcinogenic PAHs [6] (mg/kg)											
Benzo (a) anthracene (TEF 0.1)	0.0073 U	0.094	0.15	0.37	2.3	0.87	0.069	--	0.059	MTCA ULU cleanup level for the TTEC of cPAHs is 0.1 mg/kg	Ecology reuse criteria for the sum of all cPAHs is 0.1 mg/kg
Benzo (a) pyrene (TEF 1)	0.0073 U	0.093	0.18	0.50	2.7	1.1	0.094	--	0.063		
Benzo (b) fluoranthene (TEF 0.1)	0.0073 U	0.10	0.17	0.51	3.1	1.1	0.11	--	0.11		
Benzo (J,k) fluoranthene (TEF 0.1)	0.0073 U	0.033	0.058	0.14	0.76	0.36	0.033	--	0.017		
Chrysene (TEF 0.01)	0.012	0.10	0.17	0.39	2.5	1.0	0.10	--	0.088		
Dibenz (a,h) anthracene (TEF 0.1)	0.0073 U	0.016	0.025	0.068	0.36	0.18	0.020	--	0.020		
Indeno (1,2,3-cd) pyrene (TEF 0.1)	0.0073 U	0.056	0.079	0.27	1.1	0.61	0.061	--	0.039		
TTEC of cPAHs (detect only)	0.0001	0.12	0.23	0.64	3.5	1.4	0.12	--	0.088	0.1	0.1
Metals [7] (mg/kg)											
Arsenic	11 U	11 U	11 U	13 U	11 U	11 U	12 U	--	11 U	20	7
Barium	49	140	93	310	240	440	220	--	180	16,000[9]	NE
Cadmium	0.55 U	0.57 U	0.57 U	0.71	0.65	0.56 U	0.58 U	--	0.59	2.0	1
Chromium	30	52	35	37	55	54	45	--	42	2,000[11]	48
Lead	5.5 U	250	59	200	1,100	730	130	--	200	250	50
Mercury	0.27 U	0.28 U	0.29 U	0.32 U	0.44	0.41	0.30	--	0.28 U	2.0	0.07 or DET
Selenium	11 U	11 U	11 U	13 U	11 U	11 U	12 U	--	11 U	400[9]	NE
Silver	1.1 U	1.1 U	1.1 U	1.3 U	1.1 U	1.1 U	2.2	--	1.1 U	400[9]	NE

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc., of Redmond, Washington.

[2] Sample ID = Area number - boring/test pit number - starting depth of sample [feet bgs] -end depth [feet bgs], Area 1A Boring 4 collected 11-12 feet bgs = 1A-B4-11-12.

[3] Northwest Total Petroleum Hydrocarbons - Hydrocarbon Identification by Ecology-approved method NWTPH-HCID.

[4] Gasoline-range petroleum hydrocarbons by Ecology-approved method NWTPH-Gx.

[5] Diesel and Lube oil-range petroleum hydrocarbons by Ecology-approved method NWTPH-Dx.

[6] Polycyclic aromatic hydrocarbons (PAHs) and carcinogenic PAHs (cPAHs) were analyzed by U.S. Environmental Protection Agency (EPA) method 8270D/SIM. Other PAHs were analyzed but not detected.

[7] Resource Conservation Recovery Act (RCRA) metals analyzed by EPA 6000/7000 series method.

[8] MTCA Method A cleanup level for gasoline is 30 mg/kg if benzene is detected or if the sum of toluene, ethylbenzene and xylenes are equal to or greater than 1% of the total gasoline detection.

[9] MTCA Method B ULU criteria represented because MTCA Method A cleanup level has not been established.

[10] MTCA Method A cleanup level for naphthalenes is a total value for naphthalene, 1-methylnaphthalene and 2-methylnaphthalene.

[11] MTCA Method A cleanup level for Trivalent Chromium.

[12] Guidance for Remediation of Petroleum Contaminated Sites (Publication 10-09-057) Ecology, October 2011; Summary Natural Background Soil Metals Concentrations in Washington State (Publication 94-115) dated October 1994; and Hazardous Waste Regulations 40 CFR Part 260.

mg/kg = Milligram per kilogram

-- = Sample not analyzed

MTCA = Model Toxics Control Act

bgs = Below ground surface

U = Analyte was not detected at or greater than the listed reporting limit

ULU = Unrestricted Land Use

J = Estimated result by analytical laboratory

TEF = Toxicity Equivalency Factor as defined in WAC 173-340-900 Table 708-2

Total Toxic Equivalent Concentration (TTEC) is the sum of each individual cPAH concentration multiplied by its corresponding TEF.

Bold font type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Bold font type and gray shading indicates that the detected concentration is greater than the respective MTCA cleanup level.

Dashed outline indicates that the detected concentration is greater than the Reuse Criteria.

Table 14

Summary of Chemical Analytical Results for Petroleum, Total Metals and Primary PAHs - Soil[1]

2013 Environmental Subsurface Investigation - University of Washington-Tacoma

Tacoma, Washington

Investigation Location Identification	Sample ID[2]	Sample Depth (feet bgs)	Sample Date	Petroleum Hydrocarbons (mg/Kg)[3,4,5]						Total Metals (mg/Kg)[6]							Polycyclic Aromatic Hydrocarbons (mg/kg)[7]				
				Gasoline-Range (HCID)	Diesel-Range (HCID)	Lube Oil-Range (HCID)	Gasoline-Range	Diesel-Range	Lube Oil-Range	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Silver	1-Methylnaphthalene	2-Methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene
1A-B1	1A-B1-3-4	3 to 4	6/13/2013	22 U	55 U	110 U	N/A	N/A	N/A	11 U	130	0.54 U	33	87	0.27 U	1.1 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U
1A-B2	1A-B2-2-3	2 to 3	6/13/2013	21 U	53 U	110 U	N/A	N/A	N/A	11 U	65	0.53 U	36	5.4	0.26 U	1.1 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U
1A-B2	1A-B2-14-15	14 to 15	6/13/2013	22 U	55 U	110 U	N/A	N/A	N/A	11 U	70	0.54 U	24	5.4 U	0.27 U	1.1 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U
1A-B2	1A-B2-25-26	25 to 26	6/13/2013	24 U	59 U	120 U	N/A	N/A	N/A	12 U	75	0.59 U	34	140	0.30 U	1.2 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U
1A-B3	1A-B3-0-2	0 to 2	7/18/2013	23 U	56 U	DET	N/A	28 U	230	11 U	91	0.56 U	51	66	0.28 U	1.1 U	0.0075 U	0.0090	0.0075 U	0.0075 U	0.0090
1A-B4	1A-B4-0-1	0 to 1	6/13/2013	23 U	57 U	DET	N/A	28 U	270	11 U	92	0.57 U	49	25	0.28 U	1.1 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U
1A-B4	1A-B4-11-12	11 to 12	6/13/2013	25 U	62 U	120 U	N/A	N/A	N/A	12 U	1,100	0.75	34	760	0.31 U	1.2 U	0.0082 U	0.0082 U	0.0082 U	0.0086	0.019
1A-B5	1A-B5-1-2	1 to 2	6/13/2013	24 U	61	DET	N/A	87 J	560	12 U	380	0.96	52	400	0.31 U	1.2 U	0.031	0.037	0.086	0.015	0.19
1A-B5	1A-B5-9-10	9 to 10	6/13/2013	24 U	60 U	120 U	N/A	N/A	N/A	12 U	89	0.60 U	30	47	0.38	1.2 U	0.0080 U	0.0080 U	0.0080 U	0.0087	0.011
1A-B5	1A-B5-11-12	11 to 12	6/13/2013	23 U	59 U	120 U	N/A	N/A	N/A	12 U	70	0.58 U	42	5.8 U	0.29 U	1.2 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U
1A-B6	1A-B6-0-1	0 to 1	6/13/2013	23 U	57 U	110 U	N/A	N/A	N/A	11 U	68	0.57 U	27	64	0.28 U	1.1 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U
1A-B6	1A-B6-10-11	10 to 11	6/13/2013	23 U	58 U	120 U	N/A	N/A	N/A	12 U	79	0.58 U	34	32	0.29 U	1.2 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U
1B-TP1	1B-TP1-0-1	0 to 1	6/24/2013	23 U	56 U	DET	N/A	28 U	120	11 U	100	0.56 U	30	24	0.28 U	1.1 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U
1B-TP2	1B-TP2-0-1	0 to 1	6/24/2013	22 U	71 U	DET	N/A	86 J	1700	11 U	56	0.56 U	27	31	0.28 U	1.1 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0084
1B-TP2	1B-TP2-2-3	2 to 3	6/24/2013	27 U	68 U	DET	N/A	61 J	410	20	460	1.0	34	350	0.34 U	1.4 U	0.010	0.012	0.0093	0.010	0.031
1B-TP2	1B-TP2-5-6	5 to 6	6/24/2013	24 U	61 U	120 U	N/A	N/A	N/A	12 U	60	0.61 U	33	7.4	0.30 U	1.2 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U
1B-TP2	1B-TP2-7-8	7 to 8	6/24/2013	26 U	64 U	130 U	N/A	N/A	N/A	13 U	56	0.64 U	38	6.4 U	0.32 U	1.3 U	0.0085 U	0.0085 U	0.0085 U	0.0085 U	0.0085 U
1B-TP3	1B-TP3-0-1	0 to 1	6/24/2013	23 U	DET	DET	N/A	45 J	620	11 U	89	0.57 U	36	41	0.29 U	1.1 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.012
1B-TP3	1B-TP3-2-3	2 to 3	6/24/2013	23 U	57 U	110 U	N/A	N/A	N/A	11 U	96	0.57 U	110	5.8	0.28 U	1.1 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U
1B-TP3	1B-TP3-3-4	3 to 4	6/24/2013	22 U	55 U	110 U	N/A	N/A	N/A	11 U	50	0.55 U	35	5.5 U	0.28 U	1.1 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U
1B-TP4	1B-TP4-0-1	0 to 1	6/24/2013	23 U	59 U	120 U	N/A	N/A	N/A	12 U	110	0.59 U	56	11	0.29 U	1.2 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U
1B-TP5	1B-TP5-0-1	0 to 1	6/24/2013	23 U	57 U	DET	N/A	28 U	310 J	13	120	1.2	41	140	0.28 U	1.1 U	0.0075 U	0.0075 U	0.0075 U	0.021	0.023
1B-TP5	1B-TP5-2-3	2 to 3	6/24/2013	24 U	60 U	120 U	N/A	N/A	N/A	12 U	130	0.60 U	44	140	0.32	1.2 U	0.013	0.013	0.0079 U	0.0079 U	0.021
1B-TP5	1B-TP5-7-8	7 to 8	6/24/2013	23 U	56 U	110 U	N/A	N/A	N/A	11 U	63	0.56 U	43	5.6 U	0.28 U	1.1 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U
1B-TP6	1B-TP6-0-1	0 to 1	6/24/2013	23 U	59 U	120 U	N/A	N/A	N/A	12 U	82	0.59 U	47	17	0.29 U	1.2 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U
1B-TP6	1B-TP6-2-3	2 to 3	6/24/2013	22 U	56 U	110 U	N/A	N/A	N/A	11 U	50	0.56 U	29	5.6 U	0.28 U	1.1 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U
1C-TP1	1C-TP1-0-1	0 to 1	6/25/2013	27 U	69 U	140 U	N/A	N/A	N/A	24	680	3.5	64	800	0.72	1.4 U	0.036	0.037	0.0091 U	0.024	0.029
1C-TP1	1C-TP1-2-3	2 to 3	6/25/2013	23 U	58 U	120 U	N/A	N/A	N/A	12 U	81	0.58 U	50	10	0.29 U	1.2 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U
1C-TP2	1C-TP2-0-1	0 to 1	6/25/2013	21 U	53 U	110 U	N/A	N/A	N/A	11 U	83	0.53 U	33	19	0.27 U	1.1 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U
1C-TP2	1C-TP2-3-4	3 to 4	6/25/2013	25 U	62 U	120 U	N/A	N/A	N/A	17	440	0.81	60	750	0.50	1.2 U	0.011	0.011	0.0082 U	0.012	0.031
1C-TP2	1C-TP2-6-7	6 to 7	6/25/2013	25 U	62 U	130 U	N/A	N/A	N/A	12 U	120	0.62 U	50	6.2 U	0.31 U	1.2 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U
1D-B1	1D-B1-0-1	0 to 1	6/14/2013	22 U	54 U	110 U	N/A	N/A	N/A	11 U	40	0.54 U	25	5.4 U	0.27 U	1.1 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U
1D-B1	1D-B1-6-7	6 to 7	6/14/2013	21 U	53 U	110 U	N/A	N/A	N/A	11 U	41	0.53 U	25	5.3 U	0.26 U	1.1 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U
1D-B2	1D-B2-0-1	0 to 1	6/14/2013	23 U	57 U	110 U	N/A	N/A	N/A	11 U	75	0.57 U	43	5.7 U	0.28 U	1.1 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U
1D-B2	1D-B2-6-7	6 to 7	6/14/2013	22 U	55 U	110 U	N/A	N/A	N/A	11 U	46	0.55 U	36	5.5 U	0.28 U	1.1 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U
MTCA Method A ULU Cleanup Level				100/30	2,000	2,000	100/30[8]	2,000	2,000	20	16,000[9]	2.0	2,000[10]	250	2.0	400[9]	35[9]	320[9]	4,800[9]	NE	24,000[9]
Washington State Background Levels or Ecology Guidance Reuse Criteria[11]				30	200	200	30	200	200	7	NE	1	48	50	0.07 or DET	NE	NE	NE	NE	NE	NE

Investigation Location Identification	Sample ID[2]	Sample Depth (feet bgs)	Sample Date	Polycyclic Aromatic Hydrocarbons (mg/kg)[7]						cPAHs (mg/kg)[7]							
				Fluoranthene	Fluorene	Naphthalene	Benzo(ghi)perylene	Phenanthrene	Pyrene	Benzo (a) anthracene (TEF 0.1)	Benzo (a) pyrene (TEF 1)	Benzo (b) fluoranthene (TEF 0.1)	Benzo (J,k) fluoranthene (TEF 0.1)	Chrysene (TEF 0.01)	Dibenz (a,h) anthracene (TEF 0.1)	Indeno (1,2,3-cd) pyrene (TEF 0.1)	TTEC of cPAHs (detect only)
1A-B1	1A-B1-3-4	3 to 4	6/13/2013	0.041	0.0073 U	0.0073 U	0.019	0.033	0.046	0.020	0.026	0.033	0.010	0.026	0.0073 U	0.016	0.034
1A-B2	1A-B2-2-3	2 to 3	6/13/2013	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	N/A
1A-B2	1A-B2-14-15	14 to 15	6/13/2013	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	N/A
1A-B2	1A-B2-25-26	25 to 26	6/13/2013	0.018	0.0079 U	0.0079 U	0.0079 U	0.020	0.022	0.0096	0.011	0.011	0.0079 U	0.011	0.0079 U	0.0079 U	0.013
1A-B3	1A-B3-0-2	0 to 2	7/18/2013	0.064	0.0075 U	0.013	0.031	0.040	0.063	0.029	0.043	0.050	0.014	0.047	0.0075 U	0.022	0.055
1A-B4	1A-B4-0-1	0 to 1	6/13/2013	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0090	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.012	0.0075 U	0.0075 U	0.00012
1A-B4	1A-B4-11-12	11 to 12	6/13/2013	0.086	0.0088	0.014	0.031	0.089	0.099	0.039	0.048	0.051	0.018	0.053	0.0082 U	0.025	0.062
1A-B5	1A-B5-1-2	1 to 2	6/13/2013	0.71	0.086	0.057	0.29	0.86	0.90	0.38	0.51	0.46	0.15	0.49	0.078	0.23	0.65
1A-B5	1A-B5-9-10	9 to 10	6/13/2013	0.052	0.0080 U	0.013	0.022	0.051	0.056	0.025	0.033	0.036	0.012	0.034	0.0080 U	0.018	0.042
1A-B5	1A-B5-11-12	11 to 12	6/13/2013	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	N/A
1A-B6	1A-B6-0-1	0 to 1	6/13/2013	0.031	0.0076 U	0.0076 U	0.012	0.027	0.036	0.012	0.019	0.022	0.0076 U	0.020	0.0076 U	0.010	0.0234
1A-B6	1A-B6-10-11	10 to 11	6/13/2013	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	N/A
1B-TP1	1B-TP1-0-1	0 to 1	6/24/2013	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	N/A
1B-TP2	1B-TP2-0-1	0 to 1	6/24/2013	0.033	0.0074 U	0.0074 U	0.076	0.016	0.034	0.041	0.047	0.056	0.037 U	0.051	0.037 U	0.037	0.061
1B-TP2	1B-TP2-2-3	2 to 3	6/24/2013	0.15	0.0095	0.033	0.12	0.11	0.16	0.10	0.11	0.23	0.059	0.12	0.021	0.10	0.16
1B-TP2	1B-TP2-5-6	5 to 6	6/24/2013	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	N/A
1B-TP2	1B-TP2-7-8	7 to 8	6/24/2013	0.0085 U	0.0085 U	0.0085 U	0.0085 U	0.0085 U	0.0085 U	0.0085 U	0.0085 U	0.0085 U	0.0085 U	0.0085 U	0.0085 U	0.0085 U	N/A
1B-TP3	1B-TP3-0-1	0 to 1	6/24/2013	0.088	0.0076 U	0.0076 U	0.048	0.029	0.097	0.060	0.049	0.070	0.018	0.077	0.014	0.032	0.069
1B-TP3	1B-TP3-2-3	2 to 3	6/24/2013	0.0083	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	N/A
1B-TP3	1B-TP3-3-4	3 to 4	6/24/2013	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	N/A
1B-TP4	1B-TP4-0-1	0 to 1	6/24/2013	0.015	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.016	0.011	0.0084	0.010	0.0078 U	0.0083	0.0078 U	0.0078 U	0.011
1B-TP5	1B-TP5-0-1	0 to 1	6/24/2013	0.12	0.0075 U	0.018	0.052	0.059	0.14	0.080	0.080	0.10	0.028	0.083	0.011	0.046	0.11
1B-TP5	1B-TP5-2-3	2 to 3	6/24/2013	0.14	0.0079 U	0.018	0.058	0.11	0.18	0.094	0.086	0.10	0.032	0.098	0.014	0.052	0.12
1B-TP5	1B-TP5-7-8	7 to 8	6/24/2013	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	N/A
1B-TP6	1B-TP6-0-1	0 to 1	6/24/2013	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	N/A
1B-TP6	1B-TP6-2-3	2 to 3	6/24/2013	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	N/A
1C-TP1	1C-TP1-0-1	0 to 1	6/25/2013	0.17	0.012	0.072	0.069	0.13	0.16	0.10	0.090	0.14	0.043	0.11	0.020	0.065	0.13
1C-TP1	1C-TP1-2-3	2 to 3	6/25/2013	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	N/A
1C-TP2	1C-TP2-0-1	0 to 1	6/25/2013	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	N/A
1C-TP2	1C-TP2-3-4	3 to 4	6/25/2013	0.11	0.013	0.019	0.038	0.093	0.11	0.053	0.054	0.064	0.022	0.053	0.0095	0.033	0.072
1C-TP2	1C-TP2-6-7	6 to 7	6/25/2013	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	N/A
1D-B1	1D-B1-0-1	0 to 1	6/14/2013	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	N/A
1D-B1	1D-B1-6-7	6 to 7	6/14/2013	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	N/A
1D-B2	1D-B2-0-1	0 to 1	6/14/2013	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	N/A
1D-B2	1D-B2-6-7	6 to 7	6/14/2013	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	N/A
MTCA Method A ULU Cleanup Level				3,200[9]	3,200[9]	5[12]	NE	NE	2,400[9]	MTCA ULU cleanup level for the TTEC of cPAHs is 0.1 mg/kg							
Washington State Background Levels or Ecology Guidance Reuse Criteria[11]				NE	NE	NE	NE	NE	NE	Reuse Criteria is 0.1 mg/kg							

Investigation Location Identification	Sample ID[2]	Sample Depth (feet bgs)	Sample Date	Petroleum Hydrocarbons (mg/Kg)[3,4,5] Gasoline-Range (HCID)	Diesel-Range (HCID)	Lube Oil-Range (HCID)	Gasoline-Range	Diesel-Range	Lube Oil-Range	Total Metals (mg/Kg)[6] Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Silver	Polycyclic Aromatic Hydrocarbons (mg/kg)[7] 1-Methylnaphthalene	2-Methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene
1D-TP1	1D-TP1-0-1	0 to 1	6/24/2013	22 U	55 U	DET	N/A	34 J	280	11 U	83	0.55 U	26	150	0.28 U	1.1 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U
1D-TP1	1D-TP1-2-3	2 to 3	6/24/2013	26 U	65 U	130 U	N/A	N/A	N/A	13 U	120	0.65 U	36	31	0.32 U	1.3 U	0.0086 U	0.0086 U	0.0086 U	0.0086 U	0.0086 U
1D-TP2	1D-TP2-0-1	0 to 1	6/25/2013	25 U	63 U	130 U	N/A	N/A	N/A	13 U	240	1.0	48	280	1.1	1.3 U	0.016	0.018	0.0084 U	0.011	0.011
1D-TP2	1D-TP2-3.5-4.5	3.5 to 4.5	6/25/2013	25 U	62 U	120 U	N/A	N/A	N/A	12 U	82	0.62 U	57	6.2 U	0.31 U	1.2 U	0.0082 U	0.0082 U	0.0082 U	0.0082 U	0.0082 U
1D-TP3	1D-TP3-0-1	0 to 1	6/24/2013	27 U	67 U	DET	N/A	45 J	370	14	480	1.6	51	950	0.51	1.3 U	0.044	0.054	0.0090 U	0.042	0.030
1D-TP3	1D-TP3-2-3	2 to 3	6/24/2013	25 U	62 U	120 U	N/A	N/A	N/A	12 U	220	0.80	51	250	0.35	1.2 U	0.056	0.073	0.0082 U	0.0082 U	0.012
1D-TP3	1D-TP3-5-6	5 to 6	6/24/2013	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	20	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1E-B1	1E-B1-0-1	0 to 1	6/13/2013	23 U	57 U	110 U	N/A	N/A	N/A	11 U	280	4.5	43	30	0.28 U	1.5	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U
1E-B1	1E-B1-7-8	7 to 8	6/13/2013	23 U	56 U	110 U	N/A	N/A	N/A	11 U	43	0.56 U	24	5.6 U	0.28 U	1.1 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U
1E-B2	1E-B2-0-1	0 to 1	6/13/2013	22 U	55 U	DET	N/A	30 U	250	11 U	49	0.55 U	31	14	0.27 U	1.1 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U
1E-B3	1E-B3-1-2	1 to 2	6/20/2013	22 U	55 U	110 U	N/A	N/A	N/A	11 U	79	0.55 U	37	5.5 U	0.28 U	1.1 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U
1E-B3	1E-B3-6-7	6 to 7	6/20/2013	23 U	57 U	120 U	N/A	N/A	N/A	11 U	32	0.57 U	17	5.7 U	0.29 U	1.1 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U
1E-B4	1E-B4-2-3	2 to 3	6/12/2013	22 U	55 U	110 U	N/A	N/A	N/A	11 U	42	0.55 U	25	5.5 U	0.27 U	1.1 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U
1E-B4	1E-B4-7-8	7 to 8	6/12/2013	23 U	57 U	110 U	N/A	N/A	N/A	11 U	22	0.57 U	20	5.7 U	0.29 U	1.1 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U
1E-B5	1E-B5-0-1	0 to 1	6/13/2013	23 U	57 U	110 U	N/A	N/A	N/A	11 U	50	0.57 U	33	5.7 U	0.28 U	1.1 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U
1E-B5	1E-B5-5-6	5 to 6	6/13/2013	24 U	60 U	120 U	N/A	N/A	N/A	12 U	29	0.60 U	22	6.0 U	0.30 U	1.2 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U
1E-B6	1E-B6-0-1	0 to 1	6/13/2013	24 U	60 U	120 U	N/A	N/A	N/A	12 U	340	1.2	57	610	0.30 U	1.2 U	0.025	0.025	0.054	0.032	0.11
1E-B6	1E-B6-5-6	5 to 6	6/13/2013	23 U	56 U	110 U	N/A	N/A	N/A	11 U	34	0.56 U	36	5.6 U	0.28 U	1.1 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U
1F-B1	1F-B1-0.3-1.3	0.3 to 1.3	7/18/2013	21 U	53 U	110 U	N/A	N/A	N/A	11 U	71	0.53 U	27	5.3 U	0.26 U	1.1 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U
1F-B1	1F-B1-4-5	4 to 5	7/18/2013	22 U	56 U	110 U	N/A	N/A	N/A	11 U	44	0.56 U	29	5.6 U	0.28 U	1.1 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U
1F-B1	1F-B1-9-10	9 to 10	7/18/2013	23 U	56 U	110 U	N/A	N/A	N/A	11 U	53	0.56 U	45	5.6 U	0.28 U	1.1 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U
1F-B2	1F-B2-0.3-1.3	0.3 to 1.3	7/18/2013	21 U	52 U	110 U	N/A	N/A	N/A	10 U	44	0.52 U	14	5.2 U	0.26 U	1.0 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U
1F-B2	1F-B2-7-8	7 to 8	7/18/2013	DET	55 U	DET	940 J	94 J	200	11 U	49	0.55 U	30	5.5 U	0.27 U	1.1 U	0.016	0.027	0.0073 U	0.0073 U	0.0073 U
1F-B2	1F-B2-9-10	9 to 10	7/18/2013	22 U	55 U	110 U	N/A	N/A	N/A	11 U	43	0.55 U	27	5.5 U	0.27 U	1.1 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U
1F-B3	1F-B3-2-3	2 to 3	6/12/2013	24 U	60 U	120 U	N/A	N/A	N/A	12 U	76	0.60 U	35	6.0 U	0.30 U	1.2 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U
1F-B3	1F-B3-5-6	5 to 6	6/12/2013	23 U	57 U	110 U	N/A	N/A	N/A	11 U	53	0.57 U	49	5.7 U	0.29 U	1.1 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.011
1F-B4	1F-B4-2-3	2 to 3	6/11/2013	22 U	54 U	110 U	N/A	N/A	N/A	11 U	38	0.54 U	22	5.4 U	0.27 U	1.1 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U
1F-B4	1F-B4-13-14	13 to 14	6/11/2013	24 U	59 U	120 U	N/A	N/A	N/A	12 U	61	0.59 U	28	5.9 U	0.29 U	1.2 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U
1F-B5	1F-B5-3-4	3 to 4	6/13/2013	22 U	54 U	110 U	N/A	N/A	N/A	11 U	34	0.54 U	29	5.4 U	0.27 U	1.1 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U
1F-B5	1F-B5-7-8	7 to 8	6/13/2013	22 U	56 U	110 U	N/A	N/A	N/A	11 U	48	0.56 U	29	5.6 U	0.28 U	1.1 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U
1F-B6	1F-B6-4-5	4 to 5	6/11/2013	21 U	53 U	110 U	N/A	N/A	N/A	11 U	61	0.53 U	18	5.3 U	0.27 U	1.1 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.012
1F-B6	1F-B6-12-13	12 to 13	6/11/2013	22 U	55 U	110 U	N/A	N/A	N/A	11 U	48	0.55 U	43	5.5 U	0.28 U	1.1 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U
1F-B7	1F-B7-3-4	3 to 4	6/11/2013	21 U	53 U	110 U	N/A	N/A	N/A	11 U	71	0.53 U	22	5.3 U	0.26 U	1.1 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U
1F-B7	1F-B7-14-15	14 to 15	6/11/2013	24 U	59 U	120 U	N/A	N/A	N/A	12 U	39	0.59 U	17	5.9 U	0.30 U	1.2 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U
1G-B1	1G-B1-2-3	2 to 3	6/10/2013	22 U	55 U	110 U	N/A	N/A	N/A	11 U	58	0.55 U	57	5.5 U	0.27 U	1.1 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U
1G-B2	1G-B2-2-3	2 to 3	6/10/2013	23 U	57 U	110 U	N/A	N/A	N/A	11 U	66	0.57 U	56	5.7 U	0.28 U	1.1 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U
1G-B2	1G-B2-9-10	9 to 10	6/10/2013	22 U	55 U	110 U	N/A	N/A	N/A	11 U	37	0.55 U	38	5.5 U	0.28 U	1.1 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U
1G-B3	1G-B3-2-3	2 to 3	6/10/2013	22 U	56 U	110 U	N/A	N/A	N/A	11 U	40	0.56 U	28	5.6 U	0.28 U	1.1 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U
1G-B4	1G-B4-1-2	1 to 2	6/17/2013	22 U	54 U	DET	N/A	27 U	88	11 U	75	0.54 U	64	5.8	0.27 U	1.1 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U
MTCA Method A ULU Cleanup Level				100/30	2,000	2,000	100/30[8]	2,000	2,000	20	16,000[9]	2.0	2,000[10]	250	2.0	400[9]	35[9]	320[9]	4,800[9]	NE	24,000[9]
Washington State Background Levels or Ecology Guidance Reuse Criteria[11]				30	200	200	30	200	200	7	NE	1	48	50	0.07 or DET	NE	NE	NE	NE	NE	NE

Investigation Location Identification	Sample ID[2]	Sample Depth (feet bgs)	Sample Date	Polycyclic Aromatic Hydrocarbons (mg/kg)[7]						cPAHs (mg/kg)[7]							
				Fluoranthene	Fluorene	Naphthalene	Benzo(ghi)perylene	Phenanthrene	Pyrene	Benzo (a) anthracene (TEF 0.1)	Benzo (a) pyrene (TEF 1)	Benzo (b) fluoranthene (TEF 0.1)	Benzo (J,k) fluoranthene (TEF 0.1)	Chrysene (TEF 0.01)	Dibenz (a,h) anthracene (TEF 0.1)	Indeno (1,2,3-cd) pyrene (TEF 0.1)	TTEC of cPAHs (detect only)
1D-TP1	1D-TP1-0-1	0 to 1	6/24/2013	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	N/A
1D-TP1	1D-TP1-2-3	2 to 3	6/24/2013	0.021	0.0086 U	0.0086 U	0.0086 U	0.013	0.017	0.0088	0.0086 U	0.010	0.0086 U	0.0086 U	0.0086 U	0.0086 U	0.0019
1D-TP2	1D-TP2-0-1	0 to 1	6/25/2013	0.063	0.0084 U	0.022	0.039	0.039	0.065	0.043	0.048	0.073	0.019	0.056	0.012	0.033	0.067
1D-TP2	1D-TP2-3.5-4.5	3.5 to 4.5	6/25/2013	0.0082 U	0.0082 U	0.0082 U	0.0082 U	0.0082 U	0.0082 U	0.0082 U	0.0082 U	0.0082 U	0.0082 U	0.0082 U	0.0082 U	0.0082 U	N/A
1D-TP3	1D-TP3-0-1	0 to 1	6/24/2013	0.13	0.011	0.061	0.068	0.091	0.12	0.074	0.071	0.13	0.030	0.096	0.015	0.056	0.1
1D-TP3	1D-TP3-2-3	2 to 3	6/24/2013	0.060	0.0082 U	0.064	0.024	0.065	0.060	0.034	0.029	0.045	0.011	0.040	0.0082 U	0.021	0.041
1D-TP3	1D-TP3-5-6	5 to 6	6/24/2013	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
1E-B1	1E-B1-0-1	0 to 1	6/13/2013	0.021	0.0076 U	0.0076 U	0.014	0.015	0.018	0.010	0.014	0.020	0.0076 U	0.013	0.0076 U	0.010	0.018
1E-B1	1E-B1-7-8	7 to 8	6/13/2013	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	N/A
1E-B2	1E-B2-0-1	0 to 1	6/13/2013	0.017	0.0073 U	0.0073 U	0.0073	0.024	0.026	0.010	0.010	0.011	0.0073 U	0.024	0.0073 U	0.0073 U	0.012
1E-B3	1E-B3-1-2	1 to 2	6/20/2013	0.0080	0.0073 U	0.0073 U	0.0073 U	0.023	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	N/A
1E-B3	1E-B3-6-7	6 to 7	6/20/2013	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	N/A
1E-B4	1E-B4-2-3	2 to 3	6/12/2013	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	N/A
1E-B4	1E-B4-7-8	7 to 8	6/12/2013	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	N/A
1E-B5	1E-B5-0-1	0 to 1	6/13/2013	0.0077	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	N/A
1E-B5	1E-B5-5-6	5 to 6	6/13/2013	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	N/A
1E-B6	1E-B6-0-1	0 to 1	6/13/2013	0.51	0.044	0.051	0.21	0.47	0.60	0.25	0.32	0.37	0.12	0.32	0.050	0.18	0.42
1E-B6	1E-B6-5-6	5 to 6	6/13/2013	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	N/A
1F-B1	1F-B1-0.3-1.3	0.3 to 1.3	7/18/2013	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	N/A
1F-B1	1F-B1-4-5	4 to 5	7/18/2013	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	N/A
1F-B1	1F-B1-9-10	9 to 10	7/18/2013	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	N/A
1F-B2	1F-B2-0.3-1.3	0.3 to 1.3	7/18/2013	0.019	0.0070 U	0.0070 U	0.0084	0.011	0.030	0.017	0.015	0.014	0.0070 U	0.015	0.0070 U	0.0070 U	0.018
1F-B2	1F-B2-7-8	7 to 8	7/18/2013	0.0073 U	0.0073 U	0.030	0.0073 U	0.011	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.012	0.0073 U	0.0073 U	0.00012
1F-B2	1F-B2-9-10	9 to 10	7/18/2013	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	N/A
1F-B3	1F-B3-2-3	2 to 3	6/12/2013	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	N/A
1F-B3	1F-B3-5-6	5 to 6	6/12/2013	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.011	0.0076 U	0.011	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0011
1F-B4	1F-B4-2-3	2 to 3	6/11/2013	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	N/A
1F-B4	1F-B4-13-14	13 to 14	6/11/2013	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	N/A
1F-B5	1F-B5-3-4	3 to 4	6/13/2013	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	N/A
1F-B5	1F-B5-7-8	7 to 8	6/13/2013	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	N/A
1F-B6	1F-B6-4-5	4 to 5	6/11/2013	0.063	0.0071 U	0.010	0.021	0.055	0.078	0.032	0.035	0.038	0.013	0.038	0.0071 U	0.017	0.045
1F-B6	1F-B6-12-13	12 to 13	6/11/2013	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	N/A
1F-B7	1F-B7-3-4	3 to 4	6/11/2013	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	N/A
1F-B7	1F-B7-14-15	14 to 15	6/11/2013	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	N/A
1G-B1	1G-B1-2-3	2 to 3	6/10/2013	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	N/A
1G-B2	1G-B2-2-3	2 to 3	6/10/2013	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	N/A
1G-B2	1G-B2-9-10	9 to 10	6/10/2013	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	N/A
1G-B3	1G-B3-2-3	2 to 3	6/10/2013	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	N/A
1G-B4	1G-B4-1-2	1 to 2	6/17/2013	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	N/A
MTCA Method A ULU Cleanup Level				3,200[9]	3,200[9]	5[12]	NE	NE	2,400[9]	MTCA ULU cleanup level for the TTEC of cPAHs is 0.1 mg/kg							
Washington State Background Levels or Ecology Guidance Reuse Criteria[11]				NE	NE	NE	NE	NE	NE	Reuse Criteria is 0.1 mg/kg							

				Petroleum Hydrocarbons (mg/Kg) [3,4,5]						Total Metals (mg/Kg) [6]							Polycyclic Aromatic Hydrocarbons (mg/kg) [7]				
Investigation Location Identification	Sample ID [2]	Sample Depth (feet bgs)	Sample Date	Gasoline-Range (HCID)	Diesel-Range (HCID)	Lube Oil-Range (HCID)	Gasoline-Range	Diesel-Range	Lube Oil-Range	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Silver	1-Methylnaphthalene	2-Methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene
1G-TP1	1G-TP1-2-3	2 to 3	6/25/2013	22 U	55 U	110 U	N/A	N/A	N/A	11 U	85	0.54 U	49	8.6	0.27 U	1.1 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U
1G-TP1	1G-TP1-4-5	4 to 5	6/25/2013	22 U	56 U	110 U	N/A	N/A	N/A	11 U	88	0.56 U	40	25	0.42	1.1 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U
1G-TP2	1G-TP2-0-1	0 to 1	6/25/2013	23 U	57 U	110 U	N/A	N/A	N/A	11 U	140	0.57 U	52	250	0.28 U	1.1 U	0.013	0.013	0.012	0.0075 U	0.038
1G-TP2	1G-TP2-3-4	3 to 4	6/25/2013	24 U	61 U	DET	N/A	30 U	99	12 U	150	0.61 U	41	220	0.30 U	1.2 U	0.012	0.016	0.0081 U	0.010	0.016
1G-TP2	1G-TP2-6-7	6 to 7	6/25/2013	24 U	60 U	120 U	N/A	N/A	N/A	12 U	100	0.60 U	39	6.0 U	0.30 U	1.2 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U
1H-B1	1H-B1-4-5	4 to 5	6/10/2013	22 U	54 U	110 U	N/A	N/A	N/A	11 U	37	0.54 U	49	5.4 U	0.27 U	1.1 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U
1H-B1	1H-B1-9-9.5	9 to 9.5	6/10/2013	22 U	55 U	110 U	N/A	N/A	N/A	11 U	39	0.55 U	21	5.5 U	0.27 U	1.1 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U
1H-B2	1H-B2-7-7.5	7 to 7.5	6/10/2013	25 U	64 U	130 U	N/A	N/A	N/A	13 U	89	0.64 U	52	6.4 U	0.32 U	1.3 U	0.0085 U	0.0085 U	0.0085 U	0.0085 U	0.0085 U
1H-B3	1H-B3-4-5	4 to 5	6/10/2013	22 U	54 U	110 U	N/A	N/A	N/A	11 U	29	0.54 U	16	5.4 U	0.27 U	1.1 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U
1H-B3	1H-B3-7-8	7 to 8	6/10/2013	22 U	56 U	110 U	N/A	N/A	N/A	11 U	29	0.56 U	20	5.6 U	0.28 U	1.1 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U
1H-TP1	1H-TP1-0-1	0 to 1	6/25/2013	22 U	55 U	110 U	N/A	N/A	N/A	11 U	38	0.55 U	25	5.5 U	0.27 U	1.1 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U
1H-TP1	1H-TP1-5-6	5 to 6	6/25/2013	21 U	53 U	110 U	N/A	N/A	N/A	11 U	36	0.53 U	17	5.3 U	0.27 U	1.1 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U
2A-B1	2A-B1-1-2	1 to 2	6/17/2013	23 U	57 U	110 U	N/A	N/A	N/A	11 U	93	0.57 U	35	59	0.29 U	1.1 U	0.015	0.016	0.040	0.012	0.074
2A-B1	2A-B1-6-7	6 to 7	6/17/2013	23 U	58 U	120 U	N/A	N/A	N/A	12 U	42	0.58 U	27	5.8 U	0.29 U	1.2 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U
2A-B2	2A-B2-0.5-1.5	0.5 to 1.5	6/17/2013	21 U	53 U	DET	N/A	27 U	140	11 U	50	0.53 U	29	8.0	0.27 U	1.1 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U
2A-B2	2A-B2-7-8	7 to 8	6/17/2013	22 U	55 U	110 U	N/A	N/A	N/A	11 U	55	0.55 U	45	5.5 U	0.27 U	1.1 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U
2A-B3	2A-B3-0-1	0 to 1	6/17/2013	22 U	56 U	110 U	N/A	N/A	N/A	11 U	69	0.56 U	48	21	0.28 U	1.1 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U
2A-B3	2A-B3-2-3	2 to 3	6/17/2013	22 U	56 U	110 U	N/A	N/A	N/A	11 U	140	0.56 U	59	37	0.28 U	1.1 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U
2A-B4	2A-B4-0.5-1.5	0.5 to 1.5	6/17/2013	22 U	55 U	110 U	N/A	N/A	N/A	11 U	48	0.54 U	30	7.9	0.27 U	1.1 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U
2A-B4	2A-B4-5-6	5 to 6	6/17/2013	22 U	55 U	110 U	N/A	N/A	N/A	11 U	42	0.55 U	27	5.5 U	0.27 U	1.1 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U
2A-B5	2A-B5-1-2	1 to 2	6/17/2013	22 U	55 U	DET	N/A	27 U	91	11 U	40	0.55 U	25	5.5 U	0.27 U	1.1 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U
2A-B5	2A-B5-7-8	7 to 8	6/17/2013	22 U	55 U	110 U	N/A	N/A	N/A	11 U	56	0.55 U	49	5.5 U	0.28 U	1.1 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U
2A-B6	2A-B6-1-2	1 to 2	6/17/2013	21 U	53 U	110 U	N/A	N/A	N/A	11 U	42	0.53 U	33	5.3 U	0.27 U	1.1 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U
2A-B7	2A-B7-2.5-3.5	2.5 to 3.5	6/17/2013	26 U	65 U	130 U	N/A	N/A	N/A	13 U	310	0.71	37	200	0.32 U	1.3 U	0.045	0.048	0.012	0.097	0.078
2A-B7	2A-B7-4-5	4 to 5	6/17/2013	24 U	59 U	120 U	N/A	N/A	N/A	12 U	45	0.59 U	24	5.9 U	0.29 U	1.2 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U
2B-B2	2B-B2-1-2	1 to 2	6/18/2013	23 U	57 U	110 U	N/A	N/A	N/A	11 U	70	0.57 U	71	30	0.28 U	1.1 U	0.0076 U	0.0076 U	0.0076 U	0.0085	0.011
2B-B2	2B-B2-5-6	5 to 6	6/18/2013	22 U	55 U	110 U	N/A	N/A	N/A	11 U	54	0.55 U	33	5.5 U	0.27 U	1.1 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U
2B-B3	2B-B3-1-2	1 to 2	6/18/2013	22 U	56 U	110 U	N/A	N/A	N/A	11 U	52	0.56 U	38	5.6 U	0.28 U	1.1 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U
2C-B1	2C-B1-1-2	1 to 2	6/18/2013	22 U	55 U	110 U	N/A	N/A	N/A	11 U	78	0.55 U	41	5.5 U	0.28 U	1.1 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U
2C-B1	2C-B1-8-9	8 to 9	6/18/2013	22 U	54 U	110 U	N/A	N/A	N/A	11 U	55	0.54 U	35	5.4 U	0.27 U	1.1 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U
2C-B2	2C-B2-1-2	1 to 2	6/18/2013	22 U	56 U	DET	N/A	28 U	190	11 U	440	0.56 U	54	730	0.41	1.1 U	0.057	0.072	0.12	0.066	0.22
2C-B2	2C-B2-7-8	7 to 8	6/18/2013	24 U	61 U	120 U	N/A	N/A	N/A	12 U	100	0.61 U	55	6.1 U	0.30 U	1.2 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U
2C-B2	2C-B2-13-14	13 to 14	6/18/2013	23 U	58 U	120 U	N/A	N/A	N/A	12 U	51	0.58 U	45	5.8 U	0.29 U	1.2 U	0.0077 U	0.0077 U	0.0077 U	0.0077 U	0.0077 U
2D-B1	2D-B1-0-1	0 to 1	6/18/2013	23 U	57 U	110 U	N/A	N/A	N/A	11 U	78	0.57 U	49	5.7 U	0.29 U	1.1 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U
2D-B1	2D-B1-8-9	8 to 9	6/18/2013	24 U	59 U	120 U	N/A	N/A	N/A	12 U	66	0.59 U	30	5.9 U	0.29 U	1.2 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U
2D-B2	2D-B2-0-1	0 to 1	6/18/2013	27 U	67 U	130 U	N/A	N/A	N/A	13 U	120	0.67 U	55	6.7 U	0.34 U	1.3 U	0.0089 U	0.0089 U	0.0089 U	0.0089 U	0.0089 U
2D-B2	2D-B2-4-5	4 to 5	6/18/2013	27 U	66 U	130 U	N/A	N/A	N/A	13 U	170	0.66 U	130	6.8	0.33 U	1.3 U	0.0089 U	0.0089 U	0.0089 U	0.0089 U	0.0089 U
2D-B3	2D-B3-0-1	0 to 1	6/20/2013	29 U	74 U	150 U	N/A	N/A	N/A	15 U	150	0.74 U	53	7.4 U	0.37 U	1.5 U	0.0098 U	0.0098 U	0.0098 U	0.0098 U	0.0098 U
2D-B3	2D-B3-11-12	11 to 12	6/20/2013	27 U	66 U	130 U	N/A	N/A	N/A	13 U	120	0.66 U	43	6.6 U	0.33 U	1.3 U	0.0088 U	0.0088 U	0.0088 U	0.0088 U	0.0088 U
MTCA Method A ULU Cleanup Level				100/30	2,000	2,000	100/30[8]	2,000	2,000	20	16,000[9]	2.0	2,000[10]	250	2.0	400[9]	35[9]	320[9]	4,800[9]	NE	24,000[9]
Washington State Background Levels or Ecology Guidance Reuse Criteria [11]				30	200	200	30	200	200	7	NE	1	48	50	0.07 or DET	NE	NE	NE	NE	NE	NE

Investigation Location Identification	Sample ID[2]	Sample Depth (feet bgs)	Sample Date	Polycyclic Aromatic Hydrocarbons (mg/kg)[7] Fluoranthene	Fluorene	Naphthalene	Benzo(ghi)perylene	Phenanthrene	Pyrene	cPAHs (mg/kg)[7] Benzo (a) anthracene (TEF 0.1)	Benzo (a) pyrene (TEF 1)	Benzo (b) fluoranthene (TEF 0.1)	Benzo (J,k) fluoranthene (TEF 0.1)	Chrysene (TEF 0.01)	Dibenz (a,h) anthracene (TEF 0.1)	Indeno (1,2,3-cd) pyrene (TEF 0.1)	TTEC of cPAHs (detect only)
1G-TP1	1G-TP1-2-3	2 to 3	6/25/2013	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	N/A
1G-TP1	1G-TP1-4-5	4 to 5	6/25/2013	0.029	0.0074 U	0.0074 U	0.013	0.018	0.031	0.016	0.016	0.020	0.0074 U	0.019	0.0074 U	0.011	0.021
1G-TP2	1G-TP2-0-1	0 to 1	6/25/2013	0.17	0.010	0.018	0.069	0.14	0.22	0.094	0.093	0.10	0.033	0.10	0.016	0.056	0.12
1G-TP2	1G-TP2-3-4	3 to 4	6/25/2013	0.094	0.0081 U	0.023	0.046	0.049	0.093	0.049	0.055	0.079	0.022	0.059	0.011	0.040	0.077
1G-TP2	1G-TP2-6-7	6 to 7	6/25/2013	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	N/A
1H-B1	1H-B1-4-5	4 to 5	6/10/2013	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	N/A
1H-B1	1H-B1-9-9.5	9 to 9.5	6/10/2013	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	N/A
1H-B2	1H-B2-7-7.5	7 to 7.5	6/10/2013	0.0085 U	0.0085 U	0.0085 U	0.0085 U	0.0085 U	0.0085 U	0.0085 U	0.0085 U	0.0085 U	0.0085 U	0.0085 U	0.0085 U	0.0085 U	N/A
1H-B3	1H-B3-4-5	4 to 5	6/10/2013	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	N/A
1H-B3	1H-B3-7-8	7 to 8	6/10/2013	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	N/A
1H-TP1	1H-TP1-0-1	0 to 1	6/25/2013	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	N/A
1H-TP1	1H-TP1-5-6	5 to 6	6/25/2013	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	N/A
2A-B1	2A-B1-1-2	1 to 2	6/17/2013	0.33	0.036	0.035	0.093	0.39	0.37	0.15	0.18	0.17	0.058	0.17	0.025	0.079	0.23
2A-B1	2A-B1-6-7	6 to 7	6/17/2013	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	N/A
2A-B2	2A-B2-0.5-1.5	0.5 to 1.5	6/17/2013	0.066	0.0071 U	0.0071 U	0.023	0.038	0.054	0.025	0.029	0.040	0.011	0.030	0.0071 U	0.017	0.039
2A-B2	2A-B2-7-8	7 to 8	6/17/2013	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	N/A
2A-B3	2A-B3-0-1	0 to 1	6/17/2013	0.025	0.0075 U	0.0075 U	0.012	0.015	0.024	0.016	0.018	0.023	0.0075 U	0.016	0.0075 U	0.0093	0.023
2A-B3	2A-B3-2-3	2 to 3	6/17/2013	0.051	0.0075 U	0.016	0.021	0.029	0.054	0.027	0.031	0.041	0.011	0.034	0.0075 U	0.018	0.041
2A-B4	2A-B4-0.5-1.5	0.5 to 1.5	6/17/2013	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	N/A
2A-B4	2A-B4-5-6	5 to 6	6/17/2013	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	N/A
2A-B5	2A-B5-1-2	1 to 2	6/17/2013	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	N/A
2A-B5	2A-B5-7-8	7 to 8	6/17/2013	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	N/A
2A-B6	2A-B6-1-2	1 to 2	6/17/2013	0.035	0.0071 U	0.0071 U	0.013	0.036	0.044	0.016	0.018	0.019	0.0071 U	0.018	0.0071 U	0.0091	0.023
2A-B7	2A-B7-2.5-3.5	2.5 to 3.5	6/17/2013	0.74	0.018	0.063	0.32	0.26	0.91	0.37	0.50	0.51	0.14	0.39	0.068	0.27	0.64
2A-B7	2A-B7-4-5	4 to 5	6/17/2013	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	N/A
2B-B2	2B-B2-1-2	1 to 2	6/18/2013	0.064	0.0076 U	0.014	0.035	0.020	0.083	0.044	0.058	0.055	0.018	0.051	0.0082	0.028	0.074
2B-B2	2B-B2-5-6	5 to 6	6/18/2013	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	N/A
2B-B3	2B-B3-1-2	1 to 2	6/18/2013	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	N/A
2C-B1	2C-B1-1-2	1 to 2	6/18/2013	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	N/A
2C-B1	2C-B1-8-9	8 to 9	6/18/2013	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	N/A
2C-B2	2C-B2-1-2	1 to 2	6/18/2013	1.8	0.087	0.079	0.72	1.2	2.1	0.87	1.1	1.1	0.36	1.0	0.18	0.61	1.4
2C-B2	2C-B2-7-8	7 to 8	6/18/2013	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	N/A
2C-B2	2C-B2-13-14	13 to 14	6/18/2013	0.0077 U	0.0077 U	0.0077 U	0.0077 U	0.0077 U	0.0077 U	0.0077 U	0.0077 U	0.0077 U	0.0077 U	0.0077 U	0.0077 U	0.0077 U	N/A
2D-B1	2D-B1-0-1	0 to 1	6/18/2013	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	N/A
2D-B1	2D-B1-8-9	8 to 9	6/18/2013	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	N/A
2D-B2	2D-B2-0-1	0 to 1	6/18/2013	0.0089 U	0.0089 U	0.0089 U	0.0089 U	0.0089 U	0.0089 U	0.0089 U	0.0089 U	0.0089 U	0.0089 U	0.0089 U	0.0089 U	0.0089 U	N/A
2D-B2	2D-B2-4-5	4 to 5	6/18/2013	0.0089 U	0.0089 U	0.0089 U	0.0089 U	0.0089 U	0.0089 U	0.0089 U	0.0089 U	0.0089 U	0.0089 U	0.0089 U	0.0089 U	0.0089 U	N/A
2D-B3	2D-B3-0-1	0 to 1	6/20/2013	0.0098 U	0.0098 U	0.0098 U	0.0098 U	0.0098 U	0.0098 U	0.0098 U	0.0098 U	0.0098 U	0.0098 U	0.0098 U	0.0098 U	0.0098 U	N/A
2D-B3	2D-B3-11-12	11 to 12	6/20/2013	0.0088 U	0.0088 U	0.0088 U	0.0088 U	0.0088 U	0.0088 U	0.0088 U	0.0088 U	0.0088 U	0.0088 U	0.0088 U	0.0088 U	0.0088 U	N/A
MTCA Method A ULU Cleanup Level				3,200[9]	3,200[9]	5[12]	NE	NE	2,400[9]	MTCA ULU cleanup level for the TTEC of cPAHs is 0.1 mg/kg							
Washington State Background Levels or Ecology Guidance Reuse Criteria[11]				NE	NE	NE	NE	NE	NE	Reuse Criteria is 0.1 mg/kg							

Investigation Location Identification	Sample ID[2]	Sample Depth (feet bgs)	Sample Date	Petroleum Hydrocarbons (mg/Kg)[3,4,5]						Total Metals (mg/Kg)[6]							Polycyclic Aromatic Hydrocarbons (mg/kg)[7]				
				Gasoline-Range (HCID)	Diesel-Range (HCID)	Lube Oil-Range (HCID)	Gasoline-Range	Diesel-Range	Lube Oil-Range	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Silver	1-Methylnaphthalene	2-Methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene
2D-B5	2D-B5-6-7	6 to 7	6/20/2013	26 U	65 U	130 U	N/A	N/A	N/A	13 U	130	0.65 U	57	6.5 U	0.33 U	1.3 U	0.0087 U	0.0087 U	0.0087 U	0.0087 U	0.0087 U
2F-B1	2F-B1-0-1	0 to 1	6/20/2013	23 U	57 U	110 U	N/A	N/A	N/A	11 U	91	0.57 U	52	100	0.28 U	1.1 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U
2F-B2	2F-B2-0-0.5	0 to 0.5	9/11/2013	23 U	58 U	120 U	N/A	N/A	N/A	12 U	220	0.58 U	45	130	0.30	2.2	0.044	0.031	0.012	0.0095	0.027
2F-B2	2F-B2-1-2.5	1 to 2.5	9/11/2013	23 U	54 U	110 U	N/A	N/A	N/A	11 U	83	0.54 U	43	8.8	0.27 U	1.1 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U
2F-B2	2F-B2-2.5-3.25	2.5 to 3.25	9/11/2013	22 U	56 U	110 U	N/A	N/A	N/A	11 U	84	0.56 U	40	5.6 U	0.28 U	1.1 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U
CR-MW15	CR-MW15-10-11	10 to 11	8/28/2013	23 U	56 U	110 U	N/A	N/A	N/A	11 U	49	0.56 U	26	5.6 U	0.28 U	1.1 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U
CR-MW15	CR-MW15-19.5-20	19.5 to 20	8/28/2013	DET	650 U	110 U	3,000	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CR-MW16	CR-MW16-10-11	10 to 11	8/27/2013	22 U	54 U	110 U	N/A	N/A	N/A	11 U	59	0.54 U	26	5.4 U	0.27 U	1.1 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U
CR-MW16	CR-MW16-15-16	15 to 16	8/27/2013	22 U	55 U	110 U	N/A	N/A	N/A	11 U	27	0.54 U	23	5.4 U	0.27 U	1.1 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U
CR-MW17	CR-MW17-11-12	11 to 12	8/27/2013	22 U	55 U	110 U	N/A	N/A	N/A	11 U	60	0.55 U	52	5.5 U	0.28 U	1.1 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U
CR-MW17	CR-MW17-15-16	15 to 16	8/27/2013	21 U	53 U	110 U	N/A	N/A	N/A	11 U	45	0.53 U	22	5.3 U	0.27 U	1.1 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U
JP-MW1R	JPMW1R-20-21	20 to 21	3/28/2013	N/A	N/A	N/A	4.7 U	28 U	56 U	11 U	N/A	0.56 U	20	5.6 U	0.28 U	N/A	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U
JS-MW7A	JS-MW7A-0-1	0 to 1	9/12/2013	23 U	DET	DET	N/A	29 U	210	11 U	240	0.65	55 J	1,100	0.44	1.1 U	0.21	0.22	0.21	0.59	0.74
JS-MW7A	JS-MW7A-1-2	1 to 2	9/12/2013	26 U	65 U	130 U	N/A	N/A	N/A	13 U	140	0.65 U	70 J	6.5 U	0.32 U	1.3 U	0.0086 U	0.0086 U	0.0086 U	0.0086 U	0.0086 U
UG-MW23	UG-MW23-0-2	0 to 2	9/17/2013	23 U	58 U	120 U	N/A	N/A	N/A	12 U	140	0.58 U	44	85	0.29 U	1.2 U	0.0077 U	0.0077 U	0.0077 U	0.0077 U	0.0077 U
UG-MW23	UG-MW23-2-3	2 to 3	9/17/2013	21 U	53 U	110 U	N/A	N/A	N/A	11 U	55	0.53 U	9.3	5.3 U	0.26 U	1.1 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U
UG-MW23	UG-MW23-4-5	4 to 5	9/17/2013	22 U	54 U	110 U	N/A	N/A	N/A	11 U	35	0.54 U	26	5.4 U	0.27 U	1.1 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U
UG-MW24	UG-MW24-9-10	9 to 10	6/27/2013	N/A	N/A	N/A	4.5 U	29 U	57 U	11 U	63	0.57 U	41	5.7 U	0.28 U	1.1 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U
UG-MW24	UG-MW24-12-13	12 to 13	6/27/2013	N/A	N/A	N/A	4.0 U	28 U	56 U	11 U	54	0.56 U	43	5.6 U	0.28 U	1.1 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U
UG-MW24	UG-MW24-27-28	27 to 28	6/28/2013	N/A	N/A	N/A	5.7 U	27 U	53 U	11 U	32	0.53 U	13	5.3 U	0.27 U	1.1 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U
UG-MW24	UG-MW24-40-41	40 to 41	6/28/2013	N/A	N/A	N/A	6.0 U	31 U	62 U	12 U	89	0.62 U	16	6.2 U	0.31 U	1.2 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U
UG-MW24	UG-MW24-54-55	54 to 55	6/28/2013	N/A	N/A	N/A	5.8 U	29 U	59 U	12 U	48	0.59 U	11	5.9 U	0.29 U	1.2 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U
UG-MW24	UG-MW24-72-73	72 to 73	6/28/2013	N/A	N/A	N/A	5.8 U	30 U	59 U	12 U	57	0.59 U	11	5.9 U	0.30 U	1.2 U	0.0079 U	0.0085	0.0079 U	0.0079 U	0.0079 U
UG-MW24	UG-MW24-79-80	79 to 80	6/28/2013	N/A	N/A	N/A	4.0 U	28 U	56 U	11 U	33	0.56 U	17	5.6 U	0.28 U	1.1 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U
UG-MW24	UG-MW24-99-100	99 to 100	6/28/2013	N/A	N/A	N/A	4.7 U	28 U	56 U	11 U	47	0.56 U	32	5.6 U	0.28 U	1.1 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U
UG-MW25D	UG-MW25D-1-2	1 to 2	8/22/2013	22 U	55 U	110 U	N/A	N/A	N/A	11 U	97	0.55 U	36	22	0.28 U	1.1 U	0.0074 U	0.0090	0.0074 U	0.14	0.070
UG-MW25D	UG-MW25D-2.5-3.5	2.5 to 3.5	8/22/2013	24 U	59 U	120 U	N/A	N/A	N/A	12 U	79	0.59 U	49	5.9 U	0.29 U	1.2 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U
UG-MW25D	UG-MW25D-34-35	34 to 35	8/22/2013	N/A	N/A	N/A	4.7 U	26 U	53 U	11 U	36	0.53 U	14	5.3 U	0.26 U	1.1 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U
UG-MW25S	UG-MW25S-1-2	1 to 2	8/23/2013	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.0073 U	0.0073 U	0.0073 U	0.021	0.026
UG-MW26	UG-MW26-0-1	0 to 1	9/11/2013	49 U	120 U	DET	N/A	150 U	1,900	15	140	0.82	50	220	0.30 U	1.2 U	0.040 U	0.040 U	0.040 U	0.040 U	0.048
UG-MW26	UG-MW26-2-3	2 to 3	9/11/2013	22 U	55 U	110 U	N/A	N/A	N/A	11 U	45	0.55 U	37	5.5 U	0.27 U	1.1 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U
UG-MW27	UG-MW27-16-17	16 to 17	6/26/2013	N/A	N/A	N/A	4.1 U	28 U	56 U	11 U	41	0.56 U	20	5.6 U	0.28 U	1.1 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U
UG-MW27	UG-MW27-25-26	25 to 26	6/26/2013	N/A	N/A	N/A	6.0 U	31 U	61 U	12 U	79	0.61 U	41	6.1 U	0.31 U	1.2 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U
UG-MW27	UG-MW27-30-31	30 to 31	6/27/2013	N/A	N/A	N/A	6.4 U	31 U	61 U	12 U	120	0.61 U	60	6.1 U	0.31 U	1.2 U	0.0082 U	0.0082 U	0.0082 U	0.0082 U	0.0082 U
UG-MW27	UG-MW27-54-55	54 to 55	6/27/2013	N/A	N/A	N/A	6.4 U	31 U	62 U	12 U	63	0.62 U	34	6.2 U	0.31 U	1.2 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U
UG-MW28	UG-MW28-23-24	23 to 24	6/24/2013	N/A	N/A	N/A	4.1 U	29 U	57 U	11 U	50	0.57 U	20	5.7 U	0.29 U	1.1 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U
UG-MW28	UG-MW28-27-28	27 to 28	6/24/2013	N/A	N/A	N/A	5.8 U	31 U	62 U	12 U	120	0.62 U	60	6.2 U	0.31 U	1.2 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U
UG-MW28	UG-MW28-39-40	39 to 40	6/24/2013	N/A	N/A	N/A	5.8 U	31 U	62 U	12 U	90	0.62 U	49	6.2 U	0.31 U	1.2 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U
UG-MW29D	UG-MW29D-7-7.25	7 to 7.25	6/25/2013	N/A	N/A	N/A	4.8 U	28 U	56 U	11 U	40	0.56 U	53	5.6 U	0.28 U	1.1 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U
MTCA Method A ULU Cleanup Level				100/30	2,000	2,000	100/30[8]	2,000	2,000	20	16,000[9]	2.0	2,000[10]	250	2.0	400[9]	35[9]	320[9]	4,800[9]	NE	24,000[9]
Washington State Background Levels or Ecology Guidance Reuse Criteria[11]				30	200	200	30	200	200	7	NE	1	48	50	0.07 or DET	NE	NE	NE	NE	NE	NE

Investigation Location Identification	Sample ID[2]	Sample Depth (feet bgs)	Sample Date	Polycyclic Aromatic Hydrocarbons (mg/kg)[7]						cPAHs (mg/kg)[7]							
				Fluoranthene	Fluorene	Naphthalene	Benzo(ghi)perylene	Phenanthrene	Pyrene	Benzo (a) anthracene (TEF 0.1)	Benzo (a) pyrene (TEF 1)	Benzo (b) fluoranthene (TEF 0.1)	Benzo (J,k) fluoranthene (TEF 0.1)	Chrysene (TEF 0.01)	Dibenz (a,h) anthracene (TEF 0.1)	Indeno (1,2,3-cd) pyrene (TEF 0.1)	TTEC of cPAHs (detect only)
2D-B5	2D-B5-6-7	6 to 7	6/20/2013	0.0087 U	0.0087 U	0.0087 U	0.0087 U	0.0087 U	0.0087 U	0.0087 U	0.0087 U	0.0087 U	0.0087 U	0.0087 U	0.0087 U	0.0087 U	N/A
2F-B1	2F-B1-0-1	0 to 1	6/20/2013	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	N/A
2F-B2	2F-B2-0-0.5	0 to 0.5	9/11/2013	0.20	0.016	0.031	0.072	0.22	0.19	0.069	0.094	0.11	0.033	0.10	0.020	0.061	0.12
2F-B2	2F-B2-1-2.5	1 to 2.5	9/11/2013	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	N/A
2F-B2	2F-B2-2.5-3.25	2.5 to 3.25	9/11/2013	0.019	0.0074 U	0.0074 U	0.0074 U	0.022	0.018	0.0074 U	0.0074 U	0.0077	0.0074 U	0.0094	0.0074 U	0.0074 U	0.00086
CR-MW15	CR-MW15-10-11	10 to 11	8/28/2013	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	N/A
CR-MW15	CR-MW15-19.5-20	19.5 to 20	8/28/2013	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CR-MW16	CR-MW16-10-11	10 to 11	8/27/2013	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	N/A
CR-MW16	CR-MW16-15-16	15 to 16	8/27/2013	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	N/A
CR-MW17	CR-MW17-11-12	11 to 12	8/27/2013	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	N/A
CR-MW17	CR-MW17-15-16	15 to 16	8/27/2013	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	N/A
JP-MW1R	JPMW1R-20-21	20 to 21	3/28/2013	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	N/A
JS-MW7A	JS-MW7A-0-1	0 to 1	9/12/2013	6.4	0.38	0.36	1.3	6.4	6.1	2.3	2.7	3.1	0.76	2.5	0.36	1.1	3.5
JS-MW7A	JS-MW7A-1-2	1 to 2	9/12/2013	0.0086 U	0.0086 U	0.0086 U	0.0086 U	0.0086 U	0.0086 U	0.0086 U	0.0086 U	0.0086 U	0.0086 U	0.0086 U	0.0086 U	0.0086 U	N/A
UG-MW23	UG-MW23-0-2	0 to 2	9/17/2013	0.017	0.0077 U	0.0077 U	0.0080	0.012	0.016	0.0077	0.0079	0.015	0.0077 U	0.012	0.0077 U	0.0077 U	0.010
UG-MW23	UG-MW23-2-3	2 to 3	9/17/2013	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	N/A
UG-MW23	UG-MW23-4-5	4 to 5	9/17/2013	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	N/A
UG-MW24	UG-MW24-9-10	9 to 10	6/27/2013	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	N/A
UG-MW24	UG-MW24-12-13	12 to 13	6/27/2013	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	N/A
UG-MW24	UG-MW24-27-28	27 to 28	6/28/2013	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	N/A
UG-MW24	UG-MW24-40-41	40 to 41	6/28/2013	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	N/A
UG-MW24	UG-MW24-54-55	54 to 55	6/28/2013	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	N/A
UG-MW24	UG-MW24-72-73	72 to 73	6/28/2013	0.0079 U	0.0079 U	0.023	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	N/A
UG-MW24	UG-MW24-79-80	79 to 80	6/28/2013	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	N/A
UG-MW24	UG-MW24-99-100	99 to 100	6/28/2013	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	N/A
UG-MW25D	UG-MW25D-1-2	1 to 2	8/22/2013	0.37	0.0088	0.024	0.13	0.090	0.47	0.30	0.31	0.33	0.080	0.22	0.033	0.12	0.4
UG-MW25D	UG-MW25D-2.5-3.5	2.5 to 3.5	8/22/2013	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	N/A
UG-MW25D	UG-MW25D-34-35	34 to 35	8/22/2013	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	N/A
UG-MW25S	UG-MW25S-1-2	1 to 2	8/23/2013	0.17	0.0073 U	0.014	0.064	0.11	0.18	0.094	0.11	0.11	0.036	0.093	0.017	0.060	0.14
UG-MW26	UG-MW26-0-1	0 to 1	9/11/2013	0.14	0.040 U	0.060	0.069	0.15	0.17	0.077	0.11	0.13	0.044	0.12	0.040 U	0.054	0.14
UG-MW26	UG-MW26-2-3	2 to 3	9/11/2013	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	N/A
UG-MW27	UG-MW27-16-17	16 to 17	6/26/2013	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	N/A
UG-MW27	UG-MW27-25-26	25 to 26	6/26/2013	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	N/A
UG-MW27	UG-MW27-30-31	30 to 31	6/27/2013	0.0082 U	0.0082 U	0.0082 U	0.0082 U	0.0082 U	0.0082 U	0.0082 U	0.0082 U	0.0082 U	0.0082 U	0.0082 U	0.0082 U	0.0082 U	N/A
UG-MW27	UG-MW27-54-55	54 to 55	6/27/2013	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	N/A
UG-MW28	UG-MW28-23-24	23 to 24	6/24/2013	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	N/A
UG-MW28	UG-MW28-27-28	27 to 28	6/24/2013	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	N/A
UG-MW28	UG-MW28-39-40	39 to 40	6/24/2013	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	N/A
UG-MW29D	UG-MW29D-7-7.25	7 to 7.25	6/25/2013	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	N/A
MTCA Method A ULU Cleanup Level				3,200[9]	3,200[9]	5[12]	NE	NE	2,400[9]	MTCA ULU cleanup level for the TTEC of cPAHs is 0.1 mg/kg							
Washington State Background Levels or Ecology Guidance Reuse Criteria[11]				NE	NE	NE	NE	NE	NE	Reuse Criteria is 0.1 mg/kg							

Investigation Location Identification	Sample ID[2]	Sample Depth (feet bgs)	Sample Date	Petroleum Hydrocarbons (mg/Kg)[3,4,5]						Total Metals (mg/Kg)[6]							Polycyclic Aromatic Hydrocarbons (mg/kg)[7]				
				Gasoline-Range (HCID)	Diesel-Range (HCID)	Lube Oil-Range (HCID)	Gasoline-Range	Diesel-Range	Lube Oil-Range	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Silver	1-Methylnaphthalene	2-Methylnaphthalene	Acenaphthene	Acenaphthylene	Anthracene
UG-MW29D	UG-MW29D-20-20.5	20 to 20.5	6/25/2013	N/A	N/A	N/A	5.2 U	28 U	55 U	11 U	52	0.55 U	28	5.5 U	0.28 U	1.1 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U
UG-MW29D	UG-MW29D-22-23	22 to 23	6/25/2013	N/A	N/A	N/A	5.9 U	30 U	61 U	12 U	140	0.61 U	87	6.7	0.30 U	1.2 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U
UG-MW29D	UG-MW29D-34.5-35	34.5 to 35	6/25/2013	N/A	N/A	N/A	6.7 U	33 U	65 U	13 U	42	0.65 U	32	6.5 U	0.33 U	1.3 U	0.0087 U	0.0087 U	0.0087 U	0.0087 U	0.0087 U
UG-MW29D	UG-MW29D-37.5-38	37.5 to 38	6/25/2013	N/A	N/A	N/A	6.0 U	32 U	64 U	13 U	91	0.64 U	56	6.4 U	0.32 U	1.3 U	0.0086 U	0.0086 U	0.0086 U	0.0086 U	0.0086 U
UG-MW30D	UG-MW30D-10-11.5	10 to 11	7/1/2013	N/A	N/A	N/A	4.5 U	28 U	55 U	11 U	33	0.55 U	26	5.5 U	0.28 U	1.1 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U
UG-MW30D	UG-MW30D-29-30	29 to 30	7/1/2013	N/A	N/A	N/A	4.7 U	27 U	55 U	11 U	41	0.54 U	24	5.4 U	0.27 U	1.1 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U
UG-MW30D	UG-MW30D-35-36	35 to 36	7/1/2013	N/A	N/A	N/A	5.4 U	30 U	60 U	12 U	87	0.60 U	56	6.0 U	0.30 U	1.2 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U
UG-MW30D	UG-MW30D-47-48	47 to 48	7/1/2013	N/A	N/A	N/A	5.7 U	31 U	62 U	12 U	89	0.62 U	45	6.2 U	0.31 U	1.2 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U
UG-MW30D	UG-MW30D-52-53	52 to 53	7/1/2013	N/A	N/A	N/A	5.9 U	31 U	63 U	13 U	150	0.63 U	73	6.3 U	0.31 U	1.3 U	0.0084 U	0.0084 U	0.0084 U	0.0084 U	0.0084 U
UG-MW30S	UG-MW30S-9-10	9 to 10	7/2/2013	23 U	56 U	110 U	N/A	N/A	N/A	11 U	33	0.56 U	19 J	5.6 U	0.28 U	1.1 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U
UG-MW30S	UG-MW30S-11-12	11 to 12	7/2/2013	24 U	59 U	120 U	N/A	N/A	N/A	12 U	53	0.59 U	30 J	5.9 U	0.29 U	1.2 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U
UG-MW30S	UG-MW30S-13-14	13 to 14	7/2/2013	22 U	54 U	110 U	N/A	N/A	N/A	11 U	49	0.54 U	30 J	5.4 U	0.27 U	1.1 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U
UG-MW30S	UG-MW30S-17.5-18.5	17.5 to 18.5	7/2/2013	23 U	56 U	110 U	N/A	N/A	N/A	11 U	49	0.56 U	37 J	5.6 U	0.28 U	1.1 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U
UG-MW30S	UG-MW30S-19-20	19 to 20	7/2/2013	23 U	57 U	110 U	N/A	N/A	N/A	11 U	34	0.57 U	30 J	5.7 U	0.28 U	1.1 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U
UG-MW31	UG-MW31-0.5-1	0.5 to 1	8/26/2013	21 U	53 U	110 U	N/A	N/A	N/A	11 U	40	0.53 U	32	5.3 U	0.27 U	1.1 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U
UG-MW31	UG-MW31-4-5	4 to 5	8/26/2013	22 U	54 U	110 U	N/A	N/A	N/A	11 U	39	0.54 U	34	5.4 U	0.27 U	1.1 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U
UG-MW32	UG-MW32-1-2	1 to 2	9/12/2013	22 U	54 U	110 U	N/A	N/A	N/A	11 U	59	0.54 U	44 J	5.4 U	0.27 U	1.1 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U
UG-MW32	UG-MW32-3.5-4.5	3.5 to 4.5	9/12/2013	22 U	55 U	110 U	N/A	N/A	N/A	11 U	47	0.55 U	46 J	5.5 U	0.27 U	1.1 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U
UG-MW33	UG-MW33-0-1	0 to 1	9/18/2013	25 U	63 U	DET	N/A	47 U	190	14	220	0.76	58	230	0.31 U	1.3 U	0.013	0.016	0.0083 U	0.013	0.014
UG-MW33	UG-MW33-2-3	2 to 3	9/18/2013	23 U	56 U	110 U	N/A	N/A	N/A	11 U	72	0.56 U	46	5.6 U	0.28 U	1.1 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U
UG-MW34	UG-MW34-1-2	1 to 2	9/6/2013	21 U	54 U	110 U	N/A	N/A	N/A	11 U	71	0.54 U	64	5.4 U	0.27 U	1.1 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U
UG-MW34	UG-MW34-5-6	5 to 6	9/6/2013	21 U	53 U	110 U	N/A	N/A	N/A	11 U	49	0.53 U	33	6.8	0.26 U	1.1 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U
UG-MW35	UG-MW35-0-2	0 to 2	9/18/2013	22 U	55 U	110 U	N/A	N/A	N/A	11 U	140	0.55 U	44	170	0.27 U	1.1 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U
UG-MW35	UG-MW35-4-5	4 to 5	9/18/2013	22 U	55 U	110 U	N/A	N/A	N/A	11 U	85	0.55 U	61	5.8	0.27 U	1.1 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U
UG-MW36	UG-MW36-0-1	0 to 1	9/18/2013	23 U	58 U	DET	N/A	29 U	160	12 U	200	0.62	61	290	1.1	1.2 U	0.014	0.015	0.0077 U	0.0077 U	0.0083
UG-MW36	UG-MW36-1-3	1 to 3	9/18/2013	22 U	56 U	DET	N/A	31 U	170	11 U	200	0.66	58	390	0.28 U	1.1 U	0.017	0.019	0.0075 U	0.012	0.019
UG-MW36	UG-MW36-4-5	4 to 5	9/18/2013	21 U	53 U	110 U	N/A	N/A	N/A	11 U	67	0.53 U	39	5.3 U	0.26 U	1.1 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U
UG-MW37	UG-MW37-0-1	0 to 1	9/19/2013	22 U	55 U	DET	N/A	57 U	520	12	91	0.55 U	24	12	0.28 U	1.1 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U
UG-MW37	UG-MW37-1-2	1 to 2	9/19/2013	23 U	56 U	110 U	N/A	N/A	N/A	14	59	0.56 U	45	5.6 U	0.28 U	1.1 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U
UG-MW38D	UG-MW38D-1-2	1 to 2	9/16/2013	23 U	57 U	DET	N/A	28 U	310	11 U	180	0.59	42	200	0.28 U	1.1 U	0.016	0.026	0.0076 U	0.016	0.018
UG-MW38D	UG-MW38D-3.5-4.5	3.5 to 4.5	9/16/2013	22 U	56 U	110 U	N/A	N/A	N/A	11 U	60	0.56 U	31	20	0.28 U	1.1 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U
UG-MW38D	UG-MW38D-5-6	5 to 6	9/16/2013	23 U	58 U	DET	N/A	29 U	470	12 U	97	0.58 U	50	92	0.29 U	1.2 U	0.0077 U	0.0077 U	0.0077 U	0.0077 U	0.0077 U
UG-MW38D	UG-MW38D-33-34	33 to 34	9/17/2013	N/A	N/A	N/A	3.7 U	28 U	56 U	11 U	56	0.56 U	12	5.6 U	0.28 U	1.1 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U
UG-MW38S	UG-MW38S-0.5-1.5	0.5 to 1.5	9/16/2013	23 U	57 U	DET	N/A	29 U	250	11 U	100	0.57 U	40	110	0.29 U	1.1 U	0.011	0.015	0.0076 U	0.0076 U	0.013
UG-MW38S	UG-MW38S-2-3	2 to 3	9/16/2013	24 U	59 U	120 U	N/A	N/A	N/A	12 U	140	0.59 U	48	130	0.30 U	1.2 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U	0.0079 U
UG-MW38S	UG-MW38S-5-6	5 to 6	9/16/2013	22 U	54 U	110 U	N/A	N/A	N/A	11 U	46	0.54 U	33	5.4 U	0.27 U	1.1 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U
MTCA Method A ULU Cleanup Level				100/30	2,000	2,000	100/30[8]	2,000	2,000	20	16,000[9]	2.0	2,000[10]	250	2.0	400[9]	35[9]	320[9]	4,800[9]	NE	24,000[9]
Washington State Background Levels or Ecology Guidance Reuse Criteria[11]				30	200	200	30	200	200	7	NE	1	48	50	0.07 or DET	NE	NE	NE	NE	NE	NE

Investigation Location Identification	Sample ID[2]	Sample Depth (feet bgs)	Sample Date	Polycyclic Aromatic Hydrocarbons (mg/kg)[7] Fluoranthene	Fluorene	Naphthalene	Benzo(ghi)perylene	Phenanthrene	Pyrene	cPAHs (mg/kg)[7] Benzo (a) anthracene (TEF 0.1)	Benzo (a) pyrene (TEF 1)	Benzo (b) fluoranthene (TEF 0.1)	Benzo (J,k) fluoranthene (TEF 0.1)	Chrysene (TEF 0.01)	Dibenz (a,h) anthracene (TEF 0.1)	Indeno (1,2,3-cd) pyrene (TEF 0.1)	TTEC of cPAHs (detect only)
UG-MW29D	UG-MW29D-20-20.5	20 to 20.5	6/25/2013	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	N/A
UG-MW29D	UG-MW29D-22-23	22 to 23	6/25/2013	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	N/A
UG-MW29D	UG-MW29D-34.5-35	34.5 to 35	6/25/2013	0.0087 U	0.0087 U	0.0087 U	0.0087 U	0.0087 U	0.0087 U	0.0087 U	0.0087 U	0.0087 U	0.0087 U	0.0087 U	0.0087 U	0.0087 U	N/A
UG-MW29D	UG-MW29D-37.5-38	37.5 to 38	6/25/2013	0.0086 U	0.0086 U	0.0086 U	0.0086 U	0.0086 U	0.0086 U	0.0086 U	0.0086 U	0.0086 U	0.0086 U	0.0086 U	0.0086 U	0.0086 U	N/A
UG-MW30D	UG-MW30D-10-11.5	10 to 11	7/1/2013	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	N/A
UG-MW30D	UG-MW30D-29-30	29 to 30	7/1/2013	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	N/A
UG-MW30D	UG-MW30D-35-36	35 to 36	7/1/2013	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	0.0081 U	N/A
UG-MW30D	UG-MW30D-47-48	47 to 48	7/1/2013	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	0.0083 U	N/A
UG-MW30D	UG-MW30D-52-53	52 to 53	7/1/2013	0.0084 U	0.0084 U	0.011	0.0084 U	0.0084 U	0.0084 U	0.0084 U	0.0084 U	0.0084 U	0.0084 U	0.0084 U	0.0084 U	0.0084 U	N/A
UG-MW30S	UG-MW30S-9-10	9 to 10	7/2/2013	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	N/A
UG-MW30S	UG-MW30S-11-12	11 to 12	7/2/2013	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	0.0078 U	N/A
UG-MW30S	UG-MW30S-13-14	13 to 14	7/2/2013	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	N/A
UG-MW30S	UG-MW30S-17.5-18.5	17.5 to 18.5	7/2/2013	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	N/A
UG-MW30S	UG-MW30S-19-20	19 to 20	7/2/2013	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	0.0076 U	N/A
UG-MW31	UG-MW31-0.5-1	0.5 to 1	8/26/2013	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	N/A
UG-MW31	UG-MW31-4-5	4 to 5	8/26/2013	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	N/A
UG-MW32	UG-MW32-1-2	1 to 2	9/12/2013	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	N/A
UG-MW32	UG-MW32-3.5-4.5	3.5 to 4.5	9/12/2013	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	N/A
UG-MW33	UG-MW33-0-1	0 to 1	9/18/2013	0.12	0.0083 U	0.043	0.047	0.066	0.10	0.055	0.077	0.097	0.029	0.086	0.010	0.040	0.10
UG-MW33	UG-MW33-2-3	2 to 3	9/18/2013	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	N/A
UG-MW34	UG-MW34-1-2	1 to 2	9/6/2013	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	0.0071 U	N/A
UG-MW34	UG-MW34-5-6	5 to 6	9/6/2013	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	N/A
UG-MW35	UG-MW35-0-2	0 to 2	9/18/2013	0.047	0.0073 U	0.0073 U	0.018	0.035	0.042	0.013	0.024	0.032	0.0092	0.027	0.0073 U	0.015	0.031
UG-MW35	UG-MW35-4-5	4 to 5	9/18/2013	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	0.0073 U	N/A
UG-MW36	UG-MW36-0-1	0 to 1	9/18/2013	0.061	0.0077 U	0.018	0.027	0.042	0.057	0.032	0.043	0.058	0.015	0.048	0.0077 U	0.024	0.056
UG-MW36	UG-MW36-1-3	1 to 3	9/18/2013	0.11	0.0094	0.029	0.041	0.092	0.10	0.054	0.069	0.087	0.024	0.081	0.0095	0.037	0.09
UG-MW36	UG-MW36-4-5	4 to 5	9/18/2013	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	0.0070 U	N/A
UG-MW37	UG-MW37-0-1	0 to 1	9/19/2013	0.032	0.0074 U	0.0074 U	0.026	0.019	0.033	0.018	0.023	0.027	0.0084	0.024	0.0074 U	0.014	0.03
UG-MW37	UG-MW37-1-2	1 to 2	9/19/2013	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	N/A
UG-MW38D	UG-MW38D-1-2	1 to 2	9/16/2013	0.086	0.0083	0.032	0.063	0.066	0.099	0.059	0.063	0.11	0.017	0.088	0.020	0.039	0.089
UG-MW38D	UG-MW38D-3.5-4.5	3.5 to 4.5	9/16/2013	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	0.0074 U	N/A
UG-MW38D	UG-MW38D-5-6	5 to 6	9/16/2013	0.0094	0.0077 U	0.0077 U	0.010	0.0084	0.0097	0.0077 U	0.0079	0.0094	0.0077 U	0.0080	0.0077 U	0.0077 U	0.009
UG-MW38D	UG-MW38D-33-34	33 to 34	9/17/2013	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	0.0075 U	N/A
UG-MW38S	UG-MW38S-0.5-1.5	0.5 to 1.5	9/16/2013	0.063	0.0076 U	0.018	0.034	0.040	0.070	0.037	0.041	0.060	0.013	0.042	0.0083	0.023	0.056
UG-MW38S	UG-MW38S-2-3	2 to 3	9/16/2013	0.012	0.0079 U	0.0079 U	0.0079 U	0.0079	0.014	0.0079 U	0.0079 U	0.010	0.0079 U	0.0080	0.0079 U	0.0079 U	0.0011
UG-MW38S	UG-MW38S-5-6	5 to 6	9/16/2013	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	0.0072 U	N/A
MTCA Method A ULU Cleanup Level				3,200[9]	3,200[9]	5[12]	NE	NE	2,400[9]	MTCA ULU cleanup level for the TTEC of cPAHs is 0.1 mg/kg							
Washington State Background Levels or Ecology Guidance Reuse Criteria[11]				NE	NE	NE	NE	NE	NE	Reuse Criteria is 0.1 mg/kg							

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc., of Redmond, Washington.

[2] Sample ID = Area number - boring/test pit number - starting depth of sample [feet bgs] -end depth [feet bgs], Area 1A Boring 4 collected 11-12 feet bgs = 1A-B4-11-12.

[3] Northwest Total Petroleum Hydrocarbons - Hydrocarbon Identification by Ecology-approved method NWTPH-HCID

[4] Gasoline-range petroleum hydrocarbons by Ecology-approved method NWTPH-Gx

[5] Diesel and Lube oil-range petroleum hydrocarbons by Ecology-approved method NWTPH-Dx

[6] Resource Conservation Recovery Act (RCRA) metals analyzed by EPA 6000/7000 series method.

[7] Polycyclic aromatic hydrocarbons (PAHs) and carcinogenic PAHs (cPAHs) were analyzed by U.S. Environmental Protection Agency (EPA) method 8270D/SIM. Other PAHs were analyzed but not detected.

[8] MTCA Method A cleanup level for gasoline is 30 mg/kg if benzene is detected or if the sum of toluene, ethylbenzene and xylenes are equal to or greater than 1% of the total gasoline detection.

[9] MTCA Method B ULU criteria represented because MTCA Method A cleanup level has not been established.

[10] MTCA Method A cleanup level for Trivalent Chromium.

[11] Guidance for Remediation of Petroleum Contaminated Sites (Publication 10-09-057) Ecology, October 2011; Summary Natural Background Soil Metals Concentrations in Washington State (Publication 94-115) dated October 1994; and Hazardous Waste Regulations 40 CFR Part 260.

[12] MTCA Method A cleanup level for naphthalenes is a total value for naphthalene, 1-methylnaphthalene and 2-methylnaphthalene.

mg/kg = milligram per kilogram

MTCA = Model Toxics Control Act

DET = Detected

U = Analyte was not detected at or greater than the listed reporting limit

J = Estimated result by analytical laboratory

TEF = Toxicity Equivalency Factor as defined in WAC 173-340-900 Table 708-2

Total Toxic Equivalent Concentration (TTEC) is the sum of each individual cPAH concentration multiplied by its corresponding TEF.

-- = sample not analyzed

bgs = below ground surface

ULU = Unrestricted Land Use

NE = Not Established

Bold font type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Bold font type and gray shading indicates that the detected concentration is greater than the respective MTCA cleanup level.

Dashed outline indicates the value is detected at a concentration greater than the Reuse Criteria.

Table 15

Summary of All Chemical Analytical Results - All Samples for Selected HVOCs[1] - Soil

2013 Environmental Subsurface Investigation - University of Washington-Tacoma

Tacoma, Washington

Exploration	Elevation of Ground Surface (ft)	Sample Identification [2]	Sample Depth (ft bgs)	Soil Type	VOCs[3] (mg/kg) Tetrachloroethene (PCE)	Trichloroethene (TCE)	cis-1,2-Dichloroethene (DCE)	trans-1,2-Dichloroethene (DCE)	1,1-Dichloroethene (DCE)	Vinyl Chloride
CR-MW15	79.84	CR-MW15-10-11	10 to 11	Qvi	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U
		CR-MW15-12-13	12 to 13	Qvi	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U
		CR-MW15-14-15	14 to 15	Silt	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U
		CR-MW15-18-19	18 to 19	Transition Zone	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U
		CR-MW15-19.5-20	19.5 to 20	Outwash	0.046 U	0.046 U	0.046 U	0.046 U	0.046 U	0.046 U
		CR-MW15-21-22	21 to 22	Outwash	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U
		CR-MW15-23.5-24	23.5 to 24	Outwash	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U
		CR-MW15-29-30	29 to 30	Outwash	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U
		CR-MW15-32-33	32 to 33	Outwash	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U
		CR-MW15-34-35	34 to 35	Outwash	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U
CR-MW16	65.35	CR-MW16-9-10	9 to 10	Fill	0.00089 U	0.0024	0.00089 U	0.00089 U	0.00089 U	0.00089 U
		CR-MW16-10-11	10 to 11	Fill	0.00096 U	0.0016	0.00096 U	0.00096 U	0.00096 U	0.00096 U
		CR-MW16-15-16	15 to 16	Fill/Recessional Outwash	0.00088 U	0.0031	0.00088 U	0.00088 U	0.00088 U	0.00088 U
		CR-MW16-18-19	18 to 19	Qvi	0.00085 U	0.051	0.031	0.0022	0.00085 U	0.00085 U
		CR-MW16-20-21	20 to 21	Qvi	0.00086 U	0.034	0.016	0.0012	0.00086 U	0.00086 U
		CR-MW16-24-25	24 to 25	Qvi	0.00078 U	0.031	0.019	0.0012	0.00078 U	0.00078 U
		CR-MW16-26-27	26 to 27	Silt	0.0010 U	0.024	0.012	0.0010 U	0.0010 U	0.0010 U
		CR-MW16-28-29	28 to 29	Silt	0.0011 U	0.061	0.035	0.0021	0.0011 U	0.0020
		CR-MW16-30-31	30 to 31	Silt	0.0013 U	0.0090	0.015	0.0013 U	0.0013 U	0.0013 U
CR-MW17	64.32	CR-MW17-11-12	11 to 12	Fill	0.00090 U	0.00090 U	0.00090 U	0.00090 U	0.00090 U	0.00090 U
		CR-MW17-15-16	15 to 16	Fill/Recessional Outwash	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U
		CR-MW17-17-18	17 to 18	Fill/Recessional Outwash	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U
		CR-MW17-19-20	19 to 20	Qvi	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U
		CR-MW17-23-24	23 to 24	Qvi	0.00077 U	0.011	0.0080	0.00077 U	0.00077 U	0.00077 U
		CR-MW17-25-26	25 to 26	Qvi	0.0013 U	0.021	0.022	0.0013 U	0.0013 U	0.0013 U
		CR-MW17-27-28	27 to 28	Silt	0.0014 U	0.012	0.016	0.0014 U	0.0014 U	0.0014 U
		CR-MW17-28-28.5	28 to 28.5	Transition Zone	0.00097 U	0.026	0.034	0.0013	0.00097 U	0.0025
		CR-MW17-29-30	29 to 30	Transition Zone	0.0012 U	0.0025	0.0035	0.0012 U	0.0012 U	0.0012 U
JS-MW3S	89.36	JS-MW3S-8-9	8 to 9	Qvi	0.00091 U	0.00091 U	0.00091 U	0.00091 U	0.00091 U	0.00091 U
		130904-S-1	8 to 9	Qvi	0.00090 U	0.00090 U	0.00090 U	0.00090 U	0.00090 U	0.00090 U
		JS-MW3S-10.5-11.5	10.5 to 11.5	Qvi	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U
		JS-MW3S-12-12.5	12 to 12.5	Qvi	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U
		JS-MW3S-13-14	13 to 14	Qvi	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U
		JS-MW3S-18-19	18 to 19	Qvi	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U
		JS-MW3S-21-22	21 to 22	Qvi	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U
		JS-MW3S-23-24	23 to 24	Silt	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U
		JS-MW3S-24-25	24 to 25	Silt	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U
JS-MW4	94.21	JS-MW4D-7-8	7 to 8	Qvi	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U
		JS-MW4D-9-10	9 to 10	Qvi	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U
		JS-MW4D-13-14	13 to 14	Qvi	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U
		JS-MW4D-14-15	14 to 15	Qvi	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
		JS-MW4D-17-18	17 to 18	Qvi	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U
		JS-MW4D-18-19	18 to 19	Qvi	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U
		130905-S-1	18 to 19	Qvi	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U
		JS-MW4D-22-23	22 to 23	Qvi	0.00090 U	0.00090 U	0.00090 U	0.00090 U	0.00090 U	0.00090 U
		JS-MW4D-29-29.3	29 to 29.3	Qvi	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U
		JS-MW4D-29.5-30	29.5 to 30	Qvi	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U
		JS-MW4D-31-32	31 to 32	Silt	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U
		JS-MW4D-32-32.3	32 to 32.3	Silt	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U
		JS-MW4D-36-37	36 to 37	Transition Zone	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U
		JS-MW4D-37-38	37 to 38	Transition Zone	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U
		JS-MW4D-38.5-39.5	38.5 to 39.5	Transition Zone	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U
		JS-MW4D-43-44	43 to 44	Outwash	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U
		JS-MW4D-45.5-46	45.5 to 46	Outwash	0.0011 U	0.0014	0.0011 U	0.0011 U	0.0011 U	0.0011 U
		JS-MW4D-49-50	49 to 50	Outwash	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U
		JS-MW4D-52-53	52 to 53	Outwash	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U
		JS-MW4D-53-54	53 to 54	Outwash	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
JS-MW5	105.03	JS-MW5-9-10	9 to 10	Fill	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
		JS-MW5-10-11	10 to 11	Qvi	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U
		JS-MW5-14-15	14 to 15	Qvi	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U
		JS-MW5-15-15.5	15 to 15.5	Qvi	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U
		JS-MW5-16-17	16 to 17	Qvi	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U
		JS-MW5-22-23	22 to 23	Silt	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U
		JS-MW5-24-25	24 to 25	Transition Zone	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U
		130829-S-1	24 to 25	Transition Zone	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U
		JS-MW5-29-30	29 to 30	Outwash	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U
		JS-MW5-34-35	34 to 35	Outwash	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U
		JS-MW5-37-38	37 to 38	Outwash	0.00068 U	0.0032	0.00068 U	0.00068 U	0.00068 U	0.00068 U
		JS-MW5-38-39	38 to 39	Outwash	0.00090 U	0.0035	0.00090 U	0.00090 U	0.00090 U	0.00090 U
		JS-MW5-39-40	39 to 40	Outwash	0.00070 U	0.0051	0.00070 U	0.00070 U	0.00070 U	0.00070 U
JS-MW6D	102.32	JS-MW6D-11-12	11 to 12	Qvi	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U
		JS-MW6D-16-17	16 to 17	Qvi	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U
		JS-MW6D-18-19	18 to 19	Silt	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U
		JS-MW6D-20.5-21.5	20.5 to 21.5	Outwash	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U
		130830-S-1	24 to 25	Outwash	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U
		JS-MW6D-24-25	24 to 25	Outwash	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U
		JS-MW6D-27.5-28	27.5 to 28	Outwash	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U
		JS-MW6D-29-29.5	29 to 29.5	Outwash	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U
		JS-MW6D-33-34	33 to 34	Outwash	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U
		JS-MW6D-39-40	39 to 40	Outwash	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U
		JS-MW6D-46-47	46 to 47	Outwash	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U
		JS-MW6D-48-49	48 to 49	Outwash	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U
				MTCA Method A ULU Cleanup Level	0.05	0.03	160[4]	1,600[4]	4,000[4]	0.67[4]
				Reuse Criteria [5]	DET	DET	DET	DET	DET	DET

Exploration	Elevation of Ground Surface (ft)	Sample Identification [2]	Sample Depth (ft bgs)	Soil Type	VOCs[3] (mg/kg)					
					Tetrachloroethene (PCE)	Trichloroethene (TCE)	cis-1,2-Dichloroethene (DCE)	trans-1,2-Dichloroethene (DCE)	1,1-Dichloroethene (DCE)	Vinyl Chloride
JS-MW6S	102.15	JS-MW6S-10-11	10 to 11	Qvi	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U
		JS-MW6S-14-15	14 to 15	Qvi	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U
		JS-MW6S-16-17	16 to 17	Qvi	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U
		JS-MW6S-17-17.5	17 to 17.5	Qvi	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U
		JS-MW6S-18-19	18 to 19	Qvi	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U
JS-MW7	NA	JS-MW7-7-8	7 to 8	Qvi	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U
		JS-MW7-8-9	8 to 9	Qvi	0.00099 U	0.00099 U	0.00099 U	0.00099 U	0.00099 U	0.00099 U
		JS-MW7-11-12	11 to 12	Qvi	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U
		JS-MW7-13-14	13 to 14	Silt	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U
		JS-MW7-18-19	18 to 19	Transition Zone	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U
		130903-S-1	18 to 19	Transition Zone	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U
		JS-MW7-22-23	22 to 23	Transition Zone	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U
		JS-MW7-24-25	24 to 25	Transition Zone	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U
JS-MW7A	97.00	JS-MW7A-0-1	0 to 1	Fill	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U
		JS-MW7A-1-2	1 to 2	Fill	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U
		JS-MW7A-3-4	3 to 4	Fill	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U
		JS-MW7A-5-6	5 to 6	Qvi	0.00091 U	0.00091 U	0.00091 U	0.00091 U	0.00091 U	0.00091 U
UG-MW23	171.45	UG-MW23-0-2	0 to 2	Fill	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U
		UG-MW23-2-3	2 to 3	Qvi	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U
		UG-MW23-4-5	4 to 5	Silt	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U
		UG-MW23-6-7	6 to 7	Outwash	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U
		UG-MW23-9-10	9 to 10	Outwash	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U
		UG-MW23-12-13	12 to13	Outwash	0.00064 U	0.0017	0.00064 U	0.00064 U	0.00064 U	0.00064 U
		UG-MW23-16-17	16 to 17	Outwash	0.00057 U	0.0011	0.00057 U	0.00057 U	0.00057 U	0.00057 U
		UG-MW23-17.5-18.5	17.5 to 18.5	Outwash	0.00062 U	0.0017	0.00062 U	0.00062 U	0.00062 U	0.00062 U
		UG-MW23-18.5-19	18.5 to 19	Outwash	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U
		UG-MW23-19-20	19 to 20	Outwash	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U
		UG-MW23-20-20.5	20 to 20.5	Outwash	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U
		UG-MW23-20.5-21.5	20.5 to 21.5	Outwash	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U
		UG-MW23-21.5-22	21.5 to 22	Outwash	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U
UG-MW24	197.08	UG-MW24-9-10	9 to 10	Qvi	0.0012	0.075	0.00077 U	0.00077 U	0.00077 U	0.00077 U
		UG-MW24-12-13	12 to 13	Qvi	0.0036	0.34	0.00096	0.00074 U	0.00074 U	0.00074 U
		UG-MW24-27-28	27 to 28	Qvi	0.00086 U	0.0030	0.00086 U	0.00086 U	0.00086 U	0.00086 U
		UG-MW24-40-41	40 to 41	Transition Zone	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U
		UG-MW24-54-55	54 to 55	Transition Zone	0.00091 U	0.00091 U	0.00091 U	0.00091 U	0.00091 U	0.00091 U
		UG-MW24-72-73	72 to 73	Outwash	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U
		UG-MW24-79-80	79 to 80	Outwash	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
		UG-MW24-99-100	99 to 100	Outwash	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U
UG-MW25D	202.64	UG-MW25D-1-2	1 to 2	Fill	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U
		UG-MW25D-2.5-3.5	2.5 to 3.5	Qvi	0.00099 U	0.0012	0.00099 U	0.00099 U	0.00099 U	0.00099 U
		UG-MW25D-6-7	6 to 7	Qvi	0.00082 U	0.076	0.00082 U	0.00082 U	0.00082 U	0.00082 U
		UG-MW25D-12-13	12 to 13	Qvi	0.00070 U	3.2	0.0026	0.00070 U	0.0067	0.00070 U
		UG-MW25D-13-14	13 to 14	Qvi	0.00075 U	2.3	0.0023	0.00075 U	0.0058	0.00075 U
		UG-MW25D-17-18	17 to 18	Qvi	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U
		UG-MW25D-18-19	18 to 19	Silt	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U
		UG-MW25D-24-25	24 to 25	Outwash	0.00095 U	0.0039	0.00095 U	0.00095 U	0.00095 U	0.00095 U
		UG-MW25D-34-35	34 to 35	Outwash	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U
		UG-MW25D-37-38	37 to 38	Outwash	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U
		UG-MW25D-42-43	42 to 43	Outwash	0.00091 U	0.0017	0.00091 U	0.00091 U	0.00091 U	0.00091 U
		UG-MW25D-43-44	43 to 44	Outwash	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U
		UG-MW25D-48-48.5	48 to 48.5	Outwash	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U
		UG-MW25D-48.5-49	48.5 to 49	Outwash	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U
		UG-MW25D-54-55	54 to 55	Outwash	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U
UG-MW25S	203.08	UG-MW25S-7.5-8.5	7.5 to 8.5	Qvi	0.00075 U	0.44	0.0017	0.00075 U	0.0064	0.00075 U
		UG-MW25S-8.5-9.5	8.5 to 9.5	Qvi	0.00073 U	0.47	0.00073 U	0.00073 U	0.0010	0.00073 U
		UG-MW25S-10-11	10 to 11	Qvi	0.00084 U	0.37	0.00084 U	0.00084 U	0.0021	0.00084 U
		UG-MW25S-11-12	11 to 12	Qvi	0.00077 U	1.3	0.0010	0.00077 U	0.0023	0.00077 U
		UG-MW25S-15-16	15 to 16	Qvi	0.00080 U	0.39	0.0018	0.00080 U	0.0040	0.00080 U
		UG-MW25S-19-20	19 to 20	Silt	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U
UG-MW26	202.62	UG-MW26-0-1	0 to 1	Fill	0.0013 U	0.0013 U	0.0013 U	0.0013 U	0.0013 U	0.0013 U
		UG-MW26-2-3	2 to 3	Qvi	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U
		UG-MW26-6-6.3	6 to 6.3	Qvi	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U
		UG-MW26-6.5-7.5	6.5 to 7.5	Qvi	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U
		UG-MW26-11-12	11 to 12	Qvi	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U
		UG-MW26-15-16	15 to 16	Qvi	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U
		UG-MW26-19-20	19 to 20	Silt	0.00091 U	0.00091 U	0.00091 U	0.00091 U	0.00091 U	0.00091 U
		UG-MW26-23-24	23 to 24	Outwash	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U
		UG-MW26-24-25	24 to 25	Outwash	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
UG-MW27	149.28	UG-MW27-16-17	16 to 17	Qvi	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U
		UG-MW27-25-26	25 to 26	Qvi	0.00098 U	0.0011	0.00098 U	0.00098 U	0.00098 U	0.00098 U
		UG-MW27-30-31	30 to 31	Silt	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
		UG-MW27-54-55	54 to 55	Outwash	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
UG-MW28	151.80	UG-MW28-23-24	23 to 24	Qvi	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U
		UG-MW28-27-28	27 to 28	Transition Zone	0.00090 U	0.00090 U	0.00090 U	0.00090 U	0.00090 U	0.00090 U
		UG-MW28-39-40	39 to 40	Outwash	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U
UG-MW29D	149.61	UG-MW29D-7-7.25	7 to 7.25	Qvi	0.00086 U	0.0014	0.00086 U	0.00086 U	0.00086 U	0.00086 U
		UG-MW29D-9-9.5	9 to 9.5	Qvi	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U
		UG-MW29D-17-18	17 to 18	Qvi	0.00077 U	0.0066	0.00077 U	0.00077 U	0.00077 U	0.00077 U
		UG-MW29D-20-20.5	20 to 20.5	Qvi	0.00082 U	0.0073	0.00082 U	0.00082 U	0.00082 U	0.00082 U
		UG-MW29D-22-23	22 to 23	Silt	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U
		UG-MW29D-34.5-35	34.5 to 35	Outwash	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U
		UG-MW29D-37.5-38	37.5 to 38	Outwash	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U
MTCA Method A ULU Cleanup Level					0.05	0.03	160[4]	1,600[4]	4,000[4]	0.67[4]
Reuse Criteria [5]					DET	DET	DET	DET	DET	DET

Exploration	Elevation of Ground Surface (ft)	Sample Identification [2]	Sample Depth (ft bgs)	Soil Type	VOCs[3] (mg/kg) Tetrachloroethene (PCE)	Trichloroethene (TCE)	cis-1,2-Dichloroethene (DCE)	trans-1,2-Dichloroethene (DCE)	1,1-Dichloroethene (DCE)	Vinyl Chloride
UG-MW30D	123.24	UG-MW30D-10-11.5	10 to 11.5	Qvi	0.00082 U	0.020	0.00082 U	0.00082 U	0.00082 U	0.00082 U
		UG-MW30D-29-30	29 to 30	Qvi	0.00093 U	0.0039	0.00093 U	0.00093 U	0.00093 U	0.00093 U
		UG-MW30D-35-36	35 to 36	Silt	0.00081 U	0.0021	0.00081 U	0.00081 U	0.00081 U	0.00081 U
		UG-MW30D-47-48	47 to 48	Outwash	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U
		UG-MW30D-52-53	52 to 53	Outwash	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U
UG-MW30S	123.10	UG-MW30S-9-10	9 to 10	Qvi	0.00080 U	0.0023	0.00080 U	0.00080 U	0.00080 U	0.00080 U
		UG-MW30S-11-12	11 to 12	Qvi	0.00076 U	0.032	0.00076 U	0.00076 U	0.00076 U	0.00076 U
		UG-MW30S-13-14	13 to 14	Qvi	0.00073 U	0.092	0.00073 U	0.00073 U	0.00073 U	0.00073 U
		UG-MW30S-17.5-18.5	17.5 to 18.5	Qvi	0.00071 U	0.014	0.00071 U	0.00071 U	0.00071 U	0.00071 U
		UG-MW30S-19-20	19 to 20	Qvi	0.00094 U	0.045	0.00094 U	0.00094 U	0.00094 U	0.00094 U
UG-MW31	143.35	UG-MW31-0.5-1	0.5 to 1	Fill	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U
		UG-MW31-4-5	4 to 5	Fill	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U
		UG-MW31-6-7	6 to 7	Qvi	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U
		UG-MW31-11-12	11 to 12	Qvi	0.00085 U	0.0020	0.00085 U	0.00085 U	0.00085 U	0.00085 U
		UG-MW31-15-16	15 to 16	Qvi	0.00075 U	0.0077	0.00075 U	0.00075 U	0.00075 U	0.00075 U
		UG-MW31-16.5-17	16.5 to 17	Qvi	0.00091	0.026	0.00089 U	0.00089 U	0.00089 U	0.00089 U
		UG-MW31-20-21	20 to 21	Silt	0.00082 U	0.0046	0.00082 U	0.00082 U	0.00082 U	0.00082 U
		UG-MW31-22-23	22 to 23	Outwash	0.00089 U	0.0060	0.00089 U	0.00089 U	0.00089 U	0.00089 U
		UG-MW31-29.5-30	29.5 to 30	Outwash	0.00092 U	0.0024	0.00092 U	0.00092 U	0.00092 U	0.00092 U
		UG-MW31-32-33	32 to 33	Outwash	0.00072 U	0.0088	0.00072 U	0.00072 U	0.00072 U	0.00072 U
UG-MW32	160.38	UG-MW32-1-2	1 to 2	Qvi	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U
		UG-MW32-3.5-4.5	3.5 to 4.5	Qvi	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U
		UG-MW32-7-8	7 to 8	Qvi	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U
		UG-MW32-8-9	8 to 9	Qvi	0.00099 U	0.00099 U	0.00099 U	0.00099 U	0.00099 U	0.00099 U
		UG-MW32-12-13	12 to 13	Qvi	0.00099 U	0.0019	0.00099 U	0.00099 U	0.00099 U	0.00099 U
		UG-MW32-14-15	14 to 15	Silt	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U
UG-MW33	183.91	UG-MW33-0-1	0 to 1	Fill	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U
		UG-MW33-2-3	2 to 3	Qvi	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U
		UG-MW33-6-7	6 to 7	Qvi	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U
		UG-MW33-8-9	8 to 9	Qvi	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U
		UG-MW33-11-12	11 to 12	Silt	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U
		UG-MW33-12-12.5	12 to 12.5	Outwash	0.00058 U	0.00058 U	0.00058 U	0.00058 U	0.00058 U	0.00058 U
		UG-MW33-13-13.5	13 to 13.5	Outwash	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U
		UG-MW33-13.5-14	13.5 to 14	Outwash	0.00067 U	0.00067 U	0.00067 U	0.00067 U	0.00067 U	0.00067 U
		S-130918-1	14 to 15	Outwash	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U
		UG-MW33-14-15	14 to 15	Outwash	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U
UG-MW34	142.23	UG-MW34-1-2	1 to 2	Qvi	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
		UG-MW34-5-6	5 to 6	Qvi	0.00037 U	0.00037 U	0.00037 U	0.00037 U	0.00037 U	0.00037 U
		UG-MW34-11-12	11 to 12	Qvi	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U
		UG-MW34-14-15	14 to 15	Qvi	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U
		UG-MW34-15-16	15 to 16	Qvi	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U
		UG-MW34-20-21	20 to 21	Silt	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U
		UG-MW34-24-25	24 to 25	Outwash	0.00091 U	0.00091 U	0.00091 U	0.00091 U	0.00091 U	0.00091 U
		UG-MW34-30-31	30 to 31	Outwash	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
		UG-MW34-34-35	34 to 35	Outwash	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U
UG-MW35	181.91	UG-MW35-0-2	0 to 2	Fill	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U
		UG-MW35-4-5	4 to 5	Fill	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U
		UG-MW35-5.5-6	5.5 to 6	Qvi	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U
		UG-MW35-7-8	7 to 8	Qvi	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U
		UG-MW35-11.5-12.5	11.5 to 12.5	Qvi	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U
		UG-MW35-13-13.5	13 to 13.5	Silt	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U
		UG-MW35-13.5-14	13.5 to 14	Silt	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U
		UG-MW35-15-16	15 to 16	Outwash	0.00057 U	0.00067	0.00057 U	0.00057 U	0.00057 U	0.00057 U
		UG-MW35-16-17	16 to 17	Outwash	0.00059 U	0.0063	0.00059 U	0.00059 U	0.00059 U	0.00059 U
		UG-MW35-18-19	18 to 19	Outwash	0.00062 U	0.0016	0.00062 U	0.00062 U	0.00062 U	0.00062 U
		UG-MW35-19-19.5	19 to 19.5	Outwash	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U
		UG-MW35-19.5-20	19.5 to 20	Outwash	0.00095 U	0.0012	0.00095 U	0.00095 U	0.00095 U	0.00095 U
UG-MW36	180.57	UG-MW36-0-1	0 to 1	Fill	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U
		UG-MW36-1-3	1 to 3	Fill	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U
		UG-MW36-4-5	4 to 5	Qvi	0.00058 U	0.00058 U	0.00058 U	0.00058 U	0.00058 U	0.00058 U
		UG-MW36-6-7	6 to 7	Qvi	0.00058 U	0.00058 U	0.00058 U	0.00058 U	0.00058 U	0.00058 U
		UG-MW36-8-9	8 to 9	Qvi	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U
		UG-MW36-10.5-11	10.5 to 11	Qvi	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U
		UG-MW36-11-11.5	11 to 11.5	Silt	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U
		UG-MW36-12-12.5	12 to 12.5	Silt	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U
		UG-MW36-12.5-13	12.5 to 13	Transition Zone	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U
		UG-MW36-13-14	13 to 14	Outwash	0.00063 U	0.0020	0.00063 U	0.00063 U	0.00063 U	0.00063 U
UG-MW37	197.78	UG-MW37-0-1	0 to 1	Fill	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U
		UG-MW37-1-2	1 to 2	Fill	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U	0.00061 U
		UG-MW37-3-4	3 to 4	Qvi	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U
		UG-MW37-5.5-6.5	5.5 to 6.5	Qvi	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U
		UG-MW37-7-8	7 to 8	Qvi	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U
		UG-MW37-9-10	9 to 10	Qvi	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U
		S-130919-1	9 to 10	Qvi	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U
		UG-MW37-11-12	11 to 12	Qvi	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U
		UG-MW37-13-14	13 to 14	Qvi	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U
		UG-MW37-14-15	14 to 15	Silt	0.00058 U	0.00058 U	0.00058 U	0.00058 U	0.00058 U	0.00058 U
		UG-MW37-15-16	15 to 16	Silt	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U
		UG-MW37-16-17	16 to 17	Outwash	0.00055 U	0.0015	0.00055 U	0.00055 U	0.00055 U	0.00055 U
		UG-MW37-18-19	18 to 19	Outwash	0.00065 U	0.017	0.00065 U	0.00065 U	0.00065 U	0.00065 U
MTCA Method A ULU Cleanup Level					0.05	0.03	160[4]	1,600[4]	4,000[4]	0.67[4]
Reuse Criteria [5]					DET	DET	DET	DET	DET	DET

Exploration	Elevation of Ground Surface (ft)	Sample Identification [2]	Sample Depth (ft bgs)	Soil Type	VOCs[3] (mg/kg)					
					Tetrachloroethene (PCE)	Trichloroethene (TCE)	cis-1,2-Dichloroethene (DCE)	trans-1,2-Dichloroethene (DCE)	1,1-Dichloroethene (DCE)	Vinyl Chloride
UG-MW38D	192.91	UG-MW38D-1-2	1 to 2	Fill	0.0019	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
		UG-MW38D-3.5-4.5	3.5 to 4.5	Qvi	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U
		UG-MW38D-5-6	5 to 6	Qvi	0.00083 U	0.0015	0.00083 U	0.00083 U	0.00083 U	0.00083 U
		UG-MW38D-6-7	6 to 7	Qvi	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U
		UG-MW38D-10-11	10 to 11	Qvi	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U
		UG-MW38D-14-15	14 to 15	Qvi	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U
		UG-MW38D-15.5-16	15.5 to 16	Silt	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U
		UG-MW38D-18-19	18 to 19	Outwash	0.00094 U	0.0070	0.00094 U	0.00094 U	0.00094 U	0.00094 U
		UG-MW38D-20-21	20 to 21	Outwash	0.00096 U	0.012	0.00096 U	0.00096 U	0.00096 U	0.00096 U
		UG-MW38D-23-24	23 to 24	Outwash	0.00062 U	0.018	0.00062 U	0.00062 U	0.00062 U	0.00062 U
		UG-MW38D-26-27	26 to 27	Outwash	0.00064 U	0.012	0.00064 U	0.00064 U	0.00064 U	0.00064 U
		UG-MW38D-27-28	27 to 28	Outwash	0.00056 U	0.014	0.00056 U	0.00056 U	0.00056 U	0.00056 U
		UG-MW38D-33-34	33 to 34	Outwash	0.00065 U	0.050	0.00069	0.00065 U	0.00065 U	0.00065 U
		UG-MW38D-35-35.5	35 to 35.5	Outwash	0.00071 U	0.029	0.00071 U	0.00071 U	0.00071 U	0.00071 U
		UG-MW38D-35.5-36.5	35.5 to 36.5	Outwash	0.00070 U	0.013	0.00070 U	0.00070 U	0.00070 U	0.00070 U
		UG-MW38D-39-40	39 to 40	Outwash	0.00063 U	0.028	0.00063 U	0.00063 U	0.00063 U	0.00063 U
		UG-MW38D-44-45	44 to 45	Outwash	0.00065 U	0.0033	0.00065 U	0.00065 U	0.00065 U	0.00065 U
		UG-MW38D-49-50	49 to 50	Outwash	0.00076	0.011	0.00056 U	0.00056 U	0.00056 U	0.00056 U
		UG-MW38D-51-52	51 to 52	Outwash	0.00071 U	0.0087	0.00071 U	0.00071 U	0.00071 U	0.00071 U
		UG-MW38D-52-53	52 to 53	Outwash	0.00059 U	0.0055	0.00059 U	0.00059 U	0.00059 U	0.00059 U
		UG-MW38D-54-55	54 to 55	Outwash	0.00062 U	0.014	0.00062 U	0.00062 U	0.00062 U	0.00062 U
UG-MW38S	193.60	UG-MW38S-0.5-1.5	0.5 to 1.5	Fill	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U
		130916-S-1	0.5 to 1.5	Fill	0.00096	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U
		UG-MW38S-2-3	2 to 3	Fill	0.0054	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U
		UG-MW38S-5-6	5 to 6	Qvi	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U
		UG-MW38S-9-10	9 to 10	Qvi	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U
		UG-MW38S-11-12	11 to 12	Qvi	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U
		UG-MW38S-13.5-14	13.5 to 14	Qvi	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U
		UG-MW38S-16-16.5	16 to 16.5	Silt	0.0011 U	0.033	0.0011 U	0.0011 U	0.0011 U	0.0011 U
		UG-MW38S-17-18	17 to 18	Outwash	0.00078 U	0.0034	0.00078 U	0.00078 U	0.00078 U	0.00078 U
		UG-MW38S-24-25	24 to 25	Outwash	0.00089 U	0.0015	0.00089 U	0.00089 U	0.00089 U	0.00089 U
1A-B1	NA	1A-B1-3-4	3 to 4	Fill	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U
		1A-B1-18-19	18 to 19	Fill	0.051 J	0.0017 J	0.0011 UJ	0.0011 UJ	0.0011 UJ	0.0011 UJ
1A-B2	NA	1A-B2-2-3	2 to 3	Fill	0.0019 U	0.0019 U	0.0019 U	0.0019 U	0.0019 U	0.0019 U
		1A-B2-14-15	14 to 15	Fill	0.012	0.0010	0.0022	0.00083 U	0.00083 U	0.00083 U
		1A-B2-25-26	25 to 26	Fill	0.098	0.011	0.022	0.0020	0.00095 U	0.0018
1A-B3	NA	1A-B3-0-2	0 to 2	Fill	0.012	0.0015 U	0.0015 U	0.0015 U	0.0015 U	0.0015 U
1A-B4	NA	1A-B4-0-1	0 to 1	Fill	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U
		1A-B4-11-12	11 to 12	Fill	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
1A-B5	NA	1A-B5-1-2	1 to 2	Fill	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U
		1A-B5-9-10	9 to 10	Fill	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U
		1A-B5-11-12	11 to 12	Fill	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U
1A-B6	NA	1A-B6-0-1	0 to 1	Fill	0.0017	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U
		1A-B6-10-11	10 to 11	Fill	0.030	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U
		1A-B6-20-21	20 to 21	Qvi	0.034	0.0014	0.00090 U	0.00090 U	0.00090 U	0.00090 U
1B-TP1	NA	1B-TP1-0-1	0 to 1	Fill	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U
1B-TP2	NA	1B-TP2-0-1	0 to 1	Fill	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U
		1B-TP2-2-3	2 to 3	Fill	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U
		1B-TP2-5-6	5 to 6	Fill	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U
		1B-TP2-7-8	7 to 8	Qvi	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U
1B-TP3	NA	1B-TP3-0-1	0 to 1	Fill	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U
		1B-TP3-2-3	2 to 3	Fill	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U
		1B-TP3-3-4	3 to 4	Qvi	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U
1B-TP4	NA	1B-TP4-0-1	0 to 1	Fill	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U
1B-TP5	NA	1B-TP5-0-1	0 to 1	Fill	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U
		1B-TP5-2-3	2 to 3	Fill	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U
		1B-TP5-7-8	7 to 8	Qvi	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U
1B-TP6	NA	1B-TP6-0-1	0 to 1	Fill	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U
		DUPE-130624-S-3	0 to 1	Fill	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U
		1B-TP6-2-3	2 to 3	Qvi	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U
1C-TP1	NA	1C-TP1-0-1	0 to 1	Fill	0.0015 U	0.0015 U	0.0015 U	0.0015 U	0.0015 U	0.0015 U
		1C-TP1-2-3	2 to 3	Qvi	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
1C-TP2	NA	1C-TP2-0-1	0 to 1	Fill	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U
		1C-TP2-3-4	3 to 4	Fill	0.0021	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
		1C-TP2-6-7	6 to 7	Qvi	0.0074	0.0014 U	0.0014 U	0.0014 U	0.0014 U	0.0014 U
1D-B1	NA	1D-B1-0-1	0 to 1	Fill	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U
		DUPE-130614-S-2	0 to 1	Fill	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U
		1D-B1-6-7	6 to 7	Qvi	0.00089 U	0.0041	0.00089 U	0.00089 U	0.00089 U	0.00089 U
1D-B2	NA	1D-B2-0-1	0 to 1	Fill	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U
		1D-B2-6-7	6 to 7	Qvi	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U
1D-TP1	NA	1D-TP1-0-1	0 to 1	Fill	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U
		1D-TP1-2-3	2 to 3	Fill	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U
1D-TP2	NA	1D-TP2-0-1	0 to 1	Fill	0.0014 U	0.0014 U	0.0014 U	0.0014 U	0.0014 U	0.0014 U
		1D-TP2-3.5-4.5	3.5 to 4.5	Qvi	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U
1D-TP3	NA	1D-TP3-0-1	0 to 1	Fill	0.0015 U	0.0015 U	0.0015 U	0.0015 U	0.0015 U	0.0015 U
		1D-TP3-2-3	2 to 3	Fill	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U
1E-B1	NA	1E-B1-0-1	0 to 1	Fill	0.00091 U	0.00091 U	0.00091 U	0.00091 U	0.00091 U	0.00091 U
		1E-B1-7-8	7 to 8	Qvi	0.00086 U	0.00086 U	0.00086 U	0.00086 U	0.00086 U	0.00086 U
1E-B2	NA	1E-B2-0-1	0 to 1	Fill	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U
		1E-B2-6-7	6 to 7	Qvi	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U
1E-B3	NA	1E-B3-1-2	1 to 2	Fill	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U
		1E-B3-6-7	6 to 7	Qvi	0.00086 U	0.00086 U	0.00086 U	0.00086 U	0.00086 U	0.00086 U
1E-B4	NA	1E-B4-2-3	2 to 3	Qvi	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U
		1E-B4-7-8	7 to 8	Qvi	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U
1E-B5	NA	1E-B5-0-1	0 to 1	Qvi	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U
		1E-B5-5-6	5 to 6	Qvi	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U
1E-B6	NA	1E-B6-0-1	0 to 1	Fill	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U
		1E-B6-5-6	5 to 6	Qvi	0.00086 U	0.00086 U	0.00086 U	0.00086 U	0.00086 U	0.00086 U
MTCA Method A ULU Cleanup Level					0.05	0.03	160[4]	1,600[4]	4,000[4]	0.67[4]
Reuse Criteria [5]					DET	DET	DET	DET	DET	DET

Exploration	Elevation of Ground Surface (ft)	Sample Identification [2]	Sample Depth (ft bgs)	Soil Type	VOCs[3] (mg/kg) Tetrachloroethene (PCE)	Trichloroethene (TCE)	cis-1,2-Dichloroethene (DCE)	trans-1,2-Dichloroethene (DCE)	1,1-Dichloroethene (DCE)	Vinyl Chloride
1F-B1	NA	1F-B1-0.3-1.3	0.3 to 1.3	Fill	0.0013 U	0.0013 U	0.0013 U	0.0013 U	0.0013 U	0.0013 U
		1F-B1-4-5	4 to 5	Qvi	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U
		1F-B1-9-10	9 to 10	Qvi	0.00080 U	0.0021	0.00080 U	0.00080 U	0.00080 U	0.00080 U
1F-B2	NA	1F-B2-0.3-1.3	0.3 to 1.3	Fill	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U
		1F-B2-7-8	7 to 8	Fill	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U
		1F-B2-9-10	9 to 10	Qvi	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U
1F-B3	NA	1F-B3-2-3	2 to 3	Qvi	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U
		1F-B3-5-6	5 to 6	Qvi	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U
1F-B4	NA	1F-B4-2-3	2 to 3	Qvi	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U
		DUPE-130611-S-1	2 to 3	Qvi	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U
		1F-B4-13-14	13 to 14	Qvi	0.00085 U	0.0076	0.00085 U	0.00085 U	0.00085 U	0.00085 U
1F-B5	NA	1F-B5-3-4	3 to 4	Qvi	0.00086 U	0.00086 U	0.00086 U	0.00086 U	0.00086 U	0.00086 U
		1F-B5-7-8	7 to 8	Qvi	0.00083 U	0.0054	0.00083 U	0.00083 U	0.00083 U	0.00083 U
1F-B6	NA	1F-B6-4-5	4 to 5	Fill	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U
		1F-B6-12-13	12 to 13	Qvi	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U
1F-B7	NA	1F-B7-3-4	3 to 4	Fill	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
		1F-B7-9-10	9 to 10	Qvi	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U
		1F-B7-14-15	14 to 15	Qvi	0.00093 U	0.0087	0.00093 U	0.00093 U	0.00093 U	0.00093 U
1G-B1	NA	1G-B1-2-3	2 to 3	Qvi	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U
		1G-B1-7-8	7 to 8	Qvi	0.00088 UJ	0.00088 UJ	0.00088 UJ	0.00088 UJ	0.00088 UJ	0.00088 UJ
1G-B2	NA	1G-B2-2-3	2 to 3	Qvi	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U
		1G-B2-9-10	9 to 10	Qvi	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U
1G-B3	NA	1G-B3-2-3	2 to 3	Qvi	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U
1G-B4	NA	1G-B4-1-2	1 to 2	Qvi	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U
1G-B5	NA	1G-B5-3-4	3 to 4	Qvi	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U
		1G-B5-10-11	10 to 11	Qvi	0.00087 U	0.012	0.00087 U	0.00087 U	0.00087 U	0.00087 U
1G-TP1	NA	1G-TP1-0-1	0 to 1	Fill	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U
		1G-TP1-2-3	2 to 3	Qvi	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U
		1G-TP1-4-5	4 to 5	Qvi	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U
1G-TP2	NA	1G-TP2-0-1	0 to 1	Fill	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
		1G-TP2-3-4	3 to 4	Qvi	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U
		1G-TP2-6-7	6 to 7	Qvi	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U
1H-B1	NA	1H-B1-4-5	4 to 5	Qvi	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U
		1H-B1-9-9.5	9 to 9.5	Qvi	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U
1H-B2	NA	1H-B2-7-7.5	7 to 7.5	Qvi	0.00091 U	0.00091 U	0.00091 U	0.00091 U	0.00091 U	0.00091 U
		1H-B2-9-10	9 to 10	Qvi	0.00096 UJ	0.00096 UJ	0.00096 UJ	0.00096 UJ	0.00096 UJ	0.00096 UJ
1H-B3	NA	1H-B3-4-5	4 to 5	Qvi	0.00086 U	0.00086 U	0.00086 U	0.00086 U	0.00086 U	0.00086 U
		1H-B3-7-8	7 to 8	Qvi	0.00074 U	0.0072	0.00074 U	0.00074 U	0.00074 U	0.00074 U
1H-TP1	NA	1H-TP1-0-1	0 to 1	Qvi	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U
		1H-TP1-5-6	5 to 6	Qvi	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U
2A-B1	NA	2A-B1-1-2	1 to 2	Fill	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U
		2A-B1-6-7	6 to 7	Qvi	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U
2A-B2	NA	2A-B2-0.5-1.5	0.5 to 1.5	Fill	0.0013 U	0.0013 U	0.0013 U	0.0013 U	0.0013 U	0.0013 U
		2A-B2-7-8	7 to 8	Qvi	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U
2A-B3	NA	2A-B3-0-1	0 to 1	Fill	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
		2A-B3-2-3	2 to 3	Fill	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U
		2A-B3-10-11	10 to 11	Qvi	0.00087 U	0.013	0.00087 U	0.00087 U	0.00087 U	0.00087 U
2A-B4	NA	2A-B4-0.5-1.5	0.5 to 1.5	Fill	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U
		2A-B4-5-6	5 to 6	Qvi	0.00080 U	0.0012	0.00080 U	0.00080 U	0.00080 U	0.00080 U
		2A-B4-7-8	7 to 8	Qvi	0.00080 U	0.0066	0.00080 U	0.00080 U	0.00080 U	0.00080 U
2A-B5	NA	2A-B5-1-2	1 to 2	Fill	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U
		2A-B5-7-8	7 to 8	Qvi	0.00078 U	0.11	0.00085	0.00078 U	0.00078 U	0.00078 U
2A-B6	NA	2A-B6-1-2	1 to 2	Fill	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U
		2A-B6-4-5	4 to 5	Qvi	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U
2A-B7	NA	2A-B7-2.5-3.5	2.5 to 3.5	Fill	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U
		2A-B7-4-5	4 to 5	Qvi	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U
		2A-B7-8-9	8 to 9	Qvi	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U
2B-B2	NA	2B-B2-1-2	1 to 2	Qvi	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U
		2B-B2-5-6	5 to 6	Qvi	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U
2B-B3	NA	2B-B3-1-2	1 to 2	Qvi	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U
2C-B1	NA	2C-B1-1-2	1 to 2	Fill	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U
		2C-B1-8-9	8 to 9	Qvi	0.00086 U	0.00086 U	0.00086 U	0.00086 U	0.00086 U	0.00086 U
2C-B2	NA	2C-B2-1-2	1 to 2	Fill	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U
		2C-B2-7-8	7 to 8	Fill	0.00086 U	0.00086 U	0.00086 U	0.00086 U	0.00086 U	0.00086 U
		2C-B2-13-14	13 to 14	Qvi	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U
2D-B1	NA	2D-B1-0-1	0 to 1	Fill	0.0042	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U
		2D-B1-8-9	8 to 9	Qvi	0.083	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U
2D-B2	NA	2D-B2-0-1	0 to 1	Fill	0.041 J	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U
		DUPE-130618-S-2	0 to 1	Fill	0.020 J	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U
		2D-B2-4-5	4 to 5	Qvi	0.12	0.0023 U	0.0023 U	0.0023 U	0.0023 U	0.0023 U
2D-B3	NA	2D-B3-0-1	0 to 1	Fill	0.0024	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
		2D-B3-11-12	11 to 12	Qvi	0.018	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U
2D-B4	NA	2D-B4-0-1	0 to 1	Fill	0.0061	0.0014 U	0.0014 U	0.0014 U	0.0014 U	0.0014 U
2D-B5	NA	2D-B5-0-1	0 to 1	Fill	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U
		2D-B5-6-7	6 to 7	Qvi	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U
2F-B1	NA	2F-B1-0-1	0 to 1	Fill	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U
2F-B2	NA	2F-B2-0-0.5	0 to 0.5	Fill	0.0013 U	0.0013 U	0.0013 U	0.0013 U	0.0013 U	0.0013 U
		2F-B2-1-2.5	1 to 2.5	Fill	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U
		2F-B2-2.5-3.25	2.5 to 3.25	Qvi	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U
MTCA Method A ULU Cleanup Level					0.05	0.03	160[4]	1,600[4]	4,000[4]	0.67[4]
Reuse Criteria [5]					DET	DET	DET	DET	DET	DET

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc. in Redmond, Washington.

[2] Sample ID = Area - boring - starting depth of sample [feet bgs] - end depth [feet bgs], PDA Area 2D Boring 2 collected from 4-5 feet bgs = 2D-B2-4-5.

[3] VOCs were analyzed by U.S. Environmental Protection Agency (EPA) method 8260C. Other VOCs were analyzed and were either not detected or are reported on Table 16.

[4] MTCA Method B ULU criteria represented because MTCA Method A cleanup level has not been established.

[5] Reuse Criteria based on Hazardous Waste Regulations 40 CFR part 260.

Qvi = Ice-contact deposits

VOCs = Volatile organic compounds

mg/kg = Milligram per kilogram

MTCA = Model Toxics Control Act

ULU = Unrestricted land use

DET = Detected greater than laboratory reporting limits

HVOCs = halogenated volatile organic compounds

U = Analyte was not detected at or greater than the listed reporting limit

UJ = Analyte was not detected at or greater than the listed reporting limit and the result is estimated

J = Estimated result by analytical laboratory

bgs = Below ground surface

NA = Not determined

Drift = Glacial Drift

Outwash = Advance Outwash

Bold font type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Bold font type and gray shading indicates that the detected concentration is greater than the respective MTCA cleanup level.

Dashed outline indicates the detected concentration is greater than the Reuse Criteria.

Table 16

Summary of Chemical Analytical Results for Detected VOCs Except Selected HVOCs - Soil[1]

2013 Environmental Subsurface Investigation - University of Washington-Tacoma
Tacoma, Washington

Location ID	Sample ID[2]	Sample Depth (feet bgs)	Sample Date	Volatile Organic Compounds (mg/kg)[3]																			
				1,1,1-Trichloroethane	1,1-Dichloroethane (DCA)	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	2-Butanone (MEK)	2-Hexanone	Acetone	Benzene	Carbon Disulfide	Chlorobenzene	Ethylbenzene	Isopropylbenzene (Cumene)	Naphthalene	n-Butylbenzene	n-Propylbenzene	p-Isopropyltoluene	Sec-Butylbenzene	Tert-Butylbenzene	Trichlorofluoromethane (CFC-11)	Total Xylenes[4]
CR-MW15	CR-MW15-10-11	10 to 11	8/28/2013	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.0040 U	0.0040 U	**0.0055**	0.00079 U	**0.0023**	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	**0.0047**	0.0016 U
	CR-MW15-14-15	14 to 15	8/28/2013	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.0037 U	0.0037 U	0.0037 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	**0.0014**	0.0015 U
	CR-MW15-18-19	18 to 19	8/28/2013	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.0038 U	0.0038 U	0.0038 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	**0.0036**	0.0015 U
	CR-MW15-19.5-20	19.5 to 20	8/28/2013	0.046 U	0.046 U	**3.9**	**4.0**	0.23 U	0.23 U	0.23 U	0.046 U	0.046 U	0.046 U	0.23 U	**1.7**	0.046 U	0.046 U	**2.9**	**4.8**	**2.5**	**0.11**	0.046 U	0.46 U
	CR-MW15-21-22	21 to 22	8/28/2013	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.0042 U	0.0042 U	0.0042 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	**0.0062**	0.0017 U
	CR-MW15-23.5-24	23.5 to 24	8/28/2013	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.0046 U	0.0046 U	0.0046 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U	**0.0019**	0.0019 U
	CR-MW15-29-30	29 to 30	8/28/2013	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.0039 U	0.0039 U	0.0039 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	**0.0033**	0.0016 U
	CR-MW15-32-33	32 to 33	8/28/2013	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.0037 U	0.0037 U	0.0037 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	**0.00088**	0.0015 U
	CR-MW15-34-35	34 to 35	8/28/2013	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.0042 U	0.0042 U	0.0042 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	**0.0016**	0.0017 U
CR-MW16	CR-MW16-9-10	9 to 10	8/27/2013	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.0045 U	0.0045 U	0.0045 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	**0.0014**	0.0018 U
	CR-MW16-10-11	10 to 11	8/27/2013	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.0048 U	0.0048 U	0.0048 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	**0.0017**	0.0019 U
	CR-MW16-15-16	15 to 16	8/27/2013	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.0044 U	0.0044 U	0.0044 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U	**0.0034**	0.0018 U
	CR-MW16-18-19	18 to 19	8/27/2013	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.0042 U	0.0042 U	0.0042 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	**0.0035**	0.0017 U
	CR-MW16-20-21	20 to 21	8/27/2013	0.00086 U	0.00086 U	0.00086 U	0.00086 U	0.0043 U	0.0043 U	0.0043 U	0.00086 U	0.00086 U	0.00086 U	0.00086 U	0.00086 U	0.00086 U	0.00086 U	0.00086 U	0.00086 U	0.00086 U	0.00086 U	**0.0042**	0.0017 U
	CR-MW16-24-25	24 to 25	8/27/2013	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.0039 U	0.0039 U	0.0039 U	0.00078 U	**0.00098**	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	**0.0026**	0.0016 U
	CR-MW16-26-27	26 to 27	8/27/2013	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0052 U	0.0052 U	0.0052 U	0.0010 U	**0.0026**	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	**0.0068**	0.0021 U
	CR-MW16-28-29	28 to 29	8/27/2013	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0053 U	0.0053 U	0.0053 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	**0.0053**	0.0021 U
	CR-MW16-30-31	30 to 31	8/27/2013	0.0013 U	0.0013 U	0.0013 U	0.0013 U	**0.012**	0.0066 U	**0.11**	0.0013 U	**0.0014**	0.0013 U	0.0013 U	0.0013 U	0.0013 U	0.0013 U	0.0013 U	0.0013 U	0.0013 U	0.0013 U	0.0013 U	0.0027 U
CR-MW17	CR-MW17-11-12	11 to 12	8/27/2013	0.00090 U	0.00090 U	0.00090 U	0.00090 U	0.0045 U	0.0045 U	0.0045 U	0.00090 U	0.00090 U	0.00090 U	0.00090 U	0.00090 U	0.00090 U	0.00090 U	0.00090 U	0.00090 U	0.00090 U	0.00090 U	**0.0012**	0.0018 U
	CR-MW17-15-16	15 to 16	8/27/2013	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.0047 U	0.0047 U	0.0047 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	**0.0014**	0.0019 U
	CR-MW17-17-18	17 to 18	8/27/2013	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.0049 U	0.0049 U	0.0049 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	**0.0017**	0.0019 U
	CR-MW17-19-20	19 to 20	8/27/2013	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.0044 U	0.0044 U	0.0044 U	0.00089 U	**0.0011**	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	**0.0014**	0.0018 U
	CR-MW17-23-24	23 to 24	8/27/2013	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.0038 U	0.0038 U	0.0038 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	**0.0012**	0.0015 U
	CR-MW17-25-26	25 to 26	8/27/2013	0.0013 U	0.0013 U	0.0013 U	0.0013 U	0.0065 U	0.0065 U	**0.011**	0.0013 U	**0.0027**	0.0013 U	0.0013 U	0.0013 U	0.0013 U	0.0013 U	0.0013 U	0.0013 U	0.0013 U	0.0013 U	**0.0023**	0.0026 U
	CR-MW17-27-28	27 to 28	8/27/2013	0.0014 U	0.0014 U	0.0014 U	0.0014 U	0.0069 U	0.0069 U	**0.0091**	0.0014 U	**0.0018**	0.0014 U	0.0014 U	0.0014 U	0.0014 U	0.0014 U	0.0014 U	0.0014 U	0.0014 U	0.0014 U	**0.0037**	0.0027 U
	CR-MW17-28-28.5	28 to 28.5	8/27/2013	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.0048 U	0.0048 U	**0.011**	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	**0.0014**	0.0019 U
	CR-MW17-29-30	29 to 30	8/27/2013	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0058 U	0.0058 U	**0.043**	0.0012 U	**0.0039**	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	**0.0018**	0.0023 U
JS-MW4	JS-MW4D-52-53	52 to 53	9/5/2013	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.0047 U	0.0047 U	0.0047 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	**0.0025**	0.0019 U
JS-MW5	JS-MW5-9-10	9 to 10	8/29/2013	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0051 U	0.0051 U	0.0051 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	**0.0021**	0.0020 U
	JS-MW5-14-15	14 to 15	8/29/2013	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.0036 U	0.0036 U	**0.0058**	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.0014 U
	JS-MW5-15-15.5	15.5 to 15.5	8/29/2013	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.0041 U	0.0041 U	0.0041 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	**0.0016**	0.0016 U
	JS-MW5-16-17	16 to 17	8/29/2013	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.0040 U	0.0040 U	0.0040 U	0.00080 U	**0.0015**	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	**0.0020**	0.0016 U
	JS-MW5-22-23	22 to 23	8/29/2013	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.0043 U	0.0043 U	0.0043 U	0.00087 U	**0.0015**	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	**0.0021**	0.0017 U
	JS-MW5-24-25	24 to 25	8/29/2013	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.0036 U	0.0036 U	0.0036 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	**0.00090**	0.0014 U
	130829-S-1	24 to 25	8/29/2013	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.0033 U	0.0033 U	0.0033 U	0.00066 U	**0.0020**	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.00066 U	0.0013 U
	JS-MW5-29-30	29 to 30	8/29/2013	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.0039 U	0.0039 U	0.0039 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	**0.0023**	0.0015 U
	JS-MW5-34-35	34 to 35	8/29/2013	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.0049 U	0.0049 U	0.0049 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	**0.0020**	0.0020 U
	JS-MW5-37-38	37 to 38	8/29/2013	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.0034 U	0.0034 U	0.0034 U	0.00068 U	0.00068 U	**0.00082**	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	**0.0011**	0.0014 U
	JS-MW5-38-39	38 to 39	8/29/2013	0.00090 U	0.00090 U	0.00090 U	0.00090 U	0.0045 U	0.0045 U	0.0045 U	0.00090 U	0.00090 U	**0.0010**	0.00090 U	0.00090 U	0.00090 U	0.00090 U	0.00090 U	0.00090 U	0.00090 U	0.00090 U	**0.0017**	0.0018 U
	JS-MW5-39-40	39 to 40	8/29/2013	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.0035 U	0.0035 U	0.0035 U	0.00070 U	0.00070 U	**0.0010**	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	**0.0013**	0.0014 U
MTCA Method A Soil Cleanup Levels				2	180[5]	NE	800[5]	48,000[5]	NE	72,000[5]	0.03	8,000[5]	1,600[5]	6	8,000[5]	5	4,000[5]	8,000[5]	NE	8,000[5]	8,000[5]	24,000[5]	9

Location ID	Sample ID [2]	Sample Depth (feet bgs)	Sample Date	Volatile Organic Compounds (mg/kg) [3]																			
				1,1,1-Trichloroethane	1,1-Dichloroethane (DCA)	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	2-Butanone (MEK)	2-Hexanone	Acetone	Benzene	Carbon Disulfide	Chlorobenzene	Ethylbenzene	Isopropylbenzene (Cumene)	Naphthalene	n-Butylbenzene	n-Propylbenzene	p-Isopropyltoluene	Sec-Butylbenzene	Tert-Butylbenzene	Trichlorofluoromethane (CFC-11)	Total Xylenes [4]
JS-MW6D	JS-MW6D-11-12	11 to 12	8/30/2013	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.0042 U	0.0042 U	0.0042 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	**0.00088**	0.0017 U
	JS-MW6D-20.5-21.5	20.5 to 21.5	8/30/2013	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.0041 U	0.0041 U	0.0041 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U	**0.0013**	0.0017 U
	JS-MW6D-24-25	24 to 25	8/30/2013	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.0035 U	0.0035 U	0.0035 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	**0.0026**	0.0014 U
	130830-S-1	24 to 25	8/30/2013	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.0043 U	0.0043 U	0.0043 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	**0.0032**	0.0017 U
	JS-MW6D-27.5-28	27.5 to 28	8/30/2013	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.0037 U	0.0037 U	0.0037 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	**0.00098**	0.0015 U
	JS-MW6D-29-29.5	29 to 29.5	8/30/2013	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.0040 U	0.0040 U	0.0040 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	**0.00086**	0.0016 U
	JS-MW6D-33-34	33 to 34	8/30/2013	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.0043 U	0.0043 U	0.0043 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	**0.0031**	0.0017 U
	JS-MW6D-39-40	39 to 40	8/30/2013	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.0044 U	0.0044 U	0.0044 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	**0.0023**	0.0017 U
	JS-MW6D-46-47	46 to 47	8/30/2013	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.0039 U	0.0039 U	0.0039 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	**0.00084**	0.0016 U
JS-MW6S	JS-MW6S-10-11	10 to 11	9/3/2013	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.0046 U	0.0046 U	**0.0057**	0.00093 U	**0.0017**	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U	**0.0027**	0.0019 U
	JS-MW6S-14-15	14 to 15	9/3/2013	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.0040 U	0.0040 U	0.0040 U	0.00079 U	**0.00096**	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	**0.0039**	0.0016 U
	JS-MW6S-16-17	16 to 17	9/3/2013	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.0037 U	0.0037 U	0.0037 U	0.00073 U	**0.00073**	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	**0.0033**	0.0015 U
	JS-MW6S-17-17.5	17 to 17.5	9/3/2013	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.0040 U	0.0040 U	0.0040 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	**0.0040**	0.0016 U
	JS-MW6S-18-19	18 to 19	9/3/2013	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.0040 U	0.0040 U	0.0040 U	0.00080 U	**0.0013**	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	**0.0043**	0.0016 U
JS-MW7	JS-MW7-7-8	7 to 8	9/3/2013	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.0040 U	0.0040 U	0.0040 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	**0.0032**	0.0016 U
	JS-MW7-8-9	8 to 9	9/3/2013	0.00099 U	0.00099 U	0.00099 U	0.00099 U	0.0049 U	0.0049 U	0.0049 U	0.00099 U	0.00099 U	0.00099 U	0.00099 U	0.00099 U	0.00099 U	0.00099 U	0.00099 U	0.00099 U	0.00099 U	0.00099 U	**0.0055**	0.0020 U
	JS-MW7-11-12	11 to 12	9/3/2013	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.0040 U	0.0040 U	0.0040 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	**0.0013**	0.0016 U
	JS-MW7-18-19	18 to 19	9/3/2013	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.0037 U	0.0037 U	0.0037 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	**0.0027**	0.0015 U
	130903-S-1	18 to 19	9/3/2013	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.0036 U	0.0036 U	0.0036 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	**0.0023**	0.0015 U
	JS-MW7-22-23	22 to 23	9/3/2013	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.0040 U	0.0040 U	0.0040 U	0.00080 U	**0.0033**	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	**0.0026**	0.0016 U
	JS-MW7-24-25	24 to 25	9/3/2013	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.0042 U	0.0042 U	0.0042 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	**0.0032**	0.0017 U
JS-MW7A	JS-MW7A-0-1	0 to 1	9/12/2013	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.0048 U	0.0048 U	**0.021**	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.0019 U
UG-MW25D	UG-MW25D-12-13	12 to 13	8/22/2013	0.00070 U	**0.0030**	0.00070 U	0.00070 U	0.0035 U	0.0035 U	0.0035 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.0014 U
	UG-MW25D-13-14	13 to 14	8/22/2013	0.00075 U	**0.0023**	0.00075 U	0.00075 U	0.0037 U	0.0037 U	0.0037 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.0015 U
	UG-MW25D-17-18	17 to 18	8/22/2013	0.00081 U	**0.0033**	0.00081 U	0.00081 U	0.0040 U	0.0040 U	0.0040 U	**0.0017**	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.0016 U
	UG-MW25D-18-19	18 to 19	8/22/2013	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.0042 U	0.0042 U	**0.0043**	**0.00090**	**0.0038**	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.0017 U
	UG-MW25D-24-25	24 to 25	8/22/2013	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.0048 U	0.0048 U	**0.0069**	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.0019 U
	UG-MW25D-34-35	34 to 35	8/22/2013	0.00096 U	0.00096 U	0.00096 U	0.00096 U	**0.067**	**0.011**	**0.20 J**	0.00096 U	**0.0050**	0.00096 U	0.00096 U	0.00096 U	**0.0026**	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.0019 U
	UG-MW25D-43-44	43 to 44	8/23/2013	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.0041 U	0.0041 U	**0.011**	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.0017 U
UG-MW25S	UG-MW25S-7.5-8.5	7.5 to 8.5	8/23/2013	**0.0028**	**0.0035**	0.00075 U	0.00075 U	0.0037 U	0.0037 U	0.0037 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.0015 U
	UG-MW25S-8.5-9.5	8.5 to 9.5	8/23/2013	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.0036 U	0.0036 U	0.0036 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.0015 U
	UG-MW25S-10-11	10 to 11	8/23/2013	**0.0010**	**0.0022**	0.00084 U	0.00084 U	0.0042 U	0.0042 U	**0.0044**	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.0017 U
	UG-MW25S-11-12	11 to 12	8/23/2013	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.0039 U	0.0039 U	0.0039 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.0015 U
	UG-MW25S-15-16	15 to 16	8/23/2013	0.00080 U	**0.0038**	0.00080 U	0.00080 U	0.0040 U	0.0040 U	**0.0096**	**0.00096**	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.0016 U
	UG-MW25S-19-20	19 to 20	8/23/2013	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.0040 U	0.0040 U	0.0040 U	**0.0010**	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.0016 U
UG-MW27	UG-MW27-16-17	16 to 17	6/26/2013	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.0036 U	0.0036 U	0.0036 U	0.00072 U	**0.0038**	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.0014 U
UG-MW30D	UG-MW30D-10-11.5	10 to 11	7/1/2013	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.0041 U	0.0041 U	0.0041 U	0.00082 U	0.00082 U	0.00082 U	**0.0012**	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	**0.0099**
	UG-MW30D-35-36	35 to 36	7/1/2013	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.0041 U	0.0041 U	**0.0043**	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	**0.0027**
UG-MW30S	UG-MW30S-9-10	9 to 10	7/2/2013	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.0040 U	0.0040 U	0.0040 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	**0.0017**
	UG-MW30S-11-12	11 to 12	7/2/2013	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.0038 U	0.0038 U	0.0038 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	**0.0016**
	UG-MW30S-13-14	13 to 14	7/2/2013	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.0037 U	0.0037 U	0.0037 U	0.00073 U	**0.0012**	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.0015 U
MTCA Method A Soil Cleanup Levels				2	180 [5]	NE	800 [5]	48,000 [5]	NE	72,000 [5]	0.03	8,000 [5]	1,600 [5]	6	8,000 [5]	5	4,000 [5]	8,000 [5]	NE	8,000 [5]	8,000 [5]	24,000 [5]	9

Location ID	Sample ID [2]	Sample Depth (feet bgs)	Sample Date	Volatile Organic Compounds (mg/kg) [3]																			
				1,1,1-Trichloroethane	1,1-Dichloroethane (DCA)	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	2-Butanone (MEK)	2-Hexanone	Acetone	Benzene	Carbon Disulfide	Chlorobenzene	Ethylbenzene	Isopropylbenzene (Cumene)	Naphthalene	n-Butylbenzene	n-Propylbenzene	p-Isopropyltoluene	Sec-Butylbenzene	Tert-Butylbenzene	Trichlorofluoromethane (CFC-11)	Total Xylenes [4]
UG-MW31	UG-MW31-0.5-1	0.5 to 1	8/26/2013	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.0041 U	0.0041 U	0.0041 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.0016 U
	UG-MW31-4-5	4 to 5	8/26/2013	0.00087 U	0.00087 U	**0.0011**	0.00087 U	0.0044 U	0.0044 U	0.0044 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.0017 U
	UG-MW31-11-12	11 to 12	8/26/2013	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.0043 U	0.0043 U	**0.011**	0.00085 U	**0.0012**	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.0017 U
	UG-MW31-20-21	20 to 21	8/26/2013	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.0041 U	0.0041 U	**0.0057**	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.0016 U
UG-MW32	UG-MW32-1-2	1 to 2	9/12/2013	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.0039 U	0.0039 U	**0.012**	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.0016 U
	UG-MW32-14-15	14 to 15	9/12/2013	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0053 U	0.0053 U	0.0053 U	0.0011 U	**0.0021**	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0021 U
UG-MW33	UG-MW33-13-13.5	13 to 13.5	9/18/2013	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.0027 U	0.0027 U	0.0027 U	0.00054 U	**0.0011**	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.00054 U	0.0011 U
	S-130918-1	14 to 15	9/18/2013	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.0029 U	0.0029 U	0.0029 U	0.00057 U	**0.00078**	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.0011 U
	UG-MW33-14-15	14 to 15	9/18/2013	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.0031 U	0.0031 U	0.0031 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.0012 U
UG-MW34	UG-MW34-5-6	5 to 6	9/6/2013	0.00037 U	0.00037 U	0.00037 U	0.00037 U	0.0019 U	0.0019 U	**0.0045**	0.00037 U	0.00037 U	0.00037 U	0.00037 U	0.00037 U	0.00037 U	0.00037 U	0.00037 U	0.00037 U	0.00037 U	0.00037 U	0.00037 U	0.00075 U
	UG-MW34-14-15	14 to 15	9/6/2013	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.0041 U	0.0041 U	0.0041 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	**0.0023**	0.0016 U
	UG-MW34-15-16	15 to 16	9/6/2013	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.0042 U	0.0042 U	0.0042 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	**0.0041**	0.0017 U
UG-MW35	UG-MW35-15-16	15 to 16	9/18/2013	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.0028 U	0.0028 U	**0.0078**	0.00057 U	**0.00065**	0.00057 U	0.00057 U	0.00057 U	0.00074 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.0011 U
	UG-MW35-19-19.5	19 to 19.5	9/18/2013	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.0028 U	0.0028 U	0.0028 U	0.00057 U	**0.0051**	0.00057 U	0.00057 U	0.00057 U	0.00074 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.00057 U	0.0011 U
UG-MW36	UG-MW36-1-3	1 to 3	9/18/2013	0.00071 U	0.00071 U	0.00071 U	0.00071 U	**0.0061**	0.0036 U	**0.046**	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00093 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.0014 U
	UG-MW36-4-5	4 to 5	9/18/2013	0.00058 U	0.00058 U	0.00058 U	0.00058 U	0.0029 U	0.0029 U	**0.0037**	0.00058 U	0.00058 U	0.00058 U	0.00058 U	0.00058 U	0.00076 U	0.00058 U	0.00058 U	0.00058 U	0.00058 U	0.00058 U	0.00058 U	0.0012 U
UG-MW37	UG-MW37-7-8	7 to 8	9/19/2013	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.0030 U	0.0030 U	0.0030 U	0.00059 U	**0.0025**	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.0012 U
	UG-MW37-9-10	9 to 10	9/19/2013	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.0028 U	0.0028 U	0.0028 U	0.00056 U	**0.00078**	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.0011 U
	S-130919-1	9 to 10	9/19/2013	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.0027 U	0.0027 U	0.0027 U	0.00053 U	**0.00060**	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.00053 U	0.0011 U
	UG-MW37-11-12	11 to 12	9/19/2013	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.0028 U	0.0028 U	0.0028 U	0.00055 U	**0.00063**	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.00055 U	0.0011 U
	UG-MW37-13-14	13 to 14	9/19/2013	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.0030 U	0.0030 U	0.0030 U	0.00059 U	**0.00075**	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.00059 U	0.0012 U
	UG-MW37-14-15	14 to 15	9/19/2013	0.00058 U	0.00058 U	0.00058 U	0.00058 U	0.0029 U	0.0029 U	0.0029 U	0.00058 U	**0.00064**	0.00058 U	0.00058 U	0.00058 U	0.00058 U	0.00058 U	0.00058 U	0.00058 U	0.00058 U	0.00058 U	0.00058 U	0.0012 U
	UG-MW37-15-16	15 to 16	9/19/2013	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.0038 U	0.0038 U	0.0038 U	0.00075 U	**0.00098**	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.0015 U
UG-MW38D	UG-MW38D-10-11	10 to 11	9/16/2013	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.0048 U	0.0048 U	**0.0095**	0.00095 U	**0.0017**	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.0019 U
	UG-MW38D-14-15	14 to 15	9/16/2013	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.0041 U	0.0041 U	**0.0077**	0.00082 U	**0.0016**	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.0016 U
	UG-MW38D-15.5-16	15.5 to 16	9/16/2013	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.0044 U	0.0044 U	**0.0053**	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.0018 U
	UG-MW38D-18-19	18 to 19	9/16/2013	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.0047 U	0.0047 U	0.0047 U	0.00094 U	**0.0013**	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.0019 U
	UG-MW38D-27-28	27 to 28	9/17/2013	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.0028 U	0.0028 U	0.0028 U	0.00056 U	**0.0024**	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.00056 U	0.0011 U
	UG-MW38D-33-34	33 to 34	9/17/2013	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.0032 U	0.0032 U	0.0032 U	0.00065 U	**0.00079**	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.0013 U
	UG-MW38D-35-35.5	35 to 35.5	9/17/2013	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.0035 U	0.0035 U	0.0035 U	0.00071 U	**0.0014**	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.00071 U	0.0014 U
	UG-MW38D-35.5-36.5	35.5 to 36.5	9/17/2013	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.0035 U	0.0035 U	0.0035 U	0.00070 U	**0.00078**	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.0014 U
	UG-MW38D-39-40	39 to 40	9/17/2013	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.0032 U	0.0032 U	0.0032 U	0.00063 U	**0.0013**	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.00063 U	0.0013 U
	UG-MW38D-44-45	44 to 45	9/17/2013	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.0033 U	0.0033 U	0.0033 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	0.00065 U	**0.0045**	0.0013 U
	UG-MW38D-54-55	54 to 55	9/17/2013	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.0031 U	0.0031 U	0.0031 U	0.00062 U	**0.0010**	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.00062 U	0.0012 U
UG-MW38S	UG-MW38S-11-12	11 to 12	9/16/2013	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.0038 U	0.0038 U	**0.0064**	0.00075 U	**0.0012**	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.0015 U
	UG-MW38S-13.5-14	13.5 to 14	9/16/2013	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.0042 U	0.0042 U	**0.0048**	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.0017 U
1A-B2	1A-B2-25-26	25 to 26	6/13/2013	0.00095 U	0.00095 U	0.00095 U	0.00095 U	**0.010**	0.0048 U	**0.046**	0.00095 U	**0.0023**	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.0019 U
1A-B5	1A-B5-9-10	9 to 10	6/13/2013	0.0012 U	0.0012 U	0.0012 U	0.0012 U	**0.060**	0.0060 U	**0.26 J**	0.0012 U	**0.0015**	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0024 U
1A-B6	1A-B6-20-21	20 to 21	6/13/2013	0.00090 U	0.00090 U	0.00090 U	0.00090 U	0.0045 U	0.0045 U	**0.0058**	0.00090 U	0.00090 U	0.00090 U	0.00090 U	0.00090 U	0.00090 U	0.00090 U	0.00090 U	0.00090 U	0.00090 U	0.00090 U	0.00090 U	0.0018 U
1B-TP2	1B-TP2-2-3	2 to 3	6/24/2013	0.0018 U	0.0018 U	0.0018 U	0.0018 U	**0.0093**	0.0089 U	**0.064**	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.0018 U	0.0036 U
	1B-TP2-5-6	5 to 6	6/24/2013	0.0011 U	0.0011 U	0.0011 U	0.0011 U	**0.010**	0.0054 U	**0.061**	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0022 U
	1B-TP2-7-8	7 to 8	6/24/2013	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.0047 U	0.0047 U	**0.012**	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.0019 U
1B-TP6	1B-TP6-0-1	0 to 1	6/24/2013	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.0048 U	0.0048 U	**0.025 J**	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.0019 U
MTCA Method A Soil Cleanup Levels				2	180 [5]	NE	800 [5]	48,000 [5]	NE	72,000 [5]	0.03	8,000 [5]	1,600 [5]	6	8,000 [5]	5	4,000 [5]	8,000 [5]	NE	8,000 [5]	8,000 [5]	24,000 [5]	9

Location ID	Sample ID [2]	Sample Depth (feet bgs)	Sample Date	Volatile Organic Compounds (mg/kg) [3]																			
				1,1,1-Trichloroethane	1,1-Dichloroethane (DCA)	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	2-Butanone (MEK)	2-Hexanone	Acetone	Benzene	Carbon Disulfide	Chlorobenzene	Ethylbenzene	Isopropylbenzene (Cumene)	Naphthalene	n-Butylbenzene	n-Propylbenzene	p-Isopropyltoluene	Sec-Butylbenzene	Tert-Butylbenzene	Trichlorofluoromethane (CFC-11)	Total Xylenes [4]
1E-B1	1E-B1-0-1	0 to 1	6/13/2013	0.00091 U	0.00091 U	0.00091 U	0.00091 U	0.0045 U	0.0045 U	0.0045 U	0.00091 U	**0.0017**	0.00091 U	0.00091 U	0.00091 U	0.00091 U	0.00091 U	0.00091 U	0.00091 U	0.00091 U	0.00091 U	0.00091 U	0.0018 U
1E-B5	1E-B5-0-1	0 to 1	6/13/2013	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0059 U	0.0059 U	**0.012**	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0024 U
1F-B2	1F-B2-7-8	7 to 8	7/18/2013	0.00065 U	0.00065 U	**0.050**	**0.0033**	0.0032 U	0.0032 U	**0.022**	0.00065 U	0.00065 U	0.00065 U	0.00065 U	**0.0039**	**0.0031**	**0.013**	**0.0085**	**0.0048**	**0.013**	**0.00093**	0.00065 U	0.0013 U
1F-B6	1F-B6-4-5	4 to 5	6/11/2013	0.00098 U	0.00098 U	0.00098 U	0.00098 U	**0.0079**	0.0049 U	**0.038**	0.00098 U	**0.0013**	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.0020 U
1G-B4	1G-B4-1-2	1 to 2	6/17/2013	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0080 U	0.0080 U	**0.0091**	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0032 U
2A-B5	2A-B5-1-2	1 to 2	6/17/2013	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.0038 U	0.0038 U	0.0038 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	**0.0017**
	2A-B5-7-8	7 to 8	6/17/2013	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.0039 U	0.0039 U	**0.0059**	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.0016 U
2A-B6	2A-B6-4-5	4 to 5	6/17/2013	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.0048 U	0.0048 U	**0.0064**	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.0019 U
2D-B5	2D-B5-0-1	0 to 1	6/20/2013	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.0048 U	0.0048 U	0.0048 U	**0.0078**	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.0019 U
MTCA Method A Soil Cleanup Levels				2	180 [5]	NE	800 [5]	48,000 [5]	NE	72,000 [5]	0.03	8,000 [5]	1,600 [5]	6	8,000 [5]	5	4,000 [5]	8,000 [5]	NE	8,000 [5]	8,000 [5]	24,000 [5]	9

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc., of Redmond, Washington.

[2] Sample ID = Area number - boring/test pit number - starting depth of sample [feet bgs] -end depth [feet bgs], Area 1A Boring 4 collected 11-12 feet bgs = 1A-B4-11-12.

[3] Volatile Organic Compounds (VOCs) by EPA Method 8260C. Other VOCS were analyzed but either not detected or are reported on Table 15.

[4] Total xylenes consists of m,p- and o- xylenes. The higher detection limit is shown.

[5] MTCA Method B ULU criteria represented because MTCA Method A cleanup level has not been established.

mg/kg = milligram per kilogram   -- = sample not analyzed   NE = Not established

MTCA = Model Toxics Control Act   bgs = below ground surface

U = Analyte was not detected at or greater than the listed reporting limit

J = Estimated result by the analytical laboratory

Bold font type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Table 17

Summary of Chemical Analytical Results for Petroleum and Primary VOCs[1] - Groundwater

2013 Environmental Subsurface Investigation - University of Washington-Tacoma
Tacoma, Washington

Monitoring Well Identification	Sample Identification [2]	Lithology At Well Screen	Existing or New Well	Location Relative to PDAs	Well Type	Top of Casing Elevation (feet)[3]	Approximate Depth to Groundwater (feet btoc)[4]	Approximate Groundwater Elevation (feet)	Sample Date	Petroleum Hydrocarbons [6]: Gasoline-Range (µg/L)	Petroleum Hydrocarbons [6]: Diesel-Range (mg/L)	Petroleum Hydrocarbons [6]: Lube Oil-Range (mg/L)	VOCs (µg/L)[7] – PCE, TCE and Breakdown Products: PCE	TCE	cis-1,2-DCE	Trans-1,2-DCE	1,1 DCE	Vinyl Chloride	BTEX: Benzene	Ethylbenzene	Toluene	Total Xylene[8]	Chlorobenzene	Naphthalene
Westerly Plume Wells																								
BA-MW2	BA-MW2-130617	Advance Outwash	Existing	Within	Permanent	124.28	28.44	95.84	6/17/13	--	--	--	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.0 U
DD-MW1	DD-MW1-130619	Advance Outwash	Existing	ROW Between PDA	Permanent	122.12	20.33	101.79	6/19/13	--	--	--	**1.2**	**130**	1.0 U	1.0 U	1.0 U	*0.50 U*	1.0 U	1.0 U	5.0 U	2.0 U	1.0 U	6.5 U
JS-MW1	JS-MW1-130618	Advance Outwash	Existing	Within	Permanent	90.15	34.81	55.34	6/18/13	--	--	--	0.20 U	**1.4**	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.0 U
JS-MW2	JS-MW2-130618	Advance Outwash	Existing	Within	Permanent	90.33	34.92	55.41	6/18/13	--	--	--	0.20 U	**14**	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.0 U
JS-MW3	JS-MW3-130625	Advance Outwash	Existing	ROW Between PDA	Permanent	89.35	36.52	52.83	6/25/13	--	--	--	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.3 U
JS-MW3S	JS-MW3S-130913	Qvi	New	ROW Between PDA	Permanent	88.86	18.81	70.05	9/13/13	100 U	**0.31**	0.43 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.3 U
JS-MW3S	JS-MW3S-140122	Qvi	New	ROW Between PDA	Permanent	88.86	18.81	70.05	1/22/14	100 U	--	--	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.0 U
Municipal Water	WATER-130924	N/A	N/A	N/A	N/A	N/A	N/A	N/A	9/24/13	100 U	0.26 U	0.42 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.3 U
JS-MW4	JS-MW4D-130919	Advance Outwash	New	South	Permanent	93.66	40.18	53.48	9/19/13	100 U	0.26 U	0.42 U	0.20 U	2.5	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.6 U
JS-MW7A	JS-MW7A-140122	Qvi	New	Within	Permanent	96.75	11.02	85.73	1/22/14	100 U	--	--	0.20 U	**1.8**	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.0 U
UG-MW3	UG-MW3-130618	Advance Outwash	Existing	ROW Between PDA	Permanent	99.63	44.35	55.28	6/18/13	--	--	--	0.20 U	**13**	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.0 U
UG-MW4	UG-MW4-130619	Advance Outwash	Existing	ROW Between PDA	Permanent	105.31	50.52	55.12	6/19/13	--	--	--	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.3 U
UG-MW7	UG-MW7-130619	Advance Outwash	Existing	ROW Between PDA	Permanent	123.97	35.68	88.29	6/19/13	--	--	--	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.3 U
UG-MW8	UG-MW8-130619	Advance Outwash	Existing	ROW Between PDA	Permanent	123.50	33.01	90.49	6/19/13	--	--	--	0.40 U	**56**	**0.44**	0.40 U	0.40 U	0.20 U	0.40 U	0.40 U	2.0 U	0.80 U	0.40 U	2.6 U
UG-MW9	UG-MW9-130617	Advance Outwash	Existing	ROW Between PDA	Permanent	123.80	30.06	93.74	6/17/13	--	--	--	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.0 U
UG-MW13	UG-MW13-130625	Qvi	Existing	ROW Between PDA	Permanent	122.96	21.15	101.81	6/25/13	--	--	--	**1.4**	**110**	1.0 U	1.0 U	1.0 U	*0.50 U*	1.0 U	1.0 U	5.0 U	2.0 U	1.0 U	6.5 U
UG-MW14	UG-MW14-130617	Advance Outwash	Existing	Within	Permanent	133.75	21.41	112.34	6/17/13	--	--	--	**1.2**	**110**	1.0 U	1.0 U	1.0 U	*0.50 U*	1.0 U	1.0 U	5.0 U	2.0 U	1.0 U	5.0 U
UG-MW16	UG-MW16-130617	Advance Outwash	Existing	Within	Permanent	150.99	9.30	141.69	6/17/13	--	--	--	**1.9**	**170**	**1.1**	1.0 U	1.0 U	*0.50 U*	1.0 U	1.0 U	5.0 U	2.0 U	1.0 U	5.0 U
UG-MW17	UG-MW17-130617	Advance Outwash	Existing	Within	Permanent	155.46	3.80	151.66	6/17/13	--	--	--	2.0 U	**250**	2.0 U	2.0 U	2.0 U	1.0 U	2.0 U	2.0 U	10 U	4.0 U	2.0 U	10 U
UG-MW18	UG-MW18-130614	Advance Outwash	Existing	South	Permanent	203.95	34.19	169.76	6/14/13	--	--	--	**12**	**1,200**	10 U	10 U	10 U	*5.0 U*	10 U	10 U	50 U	20 U	10 U	75 U
UG-MW19	UG-MW19-130614	Advance Outwash	Existing	South	Permanent	191.75	25.06	166.69	6/14/13	--	--	--	**5.6**	**300**	2.0 U	2.0 U	2.0 U	1.0 U	2.0 U	2.0 U	10 U	4.0 U	2.0 U	15 U
UG-MW20	UG-MW20-130614	Advance Outwash	Existing	South	Permanent	169.64	5.95	163.69	6/14/13	--	--	--	1.0 U	**170**	**1.8**	1.0 U	1.0 U	*0.50 U*	1.0 U	1.0 U	5.0 U	2.0 U	1.0 U	7.5 U
UG-MW21	UG-MW21-130618	Advance Outwash	Existing	South	Permanent	196.31	25.20	171.11	6/18/13	--	--	--	0.20 U	**7.7**	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.0 U
UG-MW22	UG-MW22-130614	Advance Outwash	Existing	South	Permanent	158.82	18.68	140.14	6/14/13	--	--	--	0.20 U	**14**	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.5 U
UG-MW23	UG-MW23-131003	Advance Outwash	New	South	Permanent	171.18	10.55	160.63	10/3/13	100 U	0.25 U	0.41 U	0.20 U	**5.5**	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.0 U
UG-MW24	UG-MW24-130715	Advance Outwash	New	Within	Permanent	196.80	31.33	165.47	7/15/13	100 U	0.26 U	0.42 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.3 U
UG-MW25D	UG-MW25D-130904	Advance Outwash	New	Within	Permanent	202.05	36.73	165.32	9/4/13	100 U	0.26 U	0.41 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.0 U
UG-MW25S	UG-MW25S-130904	Qvi	New	Within	Permanent	202.60	2.07	200.53	9/4/13	100 U	0.26 U	0.42 U	2.0 U	**290**	**6.0**	2.0 U	**12**	2.0 U	**2.2**	2.0 U	10 U	4.0 U	2.0 U	10 U
UG-MW26	UG-MW26-130930	Qvi	New	Within	Permanent	202.18	-0.25	202.43	9/30/13	100 U	0.26 U	**0.46**	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.0 U
UG-MW27	UG-MW27-130702	Advance Outwash	New	Within	Permanent	148.68	23.16	125.52	7/2/13	100 U	0.26 U	0.41 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.4 U
UG-MW28	UG-MW28-130702	Qvi	New	ROW Between PDA	Permanent	151.14	19.81	131.33	7/2/13	100 U	0.25 U	0.41 U	0.20 U	**0.21**	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.4 U
UG-MW29D	UG-MW29D-130701	Advance Outwash	New	ROW Between PDA	Permanent	149.26	19.59	129.67	7/1/13	100 U	0.25 U	0.40 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.7 U
UG-MW29S	UG-MW29S-130701	Qvi	New	ROW Between PDA	Permanent	149.04	11.11	137.80	7/1/13	100 U	0.25 U	0.41 U	**0.29**	**42**	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.7 U
UG-MW30D	UG-MW30D-130712	Advance Outwash	New	South	Permanent	122.94	5.81	117.13	7/12/13	100 U	0.27 U	0.43 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.0 U
UG-MW30S	UG-MW30S-130715	Qvi	New	South	Permanent	122.70	4.44	118.26	7/15/13	100 U	0.26 U	0.41 U	**1.1**	**130**	1.0 U	1.0 U	1.0 U	*0.50 U*	1.0 U	1.0 U	5.0 U	2.0 U	1.0 U	6.5 U
	UG-MW30S-130715-VOC	Qvi	New	South	Permanent	122.70	4.44	118.26	7/15/13	--	--	--	**1.3**	**130**	1.0 U	1.0 U	1.0 U	*0.50 U*	1.0 U	1.0 U	5.0 U	2.0 U	1.0 U	6.5 U
UG-MW31	UG-MW31-130904	Qvi	New	Within	Permanent	142.92	5.20	137.72	9/4/13	100 U	0.26 U	0.42 U	1.0 U	**120**	**1.4**	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	2.0 U	1.0 U	5.0 U
UG-MW32	UG-MW32-131003	Qvi	New	Within	Permanent	159.88	6.91	152.97	10/3/13	100 U	0.26 U	0.41 U	0.20 U	**39**	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.0 U
UG-MW33	UG-MW33-131002	Qvi	New	Within	Permanent	183.57	6.61	176.96	10/2/13	100 U	0.27 U	0.43 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.0 U
UG-MW34	UG-MW34-130923	Qvi	New	Within	Permanent	142.03	16.71	125.32	9/23/13	100 U	0.26 U	0.42 U	1.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.3 U
UG-MW35	UG-MW35-140122	Qvi	New	Within	Permanent	181.60	8.39[9]	173.21	1/22/14	100 U	--	--	0.20 U	**0.24**	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.0 U
UG-MW36	UG-MW36-140122	Qvi	New	Within	Permanent	180.24	8.22[9]	172.02	1/22/14	100 U	--	--	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.0 U
UG-MW37	UG-MW37-130930	Qvi	New	Within	Permanent	197.29	1.51	195.78	9/30/13	100 U	0.26 U	**0.55**	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.0 U
UG-MW38D	UG-MW38D-131003	Advance Outwash	New	South	Permanent	192.47	26.11	166.36	10/2/13	100 U	0.26 U	0.41 U	**6.7**	**160**	**1.9**	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	2.0 U	1.0 U	5.0 U
UG-MW38S	UG-MW38S-131001	Qvi	New	South	Permanent	193.17	9.31	183.86	10/1/13	100 U	0.26 U	0.42 U	0.20 U	**1.4**	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.0 U
1A-B2	1A-B2-W	Fill	New	Within	Temporary	N/A	N/A	N/A	6/13/13	100 U	0.26 U	0.42 U	**6.5**	**4.8**	**45**	**2.9**	0.40 U	**6.9**	0.40 U	0.40 U	2.0 U	0.80 U	0.40 U	0.40 U
1F-B3	1F-B3-W	Qvi	New	Within	Temporary	ND	N/A	N/A	6/12/13	100 U	0.25 U	0.41 U	**1.2**	**180**	1.0 U	1.0 U	1.0 U	*0.50 U*	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
1F-B5	1F-B5-W	Qvi	New	Within	Temporary	ND	N/A	N/A	6/12/13	100 U	**0.46**	**0.42**	0.20U	**35**	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	1.0 U	0.20U	0.20 U	0.20 U
1F-B7	1F-B7-W	Qvi	New	Within	Temporary	ND	N/A	N/A	6/11/13	100 U	0.26 U	0.41 U	0.20 U	**30**	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	1.0 U	0.20 U	0.20 U	0.20 U
MTCA Method A Groundwater Cleanup Level										800/1,000[10]	0.5	0.5	5	5	16[11]	160[11]	400[11]	0.2	5	700	1,000	1,000	160[11]	160
MTCA Method B Groundwater Screening Level Protective of Indoor Air[11]										NE	NE	NE	24	1.5	160	110	130	0.35	2.4	2,800	16,000	290[12]	290	8.9

Monitoring Well Identification	Sample Identification [2]	Lithology At Well Screen	Existing or New Well	Location Relative to PDAs	Well Type	Top of Casing Elevation (feet) [3]	Approximate Depth to Groundwater (feet btoc) [4]	Approximate Groundwater Elevation (feet)	Sample Date	Petroleum Hydrocarbons [6]			VOCs (µg/L) [7]													
													PCE, TCE and Breakdown Products						BTEX					
										Gasoline-Range (µg/L)	Diesel-Range (mg/L)	Lube Oil-Range (mg/L)	PCE	TCE	cis-1,2-DCE	Trans-1,2-DCE	1,1 DCE	Vinyl Chloride	Benzene	Ethylbenzene	Toluene	Total Xylene [8]	Chlorobenzene	Naphthalene
Easterly Plume																								
BA-MW1	BA-MW1-130711	ND	Existing	N/A	Permanent	114.44	5.43	109.01	7/11/13	100 U	0.28 U	0.45 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.0 U
BL-MW1	BL-MW1-130709	ND	Existing	N/A	Permanent	74.69	17.66	57.03	7/9/13	100 U	0.28 U	0.45 U	1.0 U	89	86	9.5	1.0 U	*0.50 U*	1.0 U	1.0 U	5.0 U	2.0 U	1.0 U	6.5 U
BL-MW3	BL-MW3-130911	ND	Existing	N/A	Permanent	66.76	12.55	54.21	9/11/13	100 U	0.26 U	0.42 U	0.20 U	40	22	2.1	0.20 U	0.20 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.0 U
BL-MW4	BL-MW4-130708	ND	Existing	N/A	Permanent	47.80	12.88	34.92	7/8/13	100 U	0.28 U	0.46 U	0.20 U	0.30	0.79	0.20 U	0.20 U	0.75	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.3 U
BL-MW5	BL-MW5-130709	ND	Existing	N/A	Permanent	74.71	12.12	62.59	7/9/13	100 U	0.27 U	0.43 U	4.0 U	910	220	8.8	7.5	24	4.0 U	4.0 U	20 U	8.0 U	9.6	26 U
BL-MW6	BL-MW6-130711	ND	Existing	N/A	Permanent	67.11	20.15	46.96	7/11/13	100 U	0.26 U	0.41 U	2.0 U	120	240	4.5	4.5	61	2.0 U	2.0 U	10 U	4.0 U	2.0 U	10 U
CR-MW3	CR-MW3-130709	ND	Existing	N/A	Permanent	78.56	8.92	69.64	7/9/13	100 U	0.26 U	0.41 U	0.20 U	0.20 U	1.4	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.3 U
CR-MW5	CR-MW5-130709	ND	Existing	N/A	Permanent	74.13	9.98	64.15	7/9/13	100 U	0.32	0.41 U	0.20 U	2.9	22	1.2	0.24	1.1	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.3 U
CR-MW6	CR-MW6-130709	ND	Existing	N/A	Permanent	72.83	12.10	60.73	7/9/13	100 U	0.26 U	0.42 U	0.20 U	5.5	15	0.94	0.20 U	0.52	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.3 U
CR-MW8	CR-MW8-130702	ND	Existing	N/A	Permanent	76.28	8.42	67.86	7/2/13	100 U	0.27 U	0.44 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	1.9	0.20 U	1.0 U	0.40 U	0.20 U	1.4 U
CR-MW9	CR-MW9-130708	ND	Existing	N/A	Permanent	78.25	11.65	66.60	7/8/13	3,300	0.73 U	0.41 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	*0.50 U*	130	96	77	340	1.0 U	22
CR-MW12	CR-MW12-130708	ND	Existing	N/A	Permanent	47.54	10.31	37.23	7/8/13	100 U	0.26 U	0.41 U	0.20 U	4.7	3.8	0.20 U	0.20 U	0.64	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.3 U
CR-MW15	CR-MW15S-130905	Advance Outwash	New	N/A	Permanent	79.45	17.13	62.32	9/5/13	100 U	0.26 U	0.42 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	1.3	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.0 U
CR-MW16	CR-MW16S-130905	Qvi	New	N/A	Permanent	64.71	16.45	48.26	9/5/13	100 U	0.26 U	0.41 U	2.0 U	300	240	15	3.9	17	2.0 U	2.0 U	10 U	4.0 U	2.0 U	10 U
CR-MW17	CR-MW17S-130905	Qvi	New	N/A	Permanent	64.11	18.57	45.54	9/5/13	100 U	0.26 U	0.41 U	1.0 U	93	120	6.5	1.7	12	1.0 U	1.0 U	5.0 U	2.0 U	1.0 U	5.0 U
DD-MW2	DD-MW2-130709	ND	Existing	N/A	Permanent	140.30	1.73	138.57	7/9/13	100 U	0.26 U	0.42 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.3 U
JP-MW1	JP-MW1-130712	ND	Existing	N/A	Permanent	95.77	12.20 [5]	83.75	7/12/13	100 U	0.28 U	0.45 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.0 U
JP-MW1R	JP-MW1R-130712	ND	Existing	N/A	Permanent	101.64	17.67	84.39	7/12/13	100 U	0.27 U	0.43 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.0 U
JP-MW2	JP-MW2-130702	ND	Existing	N/A	Permanent	101.45	17.36	84.09	7/2/13	540 J	0.27 U	0.43 U	4.0 U	500	600	38	10	120	57	4.0 U	20 U	8.0 U	170	28 U
JS-MW5	JS-MW5S-130912	Advance Outwash	Existing	N/A	Permanent	104.67	21.87	82.80	9/12/13	100 U	0.26 U	0.41 U	0.20 U	3.8	0.69	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	1.0 U	0.40 U	0.55	1.0 U
JS-MW6D	JS-MW6D-130913	Advance Outwash	Existing	N/A	Permanent	101.99	19.22	82.77	9/13/13	100 U	0.26 U	0.41 U	0.20 U	2.8	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.3 U
JS-MW6S	JS-MW6S-130912	Qvi	Existing	N/A	Permanent	101.85	5.56	96.29	9/12/13	100 U	0.27 U	0.43 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.29	0.20 U	1.0 U	0.40 U	0.20 U	1.0 U
PL-MW1	PL-MW1-130712	ND	Existing	N/A	Permanent	101.02	17.25	83.83	7/12/13	100 U	0.26 U	0.41 U	0.20 U	17	10	0.43	0.22	2.2	0.94	0.20 U	1.0 U	0.40 U	0.27	1.0 U
PL-MW2	PL-MW2-130710	ND	Existing	N/A	Permanent	82.92	7.13	75.79	7/10/13	100 U	0.29 U	0.47 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.0 U
PS-MW6	PS-MW6-130711	ND	Existing	N/A	Permanent	66.20	19.09	47.11	7/11/13	100 U	1.0	0.42 U	0.40 U	50	20	16	0.40	4.7	0.40 U	0.40 U	2.0 U	0.80 U	0.40 U	2.0 U
PS-MW7	PS-MW7-130715	ND	Existing	N/A	Permanent	66.03	13.85	52.18	7/15/13	100 U	1.2	0.43 U	1.0 U	180	38	1.6	1.0 U	5.9	1.0 U	1.0 U	5.0 U	2.0 U	1.0 U	6.5 U
PS-MW8	PS-MW8-130711	ND	Existing	N/A	Permanent	64.84	19.81	45.03	7/11/13	100 U	0.27 U	0.43 U	0.20 U	12	13	3.3	0.20 U	0.18	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.0 U
PS-MW9	PS-MW9-130711	ND	Existing	N/A	Permanent	55.33	12.06	43.27	7/11/13	100 U	0.28 U	0.45 U	0.20 U	3.3	1.2	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.0 U
SH-MW6	SH-MW6-130708	ND	Existing	N/A	Permanent	48.82	12.05	36.77	7/8/13	100 U	0.27 U	0.43 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.3 U
SH-MW7	SH-MW7-130708	ND	Existing	N/A	Permanent	48.41	12.22	36.19	7/8/13	1,100	*0.52 U*	0.42 U	0.40 U	0.47	1.6	2.1	0.40 U	1.0	0.40 U	0.40 U	2.0 U	1.3	0.40 U	2.6 U
UG-MW1	UG-MW1-130702	ND	Existing	N/A	Permanent	103.76	19.62	84.14	7/2/13	100 U	0.27 U	0.44 U	0.40 U	1.1	19	0.81	0.63	9.7	56	0.40 U	2.0 U	0.80 U	0.40 U	2.8 U
UG-MW2R	UG-MW2R-130715	ND	Existing	N/A	Permanent	97.90	16.56	81.34	7/15/13	100 U	0.29 U	0.46 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.3 U
UG-MW5	UG-MW5-130710	ND	Existing	N/A	Permanent	115.10	21.87	93.23	7/10/13	100 U	0.28 U	0.44 U	0.20 U	5.8	1.4	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.0 U
UG-MW6	UG-MW6-130710	ND	Existing	N/A	Permanent	110.27	23.48	86.79	7/10/13	890 J	0.26 U	0.42 U	4.0 U	700	180	9.4	5.2	33	18	4.0 U	20 U	8.0 U	310	20 U
UG-MW10	UG-MW10-130711	ND	Existing	N/A	Permanent	114.25	-1.53	115.78	7/11/13	100 U	0.27 U	0.43 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.0 U
UG-MW11	UG-MW11-130710	ND	Existing	N/A	Permanent	114.59	7.88	106.71	7/10/13	100 U	0.27 U	0.43 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.0 U
UG-MW12	UG-MW12-130710	ND	Existing	N/A	Permanent	112.29	15.76	96.53	7/10/13	100 U	0.26 U	0.41 U	0.20 U	0.40	5.8	0.20 U	0.21	0.93	30	0.20 U	1.0 U	0.40 U	0.20 U	1.0 U
UG-MW15	UG-MW15-130710	ND	Existing	N/A	Permanent	116.43	11.82	104.61	7/10/13	100 U	0.26 U	0.41 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.10 U	0.20 U	0.20 U	1.0 U	0.40 U	0.20 U	1.0 U
MTCA Method A Groundwater Cleanup Level										800/1,000 [10]	0.5	0.5	5	5	16 [11]	160 [11]	400 [11]	0.2	5	700	1,000	1,000	160 [11]	160
MTCA Method B Groundwater Screening Level Protective of Indoor Air [11]										NE	NE	NE	24	1.5	160	110	130	0.35	2.4	2,800	16,000	290 [12]	290	8.9

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc., of Redmond, Washington.

[2] Sample ID = Area number - boring/test pit number - starting depth of sample [feet bgs] -end depth [feet bgs], Area 1A Boring 4 collected 11-12 feet bgs = 1A-B4-11-12.

[3] Surveyed elevations taken from AHBL 2014 Survey, NGVD 29 vertical datum and URS 2007 Upgradient TCE Assessment, NGVD 29 vertical datum.

[4] Water level measurement shown measured on November 8, 2013.

[5] Measurement collected on July 17, 2013 because monitoring well was decommissioned by November 8, 2013.

[6] Washington State Department of Ecology (Ecology)-approved method NWTPH-Gx and NWTPH-Dx.

[7] VOCs were analyzed by EPA method 8260B. Other VOCs were analyzed but not detected.

[8] Total xylenes consists of m,p- and o- xylenes. The higher detection limit is shown.

[9] Water level measured on November 8, 2014.

[10] MTCA Method A cleanup level for gasoline is 800 µg/L if benzene is detected or if the sum of toluene, ethylbenzene and xylenes are equal to or greater than 1% of the total gasoline detection.

[11] MTCA Method B criteria represented because MTCA Method A cleanup level has not been established.

[12] MTCA Method B Indoor Air Screening Level from Washington State Deportment of Ecology Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action. Values updated as appropriate to incorporate recent toxicity data.

[12] Screening Level for m,p-xylene shown.

TCE = Trichloroethene

PCE = Tetrachloroethene

cis-1,2-DCE = cis-1,2-Dichloroethene

trans-1,2-DCE = Trans-1,2-Dichloroethene

1,1-DCE = 1,1-dichloroethylene

J = Estimated result by the analytical laboratory

NE = Not established

MTCA = Model Toxics Control Act

-- = Sample not analyzed

µg/L = microgram per liter

ND = Not determined

QVI = Ice-contact deposits

U = Analyte was not detected at or greater than the listed reporting limit

Bold font type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Bold font type and gray shading indicates that the detected concentration is greater than the respective MTCA Method A cleanup level or Method B criteria protective of groundwater.

Dashed outline indicates analyte is detected at a concentration greater than the MTCA Method B Indoor Air Screening Level.

Table 18

SUMMARY OF CHEMICAL ANALYTICAL RESULTS FOR SECONDARY VOCS[1] - GROUNDWATER

2013 Environmental Subsurface Investigation - University of Washington-Tacoma
Tacoma, Washington

				VOCS[3] (µg/L)													
				Solvents					Byproducts of Chlorinated Water			Typical Laboratory Contaminants					
Monitoring Well Identification	Sample Identification [2]	Lithology At Well Screen	Sample Date	1,1,1-TCA	1,1-DCA	1,2,4-Trimethylbenzene	1,2-Dichlorobenzene	1,3,5-Trimethylbenzene	Bromodichloromethane	Chloroform	Dibromochloromethane	Acetone	Isopropylbenzene	n-Butylbenzene	n-Propylbenzene	p-Isopropyltoluene	Sec-Butylbenzene
Westerly Plume Wells																	
BA-MW2	BA-MW2-130617	Advance Outwash	6/17/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
DD-MW1	DD-MW1-130619	Advance Outwash	6/19/13	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	25 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
JS-MW1	JS-MW1-130618	Advance Outwash	6/18/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
JS-MW2	JS-MW2-130618	Advance Outwash	6/18/13	0.21	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
JS-MW3	JS-MW3-130625	Advance Outwash	6/25/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	7.2 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
JS-MW3S	JS-MW3S-130913	Qvi	9/13/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.98	8.7	0.23	8.9 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
JS-MW3S	JS-MW3S-140122	Qvi	1/22/14	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.28	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Tap Water	WATER - 130924	N/A	9/23/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	2.2	28	0.27	6.9 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
JS-MW4	JS-MW4D-130919	Advance Outwash	9/19/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
JS-MW7A	JS-MW7A-140122	Qvi	1/22/14	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
UG-MW3	UG-MW3-130618	Advance Outwash	6/18/13	0.20 U	0.25	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
UG-MW4	UG-MW4-130619	Advance Outwash	6/19/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
UG-MW7	UG-MW7-130619	Advance Outwash	6/19/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
UG-MW8	UG-MW8-130619	Advance Outwash	6/19/13	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U	10 U	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U
UG-MW9	UG-MW9-130617	Advance Outwash	6/17/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
UG-MW13	UG-MW13-130625	Qvi	6/25/13	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	36 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
UG-MW14	UG-MW14-130617	Advance Outwash	6/17/13	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	25 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
UG-MW16	UG-MW16-130617	Advance Outwash	6/17/13	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	25 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
UG-MW17	UG-MW17-130617	Advance Outwash	6/17/13	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	50 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
UG-MW18	UG-MW18-130614	Advance Outwash	6/14/13	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	380 U	10 U	10 U	10 U	10 U	10 U
UG-MW19	UG-MW19-130614	Advance Outwash	6/14/13	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	76 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
UG-MW20	UG-MW20-130614	Advance Outwash	6/14/13	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	38 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
UG-MW21	UG-MW21-130618	Advance Outwash	6/18/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
UG-MW22	UG-MW22-130614	Advance Outwash	6/14/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	7.6 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
UG-MW23	UG-MW23-131003	Advance Outwash	10/3/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
UG-MW24	UG-MW24-130715	Advance Outwash	7/15/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
UG-MW25D	UG-MW25D-130904	Advance Outwash	9/4/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
UG-MW25S	UG-MW25S-130904	Qvi	9/4/13	2.0 U	15	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	50 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
UG-MW26	UG-MW26-130930	Qvi	9/30/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
UG-MW27	UG-MW27-130702	Advance Outwash	7/2/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
UG-MW28	UG-MW28-130702	Qvi	7/2/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
UG-MW29D	UG-MW29D-130701	Advance Outwash	7/1/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
UG-MW29S	UG-MW29S-130701	Qvi	7/1/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.56	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
UG-MW30D	UG-MW30D-130712	Advance Outwash	7/12/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
UG-MW30S	UG-MW30S-130715	Qvi	7/15/13	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	25 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	UG-MW30S-130715-VOC		7/15/13	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	25 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
UG-MW31	UG-MW31-130904	Qvi	9/4/13	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	25 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
UG-MW32	UG-MW32-131003	Qvi	10/3/13	0.20 U	0.21	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
UG-MW33	UG-MW33-131002	Qvi	10/2/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
UG-MW34	UG-MW34-130923	Qvi	9/23/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	6.9 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
UG-MW35	UG-MW35-140122	Qvi	1/22/14	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
UG-MW36	UG-MW36-140122	Qvi	1/22/14	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
UG-MW37	UG-MW37-130930	Qvi	9/30/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.7	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
UG-MW38D	UG-MW38D-131003	Advance Outwash	10/2/13	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	25 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
UG-MW38S	UG-MW38S-131001	Qvi	10/1/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
1A-B2	1A-B2-W	ND	6/13/13	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U	15 U	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U
1F-B3	1F-B3-W	Qvi	6/12/13	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	25 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1F-B5	1F-B5-W	Qvi	6/12/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
1F-B7	1F-B7-W	Qvi	6/11/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
Easterly Plume																	
BA-MW1	BA-MW1-130711	ND	7/11/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
BL-MW1	BL-MW1-130709	ND	7/9/13	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	25 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
BL-MW3	BL-MW3-130911	ND	9/11/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
BL-MW4	BL-MW4-130708	ND	7/8/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
BL-MW5	BL-MW5-130709	ND	7/9/13	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	100 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
BL-MW6	BL-MW6-130711	ND	7/11/13	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	50 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
CR-MW3	CR-MW3-130709	ND	7/9/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
CR-MW5	CR-MW5-130709	ND	7/9/13	0.20 U	0.20 U	0.20 U	0.22	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.29	0.20 U	0.29	0.20 U	0.28
CR-MW6	CR-MW6-130709	ND	7/9/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
CR-MW8	CR-MW8-130702	ND	7/2/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.36	0.20 U	0.84	0.20 U	0.20 U
CR-MW9	CR-MW9-130708	ND	7/8/13	1.0 U	1.0 U	110	1.0 U	32	1.0 U	1.0 U	1.0 U	25 U	7.3	1.0 U	26	1.0 U	2.1
CR-MW12	CR-MW12-130708	ND	7/8/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
CR-MW15	CR-MW15S-130905	Advance Outwash	9/5/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
CR-MW16	CR-MW16S-130905	Qvi	9/5/13	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	50 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
CR-MW17	CR-MW17S-130905	Qvi	9/5/13	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	25 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
DD-MW2	DD-MW2-130709	ND	7/9/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
JP-MW1	JP-MW1-130712	ND	7/12/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
JP-MW1R	JP-MW1R-130712	ND	7/12/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
JP-MW2	JP-MW2-130702	ND	7/2/13	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	100 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
JS-MW5	JS-MW5S-130912	Advance Outwash	9/12/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
JS-MW6D	JS-MW6D-130913	Advance Outwash	9/13/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	8.9 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
JS-MW6S	JS-MW6S-130912	Qvi	9/12/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
PL-MW1	PL-MW1-130712	ND	7/12/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
PL-MW2	PL-MW2-130710	ND	7/10/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
PS-MW6	PS-MW6-130711	ND	7/11/13	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U	10 U	1.3	1.6	1.5	0.40 U	1.3
PS-MW7	PS-MW7-130715	ND	7/15/13	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	25 U	1.0 U	1.0 U	1.3	1.0 U	1.0 U
PS-MW8	PS-MW8-130711	ND	7/11/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
PS-MW9	PS-MW9-130711	ND	7/11/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
SH-MW6	SH-MW6-130708	ND	7/8/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
SH-MW7	SH-MW7-130708	ND	7/8/13	0.40 U	0.40 U	2.2	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U	10 U	4.0	3.3	7.5	0.88	4.7
UG-MW1	UG-MW1-130702	ND	7/2/13	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U	10 U	0.40 U	0.40 U	0.40 U	0.40 U	0.40 U
UG-MW2R	UG-MW2R-130715	ND	7/15/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
UG-MW5	UG-MW5-130710	ND	7/10/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
UG-MW6	UG-MW6-130710	ND	7/10/13	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U	100 U	4.0 U	4.0 U	4.0 U	4.0 U	4.0 U
UG-MW10	UG-MW10-130711	ND	7/11/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
UG-MW11	UG-MW11-130710	ND	7/10/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
UG-MW12	UG-MW12-130710	ND	7/10/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
UG-MW15	UG-MW15-130710	ND	7/10/13	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5.0 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
		MTCA Method A Groundwater Cleanup Level		200	7.7[4]	NE	720[4]	80[4]	0.71[4]	1.41[4]	0.52[4]	7,200[4]	800[4]	400[4]	800[4]	NE	800[4]

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc., of Redmond, Washington.

[2] Sample ID = Area number - boring/test pit number - starting depth of sample [feet bgs] -end depth [feet bgs], Area 1A Boring 4 collected 11-12 feet bgs = 1A-B4-11-12.

[3] VOCs were analyzed by EPA method 8260B. Other VOCs were analyzed but not detected.

[4] MTCA Method B criteria represented because MTCA Method A cleanup level has not been established.

[5] MTCA Method B Indoor Air Screening Level from Washington State Deportment of Ecology Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action.

Qvi = Ice-contact deposits

1,1-DCE = 1,1-dichloroethylene

1,1-DCA = 1,1 dichloroethane

1,1,1-TCA = Trichloroethane

NE = Not established

µg/L = Microgram per liter

J = Estimated result by the analytical laboratory

U = Analyte was not detected at or greater than the listed reporting limit.

Italics = The listed reporting limit is greater than the applicable cleanup level.

Bold font type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Bold font type and gray shading indicates that the detected concentration is greater than the respective MTCA cleanup level.

Dashed outline indicates that the detected concentration is greater than the MTCA Method B Indoor Air Screening Level.

ND = Not determined

QVI = Ice-contact deposits

-- = Sample not analyzed

N/A = Not applicable

Table 19

Summary of Chemical Analytical Results for Metals and PAHs[1] - Groundwater

2013 Environmental Subsurface Investigation - University of Washington-Tacoma

Tacoma, Washington

Monitoring Well Identification	Sample Identification [2]	Lithology At Wells Screen	Sample Date	Total Metals (µg/L) [3]								Dissolved Metals (µg/L) [4]					CPAHS (µg/L) [5]								
				Arsenic (Total)	Barium (Total)	Cadmium (Total)	Chromium (Total)	Lead (Total)	Mercury (Total)	Selenium (Total)	Silver (Total)	Arsenic (Dissolved)	Cadmium (Dissolved)	Chromium (Dissolved)	Lead (Dissolved)	Mercury (Dissolved)	Benzo (a) anthracene (TEF 0.1)	Benzo (a) pyrene (TEF 1)	Benzo (b) fluoranthene (TEF 0.1)	Benzo (J,k) fluoranthene (TEF 0.1)	Chrysene (TEF 0.01)	Dibenz (a,h) anthracene (TEF 0.1)	Indeno (1,2,3-cd) pyrene (TEF 0.1)	cPAH TTEC	Naphthalene
Easterly Groundwater Plume																									
BL-MW3	BL-MW3-130911	ND	9/11/2013	**8.6**	**110**	4.0 U	**28**	**7.4**	0.50 U	5.0 U	10 U	3.0 U	--	--	--	--	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	N/A	0.10 U
CR-MW15	CR-MW15S-130905	Advance Outwash	9/5/2013	3.3 U	--	4.4 U	11 U	1.1 U	0.50 U	--	--	--	--	--	--	--	0.0097 U	0.0097 U	0.0097 U	0.0097 U	0.0097 U	0.0097 U	0.0097 U	N/A	0.097 U
CR-MW16	CR-MW16S-130905	Qvi	9/5/2013	3.3 U	--	4.4 U	11 U	1.1 U	0.50 U	--	--	--	--	--	--	--	0.0096 U	0.0096 U	0.0096 U	0.0096 U	0.0096 U	0.0096 U	0.0096 U	N/A	0.096 U
CR-MW17	CR-MW17S-130905	Qvi	9/5/2013	3.3 U	--	4.4 U	11 U	1.1 U	0.50 U	--	--	--	--	--	--	--	0.0097 U	0.0097 U	0.0097 U	0.0097 U	0.0097 U	0.0097 U	0.0097 U	N/A	0.097 U
JS-MW5	JS-MW5S-130912	Advance Outwash	9/12/2013	3.0 U	25 U	4.0 U	10 U	1.0 U	0.50 U	5.0 U	10 U	--	--	--	--	--	0.0096 U	0.0096 U	0.0096 U	0.0096 U	0.0096 U	0.0096 U	0.0096 U	N/A	0.096 U
JS-MW6D	JS-MW6D-130913	Advance Outwash	9/13/2013	3.0 U	25 U	4.0 U	10 U	1.0 U	0.50 U	5.0 U	10 U	--	--	--	--	--	0.0095 U	0.0095 U	0.0095 U	0.0095 U	0.0095 U	0.0095 U	0.0095 U	N/A	0.095 U
JS-MW6S	JS-MW6S-130912	Qvi	9/12/2013	3.0 U	**100**	4.0 U	**13**	**1.7**	0.50 U	5.0 U	10 U	--	--	--	--	--	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	N/A	0.10 U
Westerly Groundwater Plume																									
JS-MW3S	JS-MW3S-130913	Qvi	9/13/2013	3.0 U	**69**	4.0 U	**18**	**2.0**	0.50 U	5.0 U	10 U	--	--	--	--	--	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	N/A	0.10 U
JS-MW4	JS-MW4D-130919	Advance Outwash	9/19/2013	3.0 U	25 U	4.0 U	10 U	**1.3**	0.50 U	5.0 U	10 U	--	--	--	--	--	0.0095 U	0.0095 U	0.0095 U	0.0095 U	0.0095 U	0.0095 U	0.0095 U	N/A	0.095 U
UG-MW23	UG-MW23-131003	Advance Outwash	10/3/2013	3.3 U	28 U	4.4 U	11 U	1.1 U	0.50 U	5.6 U	11 U	--	--	--	--	--	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	N/A	0.10 U
UG-MW24	UG-MW24-130715	Advance Outwash	7/15/2013	3.3 U	--	4.4 U	11 U	1.1 U	0.50 U	--	--	--	--	--	--	--	0.0096 U	0.0096 U	0.0096 U	0.0096 U	0.0096 U	0.0096 U	0.0096 U	N/A	0.096 U
UG-MW25D	UG-MW25D-130904	Advance Outwash	9/4/2013	**6.2**	28 U	4.4 U	11 U	1.1 U	0.50 U	5.6 U	11 U	**5.7**	--	--	--	--	0.0095 U	0.0095 U	0.0095 U	0.0095 U	0.0095 U	0.0095 U	0.0095 U	N/A	0.095 U
UG-MW25S	UG-MW25S-130904	Qvi	9/4/2013	3.3 U	**49**	4.4 U	11 U	1.1 U	0.50 U	5.6 U	11 U	--	--	--	--	--	0.0095 U	0.0095 U	0.0095 U	0.0095 U	0.0095 U	0.0095 U	0.0095 U	N/A	0.095 U
UG-MW26	UG-MW26-130930	Qvi	9/30/2013	3.0 U	**40**	4.0 U	10 U	1.0 U	0.50 U	5.0 U	10 U	--	--	--	--	--	0.0096 U	0.0096 U	0.0096 U	0.0096 U	0.0096 U	0.0096 U	0.0096 U	N/A	0.096 U
UG-MW27	UG-MW27-130702	Advance Outwash	7/2/2013	3.3 U	28 U	4.4 U	11 U	1.1 U	0.50 U	5.6 U	11 U	--	--	--	--	--	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	N/A	0.10 U
UG-MW28	UG-MW28-130702	Qvi	7/2/2013	3.3 U	**33**	4.4 U	11 U	1.1 U	0.50 U	5.6 U	11 U	--	--	--	--	--	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	N/A	0.10 U
UG-MW29D	UG-MW29D-130701	Advance Outwash	7/1/2013	3.3 U	**51**	4.4 U	11 U	1.1 U	0.50 U	5.6 U	11 U	--	--	--	--	--	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	N/A	0.094 U
UG-MW29S	UG-MW29S-130701	Qvi	7/1/2013	3.3 U	28 U	4.4 U	11 U	1.1 U	0.50 U	5.6 U	11 U	--	--	--	--	--	0.0097 U	0.0097 U	0.0097 U	0.0097 U	0.0097 U	0.0097 U	0.0097 U	N/A	0.097 U
UG-MW30D	UG-MW30D-130712	Advance Outwash	7/12/2013	3.3 U	--	4.4 U	11 U	1.1 U	0.50 U	--	--	--	--	--	--	--	0.0095 U	0.0095 U	0.0095 U	0.0095 U	0.0095 U	0.0095 U	0.0095 U	N/A	0.095 U
UG-MW30S	UG-MW30S-130715	Qvi	7/15/2013	3.3 U	--	4.4 U	11 U	1.1 U	0.50 U	--	--	--	--	--	--	--	**0.0095**	0.0095 U	0.0095 U	0.0095 U	0.0095 U	0.0095 U	0.0095 U	**0.00095**	0.095 U
UG-MW31	UG-MW31-130904	Qvi	9/4/2013	3.3 U	28 U	4.4 U	11 U	1.1 U	0.50 U	5.6 U	11 U	--	--	--	--	--	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	0.0094 U	N/A	0.094 U
UG-MW32	UG-MW32-131003	Qvi	10/3/2013	3.3 U	28 U	4.4 U	11 U	1.1 U	0.50 U	5.6 U	11 U	--	--	--	--	--	0.0097 U	0.0097 U	0.0097 U	0.0097 U	0.0097 U	0.0097 U	0.0097 U	N/A	0.097 U
UG-MW33	UG-MW33-131002	Qvi	10/2/2013	3.3 U	**54**	4.4 U	11 U	1.1 U	0.50 U	5.6 U	11 U	--	--	--	--	--	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	N/A	0.10 U
UG-MW34	UG-MW34-130923	Qvi	9/23/2013	3.0 U	**89**	4.0 U	10 U	**2.6**	0.50 U	5.0 U	10 U	--	--	--	--	--	0.015 U	0.015 U	0.015 U	0.015 U	0.015 U	0.015 U	0.015 U	N/A	0.15 U
UG-MW37	UG-MW37-130930	Qvi	9/30/2013	3.0 U	**68**	4.0 U	10 U	1.0 U	0.50 U	5.0 U	10 U	--	--	--	--	--	**0.011**	0.0097 U	**0.012**	0.0097 U	0.0097 U	0.0097 U	0.0097 U	**0.0023**	0.097 U
UG-MW38D	UG-MW38D-131003	Advance Outwash	10/2/2013	3.3 U	28 U	4.4 U	11 U	1.1 U	0.50 U	5.6 U	11 U	--	--	--	--	--	0.0095 U	0.0095 U	0.0095 U	0.0095 U	0.0095 U	0.0095 U	0.0095 U	N/A	0.095 U
UG-MW38S	UG-MW38S-131001	Qvi	10/1/2013	3.0 U	**59**	4.0 U	10 U	**1.8**	0.50 U	5.0 U	10 U	--	--	--	--	--	**0.011**	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	**0.0011**	0.10 U
1A-B2	1A-B2-W	Fill	6/13/2013	--	--	--	--	--	--	--	--	**4.3**	4.0 U	10 U	1.0 U	0.50 U	0.0098 U	0.0098 U	0.0098 U	0.0098 U	0.0098 U	0.0098 U	0.0098 U	N/A	0.098 U
1F-B3	1F-B3-W	Qvi	6/12/2013	--	--	--	--	--	--	--	--	3.0 U	4.0 U	10 U	1.0 U	0.50 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	N/A	0.10 U
1F-B5	1F-B5-W	Qvi	6/12/2013	--	--	--	--	--	--	--	--	3.0 U	4.0 U	10 U	1.0 U	0.50 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	N/A	0.10 U
1F-B7	1F-B7-W	Qvi	6/11/2013	--	--	--	--	--	--	--	--	3.0 U	4.0 U	10 U	1.0 U	0.50 U	**0.011**	0.0095 U	0.0095 U	0.0095 U	0.0095 U	0.0095 U	0.0095 U	**0.0011**	0.095 U
Tioga Sump Water Sample																									
2F-S1	2F-SUMP	N/A	6/20/2013	**160**	**440**	**16**	**80**	**5,700**	**2.5**	5.6 U	11 U	--	--	--	--	--	0.0099 U	0.0099 U	0.0099 U	0.0099 U	0.0099 U	0.0099 U	0.0099 U	N/A	0.099 U
MTCA Method A Groundwater Cleanup Level				5	3,200[6]	5	50	15	2	80[6]	80[6]	5	5	50	15	2	MTCA Groundwater Cleanup Level for the TTEC of cPAHs is 0.1 µg/L								160

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc., of Redmond, Washington.

[2] Sample ID = Area number - boring/test pit number - starting depth of sample [feet bgs] -end depth [feet bgs], Area 1A Boring 4 collected 11-12 feet bgs = 1A-B4-11-12.

[3] Total metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver) by EPA methods 6010C, 7196A, 7196AMOD and 7471B.

[4] Dissolved Metals (select) by EPA Methods 200.8 and/or 7470A.

[5] Carcinogenic PAHs (cPAHs) were analyzed by U.S. Environmental Protection Agency (EPA) method 8270D/SIM.

[6] MTCA Method B criteria represented because MTCA Method A cleanup level has not been established.

Qvi = Ice-contact deposits

μg/L = Microgram per liter

TTEC = Total Toxicity Equivalency Concentration

PAHs = polycyclic aromatic hydrocarbons

-- = Sample not analyzed

TEF = Toxicity equivalency factor

U = Analyte was not detected at or greater than the listed reporting limit.

Bold font type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Bold font type and gray shading indicates that the detected concentration is greater than the respective MTCA cleanup level.

Table 20

Summary of Chemical Analytical Results[1] - Sump Water

2013 Environmental Subsurface Investigation - University of Washington-Tacoma

Tacoma, Washington

Sample Location	Floor Sump	MTCA Method A Groundwater Cleanup Level	MTCA Method B Groundwater Screening Levels [12]
Sample ID [2]	2F-SUMP		
Sample Date	6/20/2013		
Chemical			
NWTPH-Gx [3] (µg/L)			
Gasoline-Range	100 U	800/1,000 [9]	NE
NWTPH-Dx [4] (mg/L)			
Diesel-Range	**0.76 U**	0.5	NE
Lube Oil-Range	**2.2**	0.5	NE
VOCs [5] (µg/L)			
Benzene	0.20 U	5	2.4
Trichloroethene (TCE)	0.20 U	5	1.5
Tetrachloroethene (PCE)	0.20 U	5	24
(cis) 1,2-Dichloroethene	0.20 U	16 [10]	160
(trans) 1,2-Dichloroethene	0.20 U	160 [10]	110
Vinyl Chloride	0.10 U	0.2	0.35
cPAHs [6] (µg/L)			
Benzo (a) anthracene (TEF 0.1)	0.0099 U	MTCA Method A ULU cleanup level for the sum of all cPAHs is 0.1 µg/L	NE
Benzo (a) pyrene (TEF 1)	0.0099 U		NE
Benzo (b) fluoranthene (TEF 0.1)	0.0099 U		NE
Benzo (j,k) fluoranthene (TEF 0.1)	0.0099 U		NE
Chrysene (TEF 0.01)	0.0099 U		NE
Dibenz (a,h) anthracene (TEF 0.1)	0.0099 U		NE
Indeno (1,2,3-cd) pyrene (TEF 0.1)	0.0099 U		NE
Total TTEC of cPAHs (detect only)	N/A	0.1	NE
Total Metals [7] (µg/L)			
Arsenic	**160**	5	NE
Barium	**440**	3,200 [10]	NE
Cadmium	**16**	5	NE
Chromium	**80**	50 [11]	NE
Lead	**5,700**	15	NE
Mercury	**2.5**	2	NE
Selenium	5.6 U	80 [10]	NE
Silver	11 U	80 [10]	NE
PCBs [8] (µg/L)			
All Aroclors	0.094 U, X	0.1	NE

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc. in Redmond, Washington.

[2] Sample ID = Boring number - Water sample (i.e., B10-W was a water sample collected from boring B10) or Sample ID = Monitoring well identification number (i.e., monitoring well TP-MW1).

[3] Washington State Department of Ecology (Ecology)-approved method NWTPH-Gx.

[4] Ecology-approved method NWTPH-Dx with acid/silica gel cleanup.

[5] Volatile organic compounds (VOCs) were analyzed by EPA method 8260C. Other VOCs were analyzed but not detected.

[6] Polycyclic Aromatic Hydrocarbons (PAHs) analyzed by EPA method 8270D/SIM. Other PAHs were analyzed but not detected.

[7] Metals analyzed by EPA 200.8 or 7470A method.

[8] Polychlorinated biphenyls analyzed by EPA method 8082. All aroclors were not detected, highest reporting limit presented.

[9] MTCA Method A cleanup level for gasoline-range petroleum hydrocarbons is 800 µg/L if benzene is present and 1,000 µg/L if benzene is not present.

[10] MTCA Method B criteria represented because MTCA Method A cleanup level has not been established.

[11] MTCA Method A cleanup level for total chromium shown. Cleanup level for hexavalent chromium is 48 µg/L.

[12] MTCA Method B Indoor Air Screening Level from Washington State Deportment of Ecology Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action. Values updated as appropriate to incorporate recent toxicity data.

MTCA = Model Toxics Control Act

N/A = not applicable

mg/L = milligram per Liter

µg/L = microgram per Liter

NE = Not established

TEF = Toxicity Equivalency Factor as defined in WAC 173-340-900 Table 708-2

Total Toxic Equivalent Concentration (TTEC) is the sum of each individual cPAH concentration multiplied by its corresponding TEF.

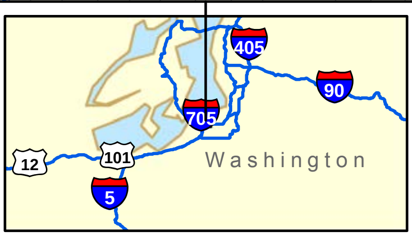
U = Analyte was not detected at or greater than the listed reporting limit

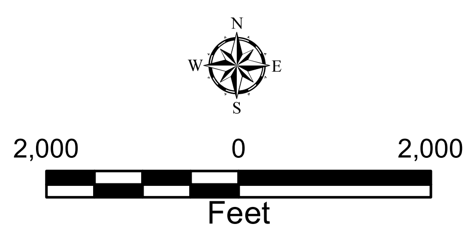
X = Sample extract treated with a mercury cleanup procedure

Italics = The listed reporting limit is greater than the applicable cleanup level

Bold type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Bold type and gray shading indicates analyte is detected at a concentration greater than the MTCA Method groundwater cleanup level/criteria.





Notes:
CPO = University of Washington Capital Project Office
UWT = University of Washington Tacoma
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Data Sources: ESRI Data & Maps

Projection:

Vicinity Map

2013 Environmental Subsurface Investigation
University of Washington – Tacoma
Tacoma, Washington

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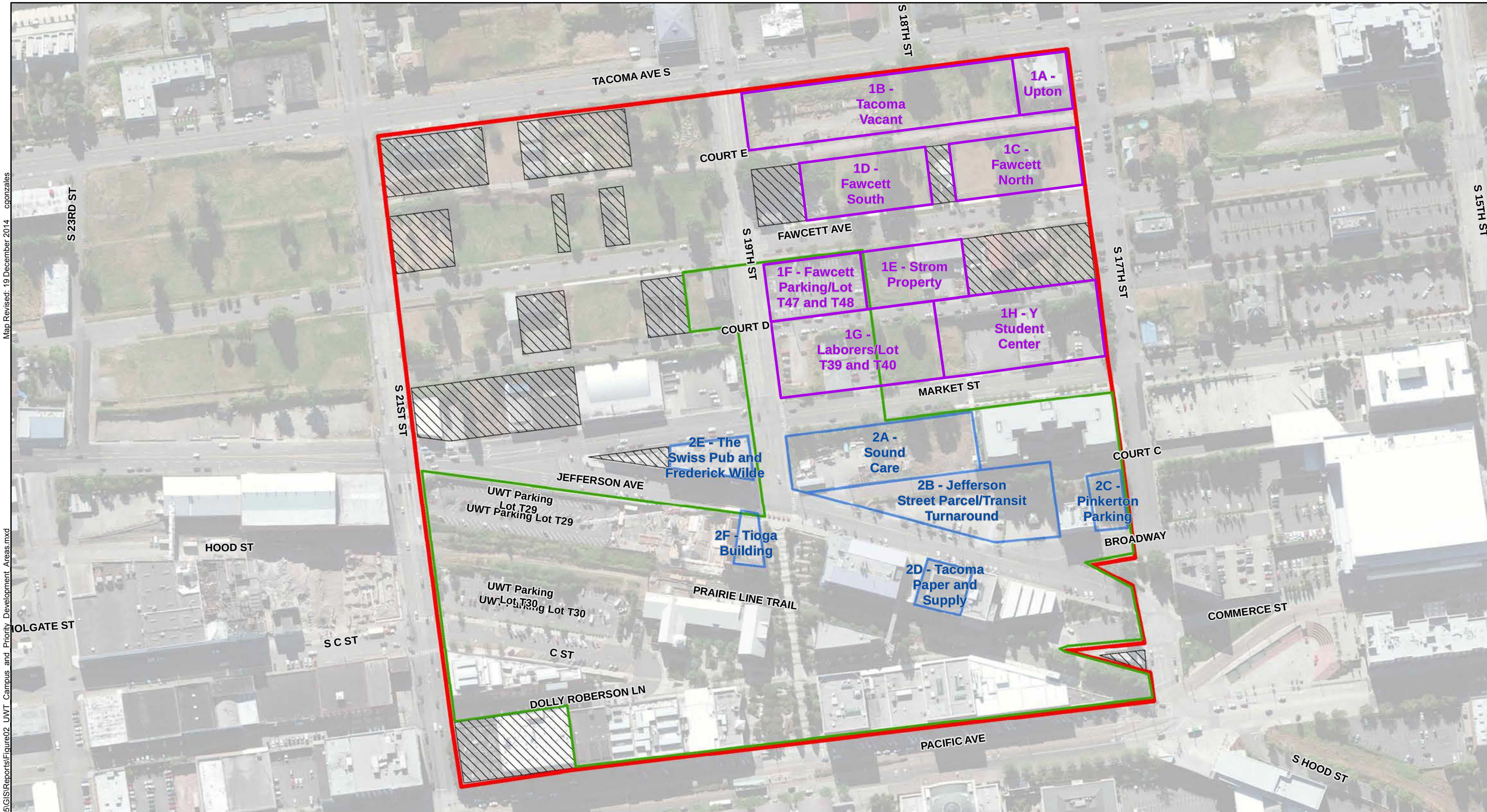
Figure 1

Office: TAC Path: \\tac\projects\0\0183085\GIS\Reports\Figure01_Vicinity_Map.mxd Map Revised: 19 December 2014 cgonzales



Office: TAC Path: \\tac\projects\0\0183085\GIS\Reports\Figure02_UWT_Campus_and_Priority_Development_Areas.mxd Map Revised: 19 December 2014 cgonzales

Notes:
PDA = Priority Development Area
1. The locations of all features shown are approximate.
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Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Legend

- UWT Master Plan Campus Boundary
- Existing UWT Campus Boundary
- PDA 1
- PDA 2
- Parcel Not Owned by UW But Within Master Plan Boundary

W S N E

200 0 200
Feet

UWT Campus and Priority Development Areas

2013 Environmental Subsurface Investigation
University of Washington – Tacoma
Tacoma, Washington

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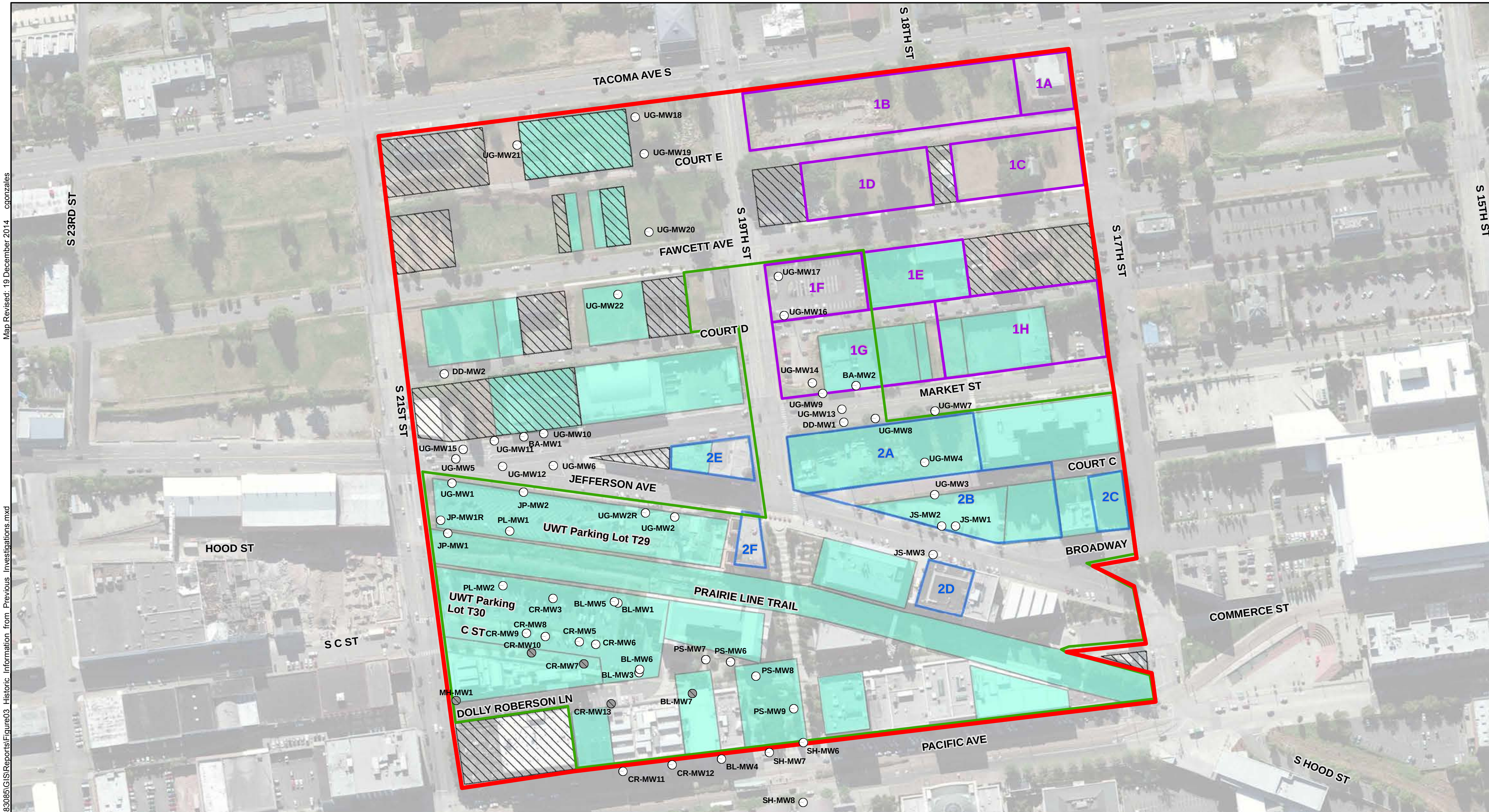
Figure 2



Map Revised: 19 December 2014 cgonzales

Path: \\tac\projects\0\0183085\GIS\Reports\Figure03_Historic_Information_from_Previous_Investigations.mxd

Office: TAC

Notes:
PDA = Priority Development Area
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Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Legend

- UWT Master Plan Campus Boundary
- Existing UWT Campus Boundary
- PDA 1
- PDA 2
- Parcel Not Owned by UW But Within Master Plan Boundary
- Parcel Specific Reports Obtained
- Existing Monitoring Installed Prior to This Investigation
- Monitoring Well Installed and Decommissioned Prior to This Investigation Completed by Others

W
N
E
S

200 0 200
Feet

Historic Information From Previous Investigations

2013 Environmental Subsurface Investigation
University of Washington – Tacoma
Tacoma, Washington

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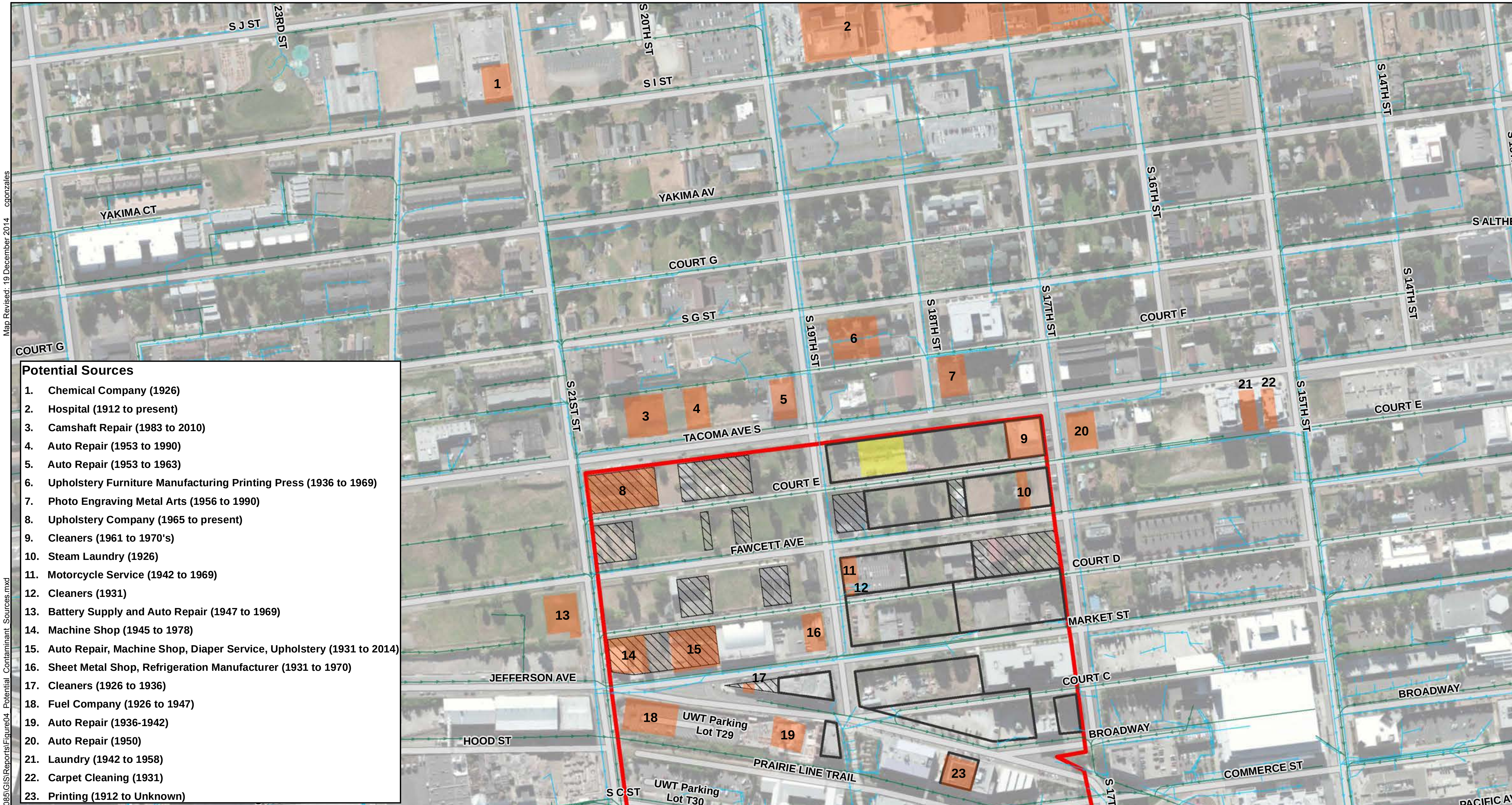
Figure 3



Potential Sources

1. Chemical Company (1926)
2. Hospital (1912 to present)
3. Camshaft Repair (1983 to 2010)
4. Auto Repair (1953 to 1990)
5. Auto Repair (1953 to 1963)
6. Upholstery Furniture Manufacturing Printing Press (1936 to 1969)
7. Photo Engraving Metal Arts (1956 to 1990)
8. Upholstery Company (1965 to present)
9. Cleaners (1961 to 1970's)
10. Steam Laundry (1926)
11. Motorcycle Service (1942 to 1969)
12. Cleaners (1931)
13. Battery Supply and Auto Repair (1947 to 1969)
14. Machine Shop (1945 to 1978)
15. Auto Repair, Machine Shop, Diaper Service, Upholstery (1931 to 2014)
16. Sheet Metal Shop, Refrigeration Manufacturer (1931 to 1970)
17. Cleaners (1926 to 1936)
18. Fuel Company (1926 to 1947)
19. Auto Repair (1936-1942)
20. Auto Repair (1950)
21. Laundry (1942 to 1958)
22. Carpet Cleaning (1931)
23. Printing (1912 to Unknown)

Legend

- UWT Master Plan Campus Boundary
- Priority Development Area
- Potential Source Property of TCE/PCE Contaminated Groundwater
- Potential Source Property of Petroleum-Contaminated Groundwater
- Parcel Not Owned by UW But Within Master Plan Boundary
- Storm Drain Utility
- Sewer Utility

W E N S

300 0 300

Feet

Notes:
PDA = Priority Development Area
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Office: TAC Path: \\tac\projects\0\0183085\GIS\Reports\Figure04_Potential_Contaminant_Sources.mxd Map Revised: 19 December 2014 cgonzales

Potential Contaminant Sources

2013 Environmental Subsurface Investigation
University of Washington – Tacoma
Tacoma, Washington

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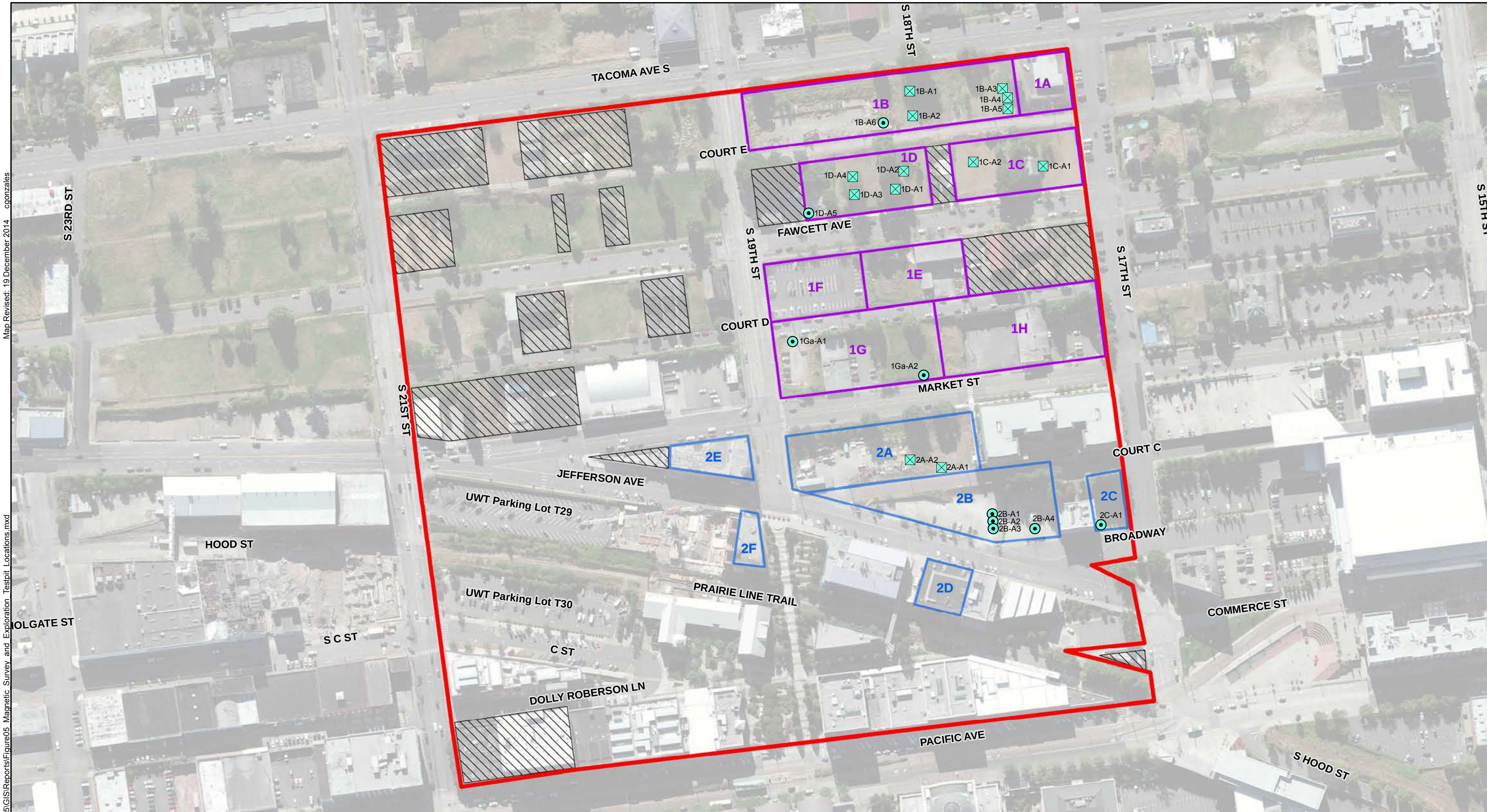
Figure 4



Notes:
PDA = Priority Development Area
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Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Legend

- UWT Master Plan Campus Boundary
- PDA 1
- PDA 2
- Magnetic Anomaly Observed and Test Pit Not Completed
- Magnetic Anomaly Observed and Test Pit Completed

N S E W

200 0 200
Feet

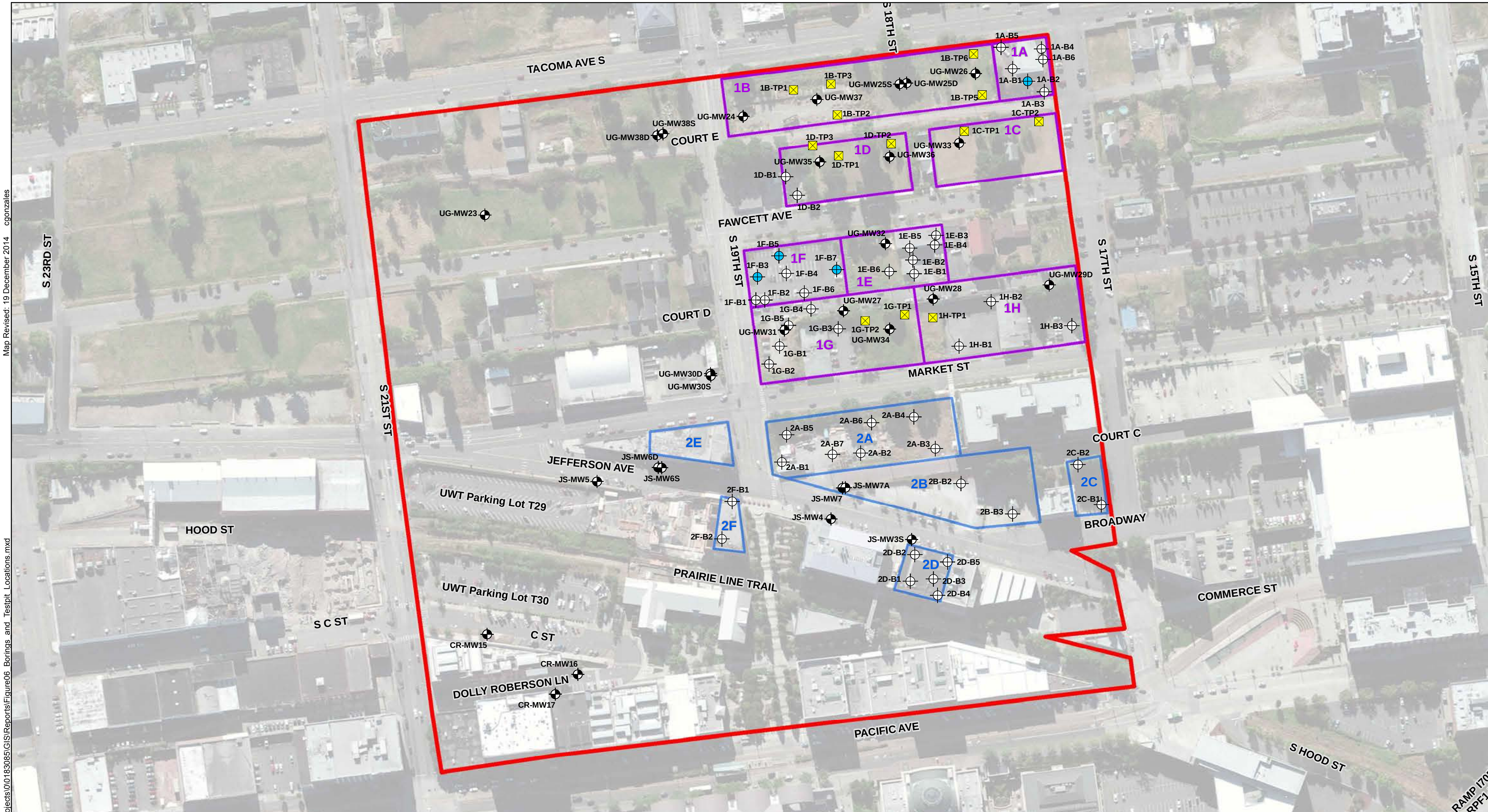
Magnetic Survey and Exploration Test Pit Locations

2013 Environmental Subsurface Investigation
University of Washington – Tacoma
Tacoma, Washington

GeoEngineers

Figure 5

Office: TAC Path: \\tac\projects\0\0183085\GIS\Reports\Figure05_Magnetic_Survey_and_Exploration_Testpit_Locations.mxd Map Revised: 19 December 2014 cgonzales



Map Revised: 19 December 2014 cgonzales

Path: \\tac\projects\0\0183085\GIS\Reports\Figure06_Borings_and_Testpit_Locations.mxd

Office: TAC

Notes:
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Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Legend

- UWT Master Plan Campus Boundary
- PDA 1
- PDA 2

Investigation Completed in 2013 (Location and Identification)

- Sonic Core Boring - Permanent Monitoring Well
- Direct Push Boring Completed as Temporary Well
- Direct Push Boring
- Test Pit

200 0 200
Feet

New Boring and Test Pit Locations

2013 Environmental Subsurface Investigation
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Tacoma, Washington

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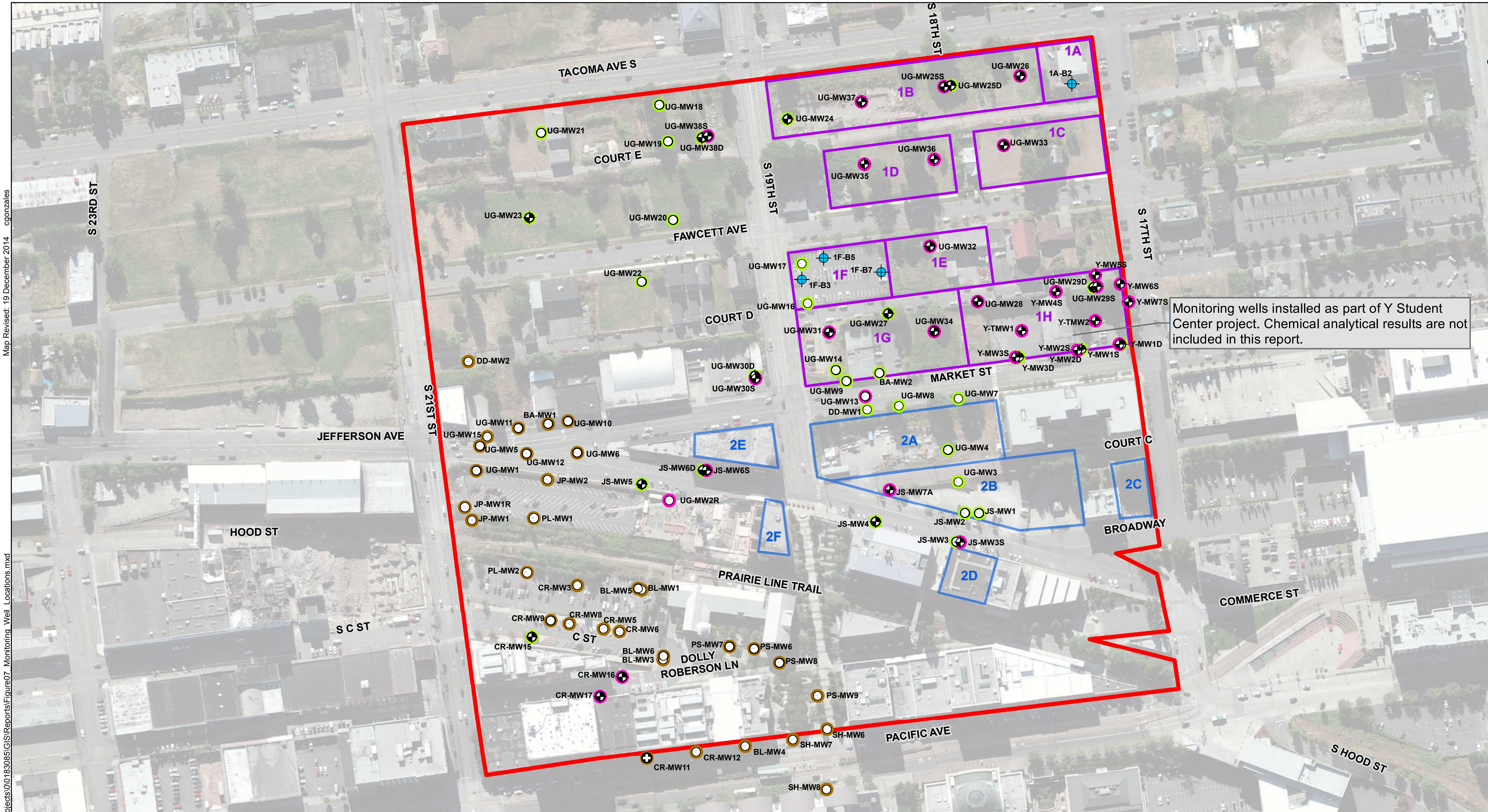
Figure 6



Map Revised: 19 December 2014 cgonzales

Path: \\tac\projects\0\0183085\GIS\Reports\Figure07_Monitoring_Well_Locations.mxd

Office: TAC

Legend

- UWT Master Plan Campus Boundary
- PDA 1
- PDA 2
- New Permanent Monitoring Well (2013)
- Direct Push Boring Completed as Temporary Well (2013)
- Existing Monitoring Permanent Well Installed by Others
- Well Screened Within Ice-Contact Deposit
- Well Screened within Advance Outwash
- Lithology of Well Screen Not Determined
- Well Decomissioned During this Investigation Due to Damage Observed in the Well

Notes:
PDA = Priority Development Area
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

200 0 200
Feet

Monitoring Well Locations

2013 Environmental Subsurface Investigation
University of Washington – Tacoma
Tacoma, Washington

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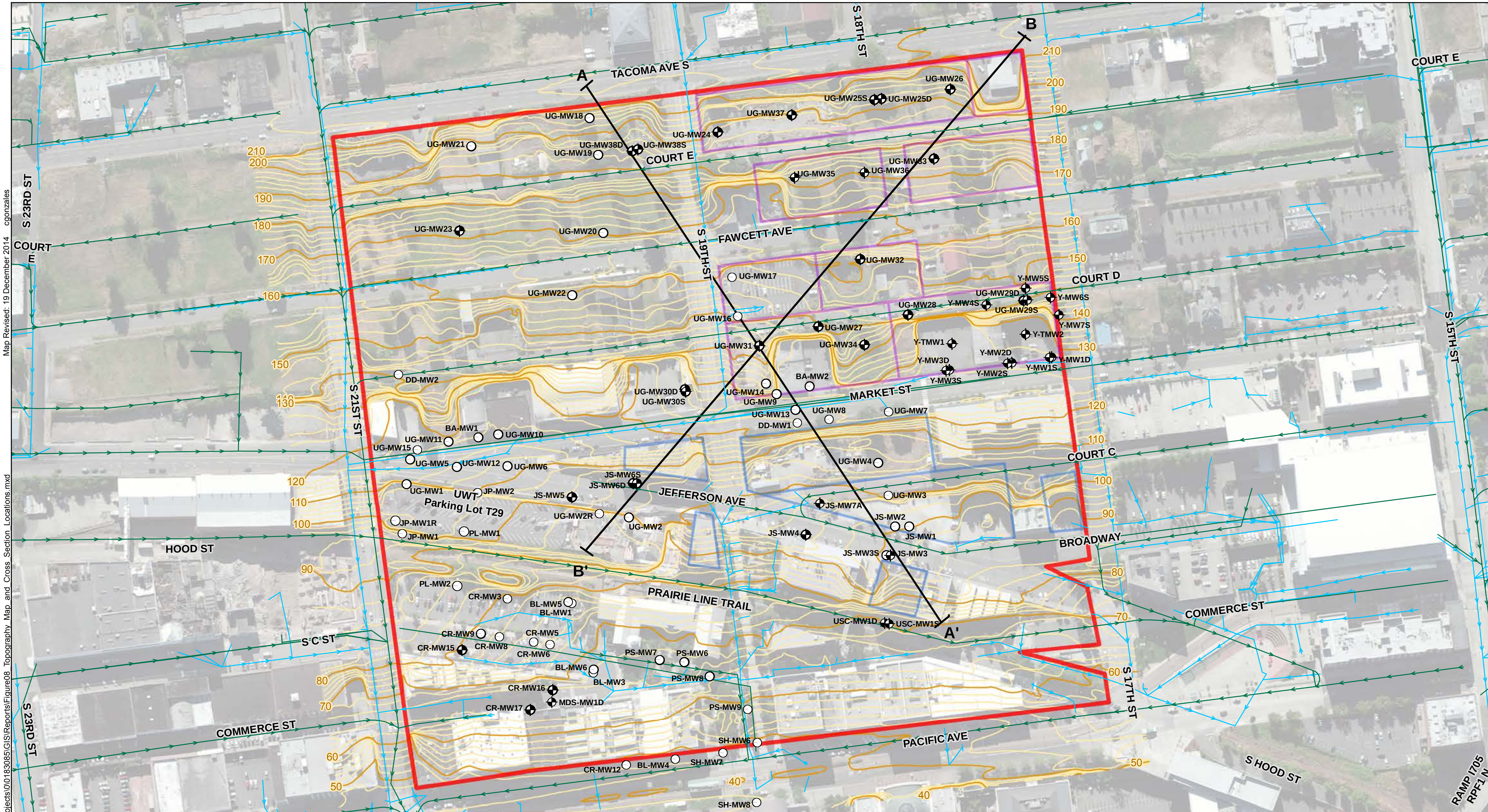
Figure 7



Legend

- UWT Master Plan Campus Boundary
- PDA 1
- PDA 2
- New Well Installed During This Investigation
- Existing Well Installed
- A — A' Cross Section Location
- Storm Drain Utility
- Sewer Utility
- Major Topographic Contours - 10 foot Interval
- Minor Topographic Contours - 2 foot Interval

200 0 200
Feet

Notes:
PDA = Priority Development Area
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Map Revised: 19 December 2014 cgonzales
Path: \\tac\projects\0\0183085\GIS\Reports\Figure08_Topography_Map_and_Cross_Section_Locations.mxd
Office: TAC

Topographic Map and Cross Section Locations

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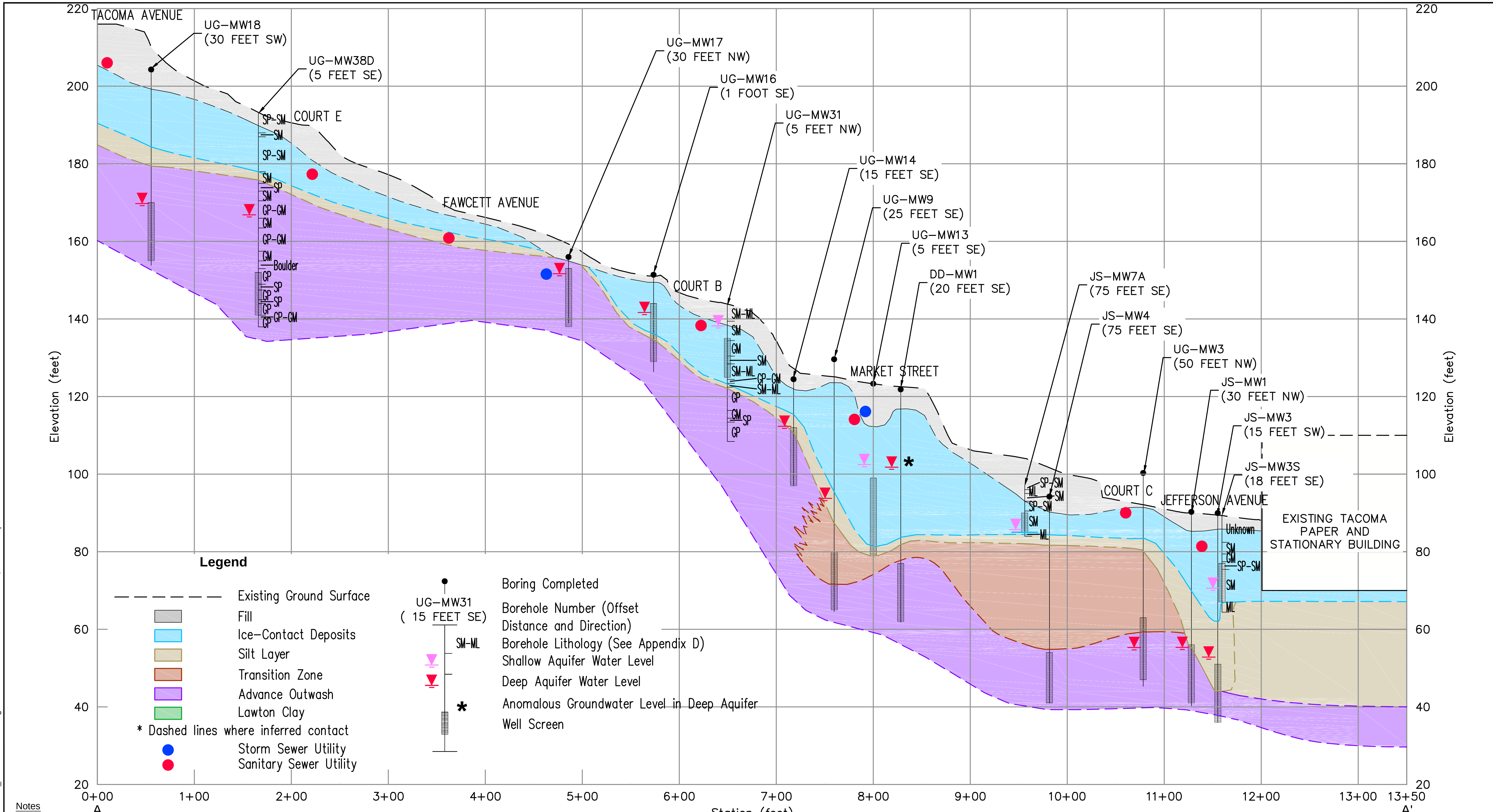
Figure 8



TD : MGF

W:\Tacoma\Projects\0\0183085\00\CAD\018308500_Cross Sections.dwg\TAB:Section A-A' modified on Dec 19, 2014 - 2:30pm

Notes

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. Horizontal datum - NAD 83/91 Washington State Plane - South Zone (City of Tacoma Horizontal control Holding City Monument Numbers 411 and 414). Vertical datum NGVD 29 (brass monument at South 19th and Fawcett Avenue, elevation 165.15).
4. Ground surface elevation based on LiDAR obtained from the Puget Sound LiDAR consortium. The surface topography in the areas of existing buildings was adjusted as necessary. Well elevations for the wells installed during this investigation was based on a survey completed by AHBL November 6, 2013. Well elevations for wells installed prior to this investigation is based on the elevations reported in the previous reports.
5. Storm sewer and sanitary sewer elevations and locations are estimated from manhole and pipe elevations obtained from City of Tacoma govme.com.
6. Lithology shown on borings completed by GeoEngineers. Refer to boring logs for lithologic symbol descriptions provided in Appendix D.

Cross Section A-A'

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University of Washington - Tacoma
Tacoma, Washington

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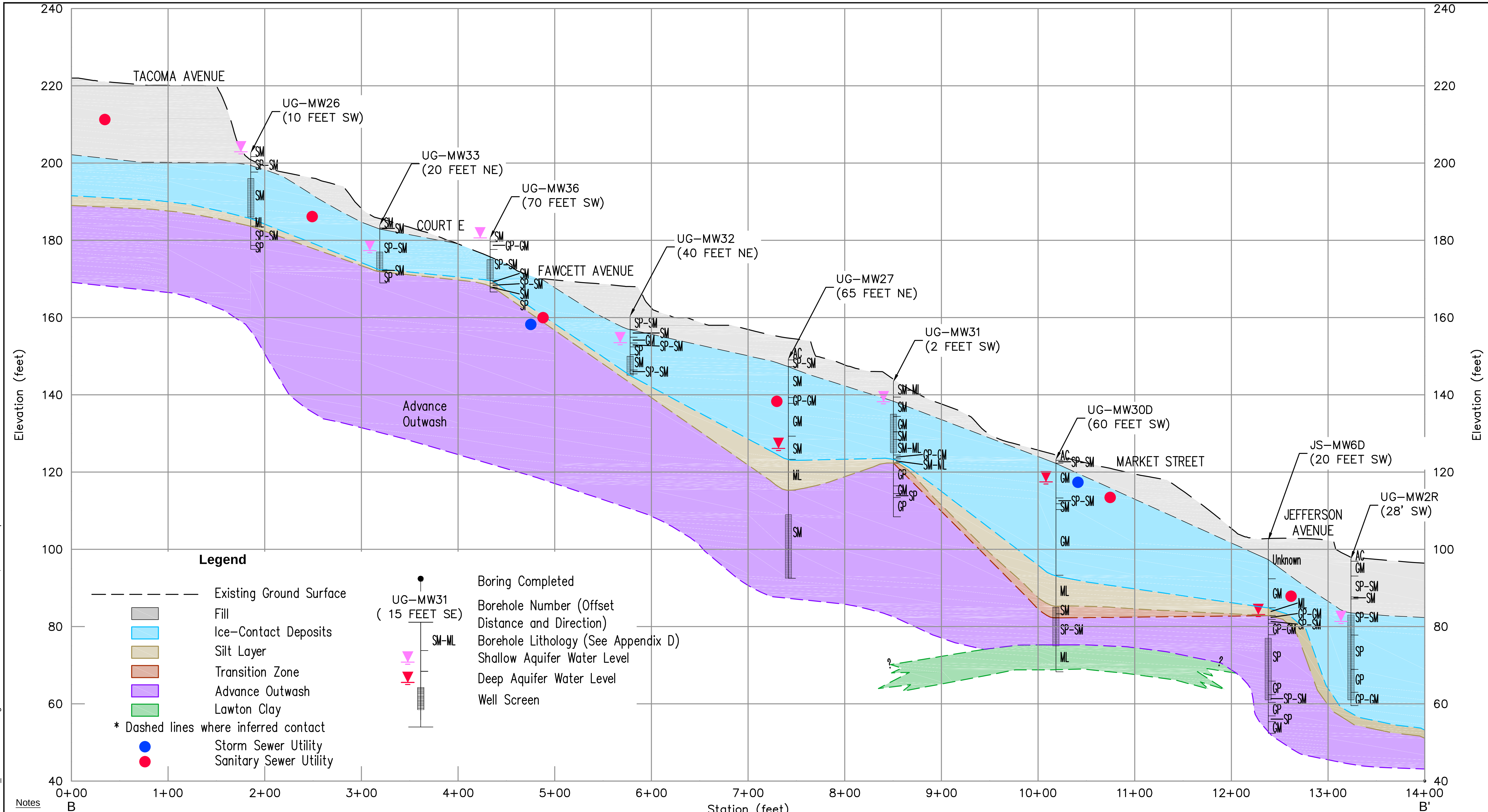
Figure 9



Notes

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. Horizontal datum - NAD 83/91 Washington State Plane - South Zone (City of Tacoma Horizontal control Holding City Monument Numbers 411 and 414). Vertical datum NGVD 29 (brass monument at South 19th and Fawcett Avenue, elevation 165.15).
4. Ground surface elevation based on LiDAR obtained from the Puget Sound LiDAR consortium. The surface topography in the areas of existing buildings was adjusted as necessary. Well elevations for the wells installed during this investigation was based on a survey completed by AHBL November 6, 2013. Well elevations for wells installed prior to this investigation is based on the elevations reported in the previous reports.
5. Storm sewer and sanitary sewer elevations and locations are estimated manhole and pipe elevations obtained from City of Tacoma govme.com.
6. Lithology shown on borings completed by GeoEngineers. Refer to boring logs for lithologic symbol descriptions provided in Appendix D.

Cross Section B-B'

2013 Environmental Subsurface Investigation
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Tacoma, Washington

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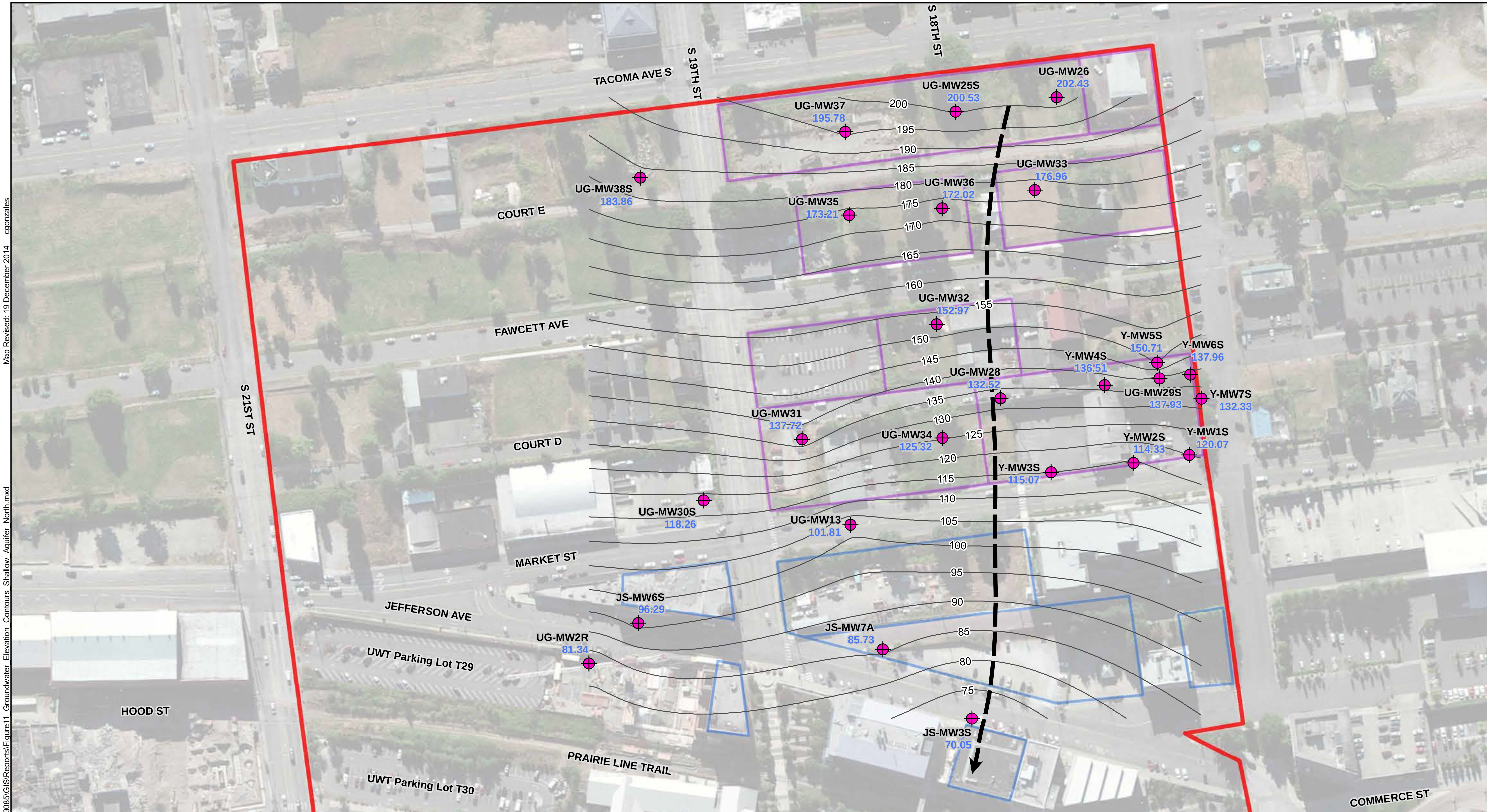
Figure 10

W:\Tacoma\Projects\0\0183085\00\CAD\018308500_Cross Sections.dwg\TAB:Section B-B' modified on Dec 19, 2014 - 2:31pm

TD : MGF



Notes:
PDA = Priority Development Area
1. Water level contours were created in Surfer 8 (Golden Software) using the kriging interpolation method.
2. The locations of all features shown are approximate.
3. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Legend

UWT Master Plan Campus Boundary
PDA 1
PDA 2

UG-MW2R
81.34
Monitoring Well Location Identification and Approximate Water Level (feet) on November 8, 2013

Generalized Groundwater Flow Direction

100 Groundwater Level Elevation Contour (5-foot interval)

W N E S

150 0 150
Feet

Groundwater Elevation Contours - Shallow Aquifer - North

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Tacoma, Washington

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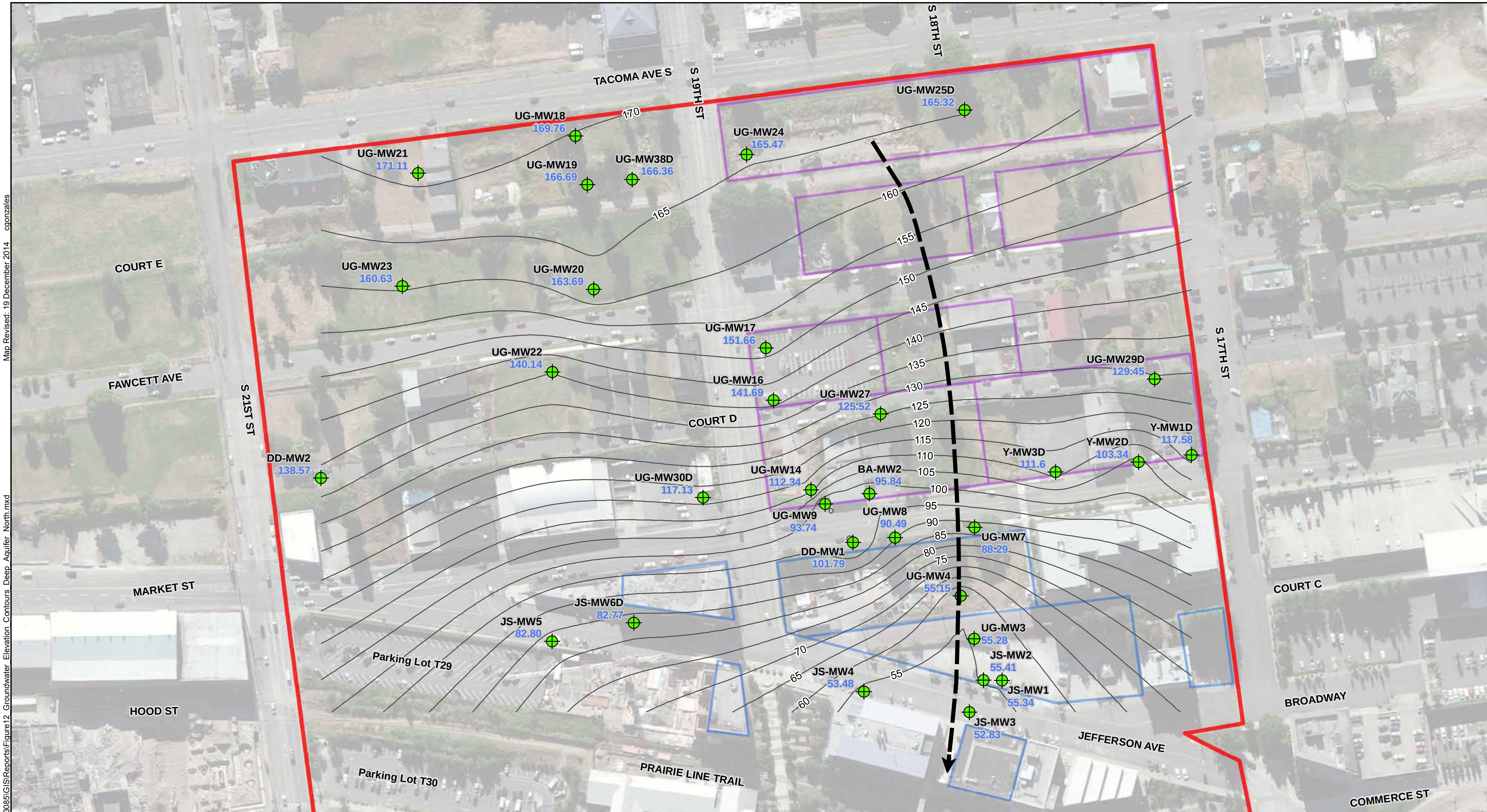
Figure 11

Map Revised: 19 December 2014 cgonzales
Path: \\tac\projects\0\0183085\GIS\Reports\Figure11_Groundwater_Elevation_Contours_Shallow_Aquifer_North.mxd
Office: TAC



Notes:
PDA = Priority Development Area
1. Water level contours were created in Surfer 8 (Golden Software) using the kriging interpolation method.
2. The locations of all features shown are approximate.
3. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Legend

- UWT Master Plan Campus Boundary
- PDA 1
- PDA 2

JS-MW5
82.80
Monitoring Well Location Identification and Approximate Water Level (feet) on November 8, 2013

Generalized Groundwater Flow Direction

100 Groundwater Level Elevation Contour (5-foot interval)

W S N E

150 0 150
Feet

Groundwater Elevation Contours - Deep Aquifer - North

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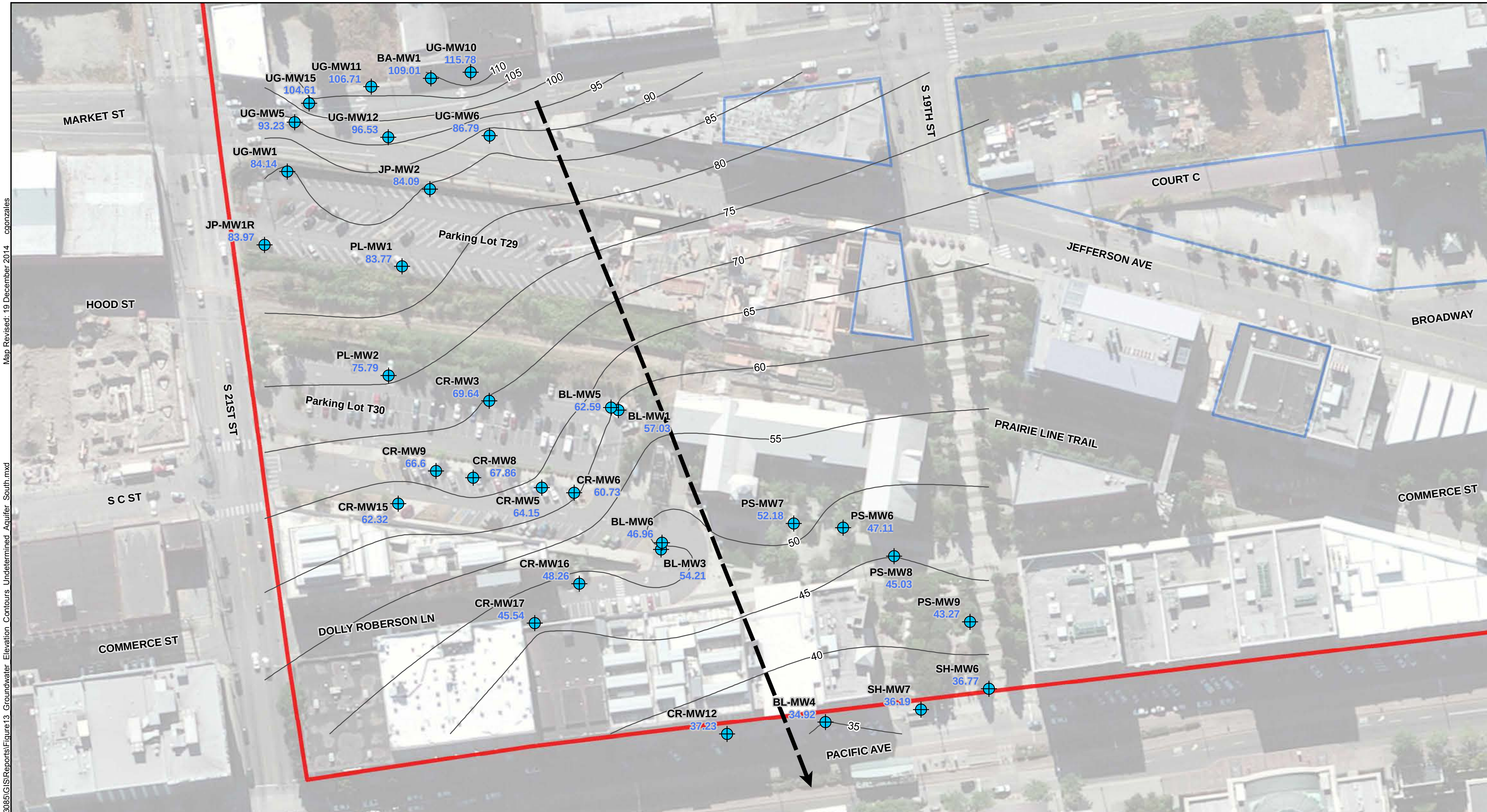
Figure 12

Office: TAC Path: \\tac\projects\0\0183085\GIS\Reports\Figure12_Groundwater_Elevation_Contours_Deep_Aquifer_North.mxd Map Revised: 19 December 2014 cgonzales



Notes:
PDA = Priority Development Area
1. Water level contours were created in Surfer 8 (Golden Software) using the kriging interpolation method.
2. The locations of all features shown are approximate.
3. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Legend

- UWT Master Plan Campus Boundary
- PDA 1
- PDA 2
- CR-MW17 45.54 — Monitoring Well Location Identification and Approximate Water Level (feet) on November 8, 2013
- Generalized Groundwater Flow Direction
- 100 — Groundwater Level Elevation Contour (5-foot interval)

100 0 100
Feet

Groundwater Elevation Contours - Not Determined Aquifer - South

2013 Environmental Subsurface Investigation
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Tacoma, Washington

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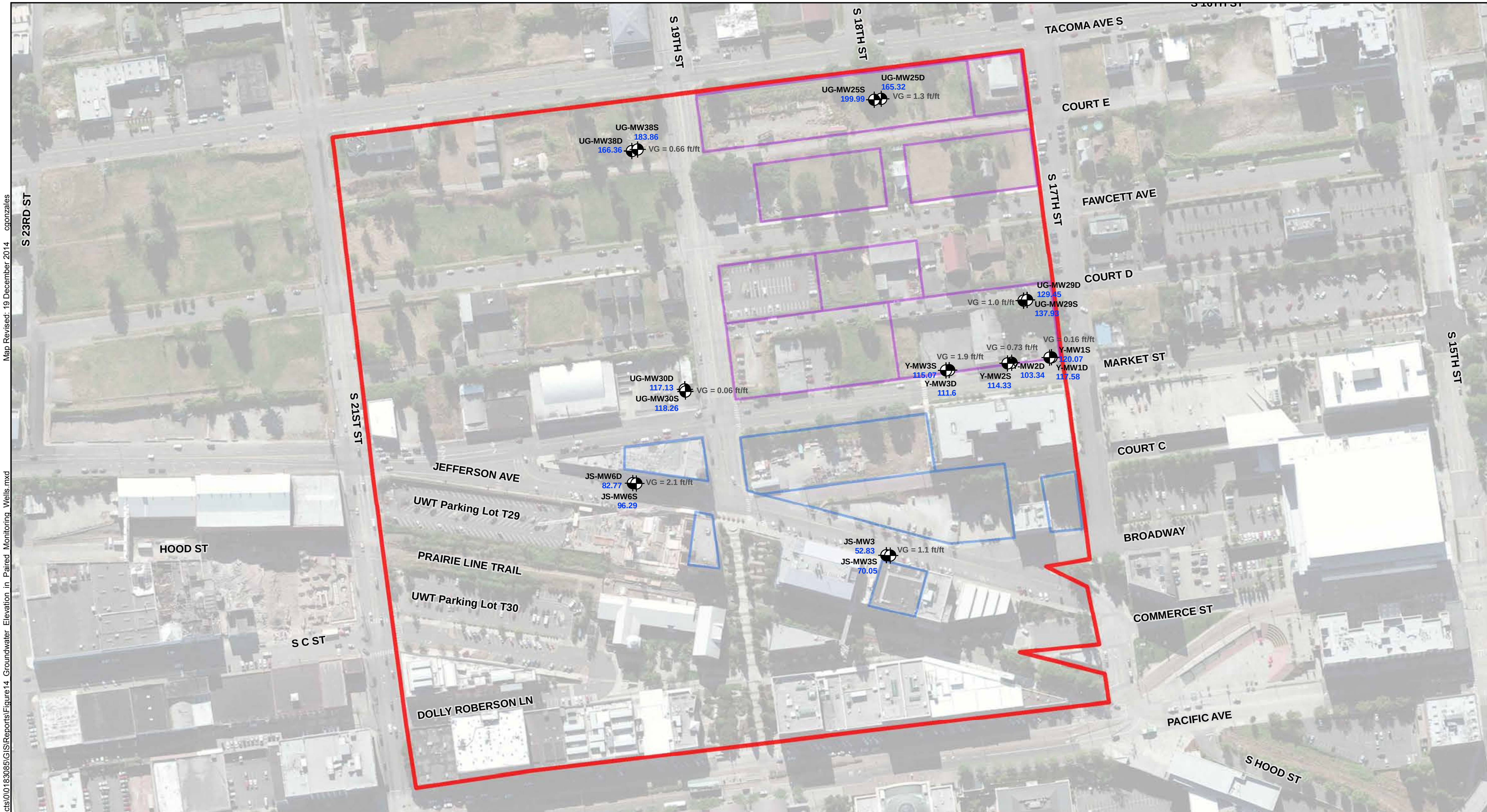
Figure 13

Office: TAC Path: \\tac\projects\0\0183085\GIS\Reports\Figure13_Groundwater_Elevation_Contours_Undetermined_Aquifer_South.mxd Map Revised: 19 December 2014 cgonzales



Map Revised: 19 December 2014 cgonzales

Path: \\tac\projects\0\0183085\GIS\Reports\Figure14_Groundwater_Elevation_in_Paired_Monitoring_Wells.mxd

Office: TAC

Notes:
ft/ft = feet per foot
PDA = Priority Development Area
VG = Vertical Gradient between shallow and deep aquifers
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Legend

- UWT Master Plan Campus Boundary
- PDA 1
- PDA 2

UG-MW30D 117.13 VG = 1.1 ft/ft — Monitoring Well Location Identification and Approximate Groundwater Elevation (feet) on November 8, 2013
VG = Vertical Gradient between shallow and deep aquifers

200 0 200
Feet

Groundwater Elevations in Paired Deep and Shallow Monitoring Wells

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University of Washington – Tacoma
Tacoma, Washington

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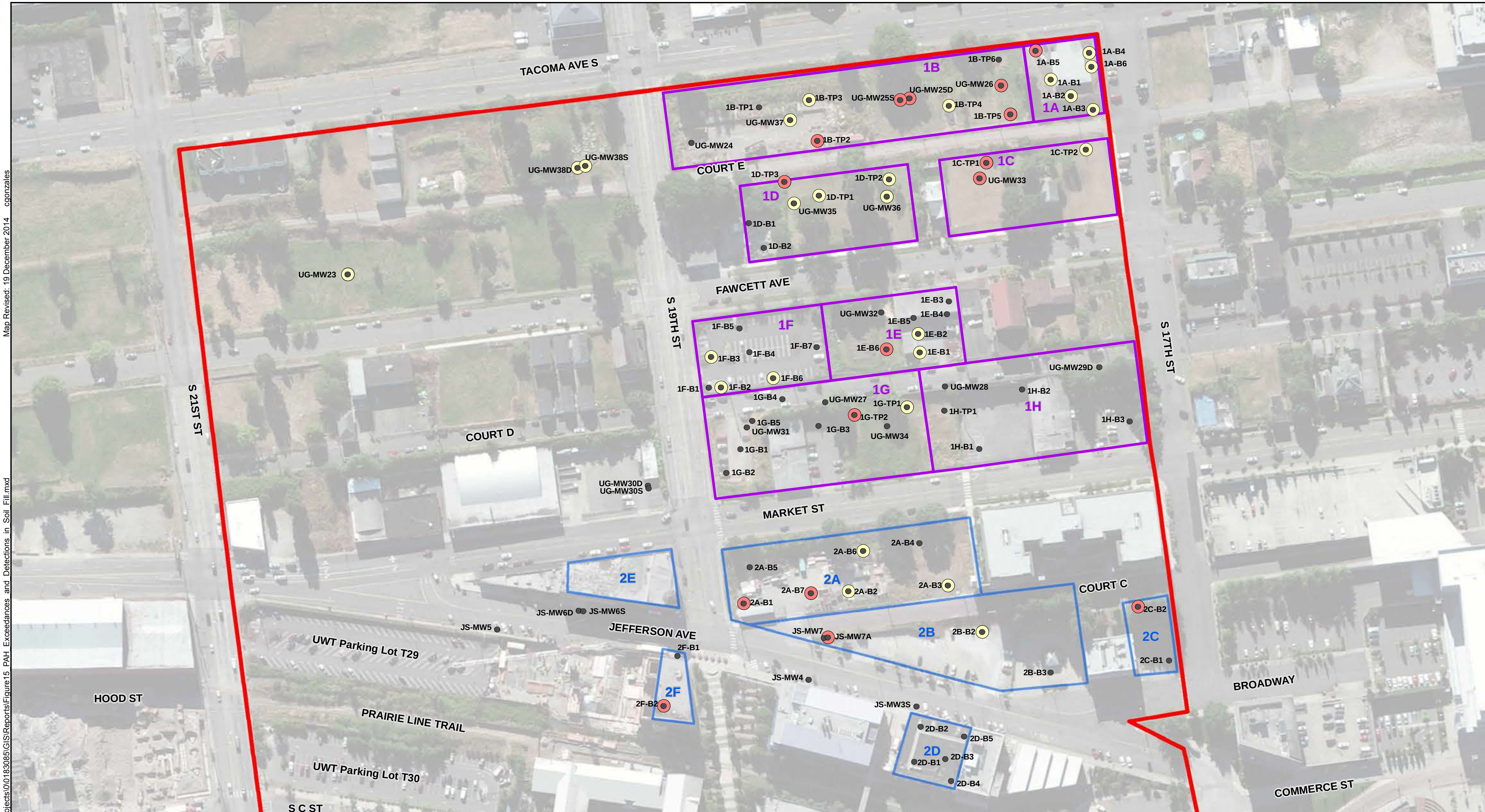
Figure 14



Notes:
PDA = Priority Development Area
MTCA = Model Toxics Control Act
ULU = Unrestricted Land Use
COC = Chemical of Concern
mg/kg = milligram per kilogram
cPAHs = Carcinogenic Polycyclic Aromatic Hydrocarbons
TTEC = Total Toxicity Equivalency Concentration
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Legend

- UWT Master Plan Campus Boundary
- PDA 1
- PDA 2
- Sample Location and Identification
- cPAH-Contaminated Soils (TTEC ≥ 0.1 mg/kg)
- cPAHs Detected at Concentrations greater than Laboratory Reporting Limits in Fill (TTEC < 0.1 mg/kg)

Contaminated Soil = chemicals of concern detected at concentrations greater than the respective MTCA cleanup level. (See Table 13)
Impacted Soil = chemicals of concern detected at concentrations greater than respective Reuse Criteria

W S N E

150 0 150
Feet

cPAH- and PAH-Impacted and Contaminated Soil

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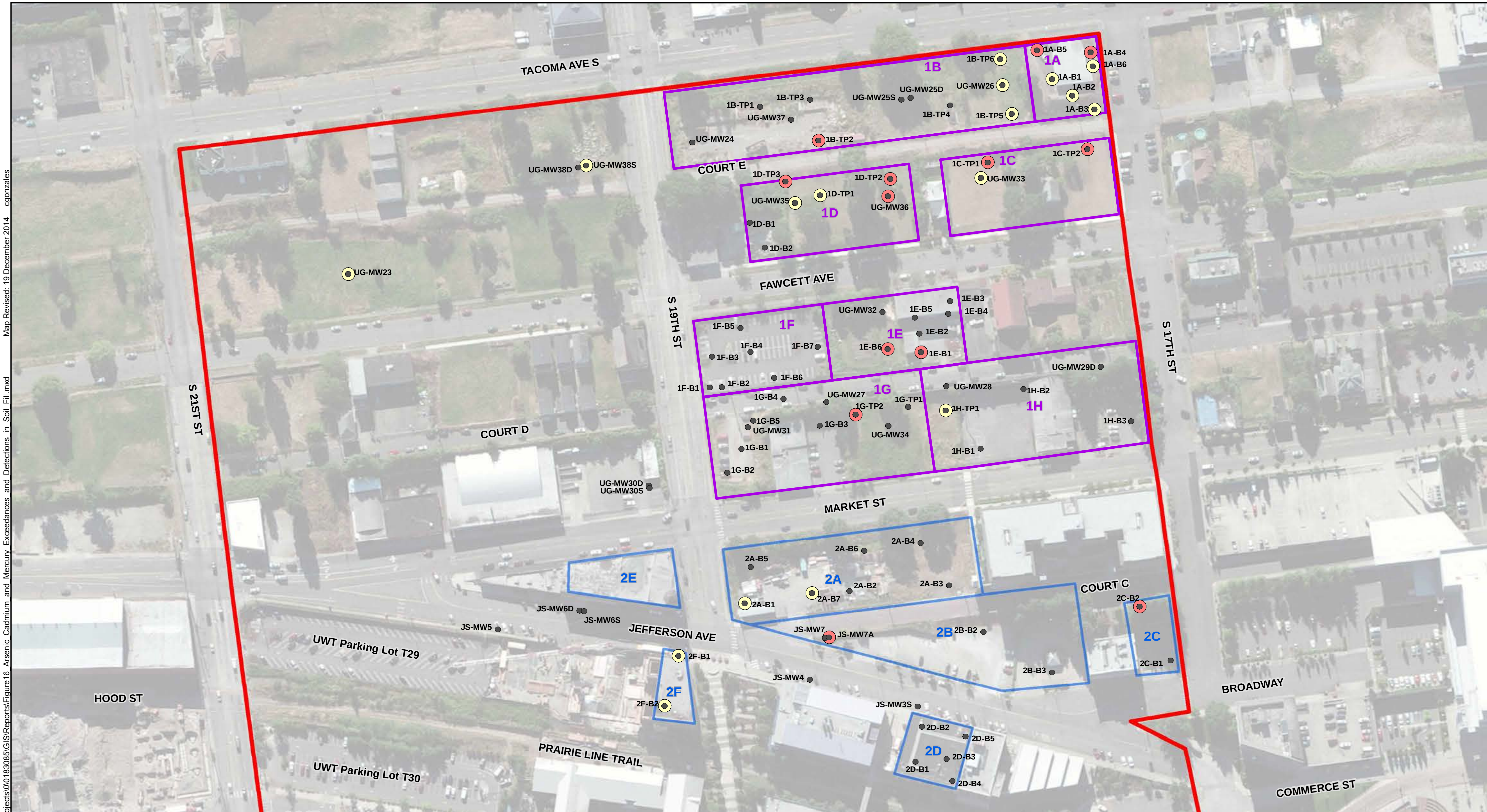
Figure 15

Office: TAC Path: \\tac\projects\0\0183085\GIS\Reports\Figure15_PAH_Exceedances_and_Detections_in_Soil_Fill.mxd Map Revised: 19 December 2014 cgonzales



Path: \\tac\projects\0\0183085\GIS\Reports\Figure16_Arsenic_Cadmium_and_Mercury_Exceedances_and_Detections_in_Soil_Fill.mxd   Map Revised: 19 December 2014   cgonzales

Office: TAC

Notes:
PDA = Priority Development Area
MTCA = Model Toxics Control Act
ULU = Unrestricted Land Use
mg/kg = milligram per kilogram
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Legend

- UWT Master Plan Campus Boundary
- PDA 1
- PDA 2
- Sample Location and Identification
- Metal-Contaminated Soil (See Table 14)
- Metal-Impacted Soil (See Table 13 and 14)

Contaminated Soil = chemicals of concern detected at concentrations greater than the respective MTCA cleanup level. (See Tables 13 and 14)
Impacted Soil = chemicals of concern detected at concentrations greater than respective Reuse Criteria (See Tables 13 and 14)

W S N E

150 0 150
Feet

Metal-Impacted and Contaminated Soil

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Tacoma, Washington

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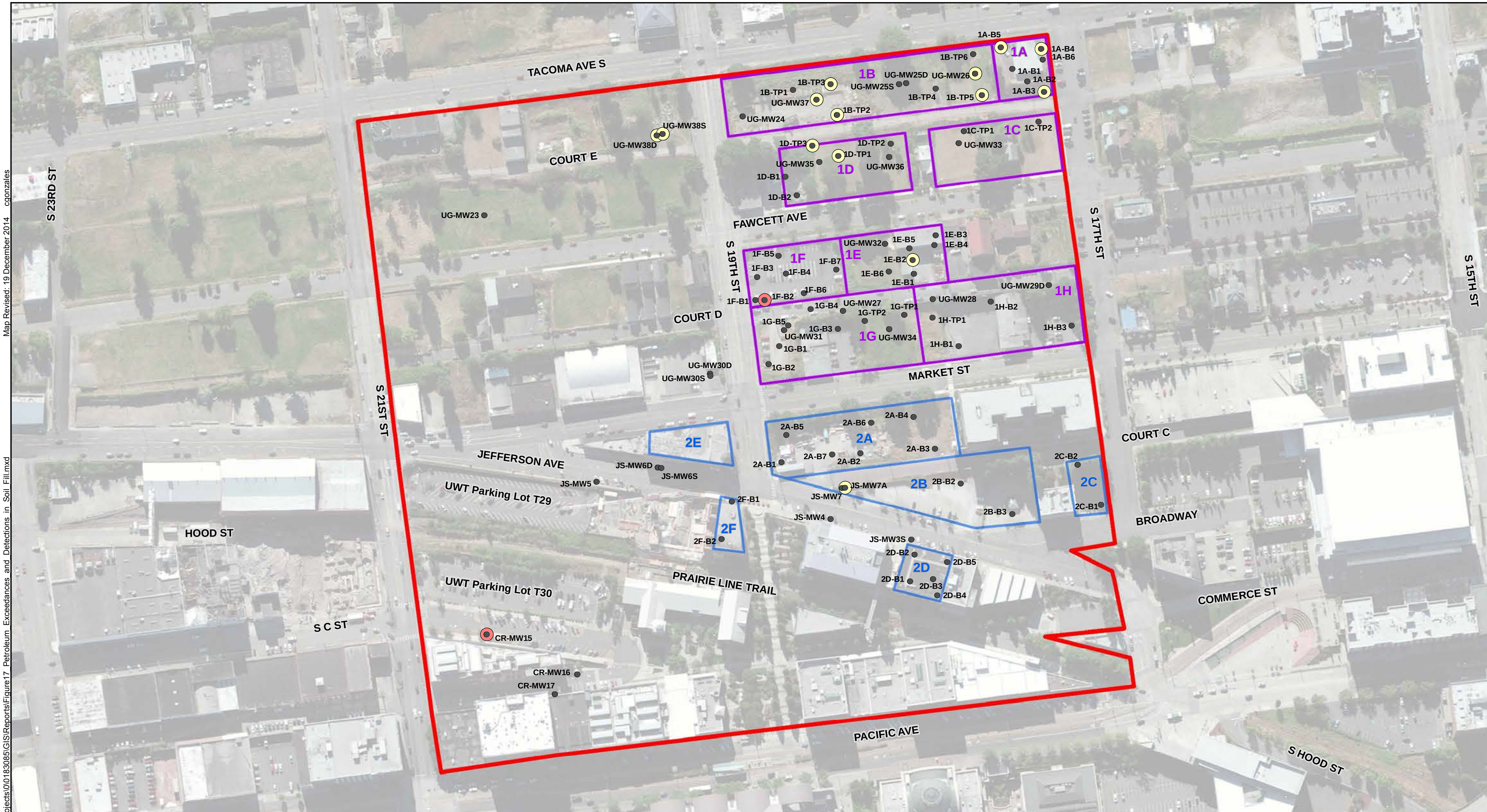
Figure 16



Notes:
PDA = Priority Development Area
MTCA = Model Toxics Control Act
ULU = Unrestricted Land Use
GRPH = Gasoline-Range Petroleum Hydrocarbons
LORPH = Lube Oil-Range Petroleum Hydrocarbons
mg/kg = milligram per kilogram
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Legend

- UWT Master Plan Campus Boundary
- PDA 1
- PDA 2
- Sample Location and Identification
- GRPH-Contaminated Soil (Concentration ≥ 100 mg/kg)
- LORPH-Impacted Soil (Concentration < 2,000 mg/kg)

Contaminated Soil = chemicals of concern detected at concentrations greater than the respective MTCA cleanup level. (See Tables 13 and 14)
Impacted Soil = chemicals of concern detected at concentrations greater than respective Reuse Criteria (See Tables 13 and 14)

200 0 200
Feet

Petroleum Hydrocarbon-Contaminated and Impacted Soil

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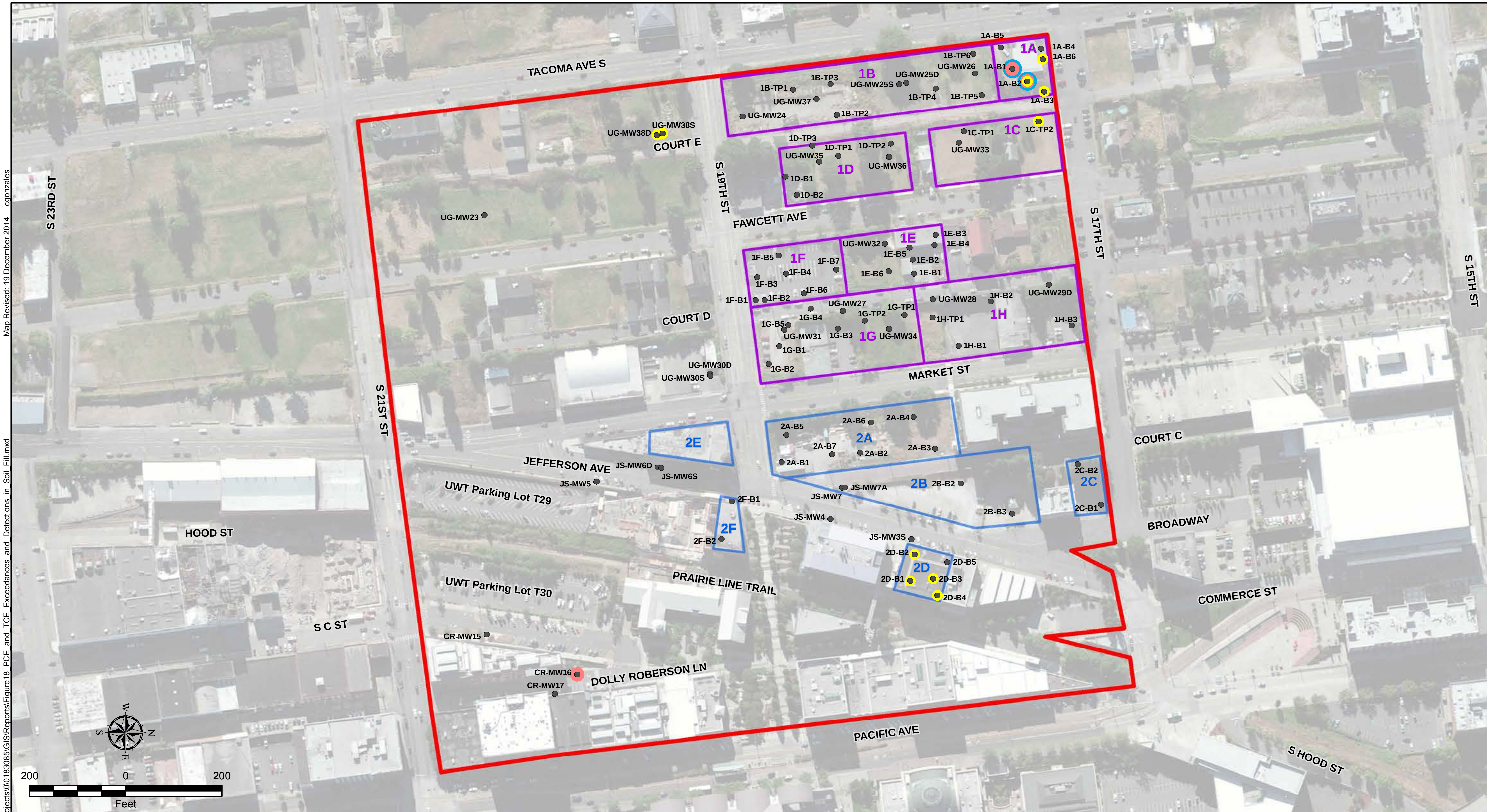
Figure 17

Path: \\tac\projects\0\0183085\GIS\Reports\Figure17_Petroleum_Exceedances_and_Detections_in_Soil_Fill.mxd   Map Revised: 19 December 2014   cgonzales
Office: TAC



Path: \\tac\projects\0\0183085\GIS\Reports\Figure18_PCE_and_TCE_Exceedances_and_Detections_in_Soil_Fill.mxd

Map Revised: 19 December 2014 cgonzales

Office: TAC

Notes:
TCE = tricloroethene
PCE = tetrachlorethene
PDA = Priority Development Area
MTCA = Model Toxics Control Act
ULU = Unrestricted Land Use
mg/kg = milligram per kilogram
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Legend

- UWT Master Plan Campus Boundary
- PDA 1
- PDA 2
- Sample Location and Identification
- PCE-Impacted Soil in Ice-Contact Deposits (Detected Concentration < 0.03 mg/kg)
- TCE-Impacted Soil in Ice-Contact Deposits (Detected Concentration < 0.05 mg/kg)
- PCE-Contaminated Soil in Ice-Contact Deposits (Detection Concentration ≥ 0.03 mg/kg)

Contaminated Soil = chemicals of concern detected at concentrations greater than the respective cleanup level. (See Tables 15)
Impacted Soil = chemical concern detected at concentrations greater than the respective Reuse Criteria (See Table 15)

PCE- and TCE- Impacted and Contaminated Soil - Fill

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Figure 18

Map Revised: 19 December 2014 cgonzales

Path: \\tac\projects\0\0183085\GIS\Reports\Figure19_PCE_and_TCE_Exceedances_and_Detections_in_Soil_Ice_Contact_Deposits.mxd

Office: TAC

Notes:
TCE = tricloroethene
PCE = tetrachlorethene
PDA = Priority Development Area
MTCA = Model Toxics Control Act
ULU = Unrestricted Land Use
mg/kg = milligram per kilogram
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Legend

- UWT Master Plan Campus Boundary
- PDA 1
- PDA 2
- Sample Location and Identification
- PCE-Impacted Soil in Ice-Contact Deposits (Detected Concentration < 0.03 mg/kg)
- TCE-Impacted Soil in Ice-Contact Deposits (Detected Concentration < 0.05 mg/kg)
- PCE-Contaminated Soil in Ice-Contact Deposits (Detection Concentration ≥ 0.03 mg/kg)
- TCE-Contaminated Soil in Ice-Contact Deposits (Detection Concentration ≥ 0.05 mg/kg)

Contaminated Soil = chemicals of concern detected at concentrations greater than the respective cleanup level. (See Table 18)
Impacted Soil = chemical concern detected at concentrations greater than the respective Reuse Criteria (See Table 18)

PCE- and TCE-Impacted and Contaminated Soil – Ice-Contact Deposits

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Tacoma, Washington

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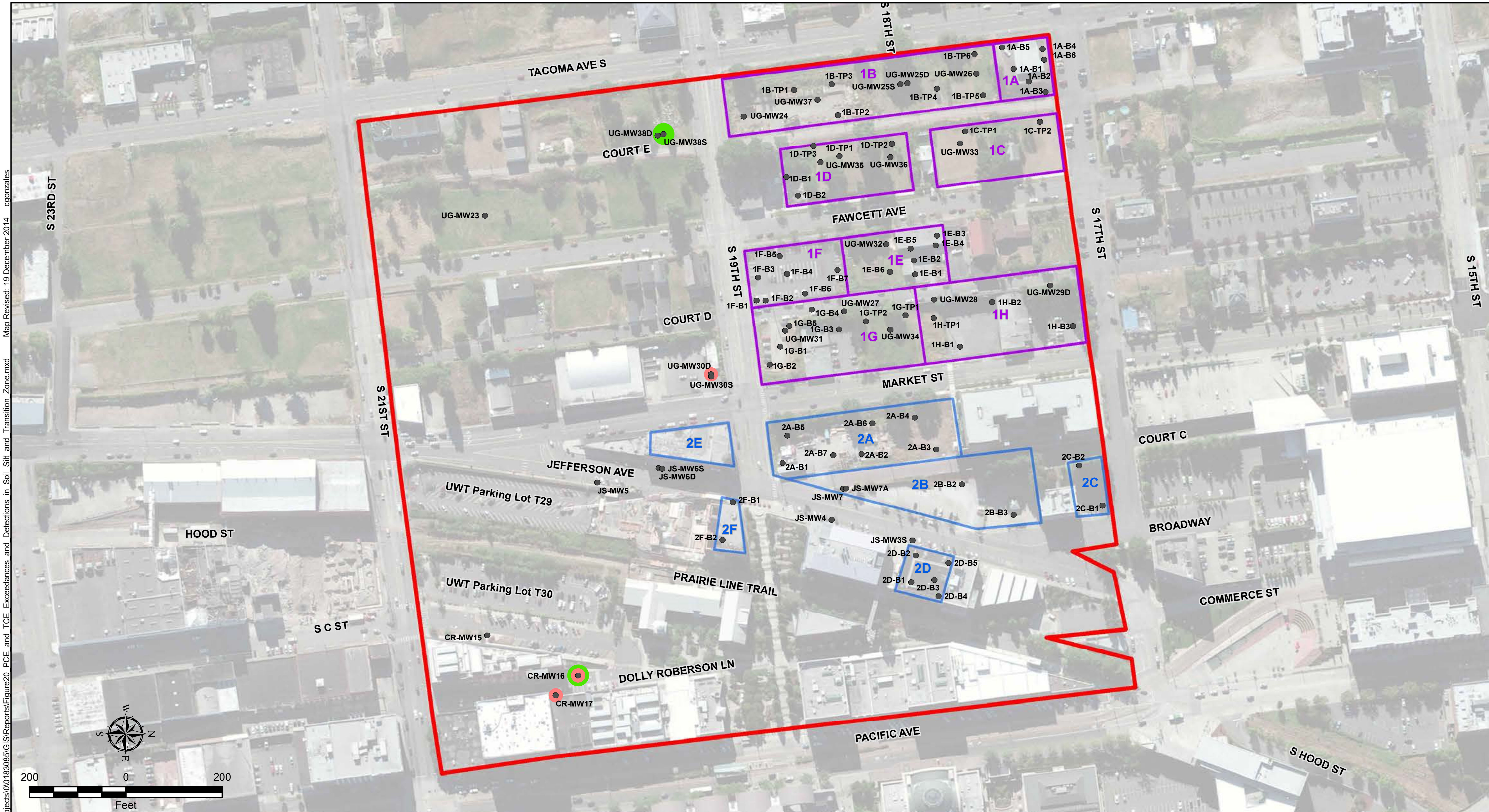
Figure 19



Notes:
TCE = tricloroethene
PDA = Priority Development Area
MTCA = Model Toxics Control Act
ULU = Unrestricted Land Use
mg/kg = milligram per kilogram
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Legend

- UWT Master Plan Campus Boundary
- PDA 1
- PDA 2
- Sample Location and Identification
- TCE-Impacted Soil in Ice-Contact Deposits (Detected Concentration < 0.05 mg/kg)
- TCE-Contaminated Soil in Ice-Contact Deposits (Detection Concentration ≥ 0.05 mg/kg)

Contaminated Soil = chemicals of concern detected at concentrations greater than the respective cleanup level. (See Table 18)
Impacted Soil = chemical concern detected at concentrations greater than the respective Reuse Criteria (See Table 18)

PCE- and TCE- Impacted and Contaminated Soil – Silt and Transition Zone

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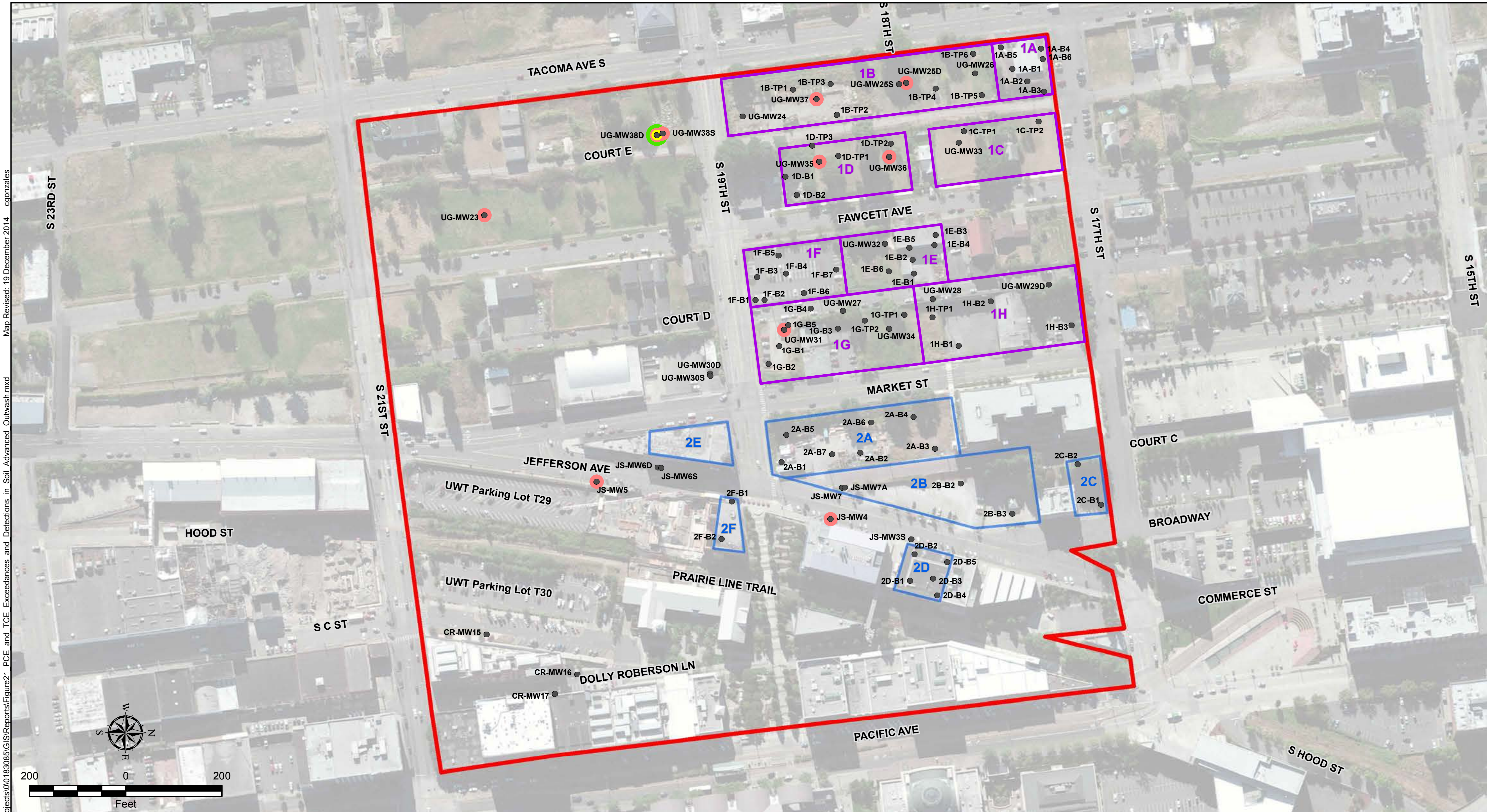
Figure 20

Path: \\tac\projects\0\0183085\GIS\Reports\Figure20_PCE_and_TCE_Exceedances_and_Detections_in_Soil_Silt_and_Transition_Zone.mxd Map Revised: 19 December 2014 cgonzales

Office: TAC



Notes:
TCE = tricloroethene
PCE = tetrachlorethene
PDA = Priority Development Area
MTCA = Model Toxics Control Act
ULU = Unrestricted Land Use
mg/kg = milligram per kilogram
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Legend

- UWT Master Plan Campus Boundary
- PDA 1
- PDA 2
- Sample Location and Identification
- PCE-Impacted Soil in Ice-Contact Deposits (Detected Concentration < 0.03 mg/kg)
- TCE-Impacted Soil in Ice-Contact Deposits (Detected Concentration < 0.05 mg/kg)
- TCE-Contaminated Soil in Ice-Contact Deposits (Detection Concentration ≥ 0.05 mg/kg)

Contaminated Soil = chemicals of concern detected at concentrations greater than the respective cleanup level. (See Table 18)
Impacted Soil = chemical concern detected at concentrations greater than the respective Reuse Criteria (See Table 18)

PCE- and TCE- Impacted and Contaminated Soil – Advance Outwash

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Tacoma, Washington

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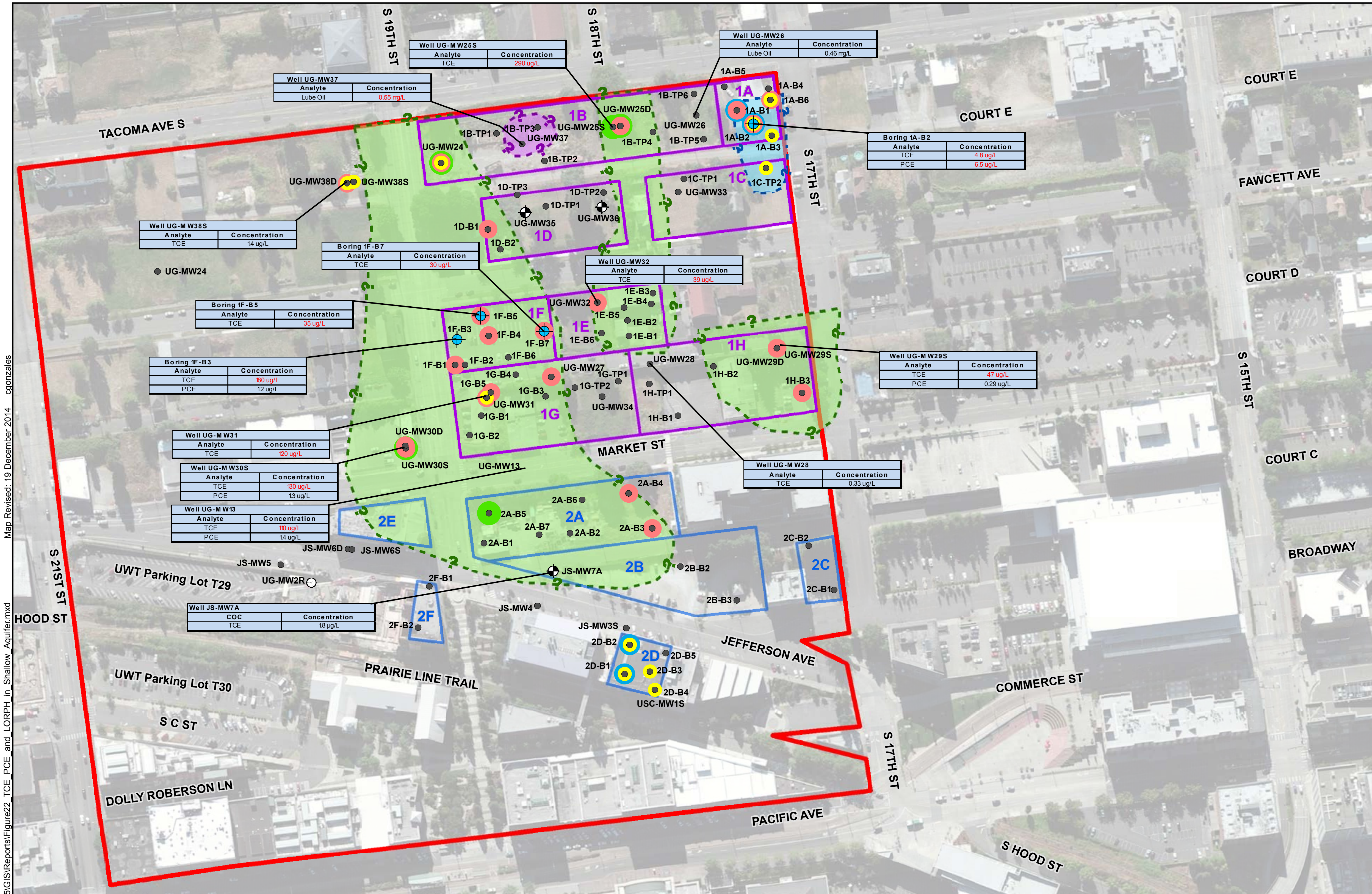
Figure 21

Path: \\tac\projects\0\0183085\GIS\Reports\Figure21_PCE_and_TCE_Exceedances_and_Detections_in_Soil_Advanced_Outwash.mxd Map Revised: 19 December 2014 cgonzales

Office: TAC



Legend

- UWT Master Plan Campus Boundary
- PDA 1
- PDA 2
- New Shallow Aquifer in Westerly Plume Monitoring Well
- Existing Shallow Aquifer Monitoring Well
- Direct Push Boring Completed as Temporary Well
- Sample Location and Identification
- PCE-Impacted Soil in Fill and Ice-Contact Deposits (Detected Concentration < 0.03mg/kg)
- TCE-Impacted Soil in Fill and Ice-Contact Deposits (Detected Concentration < 0.05 mg/kg)
- PCE-Contaminated Soil in Fill and Ice-Contact Deposits (Detection Concentration > 0.03 mg/kg)
- TCE-Contaminated Soil in Fill and Ice-Contact Deposits (Detection Concentration > 0.05mg/kg)

Approximate Lateral Extent of Contaminated Groundwater Plumes

- Lube Oil-Range Petroleum Hydrocarbons in Shallow Aquifer
- PCE in Shallow Aquifer
- TCE in Shallow Aquifer

If callout boxes are not shown than PCE and TCE were not detected greater than laboratory reporting limits

All wells shown were sampled in 2013 and analyzed for VOCs.

Notes:
TCE = tricloroethene
PCE = tetrachlorethene
mg/kg = milligram per kilogram
mg/L = milligram per liter
ug/L = microgram per liter
LORPH = Lube Oil-Range Petroleum Hydrocarbon
MTCA = Model Toxic Control Act
PDA = Priority Development Area
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and contentof electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Groundwater Results in Shallow Aquifer*

Well UG-MW31	
Analyte	Concentration
TCE	120 ug/L

*Chemicals shown in red were detected at concentrations greater than the respective MTCA Method A cleanup levels.

Groundwater MTCA Cleanup/Criteria Levels:
PCE = 5 µg/L (Method A); 24 µg/L (Indoor Air)
TCE = 5 µg/L (Method A); 1.5 µg/L (Indoor Air)
cis-1,2-DCE= 16 µg/L (Method B); 160 µg/L (Indoor Air)
trans-1,2-DCE = 160 µg/L (Method B); 110 µg/L (Indoor Air)
1,1-DCA = 7.7 µg/L (Method B);11 µg/L (Indoor Air)
Vinyl Chloride = 0.2 µg/L (Method A); 0.35 µg/L (Indoor Air)
Benzene = 5 µg/L (Method A); 2.4 µg/L (Indoor Air)
Lube Oil-Range Petroleum Hydrocarbons = 0.5 mg/L (Method A)
Arsenic = 5 µg/L (Method A)
cPAHs= 0.1 µg/L (Method A)

W S N E

200 0 200
Feet

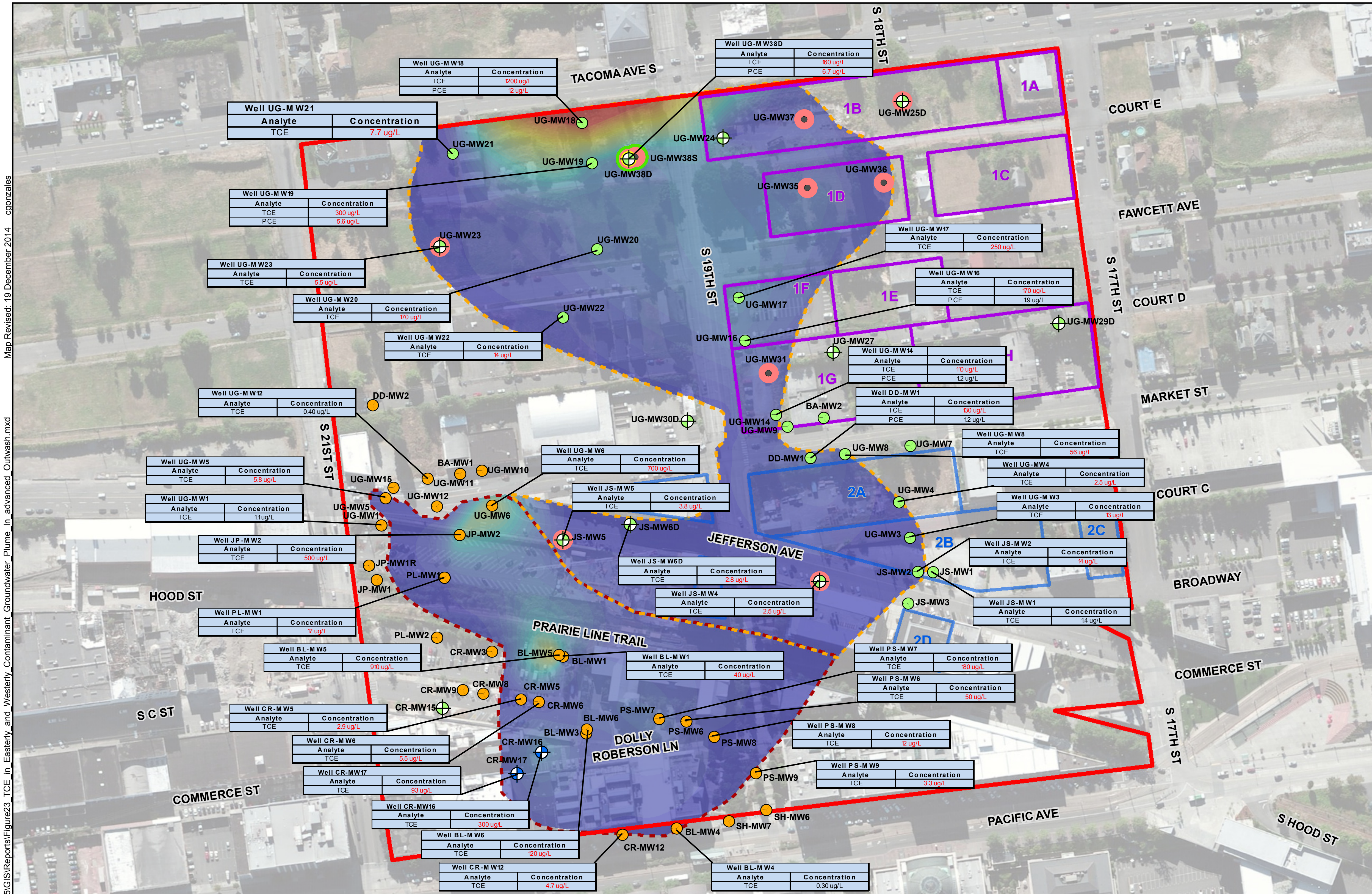
TCE, PCE and LORPH in Shallow Aquifer Westerly Plume

2013 Environmental Subsurface Investigation
University of Washington – Tacoma
Tacoma, Washington

GeoEngineers

Figure 22

Office: TAC Path: \\tac\projects\0\0183085\GIS\Reports\Figure22_TCE_PCE_and_LORPH_in_Shallow_Aquifer.mxd Map Revised: 19 December 2014 cgonzales



Legend

- UWT Master Plan Campus Boundary
- PDA 1
- PDA 2
- New Shallow Aquifer Monitoring Well
- New Deep Aquifer Monitoring Well
- Existing Deep Aquifer Monitoring Well
- Existing Not Determined Aquifer Monitoring Well
- Sample Location and Identification
- PCE-Impacted Soil in Silt/Transition Zone or Advance Outwash (Detected Concentration < 0.03mg/kg)
- TCE-Impacted Soil in Silt/Transition Zone or Advance Outwash (Detected Concentration < 0.05 mg/kg)
- TCE-Impacted Soil in Silt/Transition Zone or Advance Outwash (Detected Concentration ≥ 0.05 mg/kg)

Approximate Lateral Extent of Contaminated Groundwater Plumes

- TCE in Deep Aquifer
- TCE in Not Determined Aquifer

TCE in Advance Outwash (µg/L)

High : 1200

Low : 1.5

If callout boxes are not shown than PCE and TCE were not detected greater than laboratory reporting limits

All wells shown were sampled in 2013 and analyzed for VOCs.

Office: TAC Path: \\tac\projects\0\0183085\GIS\Reports\Figure23_TCE_in_Easterly_and_Westerly_Contaminant_Groundwater_Plume_in_advanced_Outwash.mxd Map Revised: 19 December 2014 cgonzales

Notes:
TCE = tricloroethene
PCE = tetrachlorethene
mg/kg = milligram per kilogram
ug/L = microgram per liter
MTCA = Model Toxic Control Act
PDA = Priority Development Area
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and contentof electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. CR-MW 16 and CR-MW17 are shown in Easterly Plume, but are to be screened in the shallow aquifer based on geology observed during drilling.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Groundwater Results in Deep Aquifer and Not Determined Aquifer*

Well UG-MW21	
Analyte	Concentration
TCE	7.7 ug/L

*Chemicals shown in red were detected at concentrations greater than the respective MTCA Method A cleanup levels.

Groundwater MTCA Cleanup/Criteria Levels:
PCE = 5 µg/L (Method A); 24 µg/L (Indoor Air)
TCE = 5 µg/L (Method A); 1.5 µg/L (Indoor Air)
cis-1,2-DCE= 16 µg/L (Method B); 160 µg/L (Indoor Air)
trans-1,2-DCE = 160 µg/L (Method B); 110 µg/L (Indoor Air)
1,1-DCA = 7.7 µg/L (Method B);11 µg/L (Indoor Air)
Vinyl Chloride = 0.2 µg/L (Method A); 0.35 µg/L (Indoor Air)
Benzene = 5 µg/L (Method A); 2.4 µg/L (Indoor Air)
Lube Oil-Range Petroleum Hydrocarbons = 0.5 mg/L (Method A)
Arsenic = 5 µg/L (Method A)
cPAHs= 0.1 µg/L (Method A)

W N E S

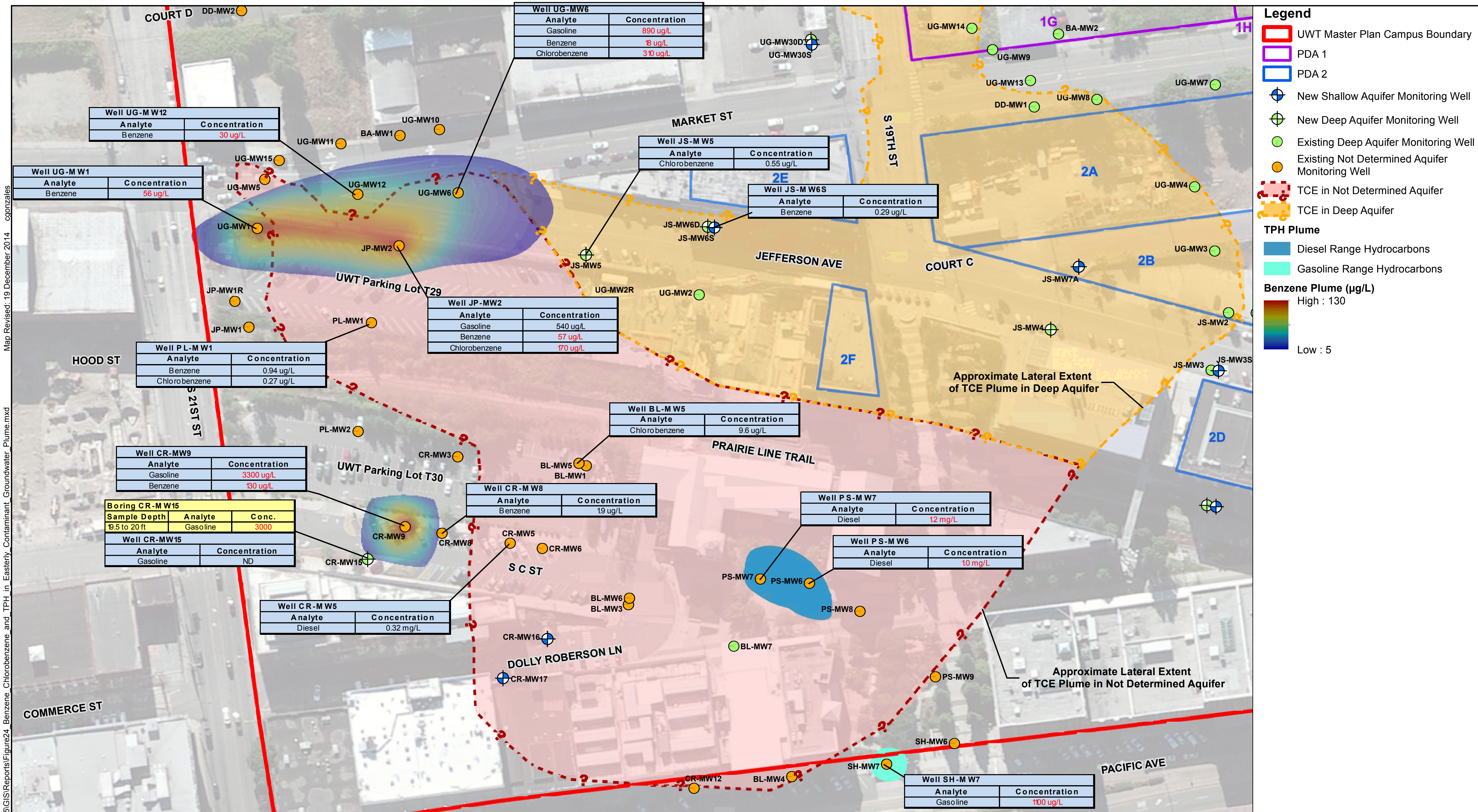
200 0 200
Feet

PCE and TCE in Easterly and Westerly Plumes - Deep Aquifer and Not Determined Aquifer

2013 Environmental Subsurface Investigation
University of Washington – Tacoma
Tacoma, Washington

GEOENGINEERS

Figure 23



Notes:
TCE = tricloroethene
PCE = tetrachloroethene
PDA = Priority Development Area
mg/kg = milligram per kilogram
mg/L = milligram per liter
ug/L = microgram per liter
ft = feet bgs
TPH = Total Petroleum Hydrocarbons
MTCA = Model Toxic Control Act
ND = Not Detected

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and contentof electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Groundwater Results*

Well PS-MW7	
Analyte	Concentration
Diesel	1.2 mg/L

Soil Results*

Boring 2D-B5		
Sample Depth	Analyte	Conc.
0 to 1ft	Benzene	0.0078

*Chemicals shown in red were detected at concentrations greater than the respective MTCA Method A cleanup levels.

Groundwater MTCA Cleanup/Criteria Levels:
PCE = 5 µg/L (Method A); 24 µg/L (Indoor Air)
TCE = 5 µg/L (Method A); 1.5 µg/L (Indoor Air)
cis-1,2-DCE= 16 µg/L (Method B); 160 µg/L (Indoor Air)
trans-1,2-DCE = 160 µg/L (Method B); 110 µg/L (Indoor Air)
1,1-DCA = 7.7 µg/L (Method B);11 µg/L (Indoor Air)
Vinyl Chloride = 0.2 µg/L (Method A); 0.35 µg/L (Indoor Air)
Benzene = 5 µg/L (Method A); 2.4 µg/L (Indoor Air)
Lube Oil-Range Petroleum Hydrocarbons = 0.5 mg/L (Method A)
Arsenic = 5 µg/L (Method A)
cPAHs= 0.1 µg/L (Method A)
Gasoline = 1,000 µg/L (Method A)

100 0 100
Feet

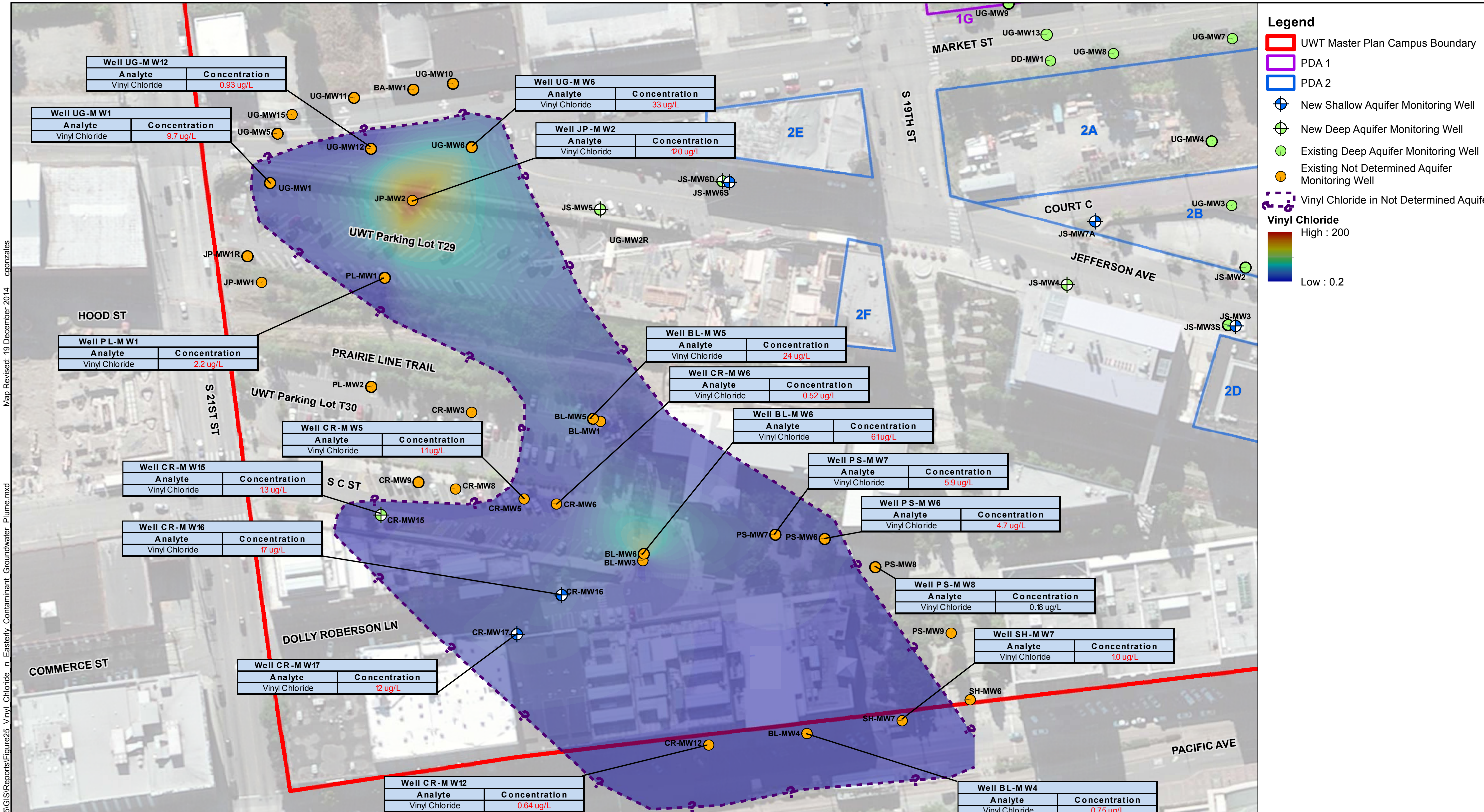
Benzene, Chlorobenzene, and TPH in Easterly Plume

2013 Environmental Subsurface Investigation
University of Washington – Tacoma
Tacoma, Washington

GEOENGINEERS

Figure 24

Office: TAC Path: \\tac\projects\0\0183085\GIS\Reports\Figure24_Benzene_Chlorobenzene_and_TPH_in_Easterly_Contaminant_Groundwater_Plume.mxd Map Revised: 19 December 2014 cgonzales



Notes:
TCE = tricloroethene
PCE = tetrachlorethene
PDA = Priority Development Area
ug/L = microgram per liter
MTCA = Model Toxic Control Act
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Groundwater Results

Well CR-MW17	
Analyte	Concentration
Vinyl Chloride	12 ug/L

*Chemicals shown in red were detected at concentrations greater than the respective MTCA Method A cleanup levels.

Groundwater MTCA Cleanup/Criteria Levels:
PCE = 5 µg/L (Method A); 24 µg/L (Indoor Air)
TCE = 5 µg/L (Method A); 1.5 µg/L (Indoor Air)
cis-1,2-DCE= 16 µg/L (Method B); 160 µg/L (Indoor Air)
trans-1,2-DCE = 160 µg/L (Method B); 110 µg/L (Indoor Air)
1,1-DCA = 7.7 µg/L (Method B);11 µg/L (Indoor Air)
Vinyl Chloride = 0.2 µg/L (Method A); 0.35 µg/L (Indoor Air)
Benzene = 5 µg/L (Method A); 2.4 µg/L (Indoor Air)
Lube Oil-Range Petroleum Hydrocarbons = 0.5 mg/L (Method A)
Arsenic = 5 µg/L (Method A)
cPAHs= 0.1 µg/L (Method A)

100 0 100
Feet

Vinyl Chloride in Easterly Plume

2013 Environmental Subsurface Investigation
University of Washington – Tacoma
Tacoma, Washington

GEOENGINEERS

Figure 25

Office: TAC Path: \\tac\projects\0\0183085\GIS\Reports\Figure25 Vinyl Chloride in Easterly Contaminant Groundwater Plume.mxd Map Revised: 19 December 2014 cgonzales

APPENDIX A
Priority Development Areas Technical Reports

GeoEngineers
1101 South Fawcett Avenue, Suite 200
Tacoma, Washington 98402
253.383.4940

May 22, 2014

University of Washington
Capital Projects Office
Box 352205
Seattle, Washington 98195-2205

Attention: Steve Harrison, Capital Project Office

Subject: Summary of Impacts, Mitigation Measures and Estimate Costs – Final
University of Washington – Tacoma
Priority Development Areas
Environmental Assessment Project – CPO Project No. 204277
File No. 0183-085-00

1.0 INTRODUCTION AND PURPOSE

This letter report provides preliminary results of the environmental investigation within the Priority Development Areas (PDAs) for the University of Washington (UW) under the Environmental Assessment Project at the UW – Tacoma (UWT) campus located in Tacoma, Washington. The project was completed under Capital Projects Office Project No. 204277. The purpose of this report is to provide potential development impacts, mitigation measures and estimated costs of the mitigation measures within PDAs based on the results of the environmental investigation. UW has requested this information to anticipate and budget for additional construction costs within the PDAs for the 2015/2017 biennium and the 10-year capital planning effort. Additional information regarding the subsurface investigation and groundwater

It is important to recognize that this report provides general impacts and potential mitigation measures that may be employed in design and construction. Additional environmental investigations may be necessary prior to selection of the final mitigation measure. Cost estimates should be refined following additional investigation on the individual sites. The project team should contact UW Environmental Health & Safety (UW EH&S) to discuss the need for further investigations. UW EH&S is the liaison with the Washington State Department of Ecology (Ecology) for review and approval of mitigation measures.

1.1. PDAs

The UW identified 14 PDAs for the focus of this environmental assessment project as summarized in Table 1. The PDAs are located within the Master Plan campus boundary. The PDAs were divided into PDA 1 and PDA 2 based on the location relative to Market Street. The PDAs established by UWT include the following and are shown on Figure 1.

PDA 1: Includes eight properties that generally encompass the PDA west of Market Street. The following properties are included within PDA 1.

- 1A. Upton Property
- 1B. Tacoma Vacant
- 1C. Fawcett North
- 1D. Fawcett South
- 1E. Strom Property
- 1F. Fawcett Parking/Lot T47 and T48
- 1G. Laborers/Lot T39 and T40
- 1H. Y Student Center/Lot T44 (not discussed in this report because site is currently under construction)

PDA 2: Includes six properties that generally encompass the existing UWT campus east of Market Street. The following properties are included within PDA 2.

- 2A. Sound Care Property
- 2B. Jefferson Street Parcel/Transit Turnaround
- 2C. Pinkerton Parking
- 2D. Tacoma Paper Supply Building
- 2E. The Swiss Pub and Frederick Wild
- 2F. Tioga Building

1.1.1. Development Activities

A general summary of the planned construction activities is included in Table 1. We assumed the following when developing associated impacts, mitigation measures and cost estimates to development based on guidance from UW.

- New buildings will be constructed with a zero lot line within the PDAs. The exterior of existing buildings would remain intact.
- The west side of the buildings will be constructed into the hillside and will be adjacent to the street at the top of the slope.
- The finished floor of the building will be constructed to a single elevation similar to the elevation of the street at the bottom of the slope.
- The subgrade will be 1-foot below the finished floor elevation.
- The footings and utilities will extend 5 feet below the finished floor elevation with a width of approximately 5 feet. The footings will include perimeter footings and a grade beam every 100 feet perpendicular to the long side of the building. The excavation for the footings will be 10 feet wide for constructability purposes.
- The mass of soil was estimated by calculating the volume of soil between the existing topography in LiDAR[1] and the anticipated subgrade or estimated depth of the contamination including the footing excavations. The volume was multiplied by 30 percent for volume fluff factor and 1.5 tons

[1] Light Detection and Ranging (LiDAR) is a remote sensing technology that measures distance by illuminating a target with a laser and analyzing the reflected light. Publically available LiDAR was used for this project.

per cubic yard to develop the mass (tons) of soil to be excavated. The cost estimate does not include excavation costs because it is assumed these will be included in the general project costs.

2.0 TERMS USED IN DOCUMENT

The following general terms are presented to provide a background for the impacts and mitigation measures discussion presented in the following sections. The specific criteria used to evaluate soil and groundwater is included in Appendix A.

2.1. Soil Contamination

There are generally five levels of soil contamination:

- **Dangerous Waste.** Chemicals are considered extremely dangerous to the human health and the environment (corrosive, toxic, flammable). Tetrachloroethene (PCE) and trichloroethene (TCE) and associated breakdown products detected in the soil and groundwater may be considered hazardous and labeled as F-listed waste (non-specific source wastes). The F-list identifies wastes from common manufacturing and industrial processes, such as solvents that have been used in cleaning or degreasing operations. Disposal at a Resource Conservation and Recovery Act (RCRA) Subtitle C landfill is required for dangerous waste.
- **Contained-in Contaminated Soil.** Soil, groundwater, or other contaminated environmental media that contain PCE and TCE can be managed under the contained-in policy by the Department of Ecology (Ecology) A contained-in determination allows media with PCE, TCE to be disposed at a Subtitle D landfill. However, the cost is typically greater than “contaminated soil” because the Ecology implements certain restrictions for transportation and use of the soil.
- **Contaminated Soil.** Chemicals of concern are detected at concentrations greater than Washington State (MTCA) cleanup levels. These cleanup levels can be based on humans or ecological receptors (e.g., plants, birds, mammals) contacting the soil or based on the protection of groundwater to drinking water standards. Contaminated soil is typically disposed at a UW-approved Subtitle D landfill.
- **Impacted Soil.** Chemicals of concern are detected at concentrations greater than what is typically found in the natural or background environment. Impacted soil is typically suitable for disposal at an inert waste landfill or Department of Natural Resources (DNR) reclamation pit.
- **Clean Soil.** Chemicals of concern are either not detected or detected at concentrations less than or similar to what is typically found in the natural environment per publication references.

2.2. Groundwater Contamination

Groundwater is typically considered either “contaminated” or “not contaminated”. However, there are different criteria available to evaluate if groundwater is “contaminated”. These criteria are applicable if the groundwater can be used as drinking water or if buildings are or will be present on or near the property being evaluated.

- MTCA Method A/B groundwater cleanup levels – These cleanup levels assume the groundwater will be utilized as drinking water.

- MTCA Method B groundwater screening levels protective of indoor air – These screening levels are based on the potential for volatile contaminants in groundwater to migrate upward through the subsurface into overlying buildings or structures.

3.0 TYPICAL IMPACTS AND MITIGATION MEASURES

Our general findings related to geology, groundwater and the chemical analytical is provided in Appendix A for reference purposes. The following general impacts and potential mitigation measures to the design and construction of the PDAs should be considered. All mitigation measures must be reviewed and approved by UW EH&S and Ecology.

- **Site is Potential Source of Groundwater Contamination.** The site may be the source of the petroleum, TCE- and/or PCE-contaminated groundwater. Mitigation measures include characterization and remediation. The estimated cost for characterization and remediation for each site may range between $380,000 and $2,150,000 depending on the type, nature and extent of the contamination.
- **Potential UST.** The site may contain an underground storage tank (UST) or contamination from a former leaking UST. Historical research was completed to evaluate the former use and potential former heating source. A magnetic and ground penetrating radar survey was also completed in areas outside of the existing buildings. The estimated cost for removal or closure-in-place of a UST is between $10,000 and $20,000.
- **PCE- or TCE-Contaminated Groundwater.** TCE- or PCE-contaminated groundwater is known or may be present beneath the site at concentrations greater than the MTCA Method A groundwater cleanup level and/or updated MTCA Method B groundwater screening level protective of indoor air. Typically PCE/TCE-contaminated groundwater in the shallow aquifer will have a larger impact to development than PCE/TCE-contaminated groundwater in the deep aquifer. Mitigation measures may include:
  - **Additional Investigation.** Further evaluate the lateral and vertical extent of contamination and soil vapor sampling. The estimated cost for additional characterization may range between $20,000 and $200,000 per PDA.
  - **Vapor Mitigation System.** Typically groundwater and soil vapor concentrations are utilized as screening levels regarding the potential for vapor intrusion into structures. If the concentration of chemicals of concern in the onsite groundwater exceeds the updated MTCA Method B groundwater screening level protective of indoor air then soil vapor sampling is typically recommended. The potential for vapor intrusion to be an issue is based on the distance between the building and the depth to the groundwater table (vapors dissipate with distance) and the concentration of chemicals of concern in the groundwater. In general, the impacted groundwater within the shallow aquifer will likely be a concern with respect to vapor intrusion. Impacted groundwater in the deep aquifer has a reduced likelihood to be a concern based on the depth and the presence of the silt layer and the shallow aquifer which could slow or block vapor migration. If vapor intrusion is evaluated to be a concern on the site based on additional soil vapor sampling, the installation of the vapor mitigation system will likely be required. The soil vapor sampling may not be completed at sites where the shallow aquifer is contaminated because the likelihood that there will be a vapor intrusion risk is high and vapor mitigation measures apply. A vapor mitigation system may include:

- A passive vapor barrier beneath any proposed building. Passive vapor barriers are typically used in combination with another mitigation option (venting or building pressurization).
- Passive or active venting system beneath and in areas where the building wall is beneath the finish grade. The venting system may need to be combined with an underslab and perimeter drain to reduce the potential for shallow groundwater to enter the venting system.
- Depressurization of subslab soil to prevent vapors from entering existing buildings.
- Estimated costs for a typical vapor mitigation system may vary between $5 and $12 per square foot depending on the application. These costs will not be necessary if the site is remediated prior to construction.

- **Building Drainage.** Underslab/footing drainage system may be required to prevent water from entering into the vapor mitigation vent system. The estimated cost for the underslab drain is $3 to $6 per square foot of the building. The water will likely have to be directed to the City of Tacoma sanitary sewer based on concentrations of chemicals of concern in the groundwater. A long-term cost may be associated with discharge of the water to the City sanitary sewer system. Alternatively, UW may choose to construct a central water treatment system. The water treatment system would be designed to treat the building's drainage water to the City of Tacoma stormwater standards. The estimated cost of the central water treatment system is not known and additional feasibility of the system would need to be investigated. The long-term costs of sanitary sewer discharge or the construction and operation of a central treatment system are not included in Table 1.
- **Construction Water Management.** Water encountered during construction from stormwater or dewatering activities will have to be managed. Water generated during construction will likely be stored in tanks, sampled and analyzed. Water disposal will be coordinated with UW EH&S at a UW-approved disposal facility. Water can typically be disposed in the City of Tacoma sanitary sewer. The City of Tacoma currently charges approximately $0.0034 per gallon of water. The volume of water generated will be based on construction methods. The cost estimate includes the cost of disposal of water of 120 days of earthwork construction, approximate cost of collecting ten water samples over the course of the project ($15,000) and two 25,000 gallon storage tanks ($7,000 each per month). If remediation of the site occurs prior to the construction these costs will not be applicable.
- **Design and Construction Methods Modification to Reduce Cross-Contamination Between Shallow and Deep Aquifers.** Construction methods may need to be modified to prevent cross-contamination between the shallow and deep aquifers. Typically these costs can be incorporated into the design at a minimal rate. For budgeting purposes, additional construction costs for implementation are $0.50 to $3 per square foot of the building. If remediation of the site occurs prior to the construction these costs will not be applicable.
- **Health and Safety.** WAC 296-843-100 requires workers who may be in contact with potentially contaminated soil or groundwater at a state-listed cleanup site have Hazardous Waste Operations and Emergency Response (HAZWOPER) training. The requirement is consistent with the Washington Administrative Code (WAC) 296-843-100, *Hazardous Waste Operations*, which indicates that on-site personnel are required to have current health and safety training in accordance with Occupational Safety and Health Administration (OSHA) HAZWOPER requirements in 29 CFR 1910.120. The rule also requires the earthwork contractor and other personnel who could potentially contact contaminated materials to develop and implement a written safety and

health program for their employees involved in hazardous waste operations under 29 CFR 1910.120. The estimated costs for the contractor to be HAZWOPER trained and have appropriate liability insurance is roughly between $10,000 and $70,000 depending on the number of subcontractors that require training.

- **Contaminated and Impacted Soil.** Soil is contaminated or impacted with chemicals of concern. Mitigation measures include:
  - **Characterize Soil and Groundwater for Disposal.** Plan to characterize the soil and groundwater either by in-situ characterization or stockpiling and subsequent sampling of soil that is generated during construction where an area contains contaminated soil and groundwater. The estimated cost of soil characterization for disposal may range between $10,000 and $170,000 based on the mass of soil to be removed.
  - **Excavate and dispose soil** as applicable under the following categories:
    - **Petroleum-Contaminated Soil.** Remedial excavation of petroleum-contaminated soil outside of what is required for construction will likely be required. Petroleum-contaminated soil shall be disposed at a UW-approved Subtitle D landfill. The estimated cost for remedial excavation (in addition to what is required for construction) and soil disposal is $140 to 160 per ton.
    - **PCE and TCE-Impacted and Contaminated Soil.** When PCE and TCE and breakdown products are detected in soil, UW EH&S will work with Ecology on obtaining a “contained-in determination” for disposal of the waste. The source of the solvent contamination, the concentration of the solvents and a TCLP analytical test result will be used when evaluating if the soil is disposed as hazardous waste by UW EH&S at a RCRA permitted Subtitle C landfill or as a solid waste at a UW-approved Subtitle D landfill. Past experience has demonstrated that it is fairly likely that the “contained-in determination” will be granted, thus we based our cost estimates on this assumption.

      The estimated cost for transportation and disposal (not including excavation and loading) of soil to a Subtitle D landfill with a contained-in determination is $80 to $100 per ton. The cost for transportation and disposal (not including excavation and loading) of soil to a RCRA Subtitle C Landfill is $250 to $300 per ton. The cost estimates do not include disposal of soil as a dangerous waste at a RCRA-Subtitle C landfill.
    - **Metals- and cPAHs- Contaminated Soil.** The contaminated soil shall be removed as necessary for construction and Ecology requirements. Metals- and cPAHs-contaminated soil shall be disposed at an UW-approved Subtitle D landfill. Typically, metals- and cPAHs-contaminated soil left in place shall be capped with a building or hardscape as required by Ecology. The estimated cost for transportation and disposal at a Subtitle D landfill is $60 to $80 per ton.
    - **Petroleum- and metals-Impacted-Soil.** Soil that is impacted with petroleum hydrocarbons, cPAHs, and metals can typically be disposed at a UW-approved permitted inert waste landfill or DNR reclamation pit. CPAHs-, metals- and petroleum-impacted soil is typically not suitable for reuse on site. For budgeting purposes, we assumed the transportation and disposal of cPAHs-, metals- and petroleum-impacted soil is $30 to $50 per ton. If soil is reused as fill on site, the cost of the offsite impacted soil disposal would be reduced.

- **Health and Safety.** As discussed in the contaminated groundwater section, WAC 296-843-100 requires its earthwork contractor and other personnel who could potentially contact contaminated materials to comply with HAZWOPER training requirements for handling soil and potentially groundwater on the site. The health and safety costs are not included as a separate item in the contaminated and impacted soil section, because the costs in the groundwater section will apply.

- **Long-Term Impacts.** In coordination with Ecology and UW EH&S, contaminated soil and groundwater may be left in place following development of the PDAs. UW may develop and implement appropriate administrative institutional controls to limit or prohibit activities that may result in exposure to hazardous substances remaining at the site. The estimated cost for this impact is not known.

4.0 SITE SPECIFIC IMPACTS AND MITIGATION MEASURES

The PDAs are presented separately in following sections. The site specific impacts and mitigation measures and associated estimated costs per value are summarized in Table 1. The cost estimate calculation per value is summarized in Table 2.

4.1. PDA 1A – Upton

4.1.1. PDA 1A-Upton - Assumed Development Plans

We understand UWT plans to construct a new building at PDA 1A-Upton. GeoEngineers assumes the new building will be 13,000 square feet with a finished floor elevation of 198 feet. The estimated mass of soil to be generated based on the above assumptions is approximately 21,000 tons to excavate PDA 1A-Upton to subgrade (Elevation 197 feet). An additional 2,000 tons is estimated to be generated from the footings.

4.1.2. PDA 1A-Upton – Subsurface Investigation Findings

A former drycleaner operated on PDA 1A-Upton from 1961 to the early 1970s and has been identified as a possible source of the PCE-contaminated groundwater. PCE (drycleaner solvent) and associated breakdown products are present in the fill soil and ice-contact deposits (0 to 26 feet below ground surface [bgs]) east of the former drycleaner building footprint. The shallow aquifer is contaminated with PCE. The full extent of PCE in the shallow aquifer is not known. Groundwater within the deeper aquifer was not sampled as part of this investigation. The former drycleaner was identified as a potential source of PCE-contaminated soil and groundwater.

Lead- and cPAHs-contaminated soil is present on the west side of PDA 1A-Upton to a depth of 2 feet bgs. Metals-, petroleum hydrocarbon- and cPAHs-impacted soil is present throughout PDA 1A-Upton to a depth of 10 feet bgs.

4.1.3. PDA 1A-Upton - Impacts and Mitigation and Estimated Costs

Impacts identified on PDA 1A-Upton are described below. A summary of the impacts, mitigation measures and estimated costs is included in Tables 1 and 2.

- Site is likely source of PCE groundwater contamination
- Groundwater is contaminated with PCE

- Soil is contaminated with chemicals of concern (PCE, metals and cPAHs)
- Soil is impacted with chemicals of concern (PCE, TCE, metals and cPAHs)

4.2. PDA 1B – Tacoma Vacant

4.2.1. PDA 1B-Tacoma Vacant - Assumed Development Plans

We understand UWT plans to construct a new building at the PDA 1B-Tacoma Vacant. GeoEngineers assumes the new building will be 67,000 square feet with a finished floor elevation of 194 feet. The estimated amount of soil to be generated based on the above assumptions is approximately 52,000 tons to excavate PDA 1B-Tacoma Vacant to subgrade (Elevation 193 feet). An additional 8,000 tons is estimated to be generated from the footings.

4.2.2. PDA 1B-Tacoma Vacant – Subsurface Investigation Findings

Chemicals of concern were encountered in soil and groundwater within PDA 1B-Tacoma Vacant as follows:

- TCE and other solvents were detected in the soil and groundwater within ice-contact deposits/shallow aquifer in the central portion of PDA 1B-Tacoma Vacant (UG-MW25S). The groundwater elevation of the shallow aquifer in this area is approximately 200.53 feet. The source of the TCE appears to be from an upgradient source; however, the exact source is unknown. TCE-contaminated groundwater will likely be encountered during construction. TCE-contaminated groundwater will likely be in contact with the west side of the building and present beneath the central portion of the building.
- PCE and TCE were detected in the ice-contact deposits within the southern portion of PDA 1B-Tacoma Vacant (UG-MW24). These PCE and TCE detections in soil indicate the shallow aquifer may be impacted. The TCE- and PCE-impacted soil will likely not be encountered during construction based on estimated groundwater levels in the area. However, the impacted groundwater may exceed the MTCA Method B groundwater screening levels protective of indoor air.
- TCE was detected in the advance outwash deposits near the southern/central portion of PDA 1B-Tacoma Vacant. These TCE detections indicate groundwater within the deep aquifer may be impacted. The groundwater elevation of the deep aquifer is approximately 165 feet in the area of the potentially TCE-contaminated groundwater. The groundwater within the deeper aquifer will likely not be encountered during construction activities and the silt layer may act as a barrier to vapor impacts.
- Petroleum-contaminated groundwater (lube-oil range) is present in the shallow aquifer near the southern portion of PDA 1B-Tacoma Vacant (UG-MW37). The groundwater elevation of the shallow aquifer groundwater in this area is approximately 196 feet. Petroleum-impacted groundwater (lube oil-range) is present in the shallow aquifer on the northern portion of PDA 1B-Tacoma Vacant (UG-MW26). The source of the lube-oil range petroleum hydrocarbons is unknown. However, the source is likely located on PDA 1B-Tacoma Vacant, because petroleum hydrocarbons do not migrate as far as solvents often traveling only 100 feet or less from the original source.
- Contaminated soil (arsenic, lead and cPAHs) is present from the ground surface to approximately 3 feet bgs on the northern two-thirds of PDA 1B-Tacoma Vacant.

- Impacted soil (petroleum hydrocarbons, metals and cPAHs) is present from the ground surface to 3 feet bgs on the southern one-third of PDA 1B-Tacoma Vacant.

4.2.3. PDA 1B-Tacoma Vacant - Impacts and Mitigation and Estimated Costs

Impacts identified on PDA 1B-Tacoma Vacant are described below. A summary of the impacts, mitigation measures and estimated costs is included in Tables 1 and 2.

- Site is likely source of petroleum hydrocarbon groundwater contamination
- Groundwater is contaminated with TCE
- Soil is contaminated with chemicals of concern (TCE, metals and cPAHs)
- Soil is impacted with chemicals of concern (PCE, TCE, petroleum hydrocarbons, metals and cPAHs)

4.3. PDA 1C – Fawcett North

4.3.1. PDA 1C - Assumed Development Plans

We understand UWT plans to construct a new building at PDA 1C-Fawcett North. GeoEngineers assumes the new building will be 32,000 square feet with a finished floor elevation of 172 feet. The estimated amount of soil to be generated based on the above assumptions is approximately 27,000 tons to excavate PDA 1C-Fawcett North to subgrade (Elevation 171 feet). An additional 3,000 tons is estimated to be generated from the footings.

4.3.2. PDA 1C-Fawcett North – Subsurface Investigation Findings

Two areas of potentially contaminated groundwater are present along the northern and southern portions of PDA 1C-Fawcett North. PCE-impacted soil was detected in the northern portion of the PDA 1C-Fawcett North, indicating the groundwater may be impacted in the area as well. The northern area is directly downgradient of PDA 1A-Upton. TCE-contaminated groundwater is present in the shallow aquifer both upgradient and downgradient of the southern area of PDA 1C-Fawcett North, indicating TCE-contaminated groundwater may be present on PDA 1C-Fawcett North.

PCE- and/or TCE-contaminated groundwater may be encountered during construction on the southern and northern portions of PDA 1C-Fawcett North. PCE and/or TCE-contaminated groundwater will also be in contact with the west side of the building and present beneath the northern and southern portions of the proposed building.

Contaminated soil (arsenic, lead and/or cPAHs) is present from ground surface to 1 foot bgs on the southern portion and 4 feet bgs on the northern portion of PDA 1C-Fawcett North. Impacted soil (arsenic, lead and mercury) is present from the ground surface to 1 foot bgs on the southern portion and 4 feet bgs on the northern portion of PDA 1C-Fawcett North. The impacted soil is located in the same area as the PCE-impacted soil or arsenic, lead and/or cPAHs-contaminated soil.

4.3.3. PDA 1C-Fawcett North - Impacts and Mitigation and Estimated Costs

Impacts identified on PDA 1C-Fawcett North are described below. A summary of the impacts, mitigation measures and estimated costs is included in Tables 1 and 2.

- Site is a potential source of groundwater contamination

- Groundwater is contaminated with PCE and TCE
- Soil is contaminated with chemicals of concern (PCE, metals and cPAHs)
- Soil is impacted with chemicals of concern (PCE, metals and cPAHs)

4.4. PDA 1D – Fawcett South

4.4.1. PDA 1D-Fawcett South - Assumed Development Plans

We understand UWT plans to construct a new building at PDA 1D-Fawcett South. GeoEngineers assumes the new building with be 32,000 square feet with a finished floor elevation of 168 feet. The estimated mass of soil to be generated based on the above assumptions is approximately 28,000 tons to excavate PDA 1D-Fawcett South to subgrade (Elevation 167 feet). An additional 3,000 tons is estimated to be generated from the footings.

4.4.2. PDA 1D-Fawcett South – Subsurface Investigation Findings

Three areas of potentially TCE-contaminated groundwater are present on PDA 1D-Fawcett South. Two areas are located within the shallow aquifer on the northern and southern portions of PDA 1D-Fawcett South. The third area is located within the deep aquifer throughout the entire site. TCE-contaminated groundwater may be encountered during construction throughout PDA 1D-Fawcett South. TCE-contaminated groundwater may also be in contact with the west side of the building and present beneath the building.

Lead-, and/or cPAHs-contaminated soil was present in soil from the ground surface to 2 feet bgs on the southern portion and 3 feet bgs on the northern portion of PDA 1D-Fawcett South. Petroleum-, metals- and cPAHs-impacted soil is present from the ground surface to 3 feet bgs on the remaining portions of PDA 1D-Fawcett South.

4.4.3. PDA 1D-Fawcett South - Impacts and Mitigation and Estimated Costs

Impacts identified on PDA 1D-Fawcett South are described below. A summary of the impacts, mitigation measures and estimated costs is included in Tables 1 and 2.

- Groundwater is contaminated with TCE
- Soil is contaminated with chemicals of concern (metals and cPAHs)
- Soil is impacted with chemicals of concern (TCE, petroleum hydrocarbons, metals, cPAHs)

4.5. PDA 1E – Strom Property

4.5.1. PDA 1E-Strom Property – Assumed Development Plans

We understand UWT plans to construct a new building at the site. GeoEngineers assumes the building will be 25,000 square feet with a finished floor elevation of 152 feet. The estimated amount of soil to be generated based on the above assumptions is approximately 15,000 tons based to excavate the site to subgrade (Elevation 151 feet). An additional 3,000 tons is estimated to be generated from the footings.

4.5.2. PDA 1E-Strom Property – Subsurface Investigation Findings

TCE-contaminated groundwater is present within the shallow aquifer at the site. Deep aquifer wells are not located on the site and soil samples were not collected in the advance outwash on the site. However, TCE was detected in soil within the advance outwash upgradient of the site.

Cadmium, lead, and cPAHs were detected in soil from the ground surface to 1 foot bgs the site. Petroleum- and cPAHs-impacted soil were also detected within the upper 1 foot at the site.

4.5.3. PDA 1E-Strom Property – Impacts and Mitigation and Estimated Costs

Impacts identified on PDA 1E-Strom Property include groundwater and soil impacts from TCE contamination. Soil is also contaminated and impacted from petroleum, cPAHs, and metals. A summary of the impacts, mitigation measures, and estimated costs is included in Tables 1 and 2.

- Groundwater is contaminated with TCE
- Soil is contaminated with chemicals of concern (metals and cPAHs)
- Soil is impacted with chemicals of concern (TCE, petroleum hydrocarbons, metals and cPAHs)

4.6. PDA 1F – Fawcett Parking Lot T47/48

4.6.1. PDA 1F-Fawcett Parking/Lot T47 and T48 – Assumed Development Plans

We understand UWT plans to construct a new building at the site. GeoEngineers assume the new building will be 25,000 square feet with a finished elevation of 146 feet. The estimated amount of soil to be generated based on the above assumptions is approximately 19,000 tons to excavate the site to subgrade (Elevation 145 feet). An additional 3,000 tons is estimated to be generated from the footings.

4.6.2. PDA 1F-Fawcett Parking/Lot T47 and T48 – Subsurface Investigation Findings

TCE-contaminated groundwater is present throughout the site in the shallow and deep aquifers. The shallow and deep aquifers may be connected on the site based on the review of borings logs and water levels observed during the investigation.

Gasoline-contaminated soil is present from approximately 7 to 8 feet bgs in the southeast portion of PDA 1F-Fawcett Parking. CPAHs-impacted soil is present from 5 to 8 feet bgs throughout the site.

4.6.3. PDA 1F- Fawcett Parking/Lot T47 and T48 – Impacts and Mitigation and Estimated Costs

Soil and groundwater are impacted with TCE on PDA 1F-Fawcett Parking. The soil is also contaminated and impacted with metals, petroleum hydrocarbons and cPAHs.

A summary of the impacts, mitigation measures, and estimated costs is included in Tables 1 and 2.

- Site is a potential source of groundwater contamination
- Groundwater is contaminated with TCE
- Soil is contaminated with chemicals of concern (petroleum hydrocarbons)
- Soil is impacted with chemicals of concern (TCE, petroleum hydrocarbons, metals and cPAHs)

4.7. PDA 1G – Laborers/Lot T39 and T40

4.7.1. PDA 1G-Laborers/Lot T39 and T40 – Assumed Development Plans

We understand UWT plans to construct a new building at the site. GeoEngineers assume two options for construction on the property: a southern option (Option A) with a dimension of 35,000 square feet, or a northern option (Option B) with a footprint of 20,000 square feet. For Option A, the finished floor elevation will be 124 feet, and for Option B the Elevation will be 126 feet. The estimated amount of soil to be generated based on the above assumptions is approximately 27,000 tons for Option A or 42,000 tons for Option B in order to excavate the site to subgrade. An additional 3,000 tons is estimated to be generated from Option A and 2,500 tons from Option B from the footings.

4.7.2. PDA 1G-Laborers/Lot T39 and T40 – Subsurface Investigation Findings

TCE-contaminated groundwater is present in the southern portion of the site (beginning at an elevation of approximately 135 feet). TCE was not found in the northern portion of the site, but TCE-contaminated groundwater is present upgradient of this portion of the property.

TCE-, cPAHs-, and lead-contaminated soil and cPAHs- and mercury-impacted soil is present in soil from the ground surface to as deep as 11 feet bgs.

4.7.3. PDA 1G-Laborers/Lot T39 and T40 – Impacts and Mitigation and Estimated Costs

Impacts identified within PDA 1G-Laborers/Lot T39 and T40 include groundwater and soil impacted by TCE, as well as soil contaminated and impacted by cPAHs, petroleum, lead, and mercury. A summary of the impacts, mitigation measures, and estimated costs is included in Tables 1 and 2.

- Potential UST
- Groundwater is contaminated with TCE (southern portion of site)
- Soil is contaminated with chemicals of concern (metals and cPAHs)
- Soil is impacted with chemicals of concern (TCE, PCE, petroleum hydrocarbons, metals and cPAHs)

4.8. PDA 2A – Sound Care

4.8.1. PDA 2A-Sound Care - Assumed Development Plans

We understand UWT plans to construct a new building at PDA 2A-Sound Care. GeoEngineers assumes the new building will be 48,000 square feet with a finished floor elevation of 100 feet. The estimated mass of soil to be generated based on the above assumptions is approximately 30,000 tons to excavate PDA 2A-Sound Care to subgrade (Elevation 167 feet). An additional 5,000 tons is estimated to be generated from the footings.

4.8.2. PDA 2A-Sound Care – Subsurface Investigation Findings

TCE-contaminated soil and potentially contaminated groundwater are present in the shallow and deep aquifers throughout PDA 2A-Sound Care as shown on Figure 1. TCE-contaminated groundwater within the shallow aquifer will likely be encountered during construction throughout PDA 2A-Sound Care and will be in contact with the west side of the building present beneath the building based on groundwater elevations observed in the wells.

One to 2 feet of fill was placed on PDA 2A-Sound Care following sampling activities during development of the existing park. Metals- and cPAHs-impacted soil are present from the former ground surface to 3 feet bgs on the remaining portions of PDA 2A-Sound Care. CPAHs-contaminated soil was present from the former ground surface to 4 feet bgs on the southern and southeast portions of PDA 2A-Sound Care.

4.8.3. PDA 2A-Sound Care - Impacts and Mitigation and Estimated Costs

Impacts identified on PDA 2A-Sound Care are described below. A summary of the impacts, mitigation measures and estimated costs is included in Tables 1 and 2.

- Groundwater is contaminated with TCE
- Soil is contaminated with chemicals of concern (metals and cPAHs)
- Soil is impacted with chemicals of concern (TCE, metals and cPAHs)

4.9. PDA 2B – Jefferson Street Parcel/Transit Turnaround

4.9.1. PDA 2B-Jefferson Street Parcel/Transit Turnaround - Assumed Development Plans

We understand UWT plans to construct a new building at PDA 2B-Jefferson Street Parcel/Transit Turnaround. GeoEngineers assumes the new building will be 50,000 square feet with a finished floor elevation of 86 feet. The estimated amount of soil to be generated based on the above assumptions is approximately 35,000 tons to excavate PDA 2B-Jefferson Street Parcel/Transit Turnaround to subgrade (Elevation 85 feet) which includes the soil prism within Court C. An additional 6,000 tons is estimated to be generated from the footings.

4.9.2. PDA 2B-Jefferson Street Parcel/Transit Turnaround – Subsurface Investigation Findings

TCE-contaminated soil and potentially contaminated groundwater are present within the shallow and deep aquifers near the southern portion of PDA 2B-Jefferson Street Parcel/Transit Turnaround as shown on Figure 1. TCE-contaminated groundwater in the shallow aquifer will likely be encountered during construction in the southwest portion of PDA 2B-Jefferson Street Parcel/Transit Turnaround based on the groundwater elevation of the shallow aquifer. TCE-contaminated groundwater will also be in contact with the west side of the building and present beneath the building. TCE-contaminated groundwater in the deep aquifer will likely not be encountered during excavation of the footings, but may be encountered for deep excavations (elevation or shoring).

Lead- and cPAHs-contaminated soil is present from the ground surface to 1 foot bgs on the southwest portion of PDA 2B-Jefferson Street Parcel/Transit Turnaround. Benzene-contaminated soil is also present on Jefferson Avenue at a depth of approximately 6 feet bgs. The gasoline-range petroleum hydrocarbons and benzene-contaminated soil was left in place during a remedial excavation completed on PDA 2B-Jefferson Street Parcel/Transit Turnaround.

Metals and cPAHs-impacted soil are present from the ground surface to 2 feet bgs on the remaining southern portion of the site.

4.9.3. PDA 2B-Jefferson Street Parcel/Transit Turnaround - Impacts and Mitigation and Estimated Costs

Impacts identified on PDA 2B-Jefferson Street Parcel and Transit Turnaround are described below. A summary of the impacts, mitigation measures and estimated costs is included in Tables 1 and 2.

- Groundwater is contaminated with TCE
- Soil is contaminated with chemicals of concern (TCE, gasoline-range petroleum hydrocarbons, benzene, metals and cPAHs)
- Soil is impacted with chemicals of concern (metals and cPAHs)

4.10. PDA 2C –Pinkerton Parking

4.10.1. PDA 2C-Pinkerton Parking - Assumed Development Plans

We understand UWT plans to construct a new building at PDA 2C-Pinkerton Parking. GeoEngineers assumes the new building will be 8,400 square feet with a finished floor elevation of 86 feet. The estimated mass of soil to be generated based on the above assumptions is approximately 5,000 tons to excavate PDA 2C-Pinkerton Parking to subgrade (Elevation 85 feet). An additional 2,000 tons is estimated to be generated from the footings.

4.10.2. PDA 2C-Pinkerton Parking – Subsurface Investigation Findings

TCE-contaminated and impacted soil were not encountered on the PDA 2C-Pinkerton Parking. Groundwater was not sampled within PDA 2C-Pinkerton Parking as part of this investigation. However, TCE-contaminated groundwater is present in the shallow aquifer approximately 250 feet upgradient (PDA 1H-Y Student Center) and may have potentially impacted the shallow groundwater beneath PDA 2C-Pinkerton Parking. For purposes of this cost estimate, we have assumed TCE-contaminated groundwater is not present within PDA 2C-Pinkerton Parking. If TCE-contaminated groundwater is discovered in PDA 2C-Pinkerton Parking, the impacts and associated mitigation measures should be evaluated.

Lead and cPAHs-contaminated soil is present from the ground surface to 2-foot bgs on the western portion of PDA 2C-Pinkerton Parking.

4.10.3. PDA 2C-Pinkerton Parking - Impacts and Mitigation and Estimated Costs

Impacts identified on PDA 2C-Pinkerton Parking are described below. A summary of the impacts, mitigation measures and estimated costs is included in Tables 1 and 2.

- Potential UST
- Soil is contaminated with chemicals of concern (metals and cPAHs)

4.11. PDA 2D – Tacoma Paper Supply Building

4.11.1. PDA 2D-Tacoma Paper Supply Building - Assumed Development Plans

We understand UWT plans to redevelop the existing building as a “core and shell” by 2016. Additional improvements will occur at a later date as the programs for the space are defined. A “core and shell” redevelopment will likely consist of a complete restoration of the building to include seismic upgrades that may require new footings and shear walls along with upgraded utilities. We have assumed the shell of the building and finished floor elevation of the building will remain (approximately 10,000 square feet and Elevation 70 feet). The footings may extend up to 5 feet below the existing finished floor. For budgeting purposes, we assumed 500 linear feet of footings with 10-foot-wide excavations and 5-feet-deep. The estimated mass of soil to be generated based on the above assumptions is 2,000 tons.

4.11.2. PDA 2D-Tacoma Paper Supply Building – Subsurface Investigation Findings

PCE-contaminated and impacted soil is present beneath the building from below the slab to the full depth explored (12 feet bgs). PCE-contaminated soil may extend deeper than 12 feet bgs. Groundwater was not encountered within the building during this investigation. PCE was not detected in the upgradient shallow and deep aquifer wells (JS-MW3S and JS-MW3) located on Jefferson Avenue upgradient of PDA 2D-Tacoma Paper Supply Building indicating the source of PCE in the soil does not appear to originate from an upgradient source. The source of the PCE is likely from within the building, but the exact location is unknown. Industrial uses of PCE are dry cleaning/textile processing, metal degreasing, printing inks, typewriter correction fluids, adhesive formulations and paper coatings. A wholesale paper company operated in the building between 1911 and 1953 and a sign printing shop was located in the southern portion of the building in at least 1912. Historical operations of printing or coating paper may be the source of the PCE within the building; however the actual source is unknown. Due to storage, we were unable to visually inspect the entire first floor for potential areas where PCE may have been disposed in the past (drywells or cisterns).

4.11.3. PDA 2D-Tacoma Paper Supply Building- Impacts and Mitigation and Estimated Costs

Impacts identified on PDA 2D-Tacoma Paper Supply Building are described below. A summary of the impacts, mitigation measures and estimated costs is included in Tables 1 and 2.

- Site is a potential source of PCE
- Groundwater is potentially contaminated with PCE
- Soil is contaminated with chemicals of concern (PCE)
- Soil is impacted with chemical of concern (PCE)

4.12. PDA 2E – The Swiss Pub and Frederick Wild

4.12.1. PDA 2E-The Swiss Pub and Frederick Wild - Assumed Development Plans

We understand UWT plans to complete seismic upgrades to the existing buildings. The upgrades may require new footings and shear walls. A new elevator and utilities may also be included in the redevelopment. Improvements will also include tenant upgrades. It is anticipated minimal soil will be excavated from PDA 2E-The Swiss Pub and Frederick Wild. The estimated mass of soil to be removed is 750 tons.

4.12.2. PDA 2E-The Swiss Pub and Frederick Wild – Subsurface Investigation Findings

A subsurface investigation was not completed within the Swiss Building during this investigation due to access constraints. Historical records indicate a garage and auto mechanic school operated on the southern portion of the Swiss Building property in 1937. This area is currently elevated approximately 1 foot higher in elevation than the remainder of the ground floor.

UW completed a subsurface investigation within the Frederick Wild building during the purchase of the property in 2013. Metals-and cPAHs-contaminated soil is present within the building. The depth of the contaminated soil appears to extend to 1 foot bgs. Diesel- and lube oil-range petroleum hydrocarbons-, metals- and cPAHs-contaminated soil are present within a sump observed during the investigation. For budgeting purposes, we have assumed that soil excavated during upgrades will be contaminated and one UST will need to be removed.

TCE-contaminated groundwater appears to be present in the deep and shallow aquifers below PDA 2E-The Swiss and Frederick Wild based on TCE concentrations detected in adjacent monitoring wells.

4.12.3. PDA 2E-The Swiss Pub and Frederick Wild - Impacts and Mitigation and Estimated Costs

Impacts identified on PDA 2E- The Swiss Pub and Frederick Wild are described below. A summary of the impacts, mitigation measures and estimated costs is included in Tables 1 and 2.

- Potential USTs
- Groundwater is contaminated with TCE
- Soil is contaminated with chemicals of concern (petroleum hydrocarbons, metals and cPAHs)

4.13. PDA 2F – Tioga Building

4.13.1. PDA 2F-Tioga Building - Assumed Development Plans

We understand UWT plans to complete tenant upgrades to the existing buildings. The upgrades may require utilities upgrades. It is anticipated minimal soil will be excavated from PDA 2F-Tioga Building. The estimated mass of soil to be removed is 500 tons.

4.13.2. PDA 2F-Tioga Building – Subsurface Investigation Findings

CPAHs-contaminated soil is present within the fill on the eastern portion of the PDA 2F-Tioga Building. TCE-contaminated groundwater appears to be present in the deep aquifer below PDA 2F-Tioga Building based on TCE concentrations in adjacent monitoring wells. The elevation of the groundwater in the deep aquifer adjacent to Jefferson Avenue is 82 feet which is approximately 4 feet lower than the bottom of the building.

4.13.3. PDA 2F-Tioga Building - Impacts and Mitigation and Estimated Costs

Impacts identified on PDA 2F –Tioga Building are described below. A summary of the impacts, mitigation measures and estimated costs is included in Tables 1 and 2.

- Groundwater is contaminated with TCE
- Soil is contaminated with chemicals of concern (metals and cPAHs)
- Soil is impacted with chemicals of concern (metals and cPAHs)

5.0 PDA 1H – Y STUDENT CENTER COST COMPARISON

We also completed two cost estimates of PDA 1H- Y Student Center for comparison purposes as summarized in Tables 1 and 2. The first cost estimate was completed on the current design of the building for comparison to the Y Student Center's change order for costs associated with TCE. The second cost estimate was completed for the entire PDA and included the assumptions that were used on the remaining PDA sites.

6.0 CONCLUSIONS

A subsurface investigation was completed to evaluate the impacts, mitigation measures and cost estimates to develop the PDA identified by UW. This investigation further evaluated the soil and groundwater conditions. In general, surficial soil (fill) is contaminated or impacted with metals, petroleum hydrocarbons or cPAHs and deeper ice-contact deposits and advance outwash deposits are contaminated or impacted with TCE and/or PCE in the area of the shallow and deep aquifers as shown on Figure 1.

The estimated costs of mitigation measures of environmental impacts of the PDAs are summarized in Tables 1 and 2. The total estimated cost range to manage environmental contamination within the PDAs (not including the Y Student Center) is summarized in Table 3 and ranges between $18,156,778 and $31,630,528.

7.0 REPORT LIMITATIONS AND GUIDELINE FOR USE

We have prepared this report for use by the University of Washington for the Priority Development Areas (PDAs) Environmental Assessment Project at the UW – Tacoma (UWT) campus located in Tacoma, Washington. Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

Please refer to Appendix B titled "Report Limitations and Guidelines for Use" for additional information pertaining to use of this report.

Sincerely,
GeoEngineers, Inc.

Tricia S. DeOme, LG
Geologist

Terry R. McPhetridge, LG, LHG
Associate

TSD:TRM:ch

Attachments:
Figure 1. Preliminary Summary of Subsurface Investigation Findings within PDAs
Table 1. Mitigation Measures and Estimated Costs
Table 2. Estimated Detail Costs for Each Site
Table 3. Summary of Costs
Appendix A. General Findings
Appendix B. Report Limitations and Guidelines for Use

cc:
David Lundstrum, EH&S
Erin McKeown, EH&S
David Leonard, EH&S
David Ogrodnik, Campus Engineering

Legend

- UWT Master Plan Campus Boundary
- PDA 1
- PDA 2
- Approximate Lateral Extent of Lube Oil-Range Petroleum Hydrocarbon-Contaminated Groundwater Plume in Shallow Aquifer
- Approximate Lateral Extent of PCE- and Breakdown Product Contaminated Groundwater Plume in Shallow Aquifer
- Approximate Lateral Extent of TCE-Contaminated Groundwater Plume in Shallow Aquifer
- Approximate Lateral Extent of TCE-Contaminated Groundwater Plume in Deep Aquifer
- Approximate Lateral Extent of TCE-Contaminated Groundwater Plume in Shallow and Deep Aquifer
- Shallow Aquifer Well and Identification
- Deep Aquifer Well and Identification
- Lithology of Well Screen Not Determined
- Soil Borings/ Test Pits
- PCE Detected in Soil But Groundwater Not Analyzed in Area
- Impacted Soil - cPAHs, Metals, Petroleum Detection Greater Than Reuse Criteria in Soil
- Contaminated Soil - cPAHs, Metals, Petroleum Detected at Concentrations Greater Than Respective MTCA Method A ULU"

Map Revised: 22 May 2014 cgonzales

Path: \\tac\projects\0\0183085\GIS\Reports\ImpactsFigure01.mxd

Office: TAC

Notes:
PDA = Priority Development Area
UWT = University of Washington Tacoma
COC = Chemical of Concern
TCE = Trichloroethene
PCE = Tetrachloroethene
cPAHs = Carcinogenic Polycyclic Aromatic Hydrocarbon
TTEC = Total Toxicity Equivalency Concentration
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Contaminated Soil
cPAHs TTEC Detected ≥ 0.1 mg/kg
Arsenic Detected ≥ 20 mg/kg
Lead Detected ≥ 250 mg/kg
Cadmium Detected ≥ 2 mg/kg
Mercury Detected ≥ 2 mg/kg
Gasoline Detected ≥ 30 mg/kg
Diesel Detected ≥ 2,000 mg/kg
Lube Oil Detected ≥ 2,000 mg/kg

Preliminary Summary of Subsurface Investigation Findings Within PDAs

UWT Environmental Assessment
Priority Development Areas - CPO Project No. 204277
Tacoma, Washington

GeoEngineers

Figure 1

Table 1

Impacts, Mitigation Measures and Estimated Costs

Priority Development Area - University of Washington Tacoma
Tacoma, Washington

PDA - Name				1A - Upton			1B - Tacoma Vacant[1]		
Timeframe for Construction				Design and Construction Anticipated Within the Next Seven Years.			Design and Construction Anticipated Within the Next Seven Years.		
Construction Plan				Three- to six-story buildings are planned. The construction will likely be built into the hillside where the elevation of the first floor is similar to the elevation of the adjacent downslope street. Foundations may extend up to 5 feet below the new cut surface. Subgrade will be 1 foot below the finished floor.			Three- to six-story buildings are planned. The construction will likely be built into the hillside where the elevation of the first floor is similar to the elevation of the adjacent downslope street. Foundations may extend up to 5 feet below the new cut surface. Subgrade will be 1 foot below the finished floor.		
Assumed Square Footage of Building (square feet)				13,000			67,000		
Assumed Finished Floor Elevation of Building (feet AMSL)				198			194		
Calculated Mass of Soil to Excavate to subgrade (1-foot below finished floor and footings) (tons)				23,000			60,000		
					Estimated Cost (2014 $)			Estimated Cost (2014 $)	
Impacts	Mitigation Measures			Description	Minimum	Maximum	Description	Minimum	Maximum
Site is Potential Source of Groundwater Contamination	Complete Remedial Investigation and Develop and Implement Remedial Alternatives			A former dry cleaner operated on the site. PCE (dry cleaner solvent) was detected in the soil and groundwater near the back of the former dry cleaner building as shown on Figure 1. Additional investigation is recommended to evaluate the lateral and vertical extent of the PCE-contaminated soil and groundwater. The estimated cost for additional investigation to evaluate the source is $80,000 to $150,000. If the PDA 1A is identified as a source of downgradient groundwater contamination, remedial action is recommended prior to construction of the new building. The actual remedial cost will be based on the remedial alternative and the extent of the contamination, but will likely range between $500,000 and $2,000,000.	$580,000	$2,150,000	Lube oil-range petroleum hydrocarbons-contaminated groundwater is present in the southern portion of the PDA 1B. Groundwater is also impacted with lube oil-range petroleum hydrocarbons in the northern portion of the site and more widespread contamination may be present. Additional investigation is recommended to evaluate the lateral and vertical extent of the petroleum-contaminated and impacted groundwater. The estimated cost for additional investigation to evaluate the source is $40,000 to $80,000 per area within the PDA 1B. If the site is identified as a source of groundwater contamination, remedial action is recommended prior to construction of the new building. The actual remedial cost will be based on the remedial alternative and the extent of the contamination but may range between $150,000 and $300,000 per area.	$380,000	$760,000
Potential Underground Storage Tank	Remove UST and Associated Petroleum Contaminated Soil			N/A	$0	$0	One magnetic anomaly was observed in the central portion of the site that was not further investigated. The anomaly is an indication a UST may be present in the area. The UST would be removed by construction activities.	$10,000	$20,000
PCE- or TCE-Contaminated Groundwater	Additional Investigation			Further subsurface investigation may be necessary to evaluate the vertical and lateral limits of the PCE- and TCE-impacted soil and/or groundwater at the site. The estimated cost of additional investigation would likely be completed as part of the investigation to identify if the site is a source of contamination. Soil vapor sampling is recommended to evaluate if a potential vapor intrusion pathway exists. The estimated cost for soil vapor sampling is shown.	$20,000	$30,000	Further subsurface investigation may be necessary to evaluate the vertical and lateral limits of the PCE- and TCE-impacted soil and/or groundwater at the site. Soil vapor sampling is also recommended to evaluate if a potential vapor intrusion pathway exists.	$60,000	$200,000
	Vapor Mitigation System			Vapor mitigation will likely be necessary at the site if remediation of the PCE is not completed prior to construction.	$65,000	$156,000	Vapor mitigation will likely be necessary at the site in areas where TCE and PCE are present in the shallow aquifer. However, the extent of the vapor mitigation should extend the full length of the building because vapors can migrate through the capillary break. The cost of vapor mitigation may be reduced if buildings are moved into areas where the groundwater is not impacted with TCE or PCE.	$335,000	$804,000
	Building Drainage			An underslab footing drain will likely be required based on the approximate elevation of the groundwater (200 feet).	$39,000	$78,000	An underslab footing drain will likely be required based on the approximate elevation of the shallow aquifer groundwater (199 feet).	$201,000	$402,000
	Construction Water Manegement[2]			Approximately 10,000 gallons per day of groundwater is anticipated to be generated.	$47,080	$47,080	Approximately 20,000 gallons per day of groundwater is anticipated to be generated.	$51,160	$51,160
	Design and Construction Methods Modification to Reduce Cross Contamination Between Shallow and Deep Aquifers			The vertical and lateral extent of the PCE-contaminated groundwater in the shallow aquifer is not known. The depth of the deeper aquifer is also not known. Additional investigation will be necessary to evaluate the potential for cross contamination between to the two aquifers. This investigation would be completed in concurrence with the remedial investigation. If cross contamination between aquifers is an impact, additional construction costs may apply.	$11,000	$66,000	It appears the shallow and deep aquifers are impacted with TCE and PCE in the southern portion of the site. It also appears only the shallow aquifer is impacted with TCE on the central portion of the site. The building excavation will likely not create pathway for cross contamination based on the observed elevation of the silt layer (approximately Elevation 177 to 183 feet). However, the design should consider the potential for cross contamination in the deeper excavations at the western retaining wall and elevator shaft. Additional investigation will be necessary to evaluate the potential for cross contamination between to the two aquifers. If cross contamination between aquifers is an impact, additional construction costs will likely apply.	$33,500	$201,000
	Health and Safety			Washington State Requirement -Worker Shall be HAZWOPER Trained. Cost includes potential costs from contractor.	$10,000	$70,000	Washington State Requirement -Worker Shall be HAZWOPER Trained. Cost includes potential costs from contractor.	$10,000	$70,000
Contaminated or Impacted Soil	Characterize Soil and Groundwater for Disposal			Based on volume of soil to be excavated.	$30,000	$75,000	Based on volume of soil to be excavated.	$130,000	$170,000
	Excavate and Dispose of Soil as Appropriate	Petroleum Hydrocarbons-Contaminated Soil	Complete remedial excavation of petroleum-contaminated soil and dispose at a RCRA subtitle D landfill or treatment facility[3]	N/A	$0	$0	N/A	$0	$0
		PCE- and TCE-Impacted and Contaminated Soil	Dispose excavated soil at UW-approved Subtitle D landfill with Contained-In Determination[4]	The estimated amount of soil PCE/TCE-impacted and soil is 14,500 tons, assuming the soil will be excavated and disposed and the excavation of subgrade will be 1-foot below the elevation of Court E and western half of the site is not impacted with PCE and TCE. This may not apply if the source of PCE is remediated prior to construction.	$1,160,000	$1,450,000	The estimated amount of soil TCE-impacted and contaminated soil is 9,500 tons. This estimate is based on the excavation of subgrade to elevation (193 feet) and the TCE-impacted soil that will be encountered during construction is only in the area of UG-MW25S. The cost of soil disposal may be reduced if buildings are moved into areas where the soil is not impacted with TCE. TCE and PCE impacted and contaminated soil is not anticipated to be encountered during construction on the southern portion of the site.	$760,000	$950,000
		Metals and/or cPAHs-Contaminated	Dispose excavated soil at UW-approved Subtitle D landfill. Cap Contaminated Soil Left in Place with Building or Hardscape.[4 and 5]	The estimated amount of the cPAH and lead-contaminated soil is 1,500 tons. This assumes the western surficial 2-feet are contaminated soil.	$90,000	$120,000	The estimated amount of the cPAH and lead-contaminated soil is 6,000 tons. This assumes the northeastern surficial 3-feet are contaminated soil.	$360,000	$480,000
		Metals, Petroleum Hydrocarbons and/or cPAHs-Impacted Soil	Dispose at a UW-approved permitted inert waste landfill or reclamation pit.[4]	Metals-, cPAHs- and petroleum-impacted soil is present on the west side of the site to a depth of approximately 10-feet bgs. The estimated amount of cPAH, metal and petroleum-impacted soil is 3,000 tons. This estimate does not include the cPAH- and metal contaminated soil in the same area.	$90,000	$150,000	Metals-, cPAHs- and petroleum-impacted soil is present on the majority of the site to a depth of approximately 3-feet bgs. The estimated amount of the cPAH-, metals- and petroleum-impacted soil is 10,000 tons. This quantity does not include the area of metal and cPAH-contaminated soil.	$300,000	$500,000
					$2,142,080	$4,392,080		$2,630,660	$4,608,160

PDA - Name				1C - Fawcett North[1]			1D - Fawcett South[1]		
Timeframe for Construction				Design and Construction Anticipated Within the Next Seven Years.			Design and Construction Anticipated Within the Next Seven Years.		
Construction Plan				Three- to six-story buildings are planned. The construction will likely be built into the hillside where the elevation of the first floor is similar to the elevation of the adjacent downslope street. Foundations may extend up to 5 feet below the new cut surface. Subgrade will be 1 foot below the finished floor.			Three- to six-story buildings are planned. The construction will likely be built into the hillside where the elevation of the first floor is similar to the elevation of the adjacent downslope street. Foundations may extend up to 5 feet below the new cut surface. Subgrade will be 1 foot below the finished floor.		
Assumed Square Footage of Building (square feet)				32,000			32,000		
Assumed Finished Floor Elevation of Building (feet AMSL)				172			168		
Calculated Mass of Soil to Excavate to subgrade (1-foot below finished floor and footings) (tons)				30,000			31,000		
					Estimated Cost (2014 $)			Estimated Cost (2014 $)	
Impacts	Mitigation Measures			Description	Minimum	Maximum	Description	Minimum	Maximum
Site is Potential Source of Groundwater Contamination	Complete Remedial Investigation and Develop and Implement Remedial Alternatives			The central portion of the site was identified as a steam laundry in 1926 and may be a potential source of PCE-and TCE-contaminated groundwater. Subsurface investigation should be completed to evaluate if the site is a source of PCE-contamination. The cost of investigation is included in the "additional investigation" below. If the site is identified as a source, remediation will likely be required by Ecology prior to development. The cost of remediation is not included in this cost estimate because there is not enough information to evaluate the potential costs.	$0	$0	N/A	$0	$0
Potential Underground Storage Tank	Remove UST and Associated Petroleum Contaminated Soil			N/A	$0	$0	N/A	$0	$0
PCE- or TCE-Contaminated Groundwater	Additional Investigation			Further subsurface investigation may be necessary to evaluate the vertical and lateral limits of the PCE- and TCE-impacted soil and/or groundwater at the site. Soil vapor sampling is also recommended to evaluate if a potential vapor intrusion pathway exists.	$50,000	$100,000	Further subsurface investigation may be necessary to evaluate the vertical and lateral limits of the TCE-impacted soil and/or groundwater at the site. Soil vapor sampling is also recommended to evaluate if a potential vapor intrusion pathway exists.	$50,000	$100,000
	Vapor Mitigation System			Vapor mitigation will likely be necessary at the site if remediation of the TCE/PCE on the upgradient sites is not completed prior to construction. If potential vapor intrusion pathway exists, then a vapor intrusion mitigation system may be necessary. The costs may be reduced if the building is oriented outside the potential PCE plume areas, or if the upgradient source in PDA 1A is remediated prior to construction activities.	$160,000	$384,000	The source of the potential TCE-contaminated groundwater in the shallow and deep aquifers is unknown. If a potential vapor intrusion pathway exists, then a vapor intrusion mitigation system will be necessary. The costs may be reduced if the buildings are oriented outside the potential TCE-plume areas and the building is raised so it does not penetrate the silt layer at Elevation 175 feet on the western portion of the site.	$160,000	$384,000
	Building Drainage			An underslab footing drain will likely be required based on the approximate elevation of the groundwater (185 feet).	$96,000	$192,000	An underslab footing drain will likely be required based on the approximate elevation of the groundwater (173 feet).	$96,000	$192,000
	Construction Water Manegement[2]			Approximately 15,000 gallons per day is estimated to be generated on the site from dewatering activities.	$49,120	$49,120	Approximately 15,000 gallons per day is estimated to be generated on the site from dewatering activities.	$49,120	$49,120
	Design and Construction Methods Modification to Reduce Cross Contamination Between Shallow and Deep Aquifers			The potential for cross contamination on the site could occur via two pathways. Cross contamination may occur laterally between the potential southern TCE plume and northern PCE plume if the building drainage system connects both plumes. Cross contamination may also occur between the shallow and deep aquifers based on the estimated elevation of the silt (175 feet) in the western portion of the building and the elevation of the proposed building. Additional investigation will be necessary to evaluate the potential for cross contamination between to the two aquifers. This investigation would be completed in concurrence with the additional investigation to evaluate the lateral and vertical extent of the contamination.	$16,000	$96,000	The proposed building will cut through the silt layer that typically is a semi-confining to confining unit for the shallow and deep aquifers (175 feet). However, the silt layer on the site is less than 6-inches-thick and contains gravel. TCE-contaminated groundwater appears to be present in the shallow and deep aquifers. Additional investigation will be necessary to evaluate the potential for cross contamination between the two aquifers. This investigation would be completed in concurrence with the additional investigation to evaluate the lateral and vertical extent of the contamination. For budgeting purposes, additional construction costs may be $16,000 to $96,000 if cross contamination is identified as an impact. However, it appears concern for cross contamination between the two aquifers may not warranted at this site.	$16,000	$96,000
	Health and Safety			Washington State Requirement -Worker Shall be HAZWOPER Trained. Cost includes potential costs from contractor.	$10,000	$70,000	Washington State Requirement -Worker Shall be HAZWOPER Trained. Cost includes potential costs from contractor.	$10,000	$70,000
Contaminated or Impacted Soil	Characterize Soil and Groundwater for Disposal			Based on volume of soil to be excavated.	$60,000	$80,000	Based on volume of soil to be excavated.	$60,000	$80,000
	Excavate and Dispose of Soil as Appropriate	Petroleum Hydrocarbons-Contaminated Soil	Complete remedial excavation of petroleum-contaminated soil and dispose at a RCRA subtitle D landfill or treatment facility[3]	N/A	$0	$0	N/A	$0	$0
		PCE- and TCE-Impacted and Contaminated Soil	Dispose excavated soil at UW-approved Subtitle D landfill with Contained-In Determination[4]	The estimated amount of TCE-impacted soil on the southern portion of the site is 3,500 tons. The estimated amount of soil PCE-impacted soil on the northern portion of the site is 11,500 tons. The costs may be reduced if the building is oriented outside the potential PCE and TCE-plume areas, or if the upgradient source in PDA 1A-Upton is remediated prior to construction activities.	$1,120,000	$1,400,000	Three areas of TCE-contaminated soil were estimated to be present on the site. The estimated amount of TCE-impacted soil on the southern portion of the site is 3,000 tons. The estimated amount of TCE-impacted soil on the northern portion of site is 4,000 tons. The estimated amount of TCE-impacted soil in the central portion of the site is 4,000 tons. The estimated volume from the footings is 3,000 tons. The costs may be reduced if the buildings are oriented outside the potential shallow aquifer TCE-plume areas and the building is raised so it does not penetrate the silt layer at Elevation 175 feet on the western portion of the site.	$1,040,000	$1,300,000
		Metals and/or cPAHs-Contaminated	Dispose excavated soil at UW-approved Subtitle D landfill. Cap Contaminated Soil Left in Place with Building or Hardscape.[4 and 5]	The estimated amount of cPAH and lead-contaminated soil is 5,000 tons. This estimate assumes 2-feet of contaminated soil across the entire site. The lead-contaminated soil on the northern portion of the site that extends to 4 feet bgs will be managed with the PCE-impacted soil and is not included in this cost estimate.	$300,000	$400,000	The estimated amount of the cPAH and lead-contaminated soil is 3,500 tons. This estimate assumes the surficial 2-feet on the southern portion and 3-feet on the northern portion will characterize as contaminated soil.	$210,000	$280,000
		Metals, Petroleum Hydrocarbons and/or cPAHs-Impacted Soil	Dispose at a UW-approved permitted inert waste landfill or reclamation pit. [4]	N/A	$0	$0	The estimated mass of the cPAH, metal and petroleum-impacted soil is 10,000 tons. This estimate assumes the surficial 2-feet across the entire site is impacted. This estimate does not include the areas with contaminated soil.	$300,000	$500,000
					$1,861,120	$2,771,120		$1,991,120	$3,051,120

PDA - Name				1E - Strom			1F - Fawcett Parking/Lot T47/48		
Timeframe for Construction				Design and Construction Anticipated Within the Next Seven Years.			Design and Construction Anticipated Within the Next Seven Years.		
Construction Plan				Three- to six-story buildings are planned. The construction will likely be built into the hillside where the elevation of the first floor is similar to the elevation of the adjacent downslope street. Foundations may extend up to 5 feet below the new cut surface. Subgrade will be 1 foot below the finished floor.			Three- to six-story buildings are planned. The construction will likely be built into the hillside where the elevation of the first floor is similar to the elevation of the adjacent downslope street. Foundations may extend up to 5 feet below the new cut surface. Subgrade will be 1 foot below the finished floor.		
Assumed Square Footage of Building (square feet)				25,000			25,000		
Assumed Finished Floor Elevation of Building (feet AMSL)				152			146		
Calculated Mass of Soil to Excavate to subgrade (1-foot below finished floor and footings) (tons)				18,000			22,000		
					Estimated Cost (2014 $)			Estimated Cost (2014 $)	
Impacts	Mitigation Measures			Description	Minimum	Maximum	Description	Minimum	Maximum
Site is Potential Source of Groundwater Contamination	Complete Remedial Investigation and Develop and Implement Remedial Alternatives			N/A	$0	$0	This site is considered a potential source of PCE and TCE-contaminated groundwater based on historical operations of former motorcycle repair and a dry cleaner. The site is also located within a larger TCE-contaminated groundwater plume. Subsurface investigation is necessary to evaluate if the site is a source of PCE- and TCE-contaminated groundwater. The cost of investigation is included in the “additional investigation” below. If the site is identified as a source, remediation of the source material will likely be required by Ecology prior to development. Remediation of the TCE-contaminated groundwater would likely be impractical because site location within a larger plume. The cost of remediation is not included in this cost estimate because there is not enough information to evaluate the potential costs.	$0	$0
Potential Underground Storage Tank	Remove UST and Associated Petroleum Contaminated Soil			N/A	$0	$0	N/A	$0	$0
PCE- or TCE-Contaminated Groundwater	Additional Investigation			Further subsurface investigation may be necessary to evaluate the vertical and lateral limits of the TCE-impacted groundwater. Soil vapor sampling is also recommended to evaluate if a potential vapor intrusion pathway exists.	$25,000	$75,000	Further subsurface investigation may be necessary to evaluate the vertical and lateral limits of the TCE-impacted groundwater. Soil vapor sampling is also recommended to evaluate if a potential vapor intrusion pathway exists.	$30,000	$100,000
	Vapor Mitigation System			The source of the TCE-contaminated groundwater in the shallow aquifer is unknown. If a potential vapor intrusion pathway exists, then a vapor intrusion mitigation system may be necessary.	$125,000	$300,000	The source of the potential TCE-contaminated groundwater in the shallow and deep aquifers is not known. If a potential vapor intrusion pathway exists, then a vapor intrusion mitigation system may be necessary.	$125,000	$300,000
	Building Drainage			An underslab footing drain will likely be required based on the approximate elevation of the groundwater (155 feet).	$75,000	$150,000	An underslab footing drain will likely be required based on the approximate elevation of the groundwater (155 feet).	$75,000	$150,000
	Construction Water Manegement[2]			Approximately 12,000 gallons per day is estimated to be generated on the site from dewatering activities.	$47,896	$47,896	Approximately 12,000 gallons per day is estimated to be generated on the site from dewatering activities.	$47,896	$47,896
	Design and Construction Methods Modification to Reduce Cross Contamination Between Shallow and Deep Aquifers			The vertical and lateral extent of the TCE-contaminated groundwater in the shallow aquifer is not known. A building with a finished floor of 152-feet will encounter the shallow aquifer and may encounter the deeper aquifer. The design should consider the potential for cross contamination in the subgrade excavations and the deeper excavations at the western retaining wall and elevator shaft. Additional investigation will be necessary to evaluate the potential for cross contamination between to the two aquifers. This investigation would be completed in concurrence with the additional investigation to evaluate the lateral and vertical extent of the contamination. If cross contamination between aquifers is considered an impact, additional construction costs will likely apply.	$12,500	$75,000	The vertical and lateral extent of the TCE-contaminated groundwater in the shallow aquifer is not known. The deep aquifer appears to be exposed near the surface on the site based on previous investigations completed by others. Additional investigation will be necessary to evaluate the potential for cross contamination between the two aquifers. This investigation would be completed in concurrence with the additional investigation to evaluate the lateral and vertical extent of the contamination. If cross contamination between aquifers is an impact, additional construction costs will likely apply. However it appears concern for cross contamination between the two aquifers may not be warranted at this site.	$12,500	$75,000
	Health and Safety			Washington State Requirement -Worker Shall be HAZWOPER Trained. Cost includes potential costs from contractor.	$10,000	$70,000	Washington State Requirement -Worker Shall be HAZWOPER Trained. Cost includes potential costs from contractor.	$10,000	$70,000
Contaminated or Impacted Soil	Characterize Soil and Groundwater for Disposal			Based on volume of soil to be excavated.	$60,000	$80,000	Based on volume of soil to be excavated.	$60,000	$80,000
	Excavate and Dispose of Soil as Appropriate	Petroleum Hydrocarbons-Contaminated Soil	Complete remedial excavation of petroleum-contaminated soil and dispose at a RCRA subtitle D landfill or treatment facility[3]	N/A	$0	$0	The estimated amount of gasoline-range petroleum hydrocarbon-contaminated soil is 150 tons.	$21,000	$24,000
		PCE- and TCE-Impacted and Contaminated Soil	Dispose excavated soil at UW-approved Subtitle D landfill with Contained-In Determination[4]	The estimated amount of TCE-impacted soil is 2,000 tons. This estimate assumes the soil below 153 feet on the northwestern 1/4 of the site are impacted with TCE.	$160,000	$200,000	The estimated amount of TCE-impacted soil is 14,000 tons. This estimate assumes soil below Elevation 151 feet is considered TCE-impacted soil on the entire site. Disposal costs could be reduced if the building is raised in elevation.	$1,120,000	$1,400,000
		Metals and/or cPAHs-Contaminated	Dispose excavated soil at UW-approved Subtitle D landfill. Cap Contaminated Soil Left in Place with Building or Hardscape.[4 and 5]	The estimated amount of the lead and cPAH-contaminated soil is 600 tons. This estimate assumes the top foot of soil in the eastern portion of the site is contaminated.	$36,000	$48,000	Not anticipated.	$0	$0
		Metals, Petroleum Hydrocarbons and/or cPAHs-Impacted Soil	Dispose at a UW-approved permitted inert waste landfill or reclamation pit.[4]	The estimated amount of the cPAH, petroleum- and lead-contaminated soil is 600 tons. This estimate assumes the top foot of soil in the northern portion of the site contains impacted soil. Estimated area does not included contaminated soil.	$18,000	$30,000	The estimated amount of the cPAH, petroleum- and lead-contaminated soil is 200 tons. This estimate assumes a limited area of impact, but down to 7 feet bgs.	$7,500	$12,500
					$569,396	$1,075,896		$1,508,896	$2,259,396

PDA - Name				1G - Laborers/Lot T39 and T40/Undeveloped Lot - Option A (Building on Southern Portion)			1G - Laborers/Lot T39 and T40/Undeveloped Lot - Option B (Building on Northern Portion)		
Timeframe for Construction				Design and Construction Anticipated Within the Next Seven Years.			Design and Construction Anticipated Within the Next Seven Years.		
Construction Plan				Three- to six-story buildings are planned. The construction will likely be built into the hillside where the elevation of the first floor is similar to the elevation of the adjacent downslope street. Foundations may extend up to 5 feet below the new cut surface. Subgrade will be 1 foot below the finished floor.			Three- to six-story buildings are planned. The construction will likely be built into the hillside where the elevation of the first floor is similar to the elevation of the adjacent downslope street. Foundations may extend up to 5 feet below the new cut surface. Subgrade will be 1 foot below the finished floor.		
Assumed Square Footage of Building (square feet)				35,000			20,000		
Assumed Finished Floor Elevation of Building (feet AMSL)				124			126		
Calculated Mass of Soil to Excavate to subgrade (1-foot below finished floor and footings) (tons)				30,000			44,500		
					Estimated Cost (2014 $)			Estimated Cost (2014 $)	
Impacts	Mitigation Measures			Description	Minimum	Maximum	Description	Minimum	Maximum
Site is Potential Source of Groundwater Contamination	Complete Remedial Investigation and Develop and Implement Remedial Alternatives			N/A	$0	$0	N/A	$0	$0
Potential Underground Storage Tank	Remove UST and Associated Petroleum Contaminated Soil			One magnetic anomaly was observed in the southern portion of the site that was not further investigated. The anomaly is an indication a UST may be present in the area. The UST would be removed by construction activities.	$10,000	$20,000	One magnetic anomaly was observed in the northern portion of the site that was not further investigated. The anomaly is an indication a UST may be present in the area. The UST would be removed by construction activities.	$10,000	$20,000
PCE- or TCE-Contaminated Groundwater	Additional Investigation			Further subsurface investigation may be necessary to evaluate the vertical and lateral limits of the TCE-impacted groundwater. Soil vapor sampling is recommended to evaluate if a potential vapor intrusion pathway exists.	$30,000	$100,000	A narrowly focused soil vapor and groundwater investigation is recommended.	$20,000	$70,000
	Vapor Mitigation System			The source of the potential TCE-contaminated groundwater in the shallow and deep aquifers is not known. If a potential vapor intrusion pathway exists, then a vapor intrusion mitigation system may be necessary.	$105,000	$252,000	The need for a vapor barrier system for the northern portion of the property is not known based on information obtained to date.	$165,000	$396,000
	Building Drainage			An underslab footing drain will likely be required based on the approximate elevation of the groundwater (140 feet).	$63,000	$126,000	An underslab footing drain will likely be required based on the approximate elevation of the groundwater (135 feet).	$99,000	$198,000
	Construction Water Manegement[2]			Approximately 16,000 gallons per day is estimated to be generated on the site from dewatering activities.	$49,528	$49,528	Approximately 16,000 gallons per day is estimated to be generated on the site from dewatering activities.	$49,528	$49,528
	Design and Construction Methods Modification to Reduce Cross Contamination Between Shallow and Deep Aquifers			TCE-contaminated groundwater is present in the deep and shallow aquifers. It appears a building with subgrade at 125 and footings extending to 120 feet would penetrate the silt. Additional investigation will be necessary to evaluate the potential for cross contamination between the two aquifers. This investigation would be completed in concurrence with the additional investigation to evaluate the lateral and vertical extent of the contamination. If cross contamination between aquifers is an impact, additional construction costs will likely apply. However it appears concern for cross contamination between the two aquifers may not warranted at this site because the shallow and deep aquifers are both impacted in the area.	$10,500	$63,000	TCE-contaminated groundwater does not appear to be present on this site, therefore costs associated with cross contamination mitigation measures are not applicable. If TCE-contaminated soil migrates from PDA 1E-Strom, cross contamination mitigation measures would be applicable because the proposed building elevation may penetrate the silt layer between the shallow and deep aquifers.	$16,500	$99,000
	Health and Safety			Washington State Requirement -Worker Shall be HAZWOPER Trained. Cost includes potential costs from contractor.	$10,000	$70,000	Washington State Requirement -Worker Shall be HAZWOPER Trained. Cost includes potential costs from contractor.	$10,000	$70,000
Contaminated or Impacted Soil	Characterize Soil and Groundwater for Disposal			Based on volume of soil to be excavated.	$60,000	$80,000	Based on volume of soil to be excavated.	$60,000	$80,000
	Excavate and Dispose of Soil as Appropriate	Petroleum Hydrocarbons-Contaminated Soil	Complete remedial excavation of petroleum-contaminated soil and dispose at a RCRA subtitle D landfill or treatment facility[3]	N/A	$0	$0	N/A	$0	$0
		PCE- and TCE-Impacted and Contaminated Soil	Dispose excavated soil at UW-approved Subtitle D landfill with Contained-In Determination[4]	The estimated amount of TCE-impacted soil is 15,000 tons. This estimate assumes soil impacted across the southwest portion of the site, beginning at approximately Elevation 142 and following the slope of the shallow aquifer. This area also includes Court D. This estimate could be reduced if the building was raised in elevation or soil prism within Court D was not removed.	$1,200,000	$1,500,000	TCE-impacted soil is not anticipated to be encountered for Option B.	$0	$0
		Metals and/or cPAHs-Contaminated	Dispose excavated soil at UW-approved Subtitle D landfill. Cap Contaminated Soil Left in Place with Building or Hardscape.[4 and 5]	Not anticipated to be encountered on Option A.	$0	$0	The estimated amount of the cPAH and lead-contaminated soil is 600 tons. This estimate assumes contamination is limited to the southwest portion of the site to a depth of 2 feet bgs.	$420,000	$560,000
		Metals, Petroleum Hydrocarbons and/or cPAHs-Impacted Soil	Dispose at a UW-approved permitted inert waste landfill or reclamation pit.[4]	Not anticipated to be encountered on Option A.	$0	$0	The estimated amount of the cPAH and lead-impacted soil is 350 tons. This estimate assumes contamination may be present in the site to depths of 5 feet bgs.	$10,500	$17,500
					$1,538,028	$2,260,528		$860,528	$1,560,028

PDA - Name				1H- Y Student Center (Estimated for Comparison Purposes) - Actual Building			1H- Y Student Center (Estimated for Comparison Purposes) - Entire PDA		
Timeframe for Construction				Under Construction			Under Construction		
Construction Plan				This cost estimate is based on the actual design of the building. A new 28,000 square foot building is being constructed into the hillside. The first floor elevation is 129 feet. The subgrade elevation is 128 feet. This cost estimate is provided for comparison purposes to the change order provided by design build team developing the site. The TCE-impacted soil and groundwater was discovered after the design build team was selected and initial design was completed.			This cost estimate uses similar assumptions made for the other PDAs, including a zero lot line building and removal of soil within Court D. This estimate also assumes the subgrade is similar to the elevation of Market Street, which is 3 feet lower than the actual building.		
Assumed Square Footage of Building (square feet)				28,000			59,500		
Assumed Finished Floor Elevation of Building (feet AMSL)				129			126		
Calculated Mass of Soil to Excavate to subgrade (1-foot below finished floor and footings) (tons)				5,000			N/A		
					Estimated Cost (2014 $)			Estimated Cost (2014 $)	
Impacts	Mitigation Measures			Description	Minimum	Maximum	Description	Minimum	Maximum
Site is Potential Source of Groundwater Contamination	Complete Remedial Investigation and Develop and Implement Remedial Alternatives			N/A	$0	$0	N/A	$0	$0
Potential Underground Storage Tank	Remove UST and Associated Petroleum Contaminated Soil			N/A	$0	$0	N/A	$0	$0
PCE- or TCE-Contaminated Groundwater	Additional Investigation			A subsurface investigation was recommended to evaluate the vertical and lateral extent of the groundwater plume.	$50,000	$100,000	A subsurface investigation was recommended to evaluate the vertical and lateral extent of the groundwater plume.	$50,000	$100,000
	Vapor Mitigation System			A vapor mitigation system is being installed on the site.	$140,000	$336,000	A vapor mitigation system will likely be required at the site.	$297,500	$714,000
	Building Drainage			An underslab footing drain will likely be required based on the approximate elevation of the groundwater (135 feet).	$84,000	$168,000	An underslab footing drain will likely be required based on the approximate elevation of the groundwater (135 feet).	$178,500	$357,000
	Construction Water Manegement[2]			Approximately 15,000 gallons per day is estimated to be generated on the site from dewatering activities.	$49,120	$49,120	Approximately 20,000 gallons per day is estimated to be generated on the site from dewatering activities.	$51,160	$51,160
	Design and Construction Methods Modification to Reduce Cross Contamination Between Shallow and Deep Aquifers			The proposed building will cut through the silt layer that typically is a semi-confining to confining unit between the shallow and deep aquifers. Additional investigation will be necessary to evaluate the potential for cross contamination between to the two aquifers. This investigation would be completed in concurrence with the additional investigation to evaluate the lateral and vertical extent of the contamination. For budgeting purposes additional construction costs are shown.	$14,000	$84,000	The proposed building will cut through the silt layer that typically is a semi-confining to confining unit between the shallow and deep aquifers. Additional investigation will be necessary to evaluate the potential for cross contamination between to the two aquifers. This investigation would be completed in concurrence with the additional investigation to evaluate the lateral and vertical extent of the contamination. For budgeting purposes additional construction costs are shown.	$29,750	$178,500
	Health and Safety			Washington State Requirement -Worker Shall be HAZWOPER Trained. Cost includes potential costs from contractor.	$10,000	$70,000	Washington State Requirement -Worker Shall be HAZWOPER Trained. Cost includes potential costs from contractor.	$10,000	$70,000
Contaminated or Impacted Soil	Characterize Soil and Groundwater for Disposal			Based on volume of soil to be excavated.	$20,000	$50,000	Based on volume of soil to be excavated.	$20,000	$50,000
	Excavate and Dispose of Soil as Appropriate	Petroleum Hydrocarbons-Contaminated Soil	Complete remedial excavation of petroleum-contaminated soil and dispose at a RCRA subtitle D landfill or treatment facility[3]	N/A	$0	$0	N/A	$0	$0
		PCE- and TCE-Impacted and Contaminated Soil	Dispose excavated soil at UW-approved Subtitle D landfill with Contained-In Determination[4]	The estimated volume of TCE-impacted soil based on the existing design of the finish floor at elevation 129 feet and not removing the soil prism in Court D is 6,000 tons. This estimate assumes the northern 150 feet of the site is impacted below the shallow aquifer water table.	$480,000	$600,000	The estimated volume of TCE-impacted soil based the design of a building with finish floor at elevation 126 feet (similar to Market Street) and removing the soil prism in Court D is 15,000 tons. This estimate assumes the northern 150 feet of the site is impacted below the shallow aquifer water table.	$1,200,000	$1,500,000
		Metals and/or cPAHs-Contaminated	Dispose excavated soil at UW-approved Subtitle D landfill. Cap Contaminated Soil Left in Place with Building or Hardscape.[4 and 5]	N/A	$0	$0	N/A	$0	$0
		Metals, Petroleum Hydrocarbons and/or cPAHs-Impacted Soil	Dispose at a UW-approved permitted inert waste landfill or reclamation pit. [4]	N/A	$0	$0	N/A	$0	$0
					$847,120	$1,457,120		$1,836,910	$3,020,660

PDA - Name				2A - Sound Care			2B - Jefferson Street Parcel/Transit Turnaround[1]		
Timeframe for Construction				Design and construction in 2016+.			Design and construction in 2016+.		
Construction Plan				Three to five story buildings are planned. The construction will likely be built into the hillside where the elevation of the first floor is similar to the elevation of the Court C. Foundations may extend up to 5 feet below Court C.			Three to five story buildings are planned. The construction will likely be built into the hillside where the elevation of the first floor is similar to the elevation of the Jefferson Avenue. Foundations may extend up to 5 feet below Jefferson Avenue.		
Assumed Square Footage of Building (square feet)				48,000			50,000		
Assumed Finished Floor Elevation of Building (feet AMSL)				100			86		
Calculated Mass of Soil to Excavate to subgrade (1-foot below finished floor and footings) (tons)				35,000			41,000		
					Estimated Cost (2014 $)			Estimated Cost (2014 $)	
Impacts	Mitigation Measures			Description	Minimum	Maximum	Description	Minimum	Maximum
Site is Potential Source of Groundwater Contamination	Complete Remedial Investigation and Develop and Implement Remedial Alternatives			N/A	$0	$0	N/A	$0	$0
Potential Underground Storage Tank	Remove UST and Associated Petroleum Contaminated Soil			N/A	$0	$0	Four magnetic anomalies was not investigated because of the location within the parking lot or concrete. Heating oil UST may be present in the area of the anomalies.	$40,000	$80,000
PCE- or TCE-Contaminated Groundwater	Additional Investigation			Further subsurface investigation may be necessary to evaluate the vertical and lateral limits of the TCE-impacted soil and/or groundwater at the site. Soil vapor sampling is also recommended to evaluate if a potential vapor intrusion pathway exists.	$50,000	$100,000	Further subsurface investigation may be necessary to evaluate the vertical and lateral limits of the TCE-impacted soil and/or groundwater at the site. Soil vapor sampling is also recommended to evaluate if a potential vapor intrusion pathway exists.	$50,000	$100,000
	Vapor Mitigation System			If a potential vapor intrusion pathway exists, then a vapor intrusion mitigation system may be necessary. Moving the building will likely not reduce the cost of the vapor mitigation due to the TCE-contaminated groundwater plume is present throughout the site.	$240,000	$576,000	The source of the potential TCE-contaminated groundwater in the shallow and deep aquifers is unknown. If a potential vapor intrusion pathway exists, then a vapor intrusion mitigation system may be necessary. The estimated cost for the vapor mitigation system for a building on the entire site is shown. Alternatively, the shallow and deep groundwater does not appear to be impacted on the northern portion of the site. If the building is located in this area, a vapor mitigation system may not be necessary, but additional investigation is recommended (as described above) to confirm TCE-contaminated groundwater is not present in the northern portion of the site.	$250,000	$600,000
	Building Drainage			An underslab footing drain will likely be required based on the approximate elevation of the groundwater (100 feet).	$144,000	$288,000	An underslab footing drain will likely be required based on the approximate elevation of the groundwater (85 feet).	$150,000	$300,000
	Construction Water Manegement[2]			Approximately 10,000 gallons per day is estimated to be generated on the site from dewatering activities.	$47,080	$47,080	Approximately 10,000 gallons per day is estimated to be generated on the site from dewatering activities.	$47,080	$47,080
	Design and Construction Methods Modification to Reduce Cross Contamination Between Shallow and Deep Aquifers			It does not appear the proposed building will cut through the silt layer that typically is a semi-confining to confining unit between the shallow and deep aquifers. TCE-contaminated groundwater appears to also be present in the shallow and deep aquifers. Additional investigation will be necessary to evaluate the potential for cross contamination between to the two aquifers. This investigation would be completed in concurrence with the additional investigation to evaluate the lateral and vertical extent of the contamination. For budgeting purposes additional construction costs may be as shown, if cross contamination is identified as an impact. However it appears concern for cross contamination between the two aquifers may not be warranted at this site.	$24,000	$144,000	It does not appear the proposed building will cut through the silt layer that typically is a semi-confining to confining unit between the shallow and deep aquifers. TCE-contaminated groundwater appears to also be present in the shallow and deep aquifers. Additional investigation will be necessary to evaluate the potential for cross contamination between to the two aquifers. This investigation would be completed in concurrence with the additional investigation to evaluate the lateral and vertical extent of the contamination. For budgeting purposes additional construction costs may be as shown, if cross contamination is identified as an impact. However it appears concern for cross contamination between the two aquifers may not be warranted at this site.	$25,000	$150,000
	Health and Safety			Washington State Requirement -Worker Shall be HAZWOPER Trained. Cost includes potential costs from contractor.	$10,000	$70,000	Washington State Requirement -Worker Shall be HAZWOPER Trained. Cost includes potential costs from contractor.	$10,000	$70,000
Contaminated or Impacted Soil	Characterize Soil and Groundwater for Disposal			Based on volume of soil to be excavated.	$60,000	$80,000	Based on volume of soil to be excavated.	$60,000	$80,000
	Excavate and Dispose of Soil as Appropriate	Petroleum Hydrocarbons-Contaminated Soil	Complete remedial excavation of petroleum-contaminated soil and dispose at a RCRA subtitle D landfill or treatment facility[3]	N/A	$0	$0	Gasoline-range petroleum hydrocarbons and benzene-impacted soil is present in the right-of-way along Jefferson Avenue. Remedial excavation of the benzene-contaminated soil may be required during construction of the building. The estimated mass of soil to be excavated is 50 tons.	$8,000	$8,000
		PCE- and TCE-Impacted and Contaminated Soil	Dispose excavated soil at UW-approved Subtitle D landfill with Contained-In Determination[4]	The estimated mass of TCE-contaminated and impacted soil is 15,000 tons. This estimate assumes the western 70 feet of the site is impacted below Elevation 105 feet to subgrade elevation of 99 feet.	$1,200,000	$1,500,000	The estimated mass of TCE-contaminated and impacted soil is 10,000 tons. This estimated assumes the southwestern 18,000 square-feet of the site is impacted below Elevation 90 feet to subgrade 85 feet and footings to 80 feet. This area includes Court C. This estimate could be reduced if the building was raised in elevation or soil prism within Court C was not removed, the building orientation is moved out of the TCE-contaminated groundwater.	$800,000	$1,000,000
		Metals and/or cPAHs-Contaminated	Dispose excavated soil at UW-approved Subtitle D landfill. Cap Contaminated Soil Left in Place with Building or Hardscape.[4 and 5]	The estimated mass of the cPAH -contaminated soil to be 3,500 tons. This estimate assumes contamination to a depth of approximately 4 feet bgs in the southwest portion of the site.	$210,000	$280,000	The estimated mass of the cPAH- and lead-contaminated soil to be 400 tons. This estimate assumes contamination to a depth of approximately 2 feet bgs in the southwest portion of the site.	$24,000	$32,000
		Metals, Petroleum Hydrocarbons and/or cPAHs-Impacted Soil	Dispose at a UW-approved permitted inert waste landfill or reclamation pit. [4]	The estimated the mass of the metals- and cPAHs- impacted soil is 8,000 tons. This estimate assumes metals- and cPAHs-impacted soil is present beneath the entire site to a depth of approximately 3 feet bgs. This mass does not include the area of metal and cPAH-contaminated soil.	$240,000	$400,000	The mass of the metal and cPAH impacted soil to be 500 tons. This estimate assumes the surficial 2-feet in the central western portion of the site. This mass does not include the area of metal and cPAH-contaminated soil.	$15,000	$25,000
					$2,225,080	$3,485,080		$1,479,080	$2,492,080

PDA - Name				2C - Pinkerton Parking			2D - Tacoma Paper Supply Building		
Timeframe for Construction				Design and construction in 2016+.			Project started design March 2014. Construction is planned for 2016.		
Construction Plan				Three to six story buildings are planned. The construction will likely be built into the hillside where the elevation of the first floor is similar to the elevation of the Jefferson Avenue. Foundations may extend up to 5 feet below Broadway.			Complete restoration (similar to Cherry Parkes) to include seismic upgrades. Elevator will likely be shared with existing Dougan Building.		
Assumed Square Footage of Building (square feet)				8,400			10,000		
Assumed Finished Floor Elevation of Building (feet AMSL)				86			70		
Calculated Mass of Soil to Excavate to subgrade (1-foot below finished floor and footings) (tons)				7,000			2,000		
					Estimated Cost (2014 $)			Estimated Cost (2014 $)	
Impacts	Mitigation Measures			Description	Minimum	Maximum	Description	Minimum	Maximum
Site is Potential Source of Groundwater Contamination	Complete Remedial Investigation and Develop and Implement Remedial Alternatives			N/A	$0	$0	PCE-contaminated groundwater has not been discovered on the site however, PCE was detected in the soil to the full depth explored throughout the building footprint. PCE was not detected in the upgradient wells indicating the source of the PCE is within the building. Additional investigation is recommended to evaluate the lateral and vertical extent of the PCE-contaminated soil and potentially-contaminated groundwater. The estimated cost for additional investigation to evaluate the source is $50,000 to $100,000. If the site is identified as a source of downgradient groundwater contamination, remedial action is recommended prior to redevelopment of the new building. The actual remedial cost will be based on the remedial alternative and the extent of the contamination but may range between $500,000 and $2,000,000.	$550,000	$2,100,000
Potential Underground Storage Tank	Remove UST and Associated Petroleum Contaminated Soil			One magnetic anomaly was not investigated because it was located in the existing sidewalk. A heating oil UST may be present in the area of the anomaly.	$10,000	$20,000	N/A	$0	$0
PCE- or TCE-Contaminated Groundwater	Additional Investigation			Further subsurface investigation may be necessary to evaluate if TCE-contaminated groundwater is present on PDA 2C.	$30,000	$50,000	Further subsurface investigation may be necessary to evaluate the vertical and lateral limits of the PCE-contaminated and impacted soil and/or groundwater at the site as part of the evaluation of a source. If groundwater is not impacted, soil vapor and indoor air sampling is also recommended to evaluate if a potential vapor intrusion pathway exists.	$20,000	$50,000
	Vapor Mitigation System			Assume Not Impacted	$0	$0	A vapor mitigation system may be necessary if the source is not remediated and a potential vapor intrusion pathway exists.	$50,000	$120,000
	Building Drainage			An underslab footing drain will likely be required based on the approximate elevation of the groundwater observed during drilling (90 feet).	$0	$0	An underslab footing drain will likely be required based on the approximate elevation of the groundwater (70 feet).	$30,000	$60,000
	Construction Water Manegement[2]			Assume Not Impacted	$0	$0	Approximately 5,000 gallons per day is estimated to be generated on the site from dewatering activities.	$45,040	$45,040
	Design and Construction Methods Modification to Reduce Cross Contamination Between Shallow and Deep Aquifers			Assume Not Impacted	$0	$0	It appears the existing building is located above or within the silt layer (semi-confining to confining unit between the shallow and deep aquifers). Therefore, a potential for cross-contamination between the shallow and deep aquifers may be a concern. Design considerations should evaluate if construction activities may create a pathway PCE in the soil to penetrate the groundwater.	$5,000	$30,000
	Health and Safety			Washington State Requirement -Worker Shall be HAZWOPER Trained. Cost includes potential costs from contractor.	$10,000	$70,000	Washington State Requirement -Worker Shall be HAZWOPER Trained. Cost includes potential costs from contractor.	$10,000	$70,000
Contaminated or Impacted Soil	Characterize Soil and Groundwater for Disposal			Based on volume of soil to be excavated.	$15,000	$25,000	Based on volume of soil to be excavated.	$15,000	$25,000
	Excavate and Dispose of Soil as Appropriate	Petroleum Hydrocarbons-Contaminated Soil	Complete remedial excavation of petroleum-contaminated soil and dispose at a RCRA subtitle D landfill or treatment facility[3]	N/A	$0	$0	N/A	$0	$0
		PCE- and TCE-Impacted and Contaminated Soil	Dispose excavated soil at UW-approved Subtitle D landfill with Contained-In Determination[4]	Assume Not Impacted	$0	$0	The estimated mass of PCE-contaminated and impacted soil is 2,000 tons. This estimate assumes all excavated soil will be impacted or contaminated with PCE.	$160,000	$200,000
		Metals and/or cPAHs-Contaminated	Dispose excavated soil at UW-approved Subtitle D landfill. Cap Contaminated Soil Left in Place with Building or Hardscape.[4 and 5]	The estimated mass of the lead and cPAH -contaminated soil is 1,000 tons. This estimate assumes contamination to a depth of approximately 4 feet bgs in the western portion of the site.	$60,000	$80,000	N/A	$0	$0
		Metals, Petroleum Hydrocarbons and/or cPAHs-Impacted Soil	Dispose at a UW-approved permitted inert waste landfill or reclamation pit. [4]	The estimated mass of lead and cPAH-impacted soil is 3,000 tons. This esimate assumes ead and cPAH-impacted is present on the western portion of the Area 2C between 4 feet bgs and 14 feet bgs.	$90,000	$150,000	N/A	$0	$0
					$215,000	$395,000		$885,040	$2,700,040

PDA - Name				2E - The Swiss Pub and Frederick Wild			2F - Tioga Building		
Timeframe for Construction				Design and construction 2014+			Design and construction 2014+		
Construction Plan				Work would involve seismic upgrades that may require new footings, shear walls and elevator shafts along with upgraded utilities.			Generally tenant improvements (primarily only impacting interior of the building) but may need access to underground for utilities.		
Assumed Square Footage of Building (square feet)				11,500			5,000		
Assumed Finished Floor Elevation of Building (feet AMSL)				95			86		
Calculated Mass of Soil to Excavate to subgrade (1-foot below finished floor and footings) (tons)				750			500		
					Estimated Cost (2014 $)			Estimated Cost (2014 $)	
Impacts	Mitigation Measures			Description	Minimum	Maximum	Description	Minimum	Maximum
Site is Potential Source of Groundwater Contamination	Complete Remedial Investigation and Develop and Implement Remedial Alternatives			N/A	$0	$0	N/A	$0	$0
Potential Underground Storage Tank	Remove UST and Associated Petroleum Contaminated Soil			A former UST is likely present within the Swiss Building based on historical records. However the location of the UST is unknown.	$10,000	$20,000	N/A	$0	$0
PCE- or TCE-Contaminated Groundwater	Additional Investigation			Soil vapor sampling is recommended to evaluate if a potential vapor intrusion pathway exists.	$20,000	$30,000	The TCE concentrations in the deep aquifer represent a lesser concern for vapor intrusion because the depth of the groundwater, the presence of the shallow aquifer and silt layer (confining to semi-confining) may preclude a contaminant pathway to the surface. It is our opinion that vapor intrusion is a low risk at this site based on the above factors. However Ecology may require additional soil vapor or indoor air sampling to evaluate the potential for vapor intrusion.	$20,000	$30,000
	Vapor Mitigation System			If a potential vapor intrusion pathway exists, then a vapor intrusion mitigation system may be necessary.	$57,500	$138,000	If a potential vapor intrusion pathway exists, then a vapor intrusion mitigation system may be necessary.	$25,000	$60,000
	Building Drainage			N/A	$0	$0	N/A	$0	$0
	Construction Water Manegement[2]			N/A	$0	$0	N/A	$0	$0
	Design and Construction Methods Modification to Reduce Cross Contamination Between Shallow and Deep Aquifers			It does not appear the proposed renovations will cut through the silt layer that is a semi-confining to confining unit for the shallow and deep aquifers. TCE-contaminated groundwater also appears to be present in the shallow and For budgeting purposes, additional construction cost is estimated to be between $5,750 and $34,500 if cross-contamination is identified as an impact.	$5,750	$34,500	N/A	$0	$0
	Health and Safety			Washington State Requirement -Worker Shall be HAZWOPER Trained. Cost includes potential costs from contractor.	$10,000	$70,000	Washington State Requirement -Worker Shall be HAZWOPER Trained. Cost includes potential costs from contractor.	$10,000	$70,000
Contaminated or Impacted Soil	Characterize Soil and Groundwater for Disposal			Based on volume of soil to be excavated.	$10,000	$15,000	Based on volume of soil to be excavated.	$10,000	$15,000
	Excavate and Dispose of Soil as Appropriate	Petroleum Hydrocarbons-Contaminated Soil	Complete remedial excavation of petroleum-contaminated soil and dispose at a RCRA subtitle D landfill or treatment facility[3]	N/A	$0	$0	N/A	$0	$0
		PCE- and TCE-Impacted and Contaminated Soil	Dispose excavated soil at UW-approved Subtitle D landfill with Contained-In Determination[4]	The estimated amount of TCE-impacted soil is 250 tons.	$20,000	$25,000	N/A	$0	$0
		Metals and/or cPAHs-Contaminated	Dispose excavated soil at UW-approved Subtitle D landfill. Cap Contaminated Soil Left in Place with Building or Hardscape.[4 and 5]	The estimated mass of the cPAH- and metal -contaminated soil is 500 tons.	$30,000	$40,000	The estimated mass of the cPAH- and metal -contaminated soil is 250 tons.	$15,000	$20,000
		Metals, Petroleum Hydrocarbons and/or cPAHs-Impacted Soil	Dispose at a UW-approved permitted inert waste landfill or reclamation pit. [4]	N/A	$0	$0	The estimated mass of the metal and cPAH impacted soil is 250 tons.	$7,500	$12,500
					$163,250	$372,500		$87,500	$207,500

Notes:

[1] Costs may be reduced for vapor mitigation, water management and/or soil management if the building is oriented outside of the TCE and PCE groundwater plumes.

[2] Calculation assumes 120 days of earthwork.

[3] Costs includes excavation, transportation and disposal. Cost assumes contractor has already mobilized to the site.

[4] Costs includes transportation and disposal. Cost does not include excavation and loading.

[5] Cost associated with capping contaminated soil left in place following construction activities is not included in the cost estimate.

Estimated costs are in 2014 U.S. Dollars based on the available information at the time of this investigation and our experience in the Puget Sound area. Costs may change based on inflation and other factors including the actual impacts and mitigation measures during time of construction.

TCE = Trichloroethene	MTCA = Model Toxics Control Act
PCE = Tetrachloroethene	sq ft = square feet
CPAHs = Carcinogenic polycyclic aromatic hydrocarbons	UST = Underground storage tank
ND = Not Determined	AMSL = above mean sea level
N/A = Not applicable	Ecology = Washington State Department of Ecology

Table 2

Estimated Detail Costs for Each Site

University of Washington Tacoma Priority Development Areas
Tacoma, Washington

PDA - Name					1A - Upton				1B - Tacoma Vacant [1]				1C - Fawcett North [1]			
Timeframe for Construction					Design and Construction Anticipated Within the Next Seven Years				Design and Construction Anticipated Within the Next Seven Years				Design and Construction Anticipated Within the Next Seven Years			
Assumed Square Footage of Building (square feet)					13,000				67,000				32,000			
Assumed Finished Floor Elevation of Building (feet AMSL)					198				194				172			
Calculated Mass of Soil to Excavate to subgrade (1-foot below finish floor and footings) (tons)					23,000				60,000				30,000			
							Estimated Cost (2014 $)				Estimated Cost (2014 $)				Estimated Cost (2014 $)	
Impacts	Mitigation Measures			Cost Per Unit	Unit Value	Unit	Min	Max	Unit Value	Unit	Min	Max	Unit Value	Unit	Min	Max
Site is Potential Source of Groundwater Contamination	Complete Remedial Investigation and Develop and Implement Remedial Alternatives			$500,000 and $2,000,000	N/A		$580,000	$2,150,000	N/A		$380,000	$760,000	N/A			
Potential Underground Storage Tank	Remove UST and Associated Petroleum Contaminated Soil			$10,000 to $20,000 per tank	0	Potential UST	$0	$0	1	Potential UST	$10,000	$20,000	0	Potential UST	$0	$0
PCE- or TCE-Contaminated Groundwater	Additional Investigation			$25,000 to $200,000	N/A		$20,000	$30,000	N/A		$60,000	$200,000	N/A		$50,000	$100,000
	Vapor Mitigation System			$5 to 12/square foot	13,000	sq ft	$65,000	$156,000	67,000	sq ft	$335,000	$804,000	32,000	sq ft	$160,000	$384,000
	Building Drainage			$3 to 6/square foot	13,000	sq ft	$39,000	$78,000	67,000	sq ft	$201,000	$402,000	32,000	sq ft	$96,000	$192,000
	Construction Water Management[2]			$0.0034/gallon plus $10,000 for sampling and $7,000/month for two 25,000 gallon tanks	10,000	gallons/day	$47,080	$47,080	20,000	gallons/day	$51,160	$51,160	15,000	gallons/day	$49,120	$49,120
	Design and Construction Methods Modification to Reduce Cross Contamination Between Shallow and Deep Aquifers			Varies - Typically costs can be incorporated into the design at minimal costs. Can assume construction costs for implementation are $0.5 to $3 per square foot of the building	22,000	sq ft	$11,000	$66,000	67,000	sq ft	$33,500	$201,000	32,000	sq ft	$16,000	$96,000
	Health and Safety			Ranges between $10,000 and $70,000	N/A		$10,000	$70,000	N/A		$10,000	$70,000	N/A		$10,000	$70,000
Contaminated or Impacted Soil	Characterize Soil and Groundwater for Disposal			$30,000 to $170,000	N/A		$30,000	$75,000	N/A		$130,000	$170,000	N/A		$60,000	$80,000
	Excavate and Dispose of Soil as Appropriate	Petroleum Hydrocarbons-Contaminated Soil	Complete remedial excavation of petroleum-contaminated soil and dispose at a RCRA subtitle D landfill or treatment facility[3]	$140 to $160/ton	N/A				Petroleum-contaminated groundwater area costs are assumed to be covered under the source remedial excavation				N/A			
		PCE- and TCE- Impacted and Contaminated Soil	Dispose excavated soil at UW-approved Subtitle D landfill with Contained-In Determination[4]	$80 to $100/ton	14,500	tons	$1,160,000	$1,450,000	9,500	tons	$760,000	$950,000	14,000	tons	$1,120,000	$1,400,000
		Metals and/or cPAHs-Contaminated	Dispose excavated soil at UW-approved Subtitle D landfill. Cap Contaminated Soil Left in Place with Building or Hardscape.[4 and 5]	$60 to $80/ton	1,500	tons	$90,000	$120,000	6,000	tons	$360,000	$480,000	5,000	tons	$300,000	$400,000
		Metals, Petroleum Hydrocarbons and/or cPAHs-Impacted Soil	Dispose at a UW-approved permitted inert waste landfill or reclamation pit. [4]	$30 to 50/ton	3,000	tons	$90,000	$150,000	10,000	tons	$300,000	$500,000	0	tons	$0	$0
Total Estimated Cost For Each Area							$2,142,080	$4,392,080			$2,630,660	$4,608,160			$1,861,120	$2,771,120

PDA - Name					1D - Fawcett South [1]				1E - Strom				1F - Fawcett Parking/Lot T47/48			
Timeframe for Construction					Design and Construction Anticipated Within the Next Seven Years				Design and Construction Anticipated Within the Next Seven Years.				Design and Construction Anticipated Within the Next Seven Years			
Assumed Square Footage of Building (square feet)					32,000				25,000				25,000			
Assumed Finished Floor Elevation of Building (feet AMSL)					168				152				146			
Calculated Mass of Soil to Excavate to subgrade (1-foot below finish floor and footings) (tons)					31,000				18,000				22,000			
							Estimated Cost (2014 $)				Estimated Cost (2014 $)				Estimated Cost (2014 $)	
Impacts	Mitigation Measures			Cost Per Unit	Unit Value	Unit	Min	Max	Unit Value	Unit	Min	Max	Unit Value	Unit	Min	Max
Site is Potential Source of Groundwater Contamination	Complete Remedial Investigation and Develop and Implement Remedial Alternatives			$500,000 and $2,000,000	N/A				N/A				N/A			
Potential Underground Storage Tank	Remove UST and Associated Petroleum Contaminated Soil			$10,000 to $20,000 per tank	0	Potential UST	$0	$0	0	Potential UST	$0	$0	0	Potential UST	$0	$0
PCE- or TCE-Contaminated Groundwater	Additional Investigation			$25,000 to $200,000	N/A		$50,000	$100,000	N/A		$25,000	$75,000	N/A		$30,000	$100,000
	Vapor Mitigation System			$5 to 12/square foot	32,000	sq ft	$160,000	$384,000	25,000	sq ft	$125,000	$300,000	25,000	sq ft	$125,000	$300,000
	Building Drainage			$3 to 6/square foot	32,000	sq ft	$96,000	$192,000	25,000	sq ft	$75,000	$150,000	25,000	sq ft	$75,000	$150,000
	Construction Water Management[2]			$0.0034/gallon plus $10,000 for sampling and $7,000/month for two 25,000 gallon tanks	15,000	gallons/day	$49,120	$49,120	12,000	gallons/day	$47,896	$47,896	12,000	gallons/day	$47,896	$47,896
	Design and Construction Methods Modification to Reduce Cross Contamination Between Shallow and Deep Aquifers			Varies - Typically costs can be incorporated into the design at minimal costs. Can assume construction costs for implementation are $0.5 to $3 per square foot of the building	32,000	sq ft	$16,000	$96,000	25,000	sq ft	$12,500	$75,000	25,000	sq ft	$12,500	$75,000
	Health and Safety			Ranges between $10,000 and $70,000	N/A		$10,000	$70,000	N/A		$10,000	$70,000	N/A		$10,000	$70,000
Contaminated or Impacted Soil	Characterize Soil and Groundwater for Disposal			$30,000 to $170,000	N/A		$60,000	$80,000	N/A		$60,000	$80,000	N/A		$60,000	$80,000
	Excavate and Dispose of Soil as Appropriate	Petroleum Hydrocarbons-Contaminated Soil	Complete remedial excavation of petroleum-contaminated soil and dispose at a RCRA subtitle D landfill or treatment facility[3]	$140 to $160/ton	N/A				N/A				150	tons	$21,000	$24,000
		PCE- and TCE- Impacted and Contaminated Soil	Dispose excavated soil at UW-approved Subtitle D landfill with Contained-In Determination[4]	$80 to $100/ton	13,000	tons	$1,040,000	$1,300,000	2,000	tons	$160,000	$200,000	14,000	tons	$1,120,000	$1,400,000
		Metals and/or cPAHs-Contaminated	Dispose excavated soil at UW-approved Subtitle D landfill. Cap Contaminated Soil Left in Place with Building or Hardscape.[4 and 5]	$60 to $80/ton	3,500	tons	$210,000	$280,000	600	tons	$36,000	$48,000	0	tons	$0	$0
		Metals, Petroleum Hydrocarbons and/or cPAHs-Impacted Soil	Dispose at a UW-approved permitted inert waste landfill or reclamation pit. [4]	$30 to 50/ton	10,000	tons	$300,000	$500,000	600	tons	$18,000	$30,000	250	tons	$7,500	$12,500
Total Estimated Cost For Each Area							$1,991,120	$3,051,120			$569,396	$1,075,896			$1,508,896	$2,259,396

PDA - Name					1G - Laborers/Lot T39 and T40/Undeveloped Lot - Option A (Building on Southern Portion)				1G - Laborers/Lot T39 and T40/Undeveloped Lot - Option B (Building on Northern Portion)				1H- Y Student Center (Estimated for Comparison Purposes) - Actual Building			
Timeframe for Construction					Design and Construction Anticipated Within the Next Seven Years				Design and Construction Anticipated Within the Next Seven Years				Under Construction			
Assumed Square Footage of Building (square feet)					21,000				33,000				28,000			
Assumed Finished Floor Elevation of Building (feet AMSL)					126				124				129			
Calculated Mass of Soil to Excavate to subgrade (1-foot below finish floor and footings) (tons)					27,000				44,500				6,000			
Impacts	Mitigation Measures			Cost Per Unit	Unit Value	Unit	Estimated Cost (2014 $) Min	Estimated Cost (2014 $) Max	Unit Value	Unit	Estimated Cost (2014 $) Min	Estimated Cost (2014 $) Max	Unit Value	Unit	Estimated Cost (2014 $) Min	Estimated Cost (2014 $) Max
Site is Potential Source of Groundwater Contamination	Complete Remedial Investigation and Develop and Implement Remedial Alternatives			$500,000 and $2,000,000	N/A				N/A				N/A			
Potential Underground Storage Tank	Remove UST and Associated Petroleum Contaminated Soil			$10,000 to $20,000 per tank	1	Potential UST	$10,000	$20,000	1	Potential UST	$10,000	$20,000	0	Potential UST	$0	$0
PCE- or TCE-Contaminated Groundwater	Additional Investigation			$25,000 to $200,000	N/A		$30,000	$100,000	N/A		$20,000	$70,000	N/A		$50,000	$100,000
	Vapor Mitigation System			$5 to 12/square foot	21,000	sq ft	$105,000	$252,000	33,000	sq ft	$165,000	$396,000	28,000	sq ft	$140,000	$336,000
	Building Drainage			$3 to 6/square foot	21,000	sq ft	$63,000	$126,000	33,000	sq ft	$99,000	$198,000	28,000	sq ft	$84,000	$168,000
	Construction Water Management[2]			$0.0034/gallon plus $10,000 for sampling and $7,000/month for two 25,000 gallon tanks	16,000	gallons/day	$49,528	$49,528	16,000	gallons/day	$49,528	$49,528	15,000	gallons/day	$49,120	$49,120
	Design and Construction Methods Modification to Reduce Cross Contamination Between Shallow and Deep Aquifers			Varies - Typically costs can be incorporated into the design at minimal costs. Can assume construction costs for implementation are $0.5 to $3 per square foot of the building	21,000	sq ft	$10,500	$63,000	33,000	sq ft	$16,500	$99,000	28,000	sq ft	$14,000	$84,000
	Health and Safety			Ranges between $10,000 and $70,000	N/A		$10,000	$70,000	N/A		$10,000	$70,000	N/A		$10,000	$70,000
Contaminated or Impacted Soil	Characterize Soil and Groundwater for Disposal			$30,000 to $170,000	N/A		$60,000	$80,000	N/A		$60,000	$80,000	N/A		$20,000	$50,000
	Excavate and Dispose of Soil as Appropriate	Petroleum Hydrocarbons-Contaminated Soil	Complete remedial excavation of petroleum-contaminated soil and dispose at a RCRA subtitle D landfill or treatment facility[3]	$140 to $160/ton	N/A				N/A				N/A			
		PCE- and TCE- Impacted and Contaminated Soil	Dispose excavated soil at UW-approved Subtitle D landfill with Contained-In Determination[4]	$80 to $100/ton	15,000	tons	$1,200,000	$1,500,000	0	tons	$0	$0	6,000	tons	$480,000	$600,000
		Metals and/or cPAHs-Contaminated	Dispose excavated soil at UW-approved Subtitle D landfill. Cap Contaminated Soil Left in Place with Building or Hardscape.[4 and 5]	$60 to $80/ton	0	tons	$0	$0	7,000	tons	$420,000	$560,000	0	tons	$0	$0
		Metals, Petroleum Hydrocarbons and/or cPAHs-Impacted Soil	Dispose at a UW-approved permitted inert waste landfill or reclamation pit.[4]	$30 to 50/ton	0	tons	$0	$0	350	tons	$10,500	$17,500	0	tons	$0	$0
Total Estimated Cost For Each Area							$1,538,028	$2,260,528			$860,528	$1,560,028			$847,120	$1,457,120

PDA - Name					1H- Y Student Center (Estimated for Comparison Purposes) - Entire PDA				2A - Sound Care				2B - Jefferson Street Parcel/Transit Turnaround			
Timeframe for Construction					Under Construction				Design and Construction in 2016+				Design and Construction in 2016+			
Assumed Square Footage of Building (square feet)					59,500				48,000				50,000			
Assumed Finished Floor Elevation of Building (feet AMSL)					126				100				86			
Calculated Mass of Soil to Excavate to subgrade (1-foot below finish floor and footings) (tons)					N/A				35,000				41,000			
Impacts	Mitigation Measures			Cost Per Unit	Unit Value	Unit	Estimated Cost (2014 $) Min	Estimated Cost (2014 $) Max	Unit Value	Unit	Estimated Cost (2014 $) Min	Estimated Cost (2014 $) Max	Unit Value	Unit	Estimated Cost (2014 $) Min	Estimated Cost (2014 $) Max
Site is Potential Source of Groundwater Contamination	Complete Remedial Investigation and Develop and Implement Remedial Alternatives			$500,000 and $2,000,000	N/A				N/A				N/A			
Potential Underground Storage Tank	Remove UST and Associated Petroleum Contaminated Soil			$10,000 to $20,000 per tank	0	Potential UST	$0	$0	0	Potential UST	$0	$0	4	Potential UST	$40,000	$80,000
PCE- or TCE-Contaminated Groundwater	Additional Investigation			$25,000 to $200,000	N/A		$50,000	$100,000	N/A		$50,000	$100,000	N/A		$50,000	$100,000
	Vapor Mitigation System			$5 to 12/square foot	59,500	sq ft	$297,500	$714,000	48,000	sq ft	$240,000	$576,000	50,000	sq ft	$250,000	$600,000
	Building Drainage			$3 to 6/square foot	59,500	sq ft	$178,500	$357,000	48,000	sq ft	$144,000	$288,000	50,000	sq ft	$150,000	$300,000
	Construction Water Management[2]			$0.0034/gallon plus $10,000 for sampling and $7,000/month for two 25,000 gallon tanks	20,000	gallons/day	$51,160	$51,160	10,000	gallons/day	$47,080	$47,080	10,000	gallons/day	$47,080	$47,080
	Design and Construction Methods Modification to Reduce Cross Contamination Between Shallow and Deep Aquifers			Varies - Typically costs can be incorporated into the design at minimal costs. Can assume construction costs for implementation are $0.5 to $3 per square foot of the building	59,500	sq ft	$29,750	$178,500	48,000	sq ft	$24,000	$144,000	50,000	sq ft	$25,000	$150,000
	Health and Safety			Ranges between $10,000 and $70,000	N/A		$10,000	$70,000	N/A		$10,000	$70,000	N/A		$10,000	$70,000
Contaminated or Impacted Soil	Characterize Soil and Groundwater for Disposal			$30,000 to $170,000	N/A		$20,000	$50,000	N/A		$60,000	$80,000	N/A		$60,000	$80,000
	Excavate and Dispose of Soil as Appropriate	Petroleum Hydrocarbons-Contaminated Soil	Complete remedial excavation of petroleum-contaminated soil and dispose at a RCRA subtitle D landfill or treatment facility[3]	$140 to $160/ton	N/A				N/A				50	tons	$8,000.00	$8,000.00
		PCE- and TCE- Impacted and Contaminated Soil	Dispose excavated soil at UW-approved Subtitle D landfill with Contained-In Determination[4]	$80 to $100/ton	15,000	tons	$1,200,000	$1,500,000	15,000	tons	$1,200,000	$1,500,000	10,000	tons	$800,000	$1,000,000
		Metals and/or cPAHs-Contaminated	Dispose excavated soil at UW-approved Subtitle D landfill. Cap Contaminated Soil Left in Place with Building or Hardscape.[4 and 5]	$60 to $80/ton	0	tons	$0	$0	3,500	tons	$210,000	$280,000	400	tons	$24,000	$32,000
		Metals, Petroleum Hydrocarbons and/or cPAHs-Impacted Soil	Dispose at a UW-approved permitted inert waste landfill or reclamation pit. [4]	$30 to 50/ton	0	tons	$0	$0	8,000	tons	$240,000	$400,000	500	tons	$15,000	$25,000
Total Estimated Cost For Each Area							$1,836,910	$3,020,660			$2,225,080	$3,485,080			$1,479,080	$2,492,080

PDA - Name					2C - Pinkerton Parking				2D - Tacoma Paper Supply/Old Spaghetti Factory				2E - The Swiss Pub and Frederick Wild				2F - Tioga Building			
Timeframe for Construction					Design and Construction in 2016+				2016.				Design and Construction 2014+				Design and Construction 2014+			
Assumed Square Footage of Building (square feet)					8,400				10,000				11,500				5,000			
Assumed Finished Floor Elevation of Building (feet AMSL)					86				70				95				86			
Calculated Mass of Soil to Excavate to subgrade (1-foot below finish floor and footings) (tons)					7,000				2,000				500				500			
							Estimated Cost (2014 $)				Estimated Cost (2014 $)				Estimated Cost (2014 $)				Estimated Cost (2014 $)	
Impacts	Mitigation Measures			Cost Per Unit	Unit Value	Unit	Min	Max	Unit Value	Unit	Min	Max	Unit Value	Unit	Min	Max	Unit Value	Unit	Min	Max
Site is Potential Source of Groundwater Contamination	Complete Remedial Investigation and Develop and Implement Remedial Alternatives			$500,000 and $2,000,000	N/A				N/A	N/A	$550,000	$2,100,000	N/A				N/A			
Potential Underground Storage Tank	Remove UST and Associated Petroleum Contaminated Soil			$10,000 to $20,000 per tank	1	Potential UST	$10,000	$20,000	0	Potential UST	$0	$0	1	Potential UST	$10,000	$20,000	0	Potential UST	$0	$0
PCE- or TCE-Contaminated Groundwater	Additional Investigation			$25,000 to $200,000	N/A		$30,000	$50,000	N/A		$20,000	$50,000	N/A		$20,000	$30,000	N/A		$20,000	$30,000
	Vapor Mitigation System			$5 to 12/square foot	0	sq ft	$0	$0	10,000	sq ft	$50,000	$120,000	11,500	sq ft	$57,500	$138,000	5,000	sq ft	$25,000	$60,000
	Building Drainage			$3 to 6/square foot	0	sq ft	$0	$0	10,000	sq ft	$30,000	$60,000	0	sq ft	$0	$0	0	sq ft	$0	$0
	Construction Water Management[2]			$0.0034/gallon plus $10,000 for sampling and $7,000/month for two 25,000 gallon tanks	0	gallons/day	$0	$0	5,000	gallons/day	$45,040	$45,040	0	gallons/day	$0	$0	0	gallons/day	$0	$0
	Design and Construction Methods Modification to Reduce Cross Contamination Between Shallow and Deep Aquifers			Varies - Typically costs can be incorporated into the design at minimal costs. Can assume construction costs for implementation are $0.5 to $3 per square foot of the building	0	sq ft	$0	$0	10,000	sq ft	$5,000	$30,000	11,500	sq ft	$5,750	$34,500	0	sq ft	$0	$0
	Health and Safety			Ranges between $10,000 and $70,000	N/A		$10,000	$70,000	N/A		$10,000	$70,000	N/A		$10,000	$70,000	N/A		$10,000	$70,000
Contaminated or Impacted Soil	Characterize Soil and Groundwater for Disposal			$30,000 to $170,000	N/A		$15,000	$25,000	N/A		$15,000	$25,000	N/A		$10,000	$15,000	N/A		$10,000	$15,000
	Excavate and Dispose of Soil as Appropriate	Petroleum Hydrocarbons-Contaminated Soil	Complete remedial excavation of petroleum-contaminated soil and dispose at a RCRA subtitle D landfill or treatment facility[3]	$140 to $160/ton	N/A				N/A				N/A				N/A			
		PCE- and TCE- Impacted and Contaminated Soil	Dispose excavated soil at UW-approved Subtitle D landfill with Contained-In Determination[4]	$80 to $100/ton	0	tons	$0	$0	2,000	tons	$160,000	$200,000	250	tons	$20,000	$25,000	0	tons	$0	$0
		Metals and/or cPAHs-Contaminated	Dispose excavated soil at UW-approved Subtitle D landfill. Cap Contaminated Soil Left in Place with Building or Hardscape.[4 and 5]	$60 to $80/ton	1,000	tons	$60,000	$80,000	0	tons	$0	$0	500	tons	$30,000	$40,000	250	tons	$15,000	$20,000
		Metals, Petroleum Hydrocarbons and/or cPAHs-Impacted Soil	Dispose at a UW-approved permitted inert waste landfill or reclamation pit. [4]	$30 to 50/ton	3,000	tons	$90,000	$150,000	0	tons	$0	$0	0	tons	$0	$0	250	tons	$7,500	$12,500
Total Estimated Cost For Each Area							$215,000	$395,000			$885,040	$2,700,040			$163,250	$372,500			$87,500	$207,500

Notes:

[1] Costs may be reduced for vapor mitigation, water management and/or soil management if the building is oriented outside of the TCE and PCE groundwater plumes.

[2] Calculation assumes 120 days of earthwork.

[3] Costs includes excavation, transportation and disposal. Cost assumes contractor has already mobilized to the site.

[4] Costs includes transportation and disposal. Cost does not include excavation and loading.

[5] Cost associated with capping contaminated soil left in place following construction activities is not included cost estimate.

Estimated costs are in 2014 U.S. Dollars based on the available information at the time of this investigation and our experience in the Puget Sound area. Costs may change based on inflation and other factors including the actual impacts and mitigation measures during time of construction.

TCE = Trichloroethene

PCE = Tetrachloroethene

CPAHs = Carcinogenic polycyclic aromatic hydrocarbons

ND = Not Determined

N/A = Not applicable

MTCA = Model Toxics Control Act

sq ft = square feet

UST = Underground storage tank

AMSL = above mean sea level

Ecology = Washington State Department of Ecology

Table 3

Summary of Costs

University of Washington Tacoma Priority Development Areas
Tacoma, Washington

Priority Development Area	Range of Estimated Costs to Mitigate Environmental Impacts	
	Minimum	Maximum
1A - Upton	$2,142,080	$4,392,080
1B - Tacoma Vacant	$2,630,660	$4,608,160
1C - Fawcett North	$1,861,120	$2,771,120
1D - Fawcett South	$1,991,120	$3,051,120
1E - Strom	$569,396	$1,075,896
1F - Fawcett Parking/Lot T47/48	$1,508,896	$2,259,396
1G - Laborers/Lot T39 and T40/Undeveloped Lot - Option A (Building on Southern Portion)	$1,538,028	$2,260,528
1G - Laborers/Lot T39 and T40/Undeveloped Lot - Option B (Building on Northern Portion)	$860,528	$1,560,028
2A - Sound Care	$2,225,080	$3,485,080
2B - Jefferson Street Parcel/Transit Turnaround	$1,479,080	$2,492,080
2C - Pinkerton Parking	$215,000	$395,000
2D - Tacoma Paper Supply	$885,040	$2,700,040
2E - Swiss and Frederick Wild	$163,250	$372,500
2F - Tioga Building	$87,500	$207,500
Total Not Including PDA 1H - Y Student Center	**$18,156,778**	**$31,630,528**
1H- Y Student Center (Estimated for Comparison Purposes) - Actual Building	$847,120	$1,457,120
1H- Y Student Center (Estimated for Comparison Purposes) - Entire PDA	$1,836,910	$3,020,660

Notes: Estimated costs are in 2014 U.S. Dollars based on the available information at the time of this investigation and our experience in the Puget Sound area. Costs may change based on inflation and other factors including the actual impacts and mitigation measures during time of construction.

APPENDIX A
General Findings

APPENDIX A
GENERAL FINDINGS

The general findings describe the geology sequence and interpreted hydrogeology and chemical analytical results for the PDAs.

Geology and Hydrogeology

The general geology on the UWT campus consist of the following sequence.

- Fill (typically 0- to 5-feet-thick, with the exception of PDA 1A-Upton where fill extends to approximately 29 feet below ground surface [bgs])
- Ice-Contact Deposits (typically 5- to 30-feet-thick)
- Silt - semi-confining to confining unit (typically 1- to 4-feet-thick)
- Advance Outwash (typically at least 30-feet-thick)
- Lawton Clay

The interpreted hydrogeology consists of a shallow and deep aquifer. A semi-confining to confining silt unit was observed between the two aquifers in the borings completed within the UWT campus. The silt appears to be thin or not present in the area of South 19th Street and Fawcett Avenue. The shallow aquifer is located within the fill/ice-contact deposits. The groundwater in the shallow aquifer appears to be present in sand and gravel seams. The continuity and connectedness of the sand and gravel seams within the shallow aquifer is unknown. The deep aquifer is located within the advance outwash. Groundwater within the deep aquifer appears to be continuous with interbeds of moist to wet sands with silt to silty sands and gravels with sand and silt to silty gravels at depth.

Chemical Analytical Results

Soil

In general, cPAHs, metals (arsenic, cadmium, lead and mercury) were detected at concentrations greater than the MTCA Method A ULU cleanup levels and/or greater than the Puget Sound Background concentrations in the fill soil within 5 feet of the existing ground surface. Diesel- and lube oil-range petroleum hydrocarbons are also present in the soil at concentrations less than MTCA Method A ULU cleanup levels but greater than the Ecology guidance reuse criteria (200 mg/kg) in the fill soil. The soil below the fill is impacted with TCE in areas of TCE-contaminated groundwater. PCE was detected in the soil at concentrations greater than the MTCA Method A cleanup level in two areas (PDA 1A-Upton and 2D-Tacoma Paper Supply Building). The chemical analytical findings for the soil are summarized in Figure1.

Groundwater

The shallow and deeper aquifers are impacted with TCE at concentrations greater than the MTCA Method A groundwater cleanup level and/or the MTCA Method B groundwater screening level protective of indoor air in the majority of the PDAs as shown on Figure 1. The lateral extent of the contaminant groundwater plumes is not known. The individual TCE plumes in the shallow aquifer may be connected via gravel or sand seams. The groundwater plumes within the shallow and deep aquifers may be connected in the area of South 19th and Fawcett Avenue base on water levels observed during this investigation.

GENERAL CRITERIA FOR CHARACTERIZATION OF SOIL AND GROUNDWATER

The following criteria were used to evaluate impacted and contaminated soil and groundwater for disposal purposes.

- **Contained-In Contaminated Soil.** Tetrachloroethene (PCE), Trichloroethene (TCE) and breakdown products at concentrations detected in analyzed soil samples. F-listed waste (i.e., spent solvent - F002) are characterized as a hazardous waste based on the concentration of the F-listed waste if the source of the waste is known. Soil on the UWT property falls into two categories for management of F-listed waste:
    - Soil where the source of the F-listed waste is known - A Contained-In Determination from Ecology will be necessary for management of soil impacted with F-Listed chemicals. A Contained-In Determination will allow soil contaminated or impacted with F-listed chemicals to be direct-hauled to a Subtitle D landfill for disposal.
    - Soil where the source of the F-listed waste is not known – The soil may be disposed at a Subtitle D landfill for disposal without a contained-in determination from Ecology. However, we recommend for budgeting purposes that UWT assume the source may be identified by construction, or Ecology will require a contained-in determination even if the source is not directly known.
- **Contaminated Soil.** Petroleum hydrocarbons, carcinogenic polycyclic aromatic hydrocarbons (cPAHs), metals and volatile organic compounds (VOCs) detected at concentrations greater than the Model Toxics Control Act (MTCA) Method A Unrestricted Land Use (ULU) cleanup level or MTCA B screening level.
- **Impacted Soil.**
    - Petroleum hydrocarbons, cPAHs and lead at concentrations greater than Washington State Department of Ecology (Ecology) *Guidance for Remediation of Petroleum Contaminated Sites* (Ecology, 2011) regarding reuse of soil as commercial fill (Ecology, 2011) but less than the respective MTCA Method A ULU cleanup level. The Ecology guidance for reuse indicates diesel- and lube-oil range petroleum hydrocarbon concentrations greater than 200 milligrams per kilogram (mg/kg) and gasoline-range petroleum hydrocarbons concentrations greater than 30 mg/kg are not suitable for reuse.
    - Metals detected at concentrations greater than the Puget Sound Background levels (Ecology, 1994) but less than respective MTCA Method A cleanup levels or MTCA Method B criteria.

- **Contaminated Groundwater**
    - Petroleum hydrocarbons, PAHs and metals detected at concentrations greater than the respective MTCA Method A groundwater cleanup levels. Method B criteria were used for comparison of specific compounds if Method A groundwater cleanup levels are not established for those compounds.
    - VOCs detected at concentrations greater than the respective MTCA Method A groundwater cleanup levels, and MTCA Method B groundwater screening levels protective of indoor air. The updated TCE/PCE screening levels were calculated using Equation 1 from Ecology's review draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action" dated October 2009 (Ecology, 2009) and Environmental Protection Agency's

(EPA's) TCE and PCE toxicity factors updated in 2011 and available on EPA's online Integrated Risk Information System (IRIS). The other values were obtained from Ecology's review draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action".

Appendix B
Report Limitations and Guidelines For Use

APPENDIX B
REPORT LIMITATIONS AND GUIDELINES FOR USE[2]

This appendix provides information to help you manage your risks with respect to the use of this report.

Environmental Services are Performed for Specific Purposes, Persons and Projects

This report has been prepared for use by University of Washington. This report is not intended for use by others, and the information contained herein is not applicable to other sites.

GeoEngineers structures our services to meet the specific needs of our clients. For example, an environmental site assessment study conducted for a property owner may not fulfill the needs of a prospective purchaser of the same property. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and project site. No one except University of Washington should rely on this environmental report without first conferring with GeoEngineers. This report should not be applied for any purpose or project except the one originally contemplated.

This Environmental Report is Based on a Unique Set of Project-Specific Factors

This report has been prepared for the Priority Development Areas (PDAs) Environmental Assessment Project at the UW – Tacoma (UWT) campus located in Tacoma, Washington. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, do not rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

If important changes are made after the date of this report, GeoEngineers should be given the opportunity to review our interpretations and recommendations and provide written modifications or confirmation, as appropriate.

Reliance Conditions for Third Parties

If a lending agency or other parties intend to place legal reliance on the product of our services, we require that those parties indicate in writing their acknowledgement that the scope of services provided, and the general conditions under which the services were rendered including the limitation of professional liability, are understood and accepted by them. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions.

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[2] Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

Environmental Regulations are Always Evolving

Some substances may be present in the site vicinity in quantities or under conditions that may have led, or may lead, to contamination of the subject site, but are not included in current local, state or federal regulatory definitions of hazardous substances or do not otherwise present current potential liability. GeoEngineers cannot be responsible if the standards for appropriate inquiry, or regulatory definitions of hazardous substance, change or if more stringent environmental standards are developed in the future.

Subsurface Conditions can Change

This environmental report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by manmade events such as construction on or adjacent to the site, by new releases of hazardous substances, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Always contact GeoEngineers before applying this report to determine if it is still applicable.

Topsoil

For the purposes of this report, we consider topsoil to consist of generally fine-grained soil with an appreciable amount of organic matter based on visual examination, and to be unsuitable for direct support of the proposed improvements. However, the organic content and other mineralogical and gradational characteristics used to evaluate the suitability of soil for use in landscaping and agricultural purposes was not determined, nor considered in our analyses. Therefore, the information and recommendations in this report, and our logs and descriptions should not be used as a basis for estimating the volume of topsoil available for such purposes.

Most Environmental Findings are Professional Opinions

Our interpretations of subsurface conditions are based on field observations and chemical analytical data from widely spaced sampling locations at the site. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ – sometimes significantly – from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

Do Not Redraw the Exploration Logs

Environmental scientists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in an environmental report should never be redrawn for inclusion in other design drawings. Only photographic or electronic reproduction is acceptable, but recognize that separating logs from the report can elevate risk.

Read These Provisions Closely

Some clients, design professionals and contractors may not recognize that the geoscience practices (geotechnical engineering, geology and environmental science) are far less exact than other engineering and natural science disciplines. This lack of understanding can create unrealistic expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory “limitations”

provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you are unclear how these “Report Limitations and Guidelines for Use” apply to your project or site.

Geotechnical, Geologic and Geoenvironmental Reports Should Not Be Interchanged

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually relate any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding a specific project.

Biological Pollutants

GeoEngineers’ Scope of Work specifically excludes the investigation, detection, prevention, or assessment of the presence of Biological Pollutants in or around any structure. Accordingly, this report includes no interpretations, recommendations, findings, or conclusions for the purpose of detecting, preventing, assessing, or abating Biological Pollutants. The term “Biological Pollutants” includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts.

PDA 1A – Upton

Priority Development Area 1A
Upton
Environmental Subsurface Investigation

Environmental Subsurface Investigation Project
UW Capital Project Office Project No. 204277
1701 Tacoma Avenue
Tacoma, Washington

for
University of Washington

December 19, 2014

GeoEngineers

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Upton
Environmental Subsurface Investigation
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Table of Contents

1.0 INTRODUCTION 1

2.0 SITE HISTORICAL USE 1

3.0 CURRENT SITE FEATURES 2

4.0 ENVIRONMENTAL SUBSURFACE EXPLORATIONS 2

4.1. Historical Research and Magnetic Anomaly Findings 2
4.2. Subsurface Borings 2
4.3. Groundwater Sampling 2

5.0 SITE GEOLOGY AND HYDROGEOLOGY 3

5.1. Soil Conditions 3
5.2. Groundwater Conditions 3

6.0 CHEMICAL ANALYTICAL PROGRAM AND ANALYTICAL RESULTS 3

6.1. General 3
6.2. Criteria for Characterization of Soil and Groundwater 4
6.3. Soil 5
6.3.1. Petroleum Hydrocarbons 6
6.3.2. VOCs 6
6.3.3. PAHs 7
6.3.4. RCRA Metals 7
6.3.5. PCBs 8
6.4. Groundwater 8
6.4.1. Petroleum-Range Hydrocarbons 8
6.4.2. VOCs 8
6.4.3. PAHs 9
6.4.4. Total RCRA Metals 9
6.4.5. Dissolved MTCA Metals 9
6.4.6. PCBs 9

7.0 CONCLUSIONS 9

8.0 PROPOSED DEVELOPMENT PLANS 9

9.0 POTENTIAL IMPACTS AND MITIGATION MEASURES TO DESIGN AND CONSTRUCTION 10

9.1. Site is a Potential Source 10
9.2. Potential UST 10
9.3. PCE-Contaminated Groundwater 10
9.4. Soil is Contaminated with Chemicals of Concern 13

10.0 LIMITATIONS 14

11.0 REFERENCES 14

LIST OF TABLES

Table 1. Summary of Chemical Analytical Results – Soil
Table 2. Summary of Chemical Analytical Results – Groundwater

LIST OF FIGURES

Figure 1. Vicinity Map
Figure 2. Site Plan – PDA 1A/Upton

APPENDICES

Appendix A. Report Limitations and Guidelines for Use

1.0 INTRODUCTION

This report presents the results of our environmental subsurface assessment completed for the University of Washington (UW) at the Upton property (Priority Development Area [PDA] – 1A) located on the UW Tacoma (UWT) campus at 1701 Tacoma Avenue in Tacoma, Washington. The property is herein referred to as the "site." The site was identified as PDA 1A for this project. The site bound by Tacoma Avenue to the west, South 17th Street to the north, Court E to the east and the Tacoma Vacant property to the south. A Vicinity Map of the site area is included as Figure 1. See Figure 2 for the layout of the site.

This subsurface investigation was completed under the UWT Environmental Subsurface Assessment Project, UW project number 204277. This report was completed as a subset of the larger subsurface assessment report titled "2013 Environmental Subsurface Investigation – University of Washington-Tacoma, Tacoma, Washington" dated December 19, 2014 to assist with development of the property. This report should be used in context with the larger subsurface assessment report. Borings logs, subsurface investigation methodologies and chemical analytical data packages are included in the larger investigation report.

General impacts and potential mitigation measures are provided in this report that may be employed in design and construction. It is important to recognize that additional environmental investigations may be necessary prior to selection of the final mitigation measure. Mitigation measures and associated costs provided in this report will likely need refinement based on the results of the additional environmental investigations. The project team should contact UW Environmental Health & Safety (UW EH&S) to discuss the need for additional environmental investigations at this site. UW EH&S is the liaison with the Washington State Department of Ecology (Ecology) for review and approval of mitigation measures.

2.0 SITE HISTORICAL USE

The site was initially developed in 1888 in a location adjacent to the alley on the east side of the property for use as an ice house. A boarding house was located in the northeast corner of the site between 1896 through at least 1912 and potentially through the 1930s.

The western portion of the existing building was constructed in 1961. A former dry cleaner business operated in this portion of the building until the early 1970s. Upton Electric (sales and rental) operated at the site from 1974 to 1988 and expanded the building into the current footprint. The property was purchased by UW in the 1990s. The extent of the existing and former building footprint is shown on Figure 2 based on a review of aerial photographs and Sanborn Fire Insurance maps.

3.0 CURRENT SITE FEATURES

The existing building is located within the central portion of the site. A music recording studio currently operates in the building. A majority of the site is paved with asphalt on the south, west and north portions. Three catch basins that appear to be drywells are present on the site.

Fill is present within a majority of the site to the approximate current elevation of Tacoma Avenue. Topography from Tacoma Avenue to Court E varies as much as 20 feet in elevation. The slopes are vegetated with various grasses on the north, east and south sides of the site. Remnants of an old concrete/asphalt block retaining wall are visible at the base of the slope on the north, east and south portions of the site.

4.0 ENVIRONMENTAL SUBSURFACE EXPLORATIONS

The environmental subsurface investigation activities completed at the site consisted of a magnetic/ground penetrating radar (GPR) (M/GPR) survey, direct-push and hand auger soil borings, groundwater development and sampling of new monitoring wells and groundwater sampling of a temporary monitoring on-site well. The subsurface investigation was completed between June and October 2013.

4.1. Historical Research and Magnetic Anomaly Findings

Historic research results indicated the potential for underground storage tanks to be present given the age of the historic buildings and the source of heat typically used during these time periods. In addition, heating conversion permits were listed in the permit records. An M/GPR survey was performed on the ground surface outside of the building footprint in June 2013. No magnetic anomalies were identified on the site.

4.2. Subsurface Borings

Five direct-push borings (1A-B1, 1A-B2 and 1A-B4 through 1A-B6) were completed at the site on June 13, 2013. The direct-push borings ranged in depth between 14 and 30 feet below ground surface (bgs) when practical refusal was encountered. Boring 1A-B3 was completed on July 18, 2013, using a hand auger to a depth of approximately 2 feet bgs due to the large amount of asphalt and concrete debris in the area.

4.3. Groundwater Sampling

Groundwater samples were collected from one onsite temporary monitoring well (1A-B2) and two new off site monitoring wells (UG-MW26 and UG-MW33). The temporary monitoring well was sampled on June 13, 2013. Temporary monitoring well 1A-B2 was located on the site. The temporary well was screened within fill material.

The new monitoring wells were sampled between September 30 and October 2, 2013. Permanent monitoring wells UG-MW26 and UG-MW33 are screened within the shallow aquifer (ice-contact deposits). Monitoring well UG-MW26 is located crossgradient and south of the site. Monitoring well UG-MW33 is located downgradient and southeast of the site.

5.0 SITE GEOLOGY AND HYDROGEOLOGY

5.1. Soil Conditions

Subsurface layers present beneath the site consist of fill, ice-contact deposits, silt layer and advance outwash. The fill comprises silt with sand and gravel and/or sand with silt and gravel from just below the surface to depths of up to 29 feet bgs.

Native soil conditions underlying the fill consist of glacially consolidated units (ice-contact deposits) consisting of silt with sand to sand with gravel and silt.

A gray silt layer was observed beneath the ice-contact deposits in the wells completed adjacent and south of the site. The silt layer is underlain by advance outwash consisting of gravel with sand and silt.

5.2. Groundwater Conditions

It appears that groundwater conditions observed at the site consist of a shallow aquifer (fill and ice-contact deposits) and deep aquifer (advance outwash) to the depths explored during this investigation. The shallow and deep aquifers appear to be separated by the silt layer located between the ice-contact deposits and advance outwash.

Groundwater within the shallow aquifer appears to be present within the fill and the sand and gravel seams observed in the ice-contact deposits. The hydraulic connection of the sand seams within the shallow aquifer is unknown in and around the project site. Groundwater within the deep aquifer appears to be continuous with interbeds of moist to wet silt at depth. The deep aquifer within the advance outwash appears to be under a semi-confined to confined condition.

Groundwater was encountered in boring 1A-B1 at approximately 22 feet bgs (Elevation 200 feet) and boring A1-B2 approximately 26 feet bgs (Elevation 195 feet). Groundwater was not encountered in the other direct-push borings.

Groundwater elevation of the shallow aquifer in the existing permanent wells ranged between 200 and 185 feet from the west to the east side of the site based on the extrapolated water level information. The extrapolated water levels are similar to the water levels observed in the direct-push borings, indicating the groundwater within the fill on the site may be hydrologically connected to the shallow aquifer. Groundwater elevation of the deep aquifer is not known. Groundwater levels will vary depending on season, precipitation and other factors.

6.0 CHEMICAL ANALYTICAL PROGRAM AND ANALYTICAL RESULTS

6.1. General

Soil and groundwater samples were submitted to OnSite Environmental, Inc., in Redmond, Washington for chemical analysis. The chemical analytical data are summarized in Tables 1 and 2. Chemicals that were not detected at or greater than the laboratory reporting limits in the analyzed samples are typically not included on the tables.

6.2. Criteria for Characterization of Soil and Groundwater

The following criteria were used to evaluate impacted and contaminated soil and groundwater.

- Tetrachloroethene (PCE), Trichloroethene (TCE) Impacted or Contaminated Soil
  - PCE, TCE and breakdown products at concentrations detected in the analyzed soil samples.
- Contaminated Soil
  - Petroleum hydrocarbons, carcinogenic polycyclic aromatic hydrocarbons (cPAHs), metals and volatile organic compounds (VOCs) were detected at concentrations greater than the Model Toxics Control Act (MTCA) Method A Unrestricted Land Use (ULU) cleanup level or MTCA Method B screening level.
- Impacted Soil

  Some contaminants were detected at concentrations less than the respective MTCA cleanup levels. UWT may be able to reuse certain types of soil depending on the sampling results. UW EH&S must review the chemical analytical data to evaluate if reuse or disposal at an off site facility is necessary. Soil reuse and disposal are subject to Ecology Guidance for Remediation of Petroleum Contaminated Sites (Ecology, 2011), solid waste regulations and disposal facility permit conditions. The criteria below is herein referred to as “Reuse Criteria”

  - **Petroleum hydrocarbons, cPAHs and/or Lead**

    The Ecology guidance indicates that soil with diesel- and/or lube oil-range petroleum hydrocarbons detected at concentrations less than 200 milligrams per kilogram (mg/kg) and/or gasoline-range petroleum hydrocarbons detected at concentrations less than 30 mg/kg are suitable for reuse as commercial fill at UWT campus with the following limitations:

    - placed above the highest water table,
    - not within 100 feet of a drinking water well,
    - not within wellhead protection area of public water supply,
    - not within wetlands or where surface water contact is possible, and
    - not within a surface water infiltration facility or septic drain field.

    If the concentrations exceed the above limits but are still less than respective MTCA cleanup levels the soil may be reused in road and bridge embankment construction, landfill daily cover or asphalt manufacturing with UW EH&S approval.

  - **Arsenic, Cadmium, and/or Mercury**

    Soil with concentrations of arsenic, cadmium and/or mercury above what is normally found in the natural background environment (Puget Sound Background levels - Ecology, 1994) is typically suitable for disposal at an inert waste landfill or a Department of Natural Resources (DNR) reclamation pit. UW EH&S approval is necessary.

Soil at and near the UWT campus has been well documented to contain chromium at concentrations slightly above the natural background level and is not considered in the "Reuse Criteria."

- Contaminated Groundwater
  - Petroleum hydrocarbons, PAHs and metals were detected at concentrations greater than the respective MTCA Method A groundwater cleanup levels. Method B criteria were used for comparison of specific compounds if Method A groundwater cleanup levels are not established for those compounds.
  - VOCs were detected at concentrations greater than the respective MTCA Method A groundwater cleanup levels, and MTCA Method B groundwater screening levels protective of indoor air. The updated TCE/PCE screening levels were calculated using Equation 1 from Ecology's review draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action" dated October 2009 (Ecology, 2009) and Environmental Protection Agency's (EPA's) TCE and PCE toxicity factors updated in 2011 and available on EPA's online Integrated Risk Information System (IRIS). The other values were obtained from Ecology's review draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action".

6.3. Soil

Soil samples collected during the drilling activities were submitted for chemical analysis. The soil samples collected from the subsurface explorations were identified using the following identification system: A#-B#-start depth-end depth, where A# is the area designation number, B# is the boring and start depth-end depth is the depth interval in feet below the ground of specific sample (e.g., 1A-B1-18-19 was collected in Area 1A from boring B1 from 18 to 19 feet bgs).

Soil samples were submitted for chemical analysis based on the following:

- Where field screening indicated the soil is impacted.
- Directly below potentially impacted soil to delineate the vertical extent.
- Where wet sand seams were encountered in the ice-contact deposit.
- At the soil/groundwater interface if groundwater was encountered.
- At the top of confining units if encountered.

The soil samples were submitted for chemical analysis of petroleum hydrocarbon identification by Ecology-approved method NWTPH-HCID with appropriate follow up of gasoline-range petroleum hydrocarbons by Ecology-approved method NWTPH-Gx and/or diesel- and lube oil-range petroleum hydrocarbons by Ecology-approved method NWTPH-Dx; VOCs by EPA method 8260C, polycyclic aromatic hydrocarbons (PAHs) by EPA method 8270DSIM, Resource Conservation and Recovery Act (RCRA) metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver) by EPA method 6000/7000 series and polychlorinated biphenyls (PCBs) by EPA method 8082A.

6.3.1. Petroleum Hydrocarbons

Lube oil-range petroleum hydrocarbons were detected at concentrations greater than Ecology's Reuse Criteria of 200 mg/kg but less than the MTCA Method A ULU cleanup level in soil samples 1A-B3-0-2 (230 mg/kg), 1A-B4-0-1 (220 mg/kg) and 1A-B5-1-2 (560 mg/kg). Lube oil-range petroleum hydrocarbons were not detected in the remaining analyzed soil samples.

Diesel- and gasoline-range petroleum hydrocarbons were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup level and Reuse Criteria in the analyzed soil samples.

6.3.2. VOCs

WITHIN FILL MATERIAL

PCE was detected at concentrations greater than the MTCA Method A ULU cleanup level (0.05 mg/kg) in the following soil samples with the concentrations detected identified in parenthesis.

- 1A-B1-18-19 (0.051 mg/kg)
- 1A-B2-25-26 (0.098 mg/kg)

PCE was detected at concentrations less than the MTCA Method A ULU cleanup level in the following soil samples with the concentrations detected identified in parenthesis.

- 1A-B2-14-15 (0.012 mg/kg)
- 1A-B3-0-2 (0.012 mg/kg)
- 1A-B6-0-1 (0.0017 mg/kg)
- 1A-B6-10-11 (0.030 mg/kg)
- 1A-B6-20-21 (0.034 mg/kg)

PCE was not detected in the remaining analyzed soil samples.

TCE was detected at concentrations less than the MTCA Method A ULU cleanup level (0.03 mg/kg) in the following three soil samples with the concentrations detected identified in parenthesis.

- 1A-B1-18-19 (0.0017 mg/kg)
- 1A-B2-14-15 (0.0010 mg/kg)
- 1A-B2-25-26 (0.011 mg/kg)
- 1A-B6-20-21 (0.0014 mg/kg)

TCE was not detected in the remaining analyzed soil samples.

Other VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels or Method B ULU criteria in the analyzed soil samples.

WITHIN ICE-CONTACT DEPOSITS

PCE and TCE were detected at concentrations less than the MTCA Method A ULU cleanup levels in soil sample 1A-B6-20-21 (0.034 mg/kg and 0.0014 mg/kg, respectively). Other VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels or Method B ULU criteria in the analyzed soil samples as shown in Table 1.

6.3.3. PAHs

Carcinogenic PAHs (cPAHs) were detected at a concentration greater than the MTCA Method A ULU cleanup level (Total Toxic Equivalent Concentration [TTEC] = 0.1 mg/kg) in soil sample 1A-B5-1-2 (TTEC = 0.64 mg/kg) collected within the fill. CPAHs were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup level in the remaining analyzed soil samples.

PAHs were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup level and Method B ULU criteria in the analyzed soil samples.

6.3.4. RCRA Metals

LEAD

Lead was detected at concentrations less than the MTCA Method A ULU cleanup level (250 mg/kg) in the following soil samples with the concentrations detected identified in parenthesis.

- 1A-B4-11-12 (760 mg/kg)
- 1A-B5-1-2 (400 mg/kg)

Lead was detected at concentrations greater than the Ecology Reuse Criteria (50 mg/kg) but less than the MTCA Method A ULU cleanup level in the following soil samples with the concentrations detected identified in parenthesis.

- 1A-B1-3-4 (87 mg/kg)
- 1A-B2-25-26 (140 mg/kg)
- 1A-B3-0-2 (66 mg/kg)
- 1A-B6-0-1 (64 mg/kg)

Lead was either not detected or were detected at concentrations less than the MTCA Method A ULU cleanup level or the Reuse Criteria in the remaining analyzed soil samples.

MERCURY

Mercury was detected at a concentration greater than Reuse Criteria (0.07 mg/kg) but less than the MTCA Method A ULU cleanup level (2 mg/kg) in soil sample 1A-B5-9-10 (0.38 mg/kg).

OTHER METALS

Other RCRA metals were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels, Method B criteria or Reuse Criteria in the analyzed soil samples.

6.3.5. PCBs

PCBs were not detected in the analyzed soil samples.

6.4. Groundwater

Groundwater samples were collected from the on-site temporary monitoring well 1A-B2, monitoring well UG-MW26 located off site and crossgradient, and monitoring well UG-MW33 located off site and downgradient. The groundwater sample collected from the on-site temporary monitoring well was identified using the following identification system: Boring ID-W, where Boring ID is the boring number and W indicated a groundwater sample. The groundwater samples collected from the crossgradient and downgradient monitoring wells were identified using the following identification system: WELL-ID-yymmdd, where WELL-ID is the well identification number and yymmdd is the date when the sample was collected (e.g., UG-MW33-131002 was collected from monitoring well UG-MW33 on October 2, 2013).

The groundwater samples were submitted for chemical analysis of gasoline-range petroleum hydrocarbons by Ecology-approved method NWTPH-Gx, and diesel- and lube oil-range petroleum hydrocarbons by Ecology-approved method NWTPH-Dx, VOCs by EPA method 8260C, and PAHs by EPA method 8270DSIM. The groundwater sample collected from temporary well 1A-B2 was also submitted for chemical analysis of dissolved MTCA metals EPA method 200.8 or 7470A and PCBs by EPA Method 8082A. Groundwater samples collected from UG-MW26 and UG-MW33 were also submitted for chemical analysis of total RCRA metals by EPA method 200.8 or 7470A. The chemical analytical data for groundwater are described below and summarized in Table 2.

6.4.1. Petroleum-Range Hydrocarbons

Lube oil-range petroleum hydrocarbons were detected at a concentration less than the MTCA Method A groundwater cleanup level (0.5 milligram per liter [mg/L]) in groundwater sample UG-MW26-130930 collected from monitoring well UG-MW26 (0.46 mg/L). Lube oil-range petroleum hydrocarbons were not detected in the remaining analyzed groundwater samples.

Gasoline- and diesel- range petroleum hydrocarbons were not detected in the analyzed groundwater samples.

6.4.2. VOCs

Chemicals of concern were detected in groundwater sample 1A-B2-W as follows:

- PCE was detected at a concentration greater than the MTCA Method A groundwater cleanup level (5 micrograms per liter [µg/L]) but less than the updated MTCA Method B groundwater screening levels protective of indoor air (24 µg/L) in groundwater sample 1A-B2-W (6.5 µg/L).
- TCE was detected at a concentration less than the MTCA Method A groundwater cleanup level (5 µg/L) but greater than the updated MTCA Method B groundwater screening levels protective of indoor air (1.5 µg/L) in groundwater sample 1A-B2-W (4.8 µg/L).
- cis-1,2-DCE was detected at a concentration greater than the MTCA Method B groundwater criteria (16 µg/L) but less than the MTCA Method B groundwater screening levels protective of indoor air (160 µg/L) in groundwater sample 1A-B2-W (45 µg/L).

- Vinyl chloride was detected at a concentration (6.9 µg/L) greater than MTCA Method A groundwater cleanup level (0.2 µg/L) and the MTCA Method B groundwater screening levels protective of indoor air (0.35 µg/L) in groundwater sample 1A-B2-W (6.9 µg/L).

Other VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A groundwater cleanup level, MTCA Method B criteria or the MTCA Method B groundwater screening levels protective of indoor air in the analyzed groundwater samples.

6.4.3. PAHs

PAHs were not detected in the analyzed groundwater samples.

6.4.4. Total RCRA Metals

Total RCRA metals were not detected in the analyzed groundwater samples collected from the permanent monitoring wells.

6.4.5. Dissolved MTCA Metals

Dissolved MTCA metals were either not detected or were detected at concentrations less than the MTCA Method A cleanup levels or the Method B criteria in groundwater sample 1A-B2-W.

6.4.6. PCBs

PCBs were not detected in groundwater sample 1A-B2-W.

7.0 CONCLUSIONS

A former dry cleaner operated on PDA 1A property from 1961 to the early 1970s. PCE (dry cleaner solvent) and associated breakdown products are present in the fill and ice-contact deposits between 0 to 26 feet bgs in the area east of the former drycleaner building footprint. The shallow aquifer is contaminated with PCE and associated breakdown products on the eastern portion of the site. The full extent of PCE contamination within the shallow aquifer is not known in the area of the site. The deep aquifer was not evaluated as part of this investigation. The former dry cleaner has been identified as a potential contaminant source of PCE.

Lead- and cPAH-contaminated soil is present on the west side of PDA 1A to a depth of 2 feet bgs. Metals-, petroleum hydrocarbons- and cPAH-impacted soil are present throughout PDA 1A to a depth of approximately 10 feet bgs.

8.0 PROPOSED DEVELOPMENT PLANS

We understand UWT plans to construct a new building at PDA 1A - Upton. GeoEngineers assumes the new building will be approximately 13,000 square feet with a finished floor elevation of 198 feet. The estimated mass of soil to be generated is approximately 21,000 tons to excavate PDA 1A to subgrade (Elevation 197 feet) based on the above assumptions. An additional 2,000 tons is estimated to be generated from the footings.

9.0 POTENTIAL IMPACTS AND MITIGATION MEASURES TO DESIGN AND CONSTRUCTION

We recommend UW develop and implement appropriate administrative institutional controls to limit or prohibit activities that may result in exposure to hazardous substances remaining at the site. Potential impacts to the design and construction of the site include the following:

- Site is likely source of PCE- (and breakdown products).
- Groundwater is contaminated with PCE.
- Soil is contaminated with chemicals of concern (PCE, metals and cPAHs).
- Soil is impacted with chemicals of concern (TCE, metals and cPAHs).

Potential long -term impacts include:

- Long-term disposal of underslab/perimeter footing drain PCE-impacted groundwater.
- Continued maintenance of vapor intrusion mitigation system, if necessary.
- Potential periodic indoor air sampling to confirm the vapor intrusion mitigation system may be necessary to evaluate the system is operating properly, if necessary.
- PCE-contaminated and/or PCE- and TCE-impacted soil may remain adjacent and beneath the building following construction activities. UW should develop and implement appropriate institutional controls to help prevent exposure to residual contamination.

The following sections describe potential impacts, mitigation measures and estimated costs to design and construction.

9.1. Site is a Potential Source

The site was operated as a former dry cleaner. PCE (dry cleaner solvent) and associated breakdown products were detected in the soil and groundwater near the western portion of the former dry cleaner building as shown on Figure 2. Ecology will require an additional investigation to evaluate the lateral and vertical extent of the PCE-contaminated soil and groundwater. The estimated cost for the additional investigation is $80,000 to $150,000. If the site is identified as a source of downgradient groundwater contamination, an Ecology-approved remedial action may be required prior to construction of the new building. The actual remedial cost will be based on the remedial alternative and the extent of the contamination but may range between $500,000 and $2,000,000.

9.2. Potential UST

A UST may be present in the footprint of the former dry cleaner that potentially may contain or formerly contained solvents. Removal of the potential UST would be managed as a source during remediation of the site if a UST is identified on the site.

9.3. PCE-Contaminated Groundwater

PCE and TCE and associated breakdown products were detected in on-site soil and groundwater at concentrations greater than the MTCA Method A groundwater cleanup levels and/or updated MTCA Method B groundwater screening levels protective of indoor air. The elevation of the groundwater was approximately 195 feet in the temporary well. PCE- and/or TCE-impacted groundwater may be encountered during construction. PCE– and/or TCE-impacted soil and groundwater may be present beneath the proposed building footprint. If remediation of the site occurs prior to construction, these impacts and mitigation measures will not be applicable. Mitigation measures include:

Additional Investigation. Further subsurface investigation may be necessary to evaluate the vertical and lateral limits of the PCE-contaminated and PCE/TCE-impacted soil and/or PCE-contaminated groundwater at the site. Soil vapor sampling is recommended to evaluate if a potential vapor intrusion pathway exists. The estimated cost for soil vapor sampling and additional investigation is $20,000 to $30,000.

Vapor Mitigation. Vapor intrusion occurs when VOCs migrate from contaminated soil or groundwater into overlying buildings through openings in the foundation. The route VOCs take from a subsurface source to the air inside a building is referred to as the vapor intrusion pathway. The most common sources of soil vapor are VOCs including TCE and PCE, which may pose short-term (TCE only) and long-term (chronic) risks through inhalation of contaminated indoor air.

Groundwater and soil vapor concentrations are typically utilized as screening levels regarding the potential for vapor intrusion. TCE and vinyl chloride were detected at a concentration that exceeds the screening level for updated MTCA Method B groundwater screening level protective of indoor air in the groundwater sample collected from temporary well 1A-B2 screened within the shallow aquifer. TCE-/vinyl chloride-contaminated groundwater in the shallow aquifer may be in contact with the west side and the bottom of the proposed building.

Soil vapor sampling was not completed as part of this investigation. Additional on-site characterization may be necessary to evaluate the vertical and lateral limits of soil vapors related to the TCE-/vinyl chloride-contaminated and impacted soil. Soil vapor sampling is recommended near the elevation of the proposed subgrade to evaluate if a potential vapor intrusion pathway exists. If a potential vapor intrusion pathway exists, then a vapor intrusion mitigation system may be necessary. Potential mitigation options to prevent vapor intrusion include:

- A passive vapor barrier beneath the building. Passive vapor barriers are typically used in combination with another mitigation option (venting or building pressurization). We recommend the vapor barrier be installed below the elevation of penetrations (pipes, etc.) that may be installed after the programing is identified in the future. Penetrating the vapor barrier following the construction will add to the cost of construction.
- Passive or active venting system beneath the building. The venting system may need to be combined with an underslab and perimeter drain to reduce the potential for shallow groundwater to enter the venting system.

The estimated cost for design and installation of indoor air mitigation system ranges between $5 per square foot to $12 per square foot of building space. The estimated costs for the vapor mitigation system for a building on the entire site $65,000 to $156,000. Potential periodic indoor air sampling to confirm the vapor intrusion mitigation system may be necessary to evaluate the system is operating properly following construction of the building. The estimated cost for long term monitoring is unknown.

Underslab/Footing Drainage. Underslab/footing drainage system may be required to prevent water from entering into the vapor mitigation vent system. The water will likely have to be directed to the City of Tacoma sanitary sewer based on concentrations of the chemicals of concern in the groundwater. A long-term cost may be associated with discharge of the water to the City sanitary sewer system. However, it is anticipated the groundwater maybe suitable for discharge to the storm system based on the concentrations detected in the existing wells during this investigation. An underslab footing drain will likely be required based on the elevation of the groundwater (195 feet). The estimated cost of the underslab footing drain is $39,000 to $78,000.

Construction Water Management. PCE-contaminated groundwater that will be encountered during construction will have to be managed. Water generated during construction will likely be stored in tanks, sampled and analyzed. Water disposal will be coordinated with UW EH&S at a UW-approved disposal facility. It is anticipated the construction dewatering water will be suitable for discharge into the storm sewer based on the concentrations detected in the existing wells during this investigation. The water may be disposed in the City of Tacoma sanitary sewer. The City of Tacoma charges approximately $0.0034 per gallon of water. The estimated volume of water generated will be based on construction methods. The base cost estimate includes the cost of disposal of water for 120 days of earthwork construction, approximate cost of collecting ten water samples over the course of the project ($15,000) and two 25,000 gallon storage tanks ($7,000 each per month).

Approximately 10,000 gallons per day is estimated to be generated on the site from dewatering activities. The estimated cost of construction water management if disposal into the City of Tacoma sanitary sewer is necessary is approximately $47,000.

Cross-Contamination. The vertical and lateral extent of the PCE-contaminated groundwater in the shallow aquifer is not known. The depth of the deeper aquifer on the site is also not known. Additional investigation will be necessary to evaluate the potential for cross-contamination between the shallow and deep aquifers. This investigation would be completed in concurrence with the remedial investigation. If cross contamination between aquifers is identified as a potential impact, typically mitigation measures can be incorporated into the design at minimal costs. For budgeting purposes, additional construction costs may range between $11,000 and $66,000.

Health and Safety. Workers who may be in contact with potentially contaminated soil or groundwater at a state-listed cleanup site have HAZWOPER training. The requirement is consistent with the Washington Administrative Code (WAC) 296-843-100, *Hazardous Waste Operations*, which indicates that on-site personnel are required to have current health and safety training in accordance with Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response requirements in 29 CFR 1910.120. The rule also requires the earthwork contractor and other personnel who could potentially contact contaminated materials to develop and implement a written safety and health program for their employees involved in hazardous waste operations under 29 CFR 1910.120. The estimated cost for the contractor to be HAZWOPER trained and have appropriate liability insurance is roughly between $10,000 and $70,000 depending on the number of subcontractors that require training, and the contractor markup factor.

9.4. Soil is Contaminated with Chemicals of Concern

Contaminated soil (PCE, metals and cPAHs) and impacted soil (TCE and breakdown products, petroleum, metals and cPAHs) will likely be generated during construction activities. We recommend UW implement the following actions.

- **Characterize Soil and Groundwater for Disposal.** In-situ characterization or stockpiling and subsequent sampling will need to be performed on soil that is generated during construction in areas of PCE/metals/cPAHs-contaminated and TCE and breakdown products/petroleum, metals/cPAHs-impacted soil. The estimate cost of the soil sampling for soil disposal is $30,000 to $75,000 based on the mass of soil to be excavated.

- **PCE and TCE-Impacted and Contaminated Soil.** If PCE and TCE and breakdown products are detected in soil, UW EH&S will work with Ecology on obtaining a “contained-in determination” for disposal of the waste. The source of the solvent contamination, the concentration of the solvents and a TCLP analytical test result will be used when evaluating if the soil is disposed as hazardous waste by UW EH&S at a RCRA-permitted Subtitle C landfill or as a solid waste at a UW-approved Subtitle D landfill. Past experience has demonstrated that it is likely that the “contained-in determination” will be granted by Ecology, thus our cost estimates are based on this assumption.

  The estimated cost to transport and dispose (not including excavation and loading) soil at a Subtitle D landfill with a contained-in determination is $80 to $100 per ton. The typical cost for transportation and disposal (not including excavation and loading) of soil at a RCRA Subtitle C Landfill is $250 to $300 per ton. The cost estimates provided in this report assume disposal at a Subtitle D landfill.

  The estimated amount of soil PCE/TCE-impacted and contaminated soil is 14,500 tons. This assumes that soil only within the eastern half of the site is impacted with PCE and TCE. This may not apply if the source of PCE is remediated prior to construction. The estimated cost for transportation and disposal of the TCE-contaminated and impacted soil is $1,160,000 to $1,450,000.

- **Lead and cPAHs-Contaminated Soil.** Lead and cPAHs- contaminated soil is present on the west side of the site to depth of approximately 2 feet bgs. Lead- and cPAHs- contaminated soil will be disposed at a UW-approved Subtitle D landfill. The contaminated soil will be removed as necessary for construction and Ecology requirements. CPAHs- and metals-contaminated soil will be disposed at an UW-approved Subtitle D landfill. CPAHs- and metals-contaminated soil left in place shall be capped with a building or hardscape as required by Ecology. The estimated cost for transportation and disposal at a Subtitle D facility is $60 to $80 per ton. We estimate the amount of the lead- and cPAHs-contaminated soil to be 1,500 tons. The estimated cost for transportation and disposal is $90,000 to $120,000.

- **Metals-, Petroleum-, cPAHs-Impacted Soil.** Metals- cPAHs- and petroleum-impacted soil is present throughout the west site to a depth of approximately 10 feet bgs. For budgeting purposes, we assumed the transportation and disposal of metals-, cPAHs-, and petroleum-impacted soil is $30 to $50 per ton. We estimate the mass of the metals- and cPAHs-impacted soil to be 3,000 tons. The estimated cost for transportation and disposal is $90,000 to $150,000. If soil is reused as fill on site, the cost would be reduced because offsite disposal of the impacted soil will not be required.

- **Health and Safety.** As discussed in the contaminated groundwater section, UW requires its earthwork contractor and other personnel who could potentially contact contaminated materials to comply with training requirements for handling soil and potentially groundwater on the site. The health and safety costs are not included as separate item in the soil, because the costs in the groundwater section will apply.

10.0 LIMITATIONS

This report has been prepared for use by the University of Washington for the Priority Development Area 1A – Upton located in Tacoma, Washington at the University of Washington Tacoma campus.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

Please refer to Appendix A titled "Report Limitations and Guidelines for Use" for additional information pertaining to use of this report.

11.0 REFERENCES

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Table 1

Summary of Chemical Analytical Results[1] - Soil

Area 1A - Upton
University of Washington Tacoma Priority Development Areas
Tacoma, Washington

Boring/Test Pit	1A-B1		1A-B2			1A-B3	1A-B4		1A-B5			1A-B6			MTCA Method A ULU Cleanup Level	Reuse Criteria [14]
Sample Identification [2]	1A-B1-3-4	1A-B1-18-19	1A-B2-2-3	1A-B2-14-15	1A-B2-25-26	1A-B3-0-2	1A-B4-0-1	1A-B4-11-12	1A-B5-1-2	1A-B5-9-10	1A-B5-11-12	1A-B6-0-1	1A-B6-10-11	1A-B6-20-21		
Sample Depth (feet bgs)	3 to 4	18 to 19	2 to 3	14 to 15	25 to 26	0 to 2	0 to 1	11 to 12	1 to 2	9 to 10	11 to 12	0 to 1	10 to 11	20 to 21		
Soil Type	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Qvi		
NWTPH-HCID [3] (mg/kg)																
Gasoline-Range	22 U	--	21 U	22 U	24 U	23 U	23 U	25 U	24 U	24 U	23 U	23 U	23 U	--	30/100[10]	30
Diesel-Range	55 U	--	53 U	55 U	59 U	56 U	57 U	62 U	DET	60 U	59 U	57 U	58 U	--	2,000	200
Lube Oil-Range	110 U	--	110 U	110 U	120 U	DET	DET	120 U	DET	120 U	120 U	110 U	120 U	--	2,000	200
NWTPH-Dx [4] (mg/kg)																
Diesel-Range Petroleum Hydrocarbons	--	--	--	--	--	28 U	28 U	--	87 J	--	--	--	--	--	2,000	200
Lube Oil-Range Petroleum Hydrocarbons	--	--	--	--	--	230	270	--	560	--	--	--	--	--	2,000	200
VOCs [5] (mg/kg)																
Tetrachloroethene (PCE)	0.00072 U	0.051 J	0.0019 U	0.012	0.098	0.012	0.00084 U	0.0010 U	0.00098 U	0.0012 U	0.00077 U	0.0017	0.030	0.034	0.05	DET
Trichloroethene (TCE)	0.00072 U	0.0017 J	0.0019 U	0.0010	0.011	0.0015 U	0.00084 U	0.0010 U	0.00098 U	0.0012 U	0.00077 U	0.00081 U	0.00078 U	0.0014	0.03	DET
cis-1,2-Dichloroethene (DCE)	0.00072 U	0.0011 UJ	0.0019 U	0.0022	0.022	0.0015 U	0.00084 U	0.0010 U	0.00098 U	0.0012 U	0.00077 U	0.00081 U	0.00078 U	0.00090 U	160[11]	DET
Trans-1,2-Dichloroethene (DCE)	0.00072 U	0.0011 UJ	0.0019 U	0.00083 U	0.0020	0.0015 U	0.00084 U	0.0010 U	0.00098 U	0.0012 U	0.00077 U	0.00081 U	0.00078 U	0.00090 U	1,600[11]	DET
Vinyl Chloride	0.00072 U	0.0011 UJ	0.0019 U	0.00083 U	0.0018	0.0015 U	0.00084 U	0.0010 U	0.00098 U	0.0012 U	0.00077 U	0.00081 U	0.00078 U	0.00090 U	0.67[11]	DET
2-Butanone (MEK)[6]	0.0036 U	0.0054 UJ	0.0094 U	0.0041 U	0.010	0.0073 U	0.0042 U	0.0050 U	0.0049 U	0.060	0.0039 U	0.0041 U	0.0039 U	0.0045 U	48,000[11]	NE
Acetone[6]	0.0036 U	0.0054 UJ	0.0094 U	0.0041 U	0.046	0.0073 U	0.0042 U	0.0050 U	0.0049 U	0.26 J	0.0039 U	0.0041 U	0.0039 U	0.0058	72,000[11]	NE
Carbon Disulfide[6]	0.00072 U	0.0011 UJ	0.0019 U	0.00083 U	0.0023	0.0015 U	0.00084 U	0.0010 U	0.00098 U	0.0015	0.00077 U	0.00081 U	0.00078 U	0.00090 U	8,000[11]	NE
PAHs [7] (mg/kg)																
1-Methylnaphthalene	0.0073 U	--	0.0071 U	0.0073 U	0.0079 U	0.0075 U	0.0075 U	0.0082 U	0.031	0.0080 U	0.0078 U	0.0076 U	0.0078 U	--	35[11]	NE
2-Methylnaphthalene	0.0073 U	--	0.0071 U	0.0073 U	0.0079 U	0.0090	0.0075 U	0.0082 U	0.037	0.0080 U	0.0078 U	0.0076 U	0.0078 U	--	320[11]	NE
Acenaphthene	0.0073 U	--	0.0071 U	0.0073 U	0.0079 U	0.0075 U	0.0075 U	0.0082 U	0.086	0.0080 U	0.0078 U	0.0076 U	0.0078 U	--	4,800[11]	NE
Acenaphthylene	0.0073 U	--	0.0071 U	0.0073 U	0.0079 U	0.0075 U	0.0075 U	0.0086	0.015	0.0087	0.0078 U	0.0076 U	0.0078 U	--	NE	NE
Anthracene	0.0073 U	--	0.0071 U	0.0073 U	0.0079 U	0.0090	0.0075 U	0.019	0.19	0.011	0.0078 U	0.0076 U	0.0078 U	--	24,000[11]	NE
Benzo[g,h,i]perylene	0.019	--	0.0071 U	0.0073 U	0.0079 U	0.031	0.0075 U	0.031	0.29	0.022	0.0078 U	0.012	0.0078 U	--	NE	NE
Fluoranthene	0.041	--	0.0071 U	0.0073 U	0.018	0.064	0.0075 U	0.086	0.71	0.052	0.0078 U	0.031	0.0078 U	--	3,200[11]	NE
Fluorene	0.0073 U	--	0.0071 U	0.0073 U	0.0079 U	0.0075 U	0.0075 U	0.0088	0.086	0.0080 U	0.0078 U	0.0076 U	0.0078 U	--	3,200[11]	NE
Naphthalene	0.0073 U	--	0.0071 U	0.0073 U	0.0079 U	0.013	0.0075 U	0.014	0.057	0.013	0.0078 U	0.0076 U	0.0078 U	--	5	NE
Phenanthrene	0.033	--	0.0071 U	0.0073 U	0.020	0.040	0.0075 U	0.089	0.86	0.051	0.0078 U	0.027	0.0078 U	--	NE	NE
Pyrene	0.046	--	0.0071 U	0.0073 U	0.022	0.063	0.0090	0.099	0.90	0.056	0.0078 U	0.036	0.0078 U	--	2,400[11]	NE
Carcinogenic PAHs [7] (mg/kg)																
Benzo (a) anthracene (TEF 0.1)	0.020	--	0.0071 U	0.0073 U	0.0096	0.029	0.0075 U	0.039	0.38	0.025	0.0078 U	0.012	0.0078 U	--	MTCA ULU cleanup level for the sum of all cPAHs is 0.1 mg/kg	Reuse Criteria for the sum of all cPAHs is 0.1 mg/kg
Benzo (a) pyrene (TEF 1)	0.026	--	0.0071 U	0.0073 U	0.011	0.043	0.0075 U	0.048	0.51	0.033	0.0078 U	0.019	0.0078 U	--		
Benzo (b) fluoranthene (TEF 0.1)	0.033	--	0.0071 U	0.0073 U	0.011	0.050	0.0075 U	0.051	0.46	0.036	0.0078 U	0.022	0.0078 U	--		
Benzo (J,k) fluoranthene (TEF 0.1)	0.010	--	0.0071 U	0.0073 U	0.0079 U	0.014	0.0075 U	0.018	0.15	0.012	0.0078 U	0.0076 U	0.0078 U	--		
Chrysene (TEF 0.01)	0.026	--	0.0071 U	0.0073 U	0.011	0.047	0.012	0.053	0.49	0.034	0.0078 U	0.020	0.0078 U	--		
Dibenz (a,h) anthracene (TEF 0.1)	0.0073 U	--	0.0071 U	0.0073 U	0.0079 U	0.0075 U	0.0075 U	0.0082 U	0.078	0.0080 U	0.0078 U	0.0076 U	0.0078 U	--		
Indeno (1,2,3-cd) pyrene (TEF 0.1)	0.016	--	0.0071 U	0.0073 U	0.0079 U	0.022	0.0075 U	0.025	0.23	0.018	0.0078 U	0.010	0.0078 U	--		
Total TTEC of cPAHs (detect only)	0.034	--	N/A	N/A	0.013	0.055	0.00012	0.062	0.64	0.042	N/A	0.024	N/A	--	0.1	0.1

Boring/Test Pit	1A-B1		1A-B2			1A-B3	1A-B4		1A-B5			1A-B6			MTCA Method A ULU Cleanup Level	Reuse Criteria [14]
Sample Identification [2]	1A-B1-3-4	1A-B1-18-19	1A-B2-2-3	1A-B2-14-15	1A-B2-25-26	1A-B3-0-2	1A-B4-0-1	1A-B4-11-12	1A-B5-1-2	1A-B5-9-10	1A-B5-11-12	1A-B6-0-1	1A-B6-10-11	1A-B6-20-21		
Sample Depth (feet bgs)	3 to 4	18 to 19	2 to 3	14 to 15	25 to 26	0 to 2	0 to 1	11 to 12	1 to 2	9 to 10	11 to 12	0 to 1	10 to 11	20 to 21		
Soil Type	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Fill	Qvi		
Metals [8] (mg/kg)																
Arsenic	11 U	--	11 U	11 U	12 U	11 U	11 U	12 U	12 U	12 U	12 U	11 U	12 U	--	20	7
Barium	130	--	65	70	75	91	92	1,100	380	89	70	68	79	--	16,000 [11]	NE
Cadmium	0.54 U	--	0.53 U	0.54 U	0.59 U	0.56 U	0.57 U	0.75	0.96	0.60 U	0.58 U	0.57 U	0.58 U	--	2.0	1.0
Chromium	33	--	36	24	34	51	49	34	52	30	42	27	34	--	2,000 [11]	48 [15]
Lead	87	--	5.4	5.4 U	140	66	25	760	400	47	5.8 U	64	32	--	250	50
Mercury	0.27 U	--	0.26 U	0.27 U	0.30 U	0.28 U	0.28 U	0.31 U	0.31 U	0.38	0.29 U	0.28 U	0.29 U	--	2.0	0.07 or DET
Selenium	11 U	--	11 U	11 U	12 U	11 U	11 U	12 U	12 U	12 U	12 U	11 U	12 U	--	400 [11]	NE
Silver	1.1 U	--	1.1 U	1.1 U	1.2 U	1.1 U	1.1 U	1.2 U	1.2 U	1.2 U	1.2 U	1.1 U	1.2 U	--	400 [11]	NE
PCBs [9] (mg/kg)																
PCBs	0.054 U	--	0.053 U	0.054 U	0.059 U	--	0.057 U	0.062 U	0.061 U	0.060 U	0.058 U	0.057 U	0.058 U	--	1 [13]	DET

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc., of Redmond, Washington.

[2] Sample ID = Area number - boring/test pit number - starting depth of sample [feet bgs] -end depth [feet bgs], Area 1A Boring 1 collected 4-5 feet bgs = 1A-B1-4-5.

[3] Washington State Department of Ecology (Ecology)-approved method NWTPH-HCID.

[4] Ecology-approved method NWTPH-Dx.

[5] VOCs were analyzed by EPA method 8260B. Other VOCs were analyzed but not detected.

[6] Acetone, 2-Butanone and Carbon Disulfide are common laboratory contaminants.

[7] Polycyclic aromatic hydrocarbons (PAHs) and carcinogenic PAHs (cPAHs) were analyzed by U.S. Environmental Protection Agency (EPA) method 8270D/SIM. Other PAHs were analyzed but not detected.

[8] Resource Conservation Recovery Act (RCRA) metals analyzed by EPA 6000/7000 series method.

[9] Polychlorinated biphenyls (PCBs) were analyzed by U.S. Environmental Protection Agency (EPA) method 8082.

[10] MTCA Method A cleanup level for gasoline is 30 mg/kg if benzene is detected or if the sum of toluene, ethylbenzene and xylenes are equal to or greater than 1% of the total gasoline detection.

[11] MTCA Method B criteria represented because MTCA Method A cleanup level has not been established.

[12] MTCA Method A cleanup level for Trivalent Chromium.

[13] MTCA ULU cleanup level for the sum of all PCBs is 1 mg/kg.

[14] Guidance for Remediation of Petroleum Contaminated Sites (Publication 10-09-057) Ecology, October 2011; Summary Natural Background Soil Metals Concentrations in Washington State (Publication 94-115) dated October 1994; and Hazardous Waste Regulations 40 CFR Part 260.

[15] Chromium was not compared to the Reuse Criteria listed above for soils based on historic soil analytical results indicating chromium is not a prevalent chemical of concern on the UWT campus.

-- = sample not analyzed
ND = Not detected
N/A = not applicable
mg/kg = milligram per kilogram
bgs = below ground surface
Qvi = Ice-contact deposit
MTCA = Model Toxics Control Act
J = Estimated result by the analytical laboratory
DET = Detected greater than laboratory reporting limits
U = Analyte was not detected at or greater than the listed reporting limit
TEF = Toxicity Equivalency Factor as defined in WAC 173-340-900 Table 708-2
Total Toxic Equivalent Concentration (TTEC) is the sum of each individual cPAH concentration multiplied by its corresponding TEF.
Bold font type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.
Bold font type and gray shading indicates that the detected concentration is greater than the respective MTCA cleanup level.
Dashed outline indicates the value is greater than the Reuse Criteria.

Table 2

Summary of Chemical Analytical Results[1] - Groundwater

Area 1A - Upton

University of Washington Tacoma Priority Development Areas

Tacoma, Washington

Boring Identification	1A-B2	UG-MW26	UG-MW33	MTCA Method A Groundwater Cleanup Level	MTCA Method B Air Screening Level [13]
Sample ID [2]	1A-B2-W	UG-MW26-130930	UG-MW33-131002		
Sample Date	6/13/2013	9/30/2013	10/2/2013		
Approximate Depth to Groundwater (feet bgs) [3]	26	-0.25	6.61		
Approximate Elevation of Groundwater [4]	194	202.43	176.96		
Top of Well Screen Elevation (feet) [4]	196	196	177		
Bottom of Well Screen Elevation (feet) [4]	191	186	172		
Lithology At Well Screen	Fill	Qvi	Qvi		
Chemical					
NWTPH-Gx[5] (µg/L)					
Gasoline-Range	100 U	100 U	100 U	800/1,000[10]	NE
NWTPH-Dx[6] (mg/L)					
Diesel-Range	0.26 U	0.26 U	0.27 U	0.5	NE
Lube Oil-Range	0.42 U	**0.46**	0.43 U	0.5	NE
VOCs[7] (µg/L)					
Trichloroethene (TCE)	**4.8**	0.20 U	0.20 U	5	1.5
Tetrachloroethene (PCE)	**6.5**	0.20 U	0.20 U	5	24
trans-1,2-Dichloroethene	**2.9**	0.20 U	0.20 U	160[11]	110
cis-1,2-Dichloroethene	**45**	0.20 U	0.20 U	16[11]	160
Vinyl Chloride	**6.9**	0.20 U	0.20 U	0.2	0.35
cPAHs[8] (µg/L)					
Benzo (a) anthracene (TEF 0.1)	0.0098 U	0.0096 U	0.010 U	MTCA ULU cleanup level for the sum of all cPAHs is 0.1 µg/L	NE
Benzo (a) pyrene (TEF 1)	0.0098 U	0.0096 U	0.010 U		NE
Benzo (b) fluoranthene (TEF 0.1)	0.0098 U	0.0096 U	0.010 U		NE
Benzo (j,k) fluoranthene (TEF 0.1)	0.0098 U	0.0096 U	0.010 U		NE
Chrysene (TEF 0.01)	0.0098 U	0.0096 U	0.010 U		NE
Dibenz (a,h) anthracene (TEF 0.1)	0.0098 U	0.0096 U	0.010 U		NE
Indeno (1,2,3-cd) pyrene (TEF 0.1)	0.0098 U	0.0096 U	0.010 U		NE
Total TTEC of cPAHs (detect only)	N/A	N/A	N/A	0.1	NE
Metals[9] (µg/L)					
Arsenic	**4.3**	0.20 U	3.3 U	5	NE
Cadmium	4.0 U	4.0 U	4.4 U	5	NE
Total Chromium	10 U	11 U	11 U	50[12]	NE
Lead	1.0 U	1.1 U	1.1 U	15	NE
Mercury	0.50 U	0.50 U	0.50 U	2	NE

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc. in Redmond, Washington.

[2] Sample ID = Boring number - Water sample (i.e., B10-W was a water sample collected from boring B10) or Sample ID = monitoring well identification number (i.e., monitoring well TP-MW1).

[3] Groundwater level was measured below the existing ground surface in the temporary well. Groundwater level was measured below the top of the casing in the monitoring wells.

[4] Based on survey completed by AHBL. Horizontal datum Washington State Plane (South Zone), NAD 83. Vertical datum NGVD 29.

[5] Washington State Department of Ecology (Ecology)-approved method NWTPH-Gx.

[6] Ecology-approved method NWTPH-Dx.

[7] Volatile organic compounds (VOCs) were analyzed by Environmental Protection Agency (EPA) method 8260C. Other VOCs were analyzed but not detected.

[8] Polycyclic Aromatic Hydrocarbons (PAHs) analyzed by EPA method 8270D/SIM. Other PAHs were analyzed but not detected.

[9] Metals analyzed by EPA 200.8 or 7470A method. The groundwater sample collected from 1A-B2 was submitted for dissolved metals. All other samples were submitted for total metals.

[10] MTCA Method A cleanup level for gasoline-range petroleum hydrocarbons is 800 µg/L if benzene is present and 1,000 µg/L if benzene is not present.

[11] MTCA Method B criteria represented because MTCA Method A cleanup level has not been established.

[12] MTCA Method A cleanup level for total chromium shown. Cleanup level for hexavalent chromium is 48 µg/L.

[13] MTCA Method B Indoor Air Screening Level from Washington State Deportment of Ecology Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action. Values updated as appropriate to incorporate recent toxicity data.

MTCA = Model Toxics Control Act | NE = Not established | Qvi = Ice-contact deposit

cPAH = Carcinogenic PAHs | µg/L = microgram per liter | mg/L = milligram per Liter

U = Analyte was not detected at or greater than the listed reporting limit

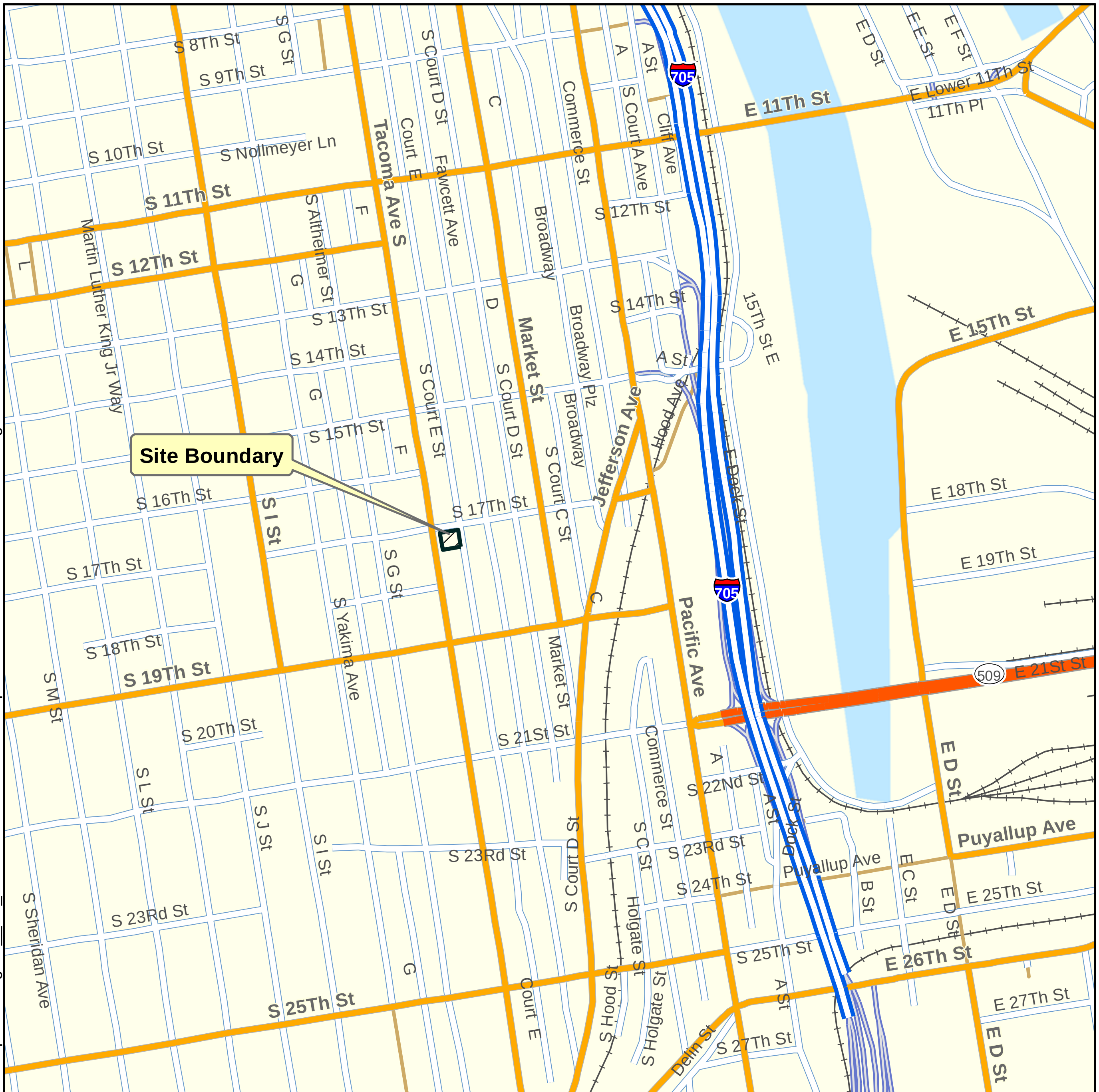
TEF = Toxicity Equivalency Factor as defined in WAC 173-340-900 Table 708-2

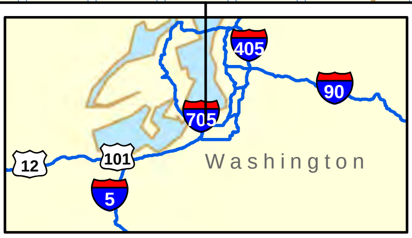
Total Toxic Equivalent Concentration (TTEC) is the sum of each individual cPAH concentration multiplied by its corresponding TEF.

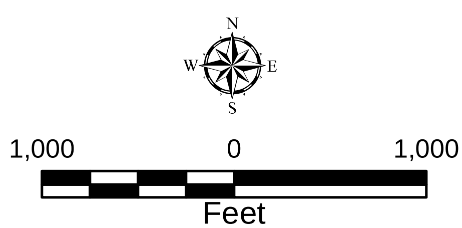
Bold font type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Bold font type and gray shading indicates analyte was detected at a concentration greater than the MTCA Method groundwater cleanup/criteria level.

Dashed outline indicates analyte was detected at a concentration greater than the MTCA Method B Indoor Air Screening Level.







Notes:
CPO = University of Washington Capital Project Office
UWT = University of Washington Tacoma
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Data Sources: ESRI Data & Maps

Projection: NAD 1983 UTM Zone 10N

Vicinity Map

UWT Environmental Investigation
Priority Development Areas - CPO Project No. 204277
Tacoma, Washington

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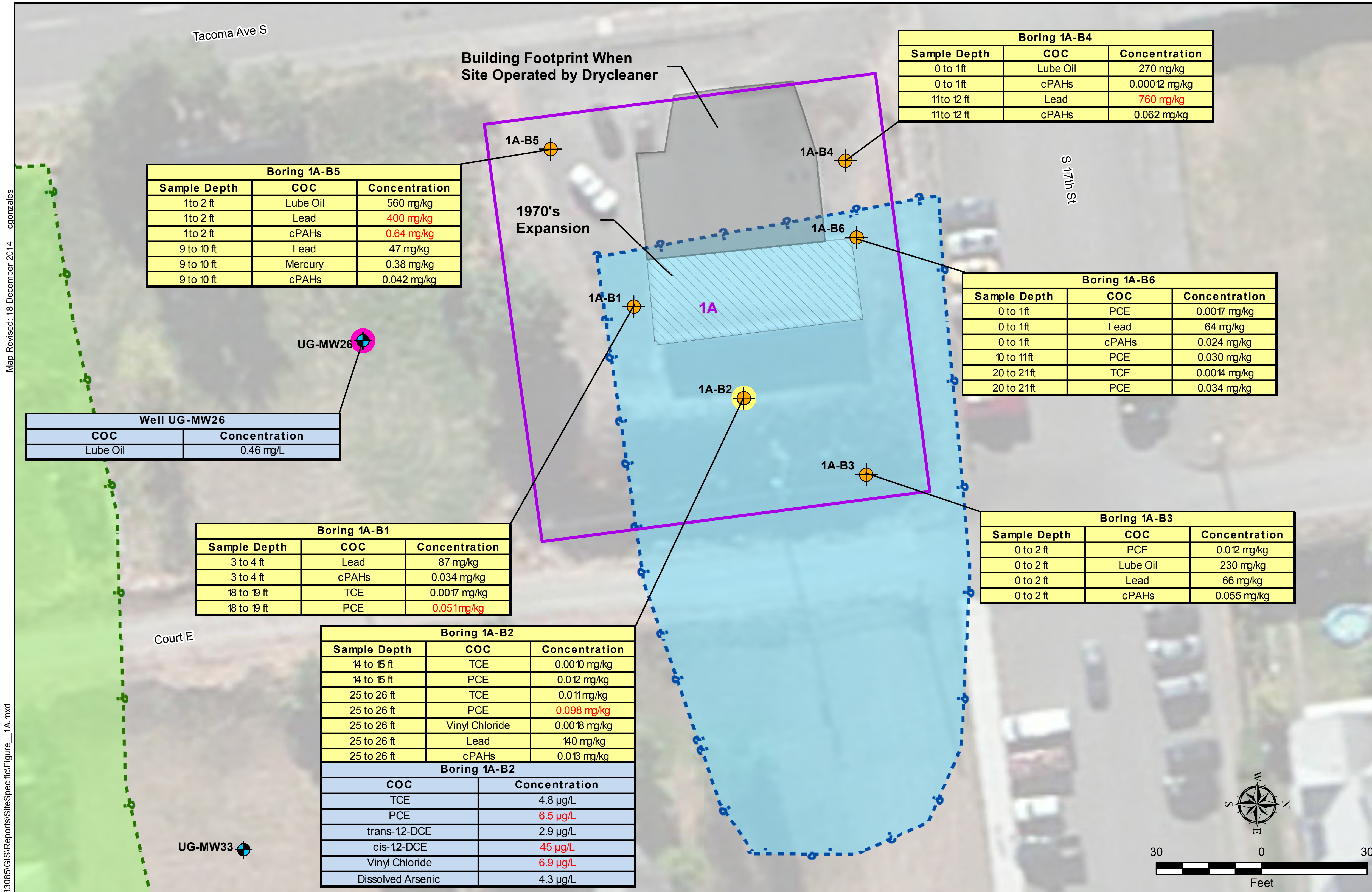
Figure 1

Office: TAC Path: \\tac\projects\0\0183085\GIS\Reports\SiteSpecific\Figure_1A_VM.mxd Map Revised: 17 December 2014 cgonzales



Boring 1A-B5		
Sample Depth	COC	Concentration
1 to 2 ft	Lube Oil	560 mg/kg
1 to 2 ft	Lead	400 mg/kg
1 to 2 ft	cPAHs	0.64 mg/kg
9 to 10 ft	Lead	47 mg/kg
9 to 10 ft	Mercury	0.38 mg/kg
9 to 10 ft	cPAHs	0.042 mg/kg

Boring 1A-B4		
Sample Depth	COC	Concentration
0 to 1 ft	Lube Oil	270 mg/kg
0 to 1 ft	cPAHs	0.00012 mg/kg
11 to 12 ft	Lead	760 mg/kg
11 to 12 ft	cPAHs	0.062 mg/kg

Boring 1A-B6		
Sample Depth	COC	Concentration
0 to 1 ft	PCE	0.0017 mg/kg
0 to 1 ft	Lead	64 mg/kg
0 to 1 ft	cPAHs	0.024 mg/kg
10 to 11 ft	PCE	0.030 mg/kg
20 to 21 ft	TCE	0.0014 mg/kg
20 to 21 ft	PCE	0.034 mg/kg

Well UG-MW26	
COC	Concentration
Lube Oil	0.46 mg/L

Boring 1A-B1		
Sample Depth	COC	Concentration
3 to 4 ft	Lead	87 mg/kg
3 to 4 ft	cPAHs	0.034 mg/kg
18 to 19 ft	TCE	0.0017 mg/kg
18 to 19 ft	PCE	0.051mg/kg

Boring 1A-B3		
Sample Depth	COC	Concentration
0 to 2 ft	PCE	0.012 mg/kg
0 to 2 ft	Lube Oil	230 mg/kg
0 to 2 ft	Lead	66 mg/kg
0 to 2 ft	cPAHs	0.055 mg/kg

Boring 1A-B2		
Sample Depth	COC	Concentration
14 to 15 ft	TCE	0.0010 mg/kg
14 to 15 ft	PCE	0.012 mg/kg
25 to 26 ft	TCE	0.011 mg/kg
25 to 26 ft	PCE	0.098 mg/kg
25 to 26 ft	Vinyl Chloride	0.0018 mg/kg
25 to 26 ft	Lead	140 mg/kg
25 to 26 ft	cPAHs	0.013 mg/kg

Boring 1A-B2	
COC	Concentration
TCE	4.8 µg/L
PCE	6.5 µg/L
trans-1,2-DCE	2.9 µg/L
cis-1,2-DCE	45 µg/L
Vinyl Chloride	6.9 µg/L
Dissolved Arsenic	4.3 µg/L

Soil Results*

Boring 2A-B7		
Sample Depth	COC	Concentration
2.5 to 3.5 feet bgs	Lead	200 mg/kg
2.5 to 3.5 feet bgs	cPAHs	0.64 mg/kg

Groundwater Results*

Well UG-MW13	
COC	Concentration
TCE	110 µg/L
PCE	1.4 µg/L

*Chemicals shown in red were detected at concentrations greater than the respective MTCA Method A cleanup levels.

Only analytical results of the chemicals of concern are shown if detected. Other chemicals that were analyzed and detected are not shown unless detected at concentrations greater than the respective MTCA cleanup levels.

Legend

Approximate Location of Priority Development Area 1A

Approximate Subsurface Location and Identification

Direct Push Boring

Sonic Core Boring - Permanent New Monitoring Well

Lithology of Well Screen Interval

Fill (Shallow Aquifer)

Ice-Contact Deposit (Shallow Aquifer)

Advance Outwash (Deep Aquifer)

Approximate Lateral Extent of PCE- and Breakdown Product Contaminated Groundwater Plume in Shallow Aquifer

Approximate Lateral Extent of TCE-Contaminated Groundwater Plume in Shallow Aquifer

Map Revised: 18 December 2014 cgonzales

Notes:
UWT = University of Washington Tacoma
cPAHs concentrations shown as TTEC.
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

COC = Chemical of Concern
PDA = Priority Development Area
PCE = tetrachloroethene
TCE = trichloroethene
cPAH = Carcinogenic Polycyclic Aromatic Hydrocarbons
mg/kg = milligram per kilogram
µg/L = microgram per Liter
bgs = Below Ground Surface
TTEC = Total Toxicity Equivalency Concentration
DCE = dichloroethene
MCTA = Model Toxics Control Act
ULU = Unrestricted Land Use

Soil MTCA Cleanup/Criteria Levels:
PCE = 0.05 mg/kg (Method A ULU)
TCE = 0.03 mg/kg (Method A ULU)
Benzene = 0.03 mg/kg (Method A ULU)
Vinyl Chloride = 0.67 mg/kg (Method B)
Lube Oil-Range Petroleum Hydrocarbons = 2,000 mg/kg (Method A ULU)
Diesel-Range Petroleum Hydrocarbons = 2,000 mg/kg (Method A ULU)
Gasoline-Range Petroleum Hydrocarbons = 100 mg/kg (Method A ULU)
cPAHs (TTEC) = 0.1 mg/kg (Method A ULU)
Lead = 250 mg/kg (Method A ULU)
Arsenic = 20 mg/kg (Method A ULU)
Cadmium = 2 mg/kg (Method A ULU)
Mercury = 2 mg/kg (Method A ULU)

Groundwater MTCA Cleanup/Criteria Levels:
PCE = 5 µg/L (Method A); 24 µg/L (Indoor Air)
TCE = 5 µg/L (Method A); 1.5 µg/L (Indoor Air)
cis-1,2-DCE= 16 µg/L (Method B); 160 µg/L (Indoor Air)
trans-1,2-DCE = 160 µg/L (Method B); 110 µg/L (Indoor Air)
1,1-DCA = 7.7 µg/L (Method B); 11 µg/L (Indoor Air)
Vinyl Chloride = 0.2 µg/L (Method A); 0.35 µg/L (Indoor Air)
Benzene = 5 µg/L (Method A); 2.4 µg/L (Indoor Air)
Lube Oil-Range Petroleum Hydrocarbons = 0.5 mg/L (Method A)
Arsenic = 5 µg/L (Method A)
cPAHs= 0.1 µg/L (Method A)

Site Plan – PDA 1A/Upton

UWT Environmental Investigation
Priority Development Areas - CPO Project No. 204277
Tacoma, Washington

GeoEngineers

Figure 2

Path: \\tac\projects\0\0183085\GIS\Reports\SiteSpecific\Figure__1A.mxd

Office: TAC

APPENDIX A
Report Limitations and Guidelines for Use

APPENDIX A
REPORT LIMITATIONS AND GUIDELINES FOR USE[1]

This appendix provides information to help you manage your risks with respect to the use of this report.

Environmental Services are Performed for Specific Purposes, Persons and Projects

This report has been prepared for use by University of Washington. This report is not intended for use by others, and the information contained herein is not applicable to other sites.

GeoEngineers structures our services to meet the specific needs of our clients. For example, an environmental site assessment study conducted for a property owner may not fulfill the needs of a prospective purchaser of the same property. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and project site. No one except University of Washington should rely on this environmental report without first conferring with GeoEngineers. This report should not be applied for any purpose or project except the one originally contemplated.

This Environmental Report is Based on a Unique Set of Project-Specific Factors

This report has been prepared for the Priority Development Areas (PDAs) Environmental Assessment Project at the UW – Tacoma (UWT) campus located in Tacoma, Washington. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, do not rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

If important changes are made after the date of this report, GeoEngineers should be given the opportunity to review our interpretations and recommendations and provide written modifications or confirmation, as appropriate.

Reliance Conditions for Third Parties

If a lending agency or other parties intend to place legal reliance on the product of our services, we require that those parties indicate in writing their acknowledgement that the scope of services provided, and the general conditions under which the services were rendered including the

[1] Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

limitation of professional liability, are understood and accepted by them. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions.

Environmental Regulations are Always Evolving

Some substances may be present in the site vicinity in quantities or under conditions that may have led, or may lead, to contamination of the subject site, but are not included in current local, state or federal regulatory definitions of hazardous substances or do not otherwise present current potential liability. GeoEngineers cannot be responsible if the standards for appropriate inquiry, or regulatory definitions of hazardous substance, change or if more stringent environmental standards are developed in the future.

Subsurface Conditions can Change

This environmental report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by manmade events such as construction on or adjacent to the site, by new releases of hazardous substances, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Always contact GeoEngineers before applying this report to determine if it is still applicable.

Topsoil

For the purposes of this report, we consider topsoil to consist of generally fine-grained soil with an appreciable amount of organic matter based on visual examination, and to be unsuitable for direct support of the proposed improvements. However, the organic content and other mineralogical and gradational characteristics used to evaluate the suitability of soil for use in landscaping and agricultural purposes was not determined, nor considered in our analyses. Therefore, the information and recommendations in this report, and our logs and descriptions should not be used as a basis for estimating the volume of topsoil available for such purposes.

Most Environmental Findings are Professional Opinions

Our interpretations of subsurface conditions are based on field observations and chemical analytical data from widely spaced sampling locations at the site. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ – sometimes significantly – from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

Do Not Redraw the Exploration Logs

Environmental scientists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in an environmental report should never be redrawn for inclusion in other design drawings. Only photographic or electronic reproduction is acceptable, but recognize that separating logs from the report can elevate risk.

Read These Provisions Closely

Some clients, design professionals and contractors may not recognize that the geoscience practices (geotechnical engineering, geology and environmental science) are far less exact than other engineering and natural science disciplines. This lack of understanding can create unrealistic expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory "limitations" provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you are unclear how these "Report Limitations and Guidelines for Use" apply to your project or site.

Geotechnical, Geologic and Geoenvironmental Reports Should Not Be Interchanged

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually relate any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding a specific project.

Biological Pollutants

GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention, or assessment of the presence of Biological Pollutants in or around any structure. Accordingly, this report includes no interpretations, recommendations, findings, or conclusions for the purpose of detecting, preventing, assessing, or abating Biological Pollutants. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts.

PDA 1B – Tacoma Vacant

Priority Development Area 1B
Tacoma Vacant
Environmental Subsurface Investigation

Environmental Subsurface Investigation Project
UW Capital Project Office Project No. 204277
1711 to 1755 Tacoma Avenue
Tacoma, Washington

for
University of Washington

December 19, 2014

GeoEngineers

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Priority Development Area 1B
Tacoma Vacant
Environmental Subsurface Investigation
UW Capital Project Office
Project No. 204277
1711 to 1755 Tacoma Avenue
Tacoma, Washington

File No. 0183-085-00

December 19, 2014

Prepared for:

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GeoEngineers

Table of Contents

1.0 INTRODUCTION **1**
2.0 SITE HISTORICAL USE **1**
3.0 CURRENT SITE FEATURES **1**
4.0 ENVIRONMENTAL SUBSURFACE INVESTIGATION **2**
4.1. Historical Research and Magnetic Anomaly Findings 2
4.2. Soil Explorations 3
4.3. Groundwater Sampling 3
5.0 SITE GEOLOGY AND HYDROGEOLOGY **3**
5.1. Soil Conditions 3
5.2. Groundwater Conditions 4
6.0 CHEMICAL ANALYTICAL PROGRAM AND ANALYTICAL RESULTS **4**
6.1. General 4
6.2. Criteria for Characterization of Soil and Groundwater 4
6.3. Soil 6
6.3.1. Petroleum-Range Hydrocarbons 6
6.3.2. VOCs 7
6.3.3. PAHs 8
6.3.4. RCRA Metals 8
6.4. Groundwater 9
6.4.1. Petroleum-Range Hydrocarbons 10
6.4.2. VOCs 10
6.4.3. PAHs 11
6.4.4. RCRA Metals 11
7.0 PROPOSED DEVELOPMENT PLANS **11**
8.0 CONCLUSIONS **11**
9.0 POTENTIAL IMPACTS AND MITIGATION MEASURES TO DESIGN AND CONSTRUCTION **12**
9.1. Site is a Potential Source 13
9.2. TCE-Contaminated Groundwater 13
9.3. Soil is Contaminated with Chemicals of Concern 15
10.0 LIMITATIONS **17**
11.0 REFERENCES **17**

LIST OF TABLES

Table 1. Summary of Chemical Analytical Results – Soil
Table 2. Summary of Chemical Analytical Results – Groundwater

LIST OF FIGURES

Figure 1. Vicinity Map
Figure 2. Site Plan PDA 1B/Tacoma Vacant

APPENDICES

Appendix A. Report Limitations and Guidelines for Use

1.0 INTRODUCTION

This report presents the results of our environmental subsurface investigation completed for the University of Washington (UW) at the Tacoma Vacant property (Priority Development Area [PDA] - 1B) located on the UW Tacoma (UWT) campus at 1711 to 1755 Tacoma Avenue in Tacoma, Washington. The property is herein referred to as the "site." The site is identified as PDA 1B for this project. The Tacoma Vacant property is bound by Tacoma Avenue to the west, the Upton property to the north, Court E to the east and South 19th Street to the south. A Vicinity Map of the site is included as Figure 1. See Figure 2 for the layout of the site.

This subsurface investigation was completed under the Environmental Subsurface Investigation Project, UW project number 204277. This report was completed as a subset of the larger subsurface assessment report titled "2013 Environmental Subsurface Investigation – University of Washington-Tacoma, Tacoma, Washington" dated December 19, 2014 to assist with development of the property. This report should be used in context with the larger subsurface assessment report. Borings logs, subsurface investigation methodologies, and chemical analytical data packages are included in the larger investigation report.

General impacts and potential mitigation measures are provided in this report that may be employed in design and construction. It is important to recognize that additional environmental investigations may be necessary prior to selection of the final mitigation measure. Mitigation measures and associated costs provided in this report will likely need refinement based on the results of the additional environmental investigations. The project team should contact UW Environmental Health & Safety (UW EH&S) to discuss the need for additional environmental investigations at this site. UW EH&S is the liaison with the Washington State Department of Ecology (Ecology) for review and approval of mitigation measures.

2.0 SITE HISTORICAL USE

The Tacoma Vacant property was developed with residences and stables (later garages) in the late 1800s near the central portion of the property including, an iron works facility as early as 1896. A Japanese School with a garage was present in the north-central portion of the property from at least 1927 to 2005. The southern portion of the site was used for wood storage and miscellaneous debris dumping between 2001 and 2005.

Apartment buildings/residences were present on the northern boundary between 1912 and 1965. A wood fuel company was present on the southern portion of the property from as early as 1936 until 1961. A construction laydown yard was constructed on the southern portion of the property around 2005, which stored wood and miscellaneous debris until 2012.

3.0 CURRENT SITE FEATURES

The northern and central portions of the property are currently vegetated with grass and trees while the southern portion of the property is used as a storage area by UW facilities. Topography from

Tacoma Avenue to Court E varies as much as 20 feet in elevation. An ecology block retaining wall is present in the southern portion of the site.

4.0 ENVIRONMENTAL SUBSURFACE INVESTIGATION

The environmental subsurface investigation completed on the site consisted of a magnetic/ground penetrating radar (M/GPR) survey, test pits, rotosonic core borings, groundwater development and sampling of new monitoring wells. The investigations were completed between June and September 2013.

4.1. Historical Research and Magnetic Anomaly Findings

Historic research results indicated the potential for underground storage tanks (USTs) to be present given the age of the historic buildings and the source of heat typically used during these time periods. In addition, heating conversion permits were listed in the permit records. An M/GPR survey was performed on the entire site in June 2013. The M/GPR survey was not performed inside the existing structure. No magnetic anomalies were identified on site.

The M/GPR survey was conducted within PDA 1B in June 2013. Six magnetic anomalies were identified in the central portion and northwest corner of the site. The magnetic anomalies were designated using the following identification nomenclature: 1B-A1 where 1B identifies the PDA and –A1 is the number of the anomaly at the site.

Test pits were completed in locations where magnetic anomalies were observed during the M/GPR survey. Magnetic anomalies were observed near the former commercial or apartments possibly indicating USTs may be present. Test pits were only completed in the vicinity of magnetic anomalies located near former commercial buildings or apartments where USTs are anticipated to be larger and require additional resources to remove if encountered during construction than residential USTs. Five test pits were excavated in the vicinity of magnetic anomalies 1B-A1 through 1B-A5. Magnetic anomaly 1B-A6 was not investigated because it was located near a former residence.

The five test pits are discussed further below.

- 1B-A1. Fill material including four old propane tanks and barbed-wire debris were observed to a depth of approximately 1.5 feet below ground surface (bgs). Native soil was encountered at approximately 1.5 feet bgs. This magnetic anomaly was likely related to the propane tanks and metal debris encountered within the fill material.
- 1B-A2. Fill material was observed to a depth of approximately 3 feet bgs including an approximately 1-inch-diameter metal pipe, chicken wire, a piece of rebar and various construction debris. Native soil was encountered at approximately 3 feet bgs. This magnetic anomaly was likely related to the metal debris encountered within the fill material.
- 1B-A3. Fill material was observed to a depth of approximately 3 feet bgs including an approximately ¾-inch-diameter metal pipe and various construction debris. Native soil was encountered at approximately 3 feet bgs. This magnetic anomaly was likely related to the metal pipe and construction debris observed within the fill material.

- **1A-A4.** Fill material was observed to a depth of approximately 3 feet bgs including an approximately ¾-inch-diameter metal pipe, approximately 4-inch-diameter clay drain pipe and various construction debris. Native soil was encountered at approximately 3 feet bgs. This magnetic anomaly was likely related to the metal pipe and various construction debris observed within the fill material.
- **1A-A5.** Fill material was observed to a depth of approximately 3.5 feet bgs including various metal pipe, metal and construction debris. Native soil was encountered at approximately 3.5 feet bgs. This magnetic anomaly was likely related to the metal and construction debris encountered in the fill material.

4.2. Soil Explorations

Subsurface explorations included completing six test pits at the site on June 24, 2013 and advancing five soil borings using rotosonic core drilling methods from June 27 through September 19, 2013.

The test pits (1B-TP1 through 1B-TP6) ranged in depth from approximately 3.5 to 8 feet bgs and were terminated when native soil was encountered. These test pits were completed separately from the test pits performed to investigate the magnetic anomalies.

The soil borings (UG-MW24, UG-MW25S, UG-MW25D, UG-MW26 and UG-MW37) ranged in depth from 20 to 100 feet bgs. The five soil borings were converted into permanent groundwater monitoring wells. The deeper soil borings were telescoped between the ice-contact deposits and advance outwash to prevent cross-contamination between the two aquifers.

4.3. Groundwater Sampling

Groundwater samples were collected from on-site monitoring wells UG-MW24, UG-MW25D, UG-MW25S, UG-MW26 and UG-MW37. A groundwater sample was collected from UG-MW24 on July 15, 2013. Groundwater samples were collected from UG-MW25S and UG-MW25D on September 4, 2013. Groundwater samples were collected from monitoring wells UG-MW26 and UG-MW37 on September 30, 2013.

5.0 SITE GEOLOGY AND HYDROGEOLOGY

5.1. Soil Conditions

Subsurface conditions consist of fill, ice-contact deposits, silt layer and advance outwash. The fill consists of silt and sand with gravel (silt with sand and gravel and/or sand with silt and gravel) from below the surface to depths ranging from approximately 1 to 5 feet bgs.

Native soil conditions observed below the fill consists of glacially consolidated ice-contact deposits comprised of silty sand to sand with gravel and silt. A semi-confining to confining silt unit was observed to depths ranging from 14 to 19 feet bgs in the soil borings except in borings UG-MW24 and UG-MW37. A silty sand layer with gravel was observed below the ice-contact deposits in borings UG-MW24 and UG-MW37 but appeared to be semi-confining to confining based on the presence of wet soil observed above the silty sand layer.

Glacial advance outwash was observed beneath the silt layer in borings UG-MW24, UG-MW25D and UG-MW37. The advance outwash consisted of sand with gravel with various amounts of silt to silty gravel with sand to the full depth explored.

5.2. Groundwater Conditions

It appears that groundwater conditions observed at the site consist of a shallow aquifer (ice-contact deposits) and deep aquifer (advance outwash) to the depths explored during this investigation. The shallow and deep aquifers appear to be separated by a silt layer between the ice-contact deposits and advance outwash.

Groundwater within the shallow aquifer appears to be present within the sand and gravel seams observed in the ice-contact deposits. The hydraulic connection of the sand and gravel seams within the shallow aquifer is unknown in and around the site. Groundwater elevation within the shallow aquifer ranged from approximately Elevation 199 feet (UG-MW37) to Elevation 202 feet (UG-MW26). Groundwater was measured at 0.25 feet above the top of casing in well UG-MW26 that likely indicates an artesian condition.

Groundwater within the deep aquifer appears to be continuous with interbeds of moist to wet sands with silt to silty sands and gravel with sand and silt to silty gravels at depth. The elevation of the groundwater within the deep aquifer was approximately observed to be approximately 165 feet in monitoring wells UG-MW24 and UG-MW25D. It should be noted that groundwater levels will vary depending on season, precipitation and other factors.

6.0 CHEMICAL ANALYTICAL PROGRAM AND ANALYTICAL RESULTS

6.1. General

Soil and groundwater samples were submitted to OnSite Environmental, Inc., in Redmond, Washington. The chemical analytical data are summarized in Tables 1 and 2. Chemicals that were not detected at or greater than the laboratory reporting limits in the analyzed samples are typically not included on the tables.

6.2. Criteria for Characterization of Soil and Groundwater

The following criteria were used to evaluate impacted and contaminated soil and groundwater.

- Tetrachloroethene (PCE) and Trichloroethene (TCE) Impacted and Contaminated Soil
    - PCE, TCE and breakdown products at concentrations detected in the analyzed soil samples.
- Contaminated Soil
    - Petroleum hydrocarbons, carcinogenic polycyclic aromatic hydrocarbons (cPAHs), metals and volatile organic compounds (VOCs) were detected at concentrations greater than the Model Toxics Control Act (MTCA) Method A Unrestricted Land Use (ULU) cleanup level or MTCA Method B screening level.

- Impacted Soil

  Some contaminants were detected at concentrations less than the respective MTCA cleanup levels. UWT may be able to reuse certain types of soil depending on the sampling results. UW EH&S must review the chemical analytical data to evaluate if reuse or disposal at an offsite facility is necessary. Soil reuse and disposal are subject to Ecology Guidance for Remediation of Petroleum Contaminated Sites (Ecology, 2011), solid waste regulations and disposal facility permit conditions. The criteria below is herein referred to as "Reuse Criteria."

  - Petroleum hydrocarbons, cPAHs and/or Lead

    The Ecology guidance indicates that soil with diesel- and/or lube oil-range petroleum hydrocarbons detected at concentrations less than 200 milligrams per kilogram (mg/kg) and/or gasoline-range petroleum hydrocarbons detected at concentrations less than 30 mg/kg are suitable for reuse as commercial fill at UWT campus with the following limitations:

    - placed above the highest water table,
    - not within 100 feet of a drinking water well,
    - not within wellhead protection area of public water supply,
    - not within wetlands or where surface water contact is possible, and
    - not within a surface water infiltration facility or septic drain field.

    If the concentrations exceed the above limits but are still less than respective MTCA cleanup levels the soil may be reused in road and bridge embankment construction, landfill daily cover or asphalt manufacturing with UW EH&S approval.

  - Arsenic, Cadmium, and/or Mercury

    Soil with concentrations of arsenic, cadmium and/or mercury above what is normally found in the natural background environment (Puget Sound Background levels - Ecology, 1994) is typically suitable for disposal at an inert waste landfill or a Department of Natural Resources (DNR) reclamation pit. UW EH&S approval is necessary.

    Soil at and near the UWT campus has been well documented to contain chromium at concentrations slightly above the natural background level and is not considered in the "Reuse Criteria."

- Contaminated Groundwater

  - Petroleum hydrocarbons, PAHs and metals detected at concentrations greater than the respective MTCA Method A groundwater cleanup levels. Method B criteria were used for comparison of specific compounds if Method A groundwater cleanup levels are not established for those compounds.

  - VOCs detected at concentrations greater than the respective MTCA Method A groundwater cleanup levels, and MTCA Method B groundwater screening levels protective of indoor air. The updated TCE/PCE/1,1-dichloroethane (DCA) screening levels were calculated using Equation 1 from Ecology's review draft "Guidance for

Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action" dated October 2009 (Ecology, 2009) and Environmental Protection Agency's (EPA's) TCE, PCE and 1,1-DCA toxicity factors updated in 2011 and available on EPA's online Integrated Risk Information System (IRIS). The other values were obtained from Ecology's review draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action."

6.3. Soil

Soil samples collected during the drilling activities were submitted for chemical analysis. The soil samples collected from the subsurface explorations were identified using the following identification system: A#-B#-start depth-end depth, where A# is the area designation number, B/TP# is the boring/test pit number and start depth-end depth is the depth interval in feet below the ground surface of specific sample (e.g., 1B-TP2-5-6 was collected in PDA 1B from test pit 2 from 5 to 6 feet bgs).

Soil samples were submitted for chemical analysis based on the following:

- Where field screening indicated the soil is impacted.
- Directly below potentially impacted soil to delineate the vertical extent.
- Where wet sand seams were encountered in the ice-contact deposits or advance outwash.
- At the soil/groundwater interface if groundwater was encountered.
- At the top of confining units if encountered.

The soil samples were submitted for chemical analysis of petroleum hydrocarbon identification by Ecology-approved method NWTPH-HCID with appropriate follow up of gasoline-range petroleum hydrocarbons by Ecology-approved method NWTPH-Gx and/or diesel- and lube oil-range petroleum hydrocarbons by Ecology-approved method NWTPH-Dx; VOCs by EPA method 8260C, PAHs by EPA method 8270DSIM, and Resource Conservation and Recovery Act (RCRA) metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver) by EPA method 6000/7000 series.

6.3.1. Petroleum-Range Hydrocarbons

WITHIN FILL MATERIAL

Lube oil-range petroleum hydrocarbons were detected at a concentration less than the MTCA Method A ULU cleanup level but greater than the Reuse Criteria in soil samples 1B-TP2-0-1, 1B-TP2-2-3, 1B-TP3-0-1, 1B-TP5-0-1, UG-MW26-0-1 and UG-MW37-0-1. Diesel-range petroleum hydrocarbons were either not detected or were detected at concentrations less than the MTCA Method A ULU cleanup level and Reuse Criteria.

Gasoline-range petroleum hydrocarbons were not detected in the analyzed soil samples.

WITHIN THE ICE-CONTACT DEPOSITS AND ADVANCE OUTWASH

Soil samples collected from within the ice-contact deposits and advance outwash were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup level and Reuse Criteria in the soil samples analyzed for petroleum hydrocarbons.

6.3.2. VOCs

WITHIN FILL MATERIAL

VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels or Method B ULU criteria in the analyzed soil samples collected from within the fill material.

WITHIN ICE-CONTACT DEPOSITS

PCE. PCE was detected at concentrations less than the MTCA Method A ULU cleanup level (0.05 mg/kg) in the following soil samples with the concentrations detected identified in parenthesis.

- UG-MW24-9-10 (0.0012 mg/kg)
- UG-MW24-12-13 (0.0036 mg/kg)

PCE was not detected in the remaining analyzed soil samples collected from within the ice-contact deposits.

TCE. TCE was detected at concentrations greater than the MTCA Method A ULU cleanup level (0.03 mg/kg) in the following soil samples with the concentrations detected identified in parenthesis.

- UG-MW24-9-10 (0.075 mg/kg)
- UG-MW24-12-13 (0.34 mg/kg)
- UG-MW25S-7.5-8.5 (0.44 mg/kg)
- UG-MW25S-8.5-9.5 (0.47 mg/kg)
- UG-MW25S-10-11 (0.37 mg/kg)
- UG-MW25S-11-12 (1.3 mg/kg)
- UG-MW25S-15-16 (0.39 mg/kg)
- UG-MW25D-6-7 (0.076 mg/kg)
- UG-MW25D-12-13 (3.2 mg/kg)
- UG-MW25D-13-14 (2.3 mg/kg)

TCE was detected at concentrations less than the MTCA Method A ULU cleanup level in the following soil samples with the concentrations detected identified in parenthesis.

- UG-MW24-27-28 (0.0030 mg/kg)
- UG-MW25D-2.5-3.5 (0.0012 mg/kg)

TCE was not detected in the remaining analyzed soil samples collected within the ice-contact deposits.

Other Solvents. 1,1,1-Trichloroethane (TCA), 1,1-DCA and/or 1,1-dichloroethene (DCE) were detected at concentrations less than the respective MTCA Method A ULU cleanup level in soil samples collected from 7.5 to 18 feet in borings UG-MW25S and UG-MW25D.

Other VOCs. Other VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels or Method B ULU criteria in the analyzed soil samples collected within the ice-contact deposits.

WITHIN ADVANCE OUTWASH

TCE. TCE was detected at concentrations less than the MTCA Method A ULU cleanup level in the following soil samples with the concentrations detected identified in parenthesis.

- UG-MW25D-24-25 (0.0039 mg/kg)
- UG-MW25D-42-43 (0.0017 mg/kg)
- UG-MW37-16-17 (0.0015 mg/kg)
- UG-MW37-18-19 (0.017 mg/kg)

TCE was not detected in the remaining analyzed soil samples collected within the advance outwash.

Other VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels and Method B ULU criteria in the analyzed soil samples collected within the advance outwash.

6.3.3. PAHs

WITHIN FILL MATERIAL

CPAHs were detected at concentrations (Total Toxic Equivalent Concentration [TTEC]) greater than the MTCA Method A ULU cleanup level (0.1 mg/kg) in the following soil samples with the concentrations detected identified in parentheses.

- 1B-TP2-2-3 (TTEC=0.16 mg/kg)
- 1B-TP5-0-1 (TTEC=0.11 mg/kg)
- 1B-TP5-2-3 (TTEC=0.12 mg/kg)
- UG-MW25S-1-2 (TTEC=0.14 mg/kg)
- UG-MW25D-1-2 (TTEC=0.40 mg/kg)
- UG-MW26-0-1 (TTEC=0.14 mg/kg)

PAHs were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup level and Method B ULU criteria in the remaining analyzed soil samples.

WITHIN ICE-CONTACT DEPOSITS AND ADVANCE OUTWASH

PAHs and cPAHs were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup level and Method B ULU criteria in the analyzed soil samples collected within ice-contact deposits and advance outwash.

6.3.4. RCRA Metals

WITHIN FILL MATERIAL

Arsenic. Arsenic was detected at a concentration equal to the MTCA Method A ULU cleanup level (20 mg/kg) in soil sample 1B-TP2-5-6 (20 mg/kg). Arsenic was detected at concentrations greater than the Reuse Criteria (7 mg/kg), but less than the MTCA Method A ULU cleanup level in the following soil samples with the concentrations detected identified in parentheses.

- UG-MW26-0-1 (15 mg/kg)
- UG-MW37-0-1 (12 mg/kg)

- UG-MW37-1-2 (14 mg/kg)

Arsenic was not detected in the remaining analyzed soil samples collected within fill material.

Lead. Lead was detected at a concentration greater than the MTCA Method A ULU cleanup level (250 mg/kg) in soil sample 1B-TP2-5-6 (350 mg/kg). Lead was detected at concentrations greater than the Reuse Criteria (50 mg/kg), but less than the MTCA Method A ULU cleanup level in the following soil samples with the concentrations detected identified in parentheses.

- 1B-TP5-0-1 (140 mg/kg)
- 1B-TP4-2-3 (140 mg/kg)
- UG-MW26-0-1 (220 mg/kg)

Lead was either not detected or was detected at concentrations less than the MTCA Method A cleanup level and the Reuse Criteria in the remaining analyzed soil samples collected within the fill material.

Cadmium. Cadmium was detected at a concentration less than the MTCA Method A cleanup level (2 mg/kg), but greater than the Reuse Criteria (1 mg/kg) in soil samples 1B-TP5-0-1 (1.2 mg/kg) and UG-MW26-0-1 (0.82 mg/kg).

Cadmium was either not detected or was detected at concentrations less than the Reuse Criteria in the remaining analyzed soil samples collected within fill material.

Mercury. Mercury was detected at a concentration less than the MTCA Method A cleanup level (2 mg/kg) but greater than the Reuse Criteria (0.07 mg/kg) in soil sample 1B-TP5-2-3 (0.32 mg/kg). Mercury was not detected in the remaining analyzed soil samples collected within the fill material.

Other Metals. Other RCRA metals were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels, Method B ULU criteria or Reuse Criteria in the analyzed soil samples collected within the fill material.

WITHIN ICE-CONTACT DEPOSITS AND ADVANCE OUTWASH

RCRA metals were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels, Method B ULU criteria or Reuse Criteria in the analyzed soil samples collected within the ice-contact deposits and the advance outwash.

6.4. Groundwater

Groundwater samples were collected in monitoring wells UG-MW24, UG-MW25D, UG-MW25S, UG-MW26 and UG-MW37 for chemical analysis. The groundwater samples were identified using the following identification system: WELL-ID-yymmdd, where WELL-ID is the well identification number and yymmdd is the date when the sample was collected (e.g., UG-MW24-130715 was collected from monitoring well UG-MW24 on July 15, 2013).

Groundwater samples were submitted for chemical analysis of gasoline-range petroleum hydrocarbons by Ecology-approved method NWTPH-Gx, diesel- and lube oil-range petroleum hydrocarbons by Ecology-approved method NWTPH-Dx, VOCs by EPA method 8260C, PAHs by EPA method 8270DSIM, total MTCA metals by EPA method 200.8 or 7470A. The groundwater sample collected from UG-MW25D was also submitted for chemical analysis for dissolved arsenic by EPA method 200.8. The chemical analytical data for groundwater are described below and summarized in Table 2.

6.4.1. Petroleum-Range Hydrocarbons

SHALLOW AQUIFER

Lube oil--range petroleum hydrocarbons were detected at a concentration greater than the MTCA Method A groundwater cleanup level (0.5 milligram per liter [mg/L]) in the groundwater sample collected from monitoring well UG-MW37 (0.55 mg/L). Lube oil-range petroleum hydrocarbons were detected at a concentration (0.46 mg/L) slightly less than the MTCA Method A groundwater cleanup level in the sample collected from monitoring well UG-MW26. Lube oil-range petroleum hydrocarbons were not detected in the remaining analyzed groundwater samples.

Gasoline- and diesel-range petroleum hydrocarbons were not detected in the analyzed groundwater samples.

DEEP AQUIFER

Gasoline-, diesel, and lube-oil range petroleum hydrocarbons were not detected in the analyzed groundwater samples.

6.4.2. VOCs

SHALLOW AQUIFER

TCE was detected at a concentration greater than the MTCA Method A groundwater cleanup level (5 micrograms per liter [µg/L]) and the MTCA Method B groundwater screening level protective of indoor air (1.5 µg/L) in the groundwater sample collected from UG-MW25S (290 µg/L). TCE was either not detected or was detected at concentrations less than the MTCA Method A groundwater cleanup level and the MTCA Method B groundwater screening level protective of indoor air in the remaining analyzed shallow aquifer groundwater samples.

1,1-dichloroethane (DCA) was detected in the groundwater sample collected from UG-MW25S (15 µg/L) at a concentration greater than the MTCA Method B groundwater criteria (7.7 µg/L) and the updated MTCA Method B groundwater screening level protective of indoor air (11 µg/L).

Other VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A groundwater cleanup levels or MTCA Method B criteria in the analyzed groundwater samples.

DEEP AQUIFER

VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A groundwater cleanup levels or MTCA Method B criteria in the analyzed groundwater samples.

6.4.3. PAHs

PAHs and cPAHs were either not detected or were detected at concentrations less than the respective MTCA Method A groundwater cleanup level or Method B criteria in the analyzed groundwater samples.

6.4.4. RCRA Metals

SHALLOW AQUIFER

RCRA metals were not detected in the analyzed groundwater samples from the shallow aquifer.

DEEP AQUIFER

Total arsenic was detected at a concentration greater than the MTCA Method A groundwater cleanup level (5 µg/L) in the groundwater sample collected from UG-MW25D (6.2 µg/L). The groundwater sample collected from UG-MW25D was submitted for follow-up chemical analysis of dissolved arsenic. Dissolved arsenic was detected at a concentration greater than the MTCA Method A groundwater cleanup level (5 µg/L) in the groundwater sample collected from UG-MW25D (5.7 µg/L). Arsenic was not detected in the other groundwater sample collected from the deep aquifer. Other metals were not detected in the analyzed groundwater samples.

7.0 PROPOSED DEVELOPMENT PLANS

We understand UWT plans to construct a new building at PDA 1B. GeoEngineers assumes the new building will be approximately 67,000 square feet with a finished floor elevation of 194 feet. The estimated amount of soil to be generated is approximately 52,000 tons to excavate PDA 1B to subgrade (Elevation 193 feet) based on the above assumptions. An additional 8,000 tons is estimated to be generated from the footings.

8.0 CONCLUSIONS

Soil and groundwater samples were collected for chemical analysis to evaluate potential impacts to development. Chemicals of concern were encountered in soil and groundwater within PDA 1B as follows:

- TCE and 1,1-DCA-contaminated groundwater and impacted soil are present within the ice-contact deposits (shallow aquifer) in the central portion of PDA 1B (UG-MW25S). The groundwater elevation of the shallow aquifer is approximately 200 feet in this area. The source of the TCE appears to be from an upgradient source; however, the exact source is unknown. TCE- and 1,1-DCA-contaminated groundwater and soil will likely be encountered during construction in the area of UG-MW25S. TCE- and 1,1-DCA -contaminated groundwater will likely be in contact with the west side of any future structure and present beneath the central portion of the site.
- PCE and TCE were detected in soil within the ice-contact deposits within the southern portion of PDA 1B (UG-MW24). These PCE and TCE detections in soil indicate the shallow groundwater may be impacted as well. The TCE- and PCE-impacted soil will likely not be encountered during construction in the area of UG-MW24 based on the depth of TCE- and PCE-contaminated soil (Elevation 188 feet) and the anticipated depth of excavation (Elevation 189 feet [footings]).

However, the impacted groundwater may exceed the MTCA Method B groundwater screening levels protective of indoor air.

- TCE was detected in the advance outwash deposits near the south-central portion of PDA 1B (UG-MW37). These TCE detections indicate that the deep aquifer may be impacted in this area. The groundwater elevation of the deep aquifer is approximately 165 feet in the area of the potentially TCE-contaminated groundwater. Groundwater within the deep aquifer will likely not be encountered during construction activities. The silt layer may act as a barrier to vapor impacts from the groundwater within the deeper aquifer to the proposed surface elevation of the building.
- Petroleum-contaminated groundwater (lube oil-range) is present in the shallow aquifer near the southern portion of PDA 1B (UG-MW37). The groundwater elevation of the shallow aquifer is approximately 196 feet in this area. Petroleum-impacted groundwater (lube oil-range) is also present in the shallow aquifer on the northern portion of PDA 1B. The actual source of the lube-oil range petroleum hydrocarbons is unknown but is likely from a source on PDA 1B because heavy oil petroleum hydrocarbons typically do not migrate as far as solvents, often traveling only 100 feet or less from the original source. Groundwater in both these areas will likely be encountered during construction.
- Contaminated soil (arsenic, lead and cPAHs) is present from the ground surface to approximately 3 feet bgs on the central and northern portions of PDA 1B.
- Impacted soil (petroleum hydrocarbons, metals and cPAHs) is present from the ground surface to 3 feet bgs on the southern portion of PDA 1B.

9.0 POTENTIAL IMPACTS AND MITIGATION MEASURES TO DESIGN AND CONSTRUCTION

We recommend UW develop and implement appropriate administrative institutional controls to limit or prohibit activities that may result in exposure to hazardous substances remaining at the site. Potential impacts to the design and construction of the site are the following:

- Groundwater is contaminated with petroleum hydrocarbons and the site is likely a source of the petroleum hydrocarbon groundwater contamination.
- Groundwater is contaminated with TCE and 1,1-DCA.
- Soil is contaminated and/or impacted with chemicals of concern (PCE, TCE, 1,1-DCA, metals and cPAHs).

Potential long-term impacts include the following:

- Long-term disposal of underslab/perimeter footing drain PCE/TCE/1,1-DCA-impacted or contaminated groundwater.
- Continued maintenance of vapor intrusion mitigation system, if necessary.
- Potential periodic indoor air sampling to confirm the vapor intrusion mitigation system may be necessary to evaluate the system is operating properly, if necessary.

- PCE- and TCE-contaminated or PCE-, TCE- and 1,1-DCA-impacted soil may remain adjacent and beneath the building following construction activities. UW should develop and implement appropriate institutional controls to help prevent exposure to residual contamination.

9.1. Site is a Potential Source

Two areas of petroleum-contaminated groundwater were identified on PDA 1B. Groundwater contaminated with lube oil-range petroleum hydrocarbons is present in the southern portion of the PDA 1B. Groundwater is also impacted with lube oil-range petroleum hydrocarbons in the northern portion of the site with the possibility of more widespread contamination being present. Ecology will require an additional investigation to evaluate the lateral and vertical extent of the petroleum-contaminated groundwater.

The estimated cost for the additional investigation to evaluate the site as a source is $40,000 to $80,000 per area within the PDA 1B. If the site is identified as a source of groundwater contamination, Ecology-approved remedial action may be required prior to construction of the new building. The actual remedial cost will be based on the remedial alternative and the extent of the contamination but may range between $150,000 and $300,000 per area, or a total cost range of $380,000 to $760,000.

9.2. TCE-Contaminated Groundwater

TCE and 1,1-DCA and other breakdown products were detected in groundwater at concentrations greater than the respective MTCA Method A groundwater cleanup levels and/or updated MTCA Method B groundwater screening levels protective of indoor air within the central portion of the site. TCE and 1,1-DCA-contaminated groundwater is present within the central portion of the site at approximately elevation 200 feet. This indicates that the TCE and 1,1-DCA-contaminated groundwater will likely be encountered during construction if the finished floor elevation is at 194 feet with the base of the footings possibly extending to elevation 189 feet. This also indicates the TCE and 1,1-DCA-contaminated groundwater will be in contact with the west side of the building and present beneath the central portion of the building.

TCE- and PCE-contaminated groundwater may also be present on the southern portion of the site in the area of UG-MW24 based on the PCE and TCE soil detections at approximately Elevation 188 feet (or 9 feet bgs). TCE and PCE impacted soil will likely not be encountered during construction on the southern portion of the site based on the planned depth of excavation [193 feet for subgrade and 189 feet for footings].

Mitigation measures include:

Additional Investigation. Further subsurface investigation may be necessary to evaluate the vertical and lateral limits of the PCE, TCE and 1,1-DCA-impacted/contaminated soil and/or groundwater at the site. Soil vapor sampling may be necessary to evaluate if a potential vapor intrusion pathway exists in the central (UG-MW25S) and southern (UG-MW24) portions of the site. The estimated cost for additional investigation is $60,000 to $200,000.

Vapor Mitigation. Vapor intrusion occurs when VOCs migrate from contaminated soil or groundwater into overlying buildings through openings in the foundation. The route VOCs take from a subsurface source to the air inside a building is referred to as the vapor intrusion pathway. The most common sources of soil vapor are VOCs including TCE, PCE and 1,1-DCA, which may pose short-term (TCE only) and long-term (chronic) risks through inhalation of contaminated indoor air.

Groundwater and soil vapor concentrations are typically utilized as screening levels regarding the potential for vapor intrusion. TCE, PCE and 1,1-DCA are or may be present on the site at concentrations greater than the updated MTCA Method B groundwater screening level protective of indoor air within the shallow and deep aquifers. Soil vapor sampling was not completed as part of this investigation. Additional on-site characterization may be necessary to evaluate the vertical and lateral limits of the TCE/PCE/1,1-DCA-contaminated impacted soil vapors. Soil vapor sampling is recommended near the elevation of the proposed subgrade to evaluate if a potential vapor intrusion pathway exists. If a potential vapor intrusion pathway exists, then a vapor intrusion mitigation system may be necessary. Potential mitigation options to prevent vapor intrusion include:

- A passive vapor barrier beneath the building. Passive vapor barriers are typically used in combination with another mitigation option (venting or building pressurization). We recommend the vapor barrier be installed below the elevation of penetrations (pipes, etc.) that may be installed after the programing is identified in the future. Penetrating the vapor barrier following the construction will increase the cost of construction.
- Passive or active venting system beneath the building. The venting system may need to be combined with an underslab and perimeter drain to reduce the potential for shallow groundwater to enter the venting system.

The estimated cost for design of indoor air mitigation system ranges between $5 and $12 per square foot of building space. The estimated costs for the vapor mitigation system for a building on the entire site is between $335,000 and $804,000. Potential periodic indoor air sampling to confirm the vapor intrusion mitigation system may be necessary to evaluate the system is operating properly following construction of the building. The estimated cost for long term monitoring is unknown.

Underslab/Footing Drainage. An underslab/footing drainage system may be required to prevent water from entering into the vapor mitigation vent system. The water will likely have to be directed to the City of Tacoma sanitary sewer based on concentrations of the chemicals of concern in the groundwater. A long-term cost may be associated with discharge of the water to the City sanitary sewer system. An underslab footing drain will likely be required based on the approximate elevation of the shallow aquifer groundwater (200 feet). The estimated cost of the underslab footing drain is $201,000 to $402,000.

Construction Water Management. TCE and 1,1-DCA-contaminated groundwater encountered during construction will have to be managed. Water generated during construction will likely be stored in tanks, sampled and analyzed. Water disposal will be coordinated with UW EH&S at a UW-approved disposal facility. It is anticipated the construction dewatering water will be suitable for discharge into the storm sewer based on the concentrations detected in the existing wells during this investigation. The water may be disposed in the City of Tacoma sanitary sewer. The City of Tacoma charges approximately $0.0034 per gallon of water. The estimated volume of water generated will be based on construction methods. The base cost estimate includes the cost of disposal of water for 120 days of earthwork construction, approximate cost of collecting ten water samples over the course of the project ($15,000) and two 25,000 gallon storage tanks ($7,000 each per month).

Approximately 20,000 gallons per day is estimated to be generated on the site from dewatering activities. The estimated cost of construction water management if disposal into the City of Tacoma sanitary sewer is necessary is approximately $51,000.

Cross-Contamination. It does not appear the proposed building will cut through the silt layer that is a semi-confining to confining unit for the shallow and deep aquifers. TCE-contaminated groundwater also appears to be present in the shallow and deep aquifers. Additional investigation will be necessary to evaluate the potential for cross-contamination between to the two aquifers. This investigation could be completed in concurrence with the additional investigation to evaluate the lateral and vertical extent of the contamination. However, it appears that cross-contamination between the two aquifers is likely not warranted at this site. For budgeting purposes, additional construction cost is estimated to be between $33,500 and $201,000 if cross-contamination is identified as an impact.

Health and Safety. Workers who may be in contact with potentially contaminated soil or groundwater at a state-listed cleanup site have HAZWOPER training. The requirement is consistent with the Washington Administrative Code (WAC) 296-843-100, *Hazardous Waste Operations*, which indicates that on-site personnel are required to have current health and safety training in accordance with Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response requirements in 29 CFR 1910.120. The rule also requires the earthwork contractor and other personnel who could potentially contact contaminated materials to develop and implement a written safety and health program for their employees involved in hazardous waste operations under 29 CFR 1910.120. The estimated cost for the contractor to be HAZWOPER trained and have appropriate liability insurance is roughly between $10,000 and $70,000 depending on the number of subcontractors that require training, and the contractor markup factor.

9.3. Soil is Contaminated with Chemicals of Concern

Contaminated soil (metals and cPAHs) and impacted soil (PCE, TCE, 1,1-DCA, petroleum, metals and cPAHs) TCE, will likely be generated during construction activities. We recommend UW implement the following actions.

- **Characterize Soil and Groundwater for Disposal.** In-situ characterization or stockpiling and subsequent sampling will need to be performed on soil that is generated during construction in areas of TCE-contaminated, TCE/1,1-DCA-impacted and cPAHs/lead-contaminated and cPAHs/metal-impacted soil. The estimated cost of the soil sampling for soil disposal is $130,000 to $170,000 based on the mass of soil to be excavated.
- **PCE and TCE-Impacted and Contaminated Soil.** When PCE and TCE, breakdown products and other regulated solvents are detected in soil, UW EH&S will work with Ecology on obtaining a “contained-in determination” for disposal of the waste. The source of the solvent contamination, the concentration of the solvents and a TCLP analytical test result will be used when evaluating if the soil is disposed as hazardous waste by UW EH&S at a RCRA permitted

Subtitle C landfill or as a solid waste at a UW-approved Subtitle D landfill. Past experience has demonstrated that it is fairly likely that the "contained-in determination" will be granted, thus we based our cost estimates on this assumption.

The estimated cost to transport and dispose (not including excavation and loading) soil at a Subtitle D landfill with a contained-in determination is $80 to $100 per ton. The typical cost for transportation and disposal (not including excavation and loading) of soil at a RCRA Subtitle C Landfill is $250 to $300 per ton. The cost estimates provided in this report assume disposal at a Subtitle D landfill.

The estimated amount of TCE-contaminated and impacted soil is approximately 9,500 tons. This estimate is based on the excavation of subgrade to elevation (193 feet) and the TCE impacted soil that will be encountered during construction is only in the area of UG-MW25S. The estimated cost for transportation and disposal of the TCE-contaminated and impacted soil is between $760,000 and 950,000. The cost of soil removal may be reduced if buildings are moved into areas where the groundwater and soil are not impacted with TCE or PCE.

- Lead and cPAH-Contaminated Soil. Lead and cPAH- contaminated soil will be disposed at a UW-approved RCRA permitted Subtitle D landfill. The contaminated-soil will be removed as necessary for construction and Ecology requirements. CPAHs- and metals-contaminated soil will be disposed at an UW-approved Subtitle D landfill. CPAHs- and metals-contaminated soil left in place shall be capped with a building or hardscape as required by Ecology. The estimated cost for transportation and disposal at a RCRA-subtitle D facility is $60 to $80 per ton. We estimate the mass of the lead and cPAHs-contaminated soil to be 6,000 tons. This estimate assumes the northeastern surface to three feet bgs soils are contaminated. The estimated cost for transportation and disposal is between $360,000 and $480,000.
- Metals-, Petroleum-, cPAH-Impacted Soil. Metals- petroleum- and cPAHs-impacted soil is present on the majority of the site of the site to a depth of approximately 3-feet bgs. Soil is impacted with cPAHs, petroleum hydrocarbons and metals. Metals-, petroleum hydrocarbons- and cPAHs-impacted soil is typically suitable for disposal at a UW-approved permitted inert waste landfill or reclamation pit. For budgeting purposes, we assumed the transportation and disposal of cPAH-, metals- and petroleum-impacted soil is $30 to $50 per ton. We estimate the mass of the metals- and cPAHs-impacted soil to be 10,000 tons. This estimate assumes the surficial 2 feet in the central western portion of the site. The estimated cost for transportation and disposal is between $300,000 and $500,000. If soil is reused as fill on site, the cost would be reduced because off site disposal of the impacted soil will not be required.
- Health and Safety. As discussed in the "Contaminated Groundwater" section, UW requires its earthwork contractor and other personnel who could potentially contact contaminated materials to comply with training requirements for handling soil and potentially groundwater on the site. The health and safety costs were already itemized in the groundwater section.

10.0 LIMITATIONS

This report has been prepared for use by the University of Washington for the Priority Development PDA 1B – Tacoma Vacant Property located in Tacoma, Washington at the University of Washington Tacoma campus.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

Please refer to Appendix A titled "Report Limitations and Guidelines for Use" for additional information pertaining to use of this report.

11.0REFERENCES

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TABLE 1

SUMMARY OF CHEMICAL ANALYTICAL RESULTS[1] - SOIL

AREA 1B - TACOMA VACANT
PRIORITY DEVELOPMENT AREAS - UNIVERSITY OF WASHINGTON TACOMA
TACOMA, WASHINGTON

Boring/Test Pit	1B-TP1	1B-TP2				1B-TP3			1B-TP4
Sample Identification [2]	1B-TP1-0-1	1B-TP2-0-1	1B-TP2-2-3	1B-TP2-5-6	1B-TP2-7-8	1B-TP3-0-1	1B-TP3-2-3	1B-TP3-3-4	1B-TP4-0-1
Sample Depth (feet bgs)	0 to 1	0 to 1	2 to 3	5 to 6	7 to 8	0 to 1	2 to 3	3 to 4	0 to 1
Soil Type	Fill	Fill	Fill	Fill	Qvi	Fill	Fill	Qvi	Fill
NWTPH-HCID [3] (mg/kg)									
Gasoline-Range	23 U	22 U	27 U	24 U	26 U	23 U	23 U	22 U	23 U
Diesel-Range	56 U	71 U	68 U	61 U	64 U	DET	57 U	55 U	59 U
Lube Oil-Range	DET	DET	DET	120 U	130 U	DET	110 U	110 U	120 U
NWTPH-Gx [4] (mg/kg)									
Gasoline-Range Petroleum Hydrocarbons	--	--	--	--	--	--	--	--	--
NWTPH-Dx [5] (mg/kg)									
Diesel-Range Petroleum Hydrocarbons	28 U	86 J	61 J	--	--	45 J	--	--	--
Lube Oil-Range Petroleum Hydrocarbons	120	1,700	410	--	--	620	--	--	--
VOCs [6] (mg/kg)									
Tetrachloroethene (PCE)	0.0011 U	0.00097 U	0.0018 U	0.0011 U	0.00094 U	0.00098 U	0.0012 U	0.00088 U	0.00089 U
Trichloroethene (TCE)	0.0011 U	0.00097 U	0.0018 U	0.0011 U	0.00094 U	0.00098 U	0.0012 U	0.00088 U	0.00089 U
(cis) 1,2-Dichloroethene	0.0011 U	0.00097 U	0.0018 U	0.0011 U	0.00094 U	0.00098 U	0.0012 U	0.00088 U	0.00089 U
(trans) 1,2-Dichloroethene	0.0011 U	0.00097 U	0.0018 U	0.0011 U	0.00094 U	0.00098 U	0.0012 U	0.00088 U	0.00089 U
Vinyl Chloride	0.0011 U	0.00097 U	0.0018 U	0.0011 U	0.00094 U	0.00098 U	0.0012 U	0.00088 U	0.00089 U
1,1,1-Trichloroethane	0.0011 U	0.00097 U	0.0018 U	0.0011 U	0.00094 U	0.00098 U	0.0012 U	0.00088 U	0.00089 U
1,1-Dichloroethane	0.0011 U	0.00097 U	0.0018 U	0.0011 U	0.00094 U	0.00098 U	0.0012 U	0.00088 U	0.00089 U
1,1-Dichloroethene	0.0011 U	0.00097 U	0.0018 U	0.0011 U	0.00094 U	0.00098 U	0.0012 U	0.00088 U	0.00089 U
Benzene	0.0011 U	0.00097 U	0.0018 U	0.0011 U	0.00094 U	0.00098 U	0.0012 U	0.00088 U	0.00089 U
2-Butanone (MEK) [7]	0.0054 U	0.0049 U	0.0093	0.010	0.0047 U	0.0049 U	0.0059 U	0.0044 U	0.0044 U
2-Hexanone [7]	0.0054 U	0.0049 U	0.0089 U	0.0054 U	0.0047 U	0.0049 U	0.0059 U	0.0044 U	0.0044 U
Acetone [7]	0.0054 U	0.0049 U	0.064	0.061	0.012	0.0049 U	0.0059 U	0.0044 U	0.0044 U
Carbon Disulfide [7]	0.0011 U	0.00097 U	0.0018 U	0.0011 U	0.00094 U	0.00098 U	0.0012 U	0.00088 U	0.00089 U
Naphthalene	0.0054 U	0.0049 U	0.0018 U	0.0011 U	0.00094 U	0.0049 U	0.0059 U	0.0044 U	0.0044 U
PAHs [8] (mg/kg)									
1-Methylnaphthalene	0.0075 U	0.0074 U	0.010	0.0081 U	0.0085 U	0.0076 U	0.0076 U	0.0074 U	0.0078 U
2-Methylnaphthalene	0.0075 U	0.0074 U	0.012	0.0081 U	0.0085 U	0.0076 U	0.0076 U	0.0074 U	0.0078 U
Acenaphthene	0.0075 U	0.0074 U	0.0093	0.0081 U	0.0085 U	0.0076 U	0.0076 U	0.0074 U	0.0078 U
Acenaphthylene	0.0075 U	0.0074 U	0.010	0.0081 U	0.0085 U	0.0076 U	0.0076 U	0.0074 U	0.0078 U
Anthracene	0.0075 U	0.0084	0.031	0.0081 U	0.0085 U	0.012	0.0076 U	0.0074 U	0.0078 U
Benzo[g,h,i]perylene	0.0075 U	0.076	0.12	0.0081 U	0.0085 U	0.048	0.0076 U	0.0074 U	0.0078 U
Fluoranthene	0.0075 U	0.033	0.15	0.0081 U	0.0085 U	0.088	0.0083	0.0074 U	0.015
Fluorene	0.0075 U	0.0074 U	0.0095	0.0081 U	0.0085 U	0.0076 U	0.0076 U	0.0074 U	0.0078 U
Naphthalene	0.0075 U	0.0074 U	0.033	0.0081 U	0.0085 U	0.0076 U	0.0076 U	0.0074 U	0.0078 U
Phenanthrene	0.0075 U	0.016	0.11	0.0081 U	0.0085 U	0.029	0.0076 U	0.0074 U	0.0078 U
Pyrene	0.0075 U	0.034	0.16	0.0081 U	0.0085 U	0.097	0.0076 U	0.0074 U	0.016
Carcinogenic PAHs [8] (mg/kg)									
Benzo (a) anthracene (TEF 0.1)	0.0075 U	0.041	0.10	0.0081 U	0.0085 U	0.060	0.0076 U	0.0074 U	0.011
Benzo (a) pyrene (TEF 1)	0.0075 U	0.047	0.11	0.0081 U	0.0085 U	0.049	0.0076 U	0.0074 U	0.0084
Benzo (b) fluoranthene (TEF 0.1)	0.0075 U	0.056	0.23	0.0081 U	0.0085 U	0.070	0.0076 U	0.0074 U	0.010
Benzo (J,k) fluoranthene (TEF 0.1)	0.0075 U	0.037 U	0.059	0.0081 U	0.0085 U	0.018	0.0076 U	0.0074 U	0.0078 U
Chrysene (TEF 0.01)	0.0075 U	0.051	0.12	0.0081 U	0.0085 U	0.077	0.0076 U	0.0074 U	0.0083
Dibenz (a,h) anthracene (TEF 0.1)	0.0075 U	0.037 U	0.021	0.0081 U	0.0085 U	0.014	0.0076 U	0.0074 U	0.0078 U
Indeno (1,2,3-cd) pyrene (TEF 0.1)	0.0075 U	0.037	0.10	0.0081 U	0.0085 U	0.032	0.0076 U	0.0074 U	0.0078 U
Total TTEC of cPAHs (detect only)	N/A	0.061	0.16	N/A	N/A	0.069	N/A	N/A	0.011
Metals [9] (mg/kg)									
Arsenic	11 U	11 U	20	12 U	13 U	11 U	11 U	11 U	12 U
Barium	100	56	460	60	56	89	96	50	110
Cadmium	0.56 U	0.56 U	1.0	0.61 U	0.64 U	0.57 U	0.57 U	0.55 U	0.59 U
Chromium	30	27	34	33	38	36	110	35	56
Lead	24	31	350	7.4	6.4 U	41	5.8	5.5 U	11
Mercury	0.28 U	0.28 U	0.34 U	0.30 U	0.32 U	0.29 U	0.28 U	0.28 U	0.29 U
Selenium	11 U	11 U	14 U	12 U	13 U	11 U	11 U	11 U	12 U
Silver	1.1 U	1.1 U	1.4 U	1.2 U	1.3 U	1.1 U	1.1 U	1.1 U	1.2 U

Boring/Test Pit	1B-TP5			1B-TP6		UG-MW24			
Sample Identification [2]	1B-TP5-0-1	1B-TP5-2-3	1B-TP5-7-8	1B-TP6-0-1	1B-TP6-2-3	UG-MW24-9-10	UG-MW24-12-13	UG-MW24-27-28	UG-MW24-40-41
Sample Depth (feet bgs)	0 to 1	2 to 3	7 to 8	0 to 1	2 to 3	9 to 10	12 to 13	27 to 28	40 to 41
Soil Type	Fill	Fill	Qvi	Fill	Qvi	Qvi	Qvi	Qvi	Transition Zone
NWTPH-HCID [3] (mg/kg)									
Gasoline-Range	23 U	24 U	23 U	23 U	22 U	29 U	28 U	27 U	31 U
Diesel-Range	57 U	60 U	56 U	59 U	56 U	57 U	56 U	53 U	62 U
Lube Oil-Range	DET	120 U	110 U	120 U	110 U	4.5 U	4.0 U	5.7 U	6.0 U
NWTPH-Gx [4] (mg/kg)									
Gasoline-Range Petroleum Hydrocarbons	--	--	--	--	--	--	--	--	--
NWTPH-Dx [5] (mg/kg)									
Diesel-Range Petroleum Hydrocarbons	28 U	--	--	--	--	--	--	--	--
Lube Oil-Range Petroleum Hydrocarbons	310 J	--	--	--	--	--	--	--	--
VOCs [6] (mg/kg)									
Tetrachloroethene (PCE)	0.00092 U	0.0011 U	0.00082 U	0.00095 U	0.00092 U	0.0012	0.0036	0.00086 U	0.0011 U
Trichloroethene (TCE)	0.00092 U	0.0011 U	0.00082 U	0.00095 U	0.00092 U	0.075	0.34	0.0030	0.0011 U
(cis) 1,2-Dichloroethene	0.00092 U	0.0011 U	0.00082 U	0.00095 U	0.00092 U	0.00077 U	0.00096	0.00086 U	0.0011 U
(trans) 1,2-Dichloroethene	0.00092 U	0.0011 U	0.00082 U	0.00095 U	0.00092 U	0.00077 U	0.00074 U	0.00086 U	0.0011 U
Vinyl Chloride	0.00092 U	0.0011 U	0.00082 U	0.00095 U	0.00092 U	0.00077 U	0.00074 U	0.00086 U	0.0011 U
1,1,1-Trichloroethane	0.00092 U	0.0011 U	0.00082 U	0.00095 U	0.00092 U	0.00077 U	0.00074 U	0.00086 U	0.0011 U
1,1-Dichloroethane	0.00092 U	0.0011 U	0.00082 U	0.00095 U	0.00092 U	0.00077 U	0.00074 U	0.00086 U	0.0011 U
1,1-Dichloroethene	0.00092 U	0.0011 U	0.00082 U	0.00095 U	0.00092 U	0.00077 U	0.00074 U	0.00086 U	0.0011 U
Benzene	0.00092 U	0.0011 U	0.00082 U	0.00095 U	0.00092 U	0.00077 U	0.00074 U	0.00086 U	0.0011 U
2-Butanone (MEK) [7]	0.0046 U	0.0056 U	0.0041 U	0.0048 U	0.0046 U	0.0039 U	0.0037 U	0.0043 U	0.0057 U
2-Hexanone [7]	0.0046 U	0.0056 U	0.0041 U	0.0048 U	0.0046 U	0.0039 U	0.0037 U	0.0043 U	0.0057 U
Acetone [7]	0.0046 U	0.0056 U	0.0041 U	0.025 J	0.0046 U	0.0039 U	0.0037 U	0.0043 U	0.0057 U
Carbon Disulfide [7]	0.00092 U	0.0011 U	0.00082 U	0.00095 U	0.00092 U	0.00077 U	0.00074 U	0.00086 U	0.0011 U
Naphthalene	0.0046 U	0.0056 U	0.0041 U	0.00095 U	0.0046 U	0.0039 U	0.0037 U	0.0043 U	0.0057 U
PAHs [8] (mg/kg)									
1-Methylnaphthalene	0.0075 U	0.013	0.0075 U	0.0078 U	0.0075 U	0.0076 U	0.0074 U	0.0071 U	0.0083 U
2-Methylnaphthalene	0.0075 U	0.013	0.0075 U	0.0078 U	0.0075 U	0.0076 U	0.0074 U	0.0071 U	0.0083 U
Acenaphthene	0.0075 U	0.0079 U	0.0075 U	0.0078 U	0.0075 U	0.0076 U	0.0074 U	0.0071 U	0.0083 U
Acenaphthylene	0.021	0.0079 U	0.0075 U	0.0078 U	0.0075 U	0.0076 U	0.0074 U	0.0071 U	0.0083 U
Anthracene	0.023	0.021	0.0075 U	0.0078 U	0.0075 U	0.0076 U	0.0074 U	0.0071 U	0.0083 U
Benzo[g,h,i]perylene	0.052	0.058	0.0075 U	0.0078 U	0.0075 U	0.0076 U	0.0074 U	0.0071 U	0.0083 U
Fluoranthene	0.12	0.14	0.0075 U	0.0078 U	0.0075 U	0.0076 U	0.0074 U	0.0071 U	0.0083 U
Fluorene	0.0075 U	0.0079 U	0.0075 U	0.0078 U	0.0075 U	0.0076 U	0.0074 U	0.0071 U	0.0083 U
Naphthalene	0.018	0.018	0.0075 U	0.0078 U	0.0075 U	0.0076 U	0.0074 U	0.0071 U	0.0083 U
Phenanthrene	0.059	0.11	0.0075 U	0.0078 U	0.0075 U	0.0076 U	0.0074 U	0.0071 U	0.0083 U
Pyrene	0.14	0.18	0.0075 U	0.0078 U	0.0075 U	0.0076 U	0.0074 U	0.0071 U	0.0083 U
Carcinogenic PAHs [8] (mg/kg)									
Benzo (a) anthracene (TEF 0.1)	0.080	0.094	0.0075 U	0.0078 U	0.0075 U	0.0076 U	0.0074 U	0.0071 U	0.0083 U
Benzo (a) pyrene (TEF 1)	0.080	0.086	0.0075 U	0.0078 U	0.0075 U	0.0076 U	0.0074 U	0.0071 U	0.0083 U
Benzo (b) fluoranthene (TEF 0.1)	0.10	0.10	0.0075 U	0.0078 U	0.0075 U	0.0076 U	0.0074 U	0.0071 U	0.0083 U
Benzo (J,k) fluoranthene (TEF 0.1)	0.028	0.032	0.0075 U	0.0078 U	0.0075 U	0.0076 U	0.0074 U	0.0071 U	0.0083 U
Chrysene (TEF 0.01)	0.083	0.098	0.0075 U	0.0078 U	0.0075 U	0.0076 U	0.0074 U	0.0071 U	0.0083 U
Dibenz (a,h) anthracene (TEF 0.1)	0.011	0.014	0.0075 U	0.0078 U	0.0075 U	0.0076 U	0.0074 U	0.0071 U	0.0083 U
Indeno (1,2,3-cd) pyrene (TEF 0.1)	0.046	0.052	0.0075 U	0.0078 U	0.0075 U	0.0076 U	0.0074 U	0.0071 U	0.0083 U
Total TTEC of cPAHs (detect only)	0.11	0.12	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Metals [9] (mg/kg)									
Arsenic	13	12 U	11 U	12 U	11 U	11 U	11 U	11 U	12 U
Barium	120	130	63	82	50	63	54	32	89
Cadmium	1.2	0.60 U	0.56 U	0.59 U	0.56 U	0.57 U	0.56 U	0.53 U	0.62 U
Chromium	41	44	43	47	29	41	43	13	16
Lead	140	140	5.6 U	17	5.6 U	5.7 U	5.6 U	5.3 U	6.2 U
Mercury	0.28 U	0.32	0.28 U	0.29 U	0.28 U	0.28 U	0.28 U	0.27 U	0.31 U
Selenium	11 U	12 U	11 U	12 U	11 U	11 U	11 U	11 U	12 U
Silver	1.1 U	1.2 U	1.1 U	1.2 U	1.1 U	1.1 U	1.1 U	1.1 U	1.2 U

Boring/Test Pit	UG-MW24 (continued)				UG-MW25S						
Sample Identification [2]	UG-MW24-54-55	UG-MW24-72-73	UG-MW24-79-80	UG-MW24-99-100	UG-MW25S-1-2	UG-MW25S-7.5-8.5	UG-MW25S-8.5-9.5	UG-MW25S-10-11	UG-MW25S-11-12	UG-MW25S-15-16	UG-MW25S-19-20
Sample Depth (feet bgs)	54 to 55	72 to 73	79 to 80	99 to 100	1 to 2	7.5 to 8.5	8.5 to 9.5	10 to 11	11 to 12	15 to 16	19 to 20
Soil Type	Transition Zone	Advance Outwash	Advance Outwash	Advance Outwash	Fill	Qvi	Qvi	Qvi	Qvi	Qvi	Qvi
NWTPH-HCID [3] (mg/kg)											
Gasoline-Range	29 U	30 U	28 U	28 U	–	–	–	–	–	–	–
Diesel-Range	59 U	59 U	56 U	56 U	–	–	–	–	–	–	–
Lube Oil-Range	5.8 U	5.8 U	4.0 U	4.7 U	–	–	–	–	–	–	–
NWTPH-Gx [4] (mg/kg)											
Gasoline-Range Petroleum Hydrocarbons	–	–	–	–	–	–	–	–	–	–	–
NWTPH-Dx [5] (mg/kg)											
Diesel-Range Petroleum Hydrocarbons	–	–	–	–	–	–	–	–	–	–	–
Lube Oil-Range Petroleum Hydrocarbons	–	–	–	–	–	–	–	–	–	–	–
VOCs [6] (mg/kg)											
Tetrachloroethene (PCE)	0.00091 U	0.00092 U	0.0010 U	0.00097 U	–	0.00075 U	0.00073 U	0.00084 U	0.00077 U	0.00080 U	0.00080 U
Trichloroethene (TCE)	0.00091 U	0.00092 U	0.0010 U	0.00097 U	–	**0.44**	**0.47**	**0.37**	**1.3**	**0.39**	0.00080 U
(cis) 1,2-Dichloroethene	0.00091 U	0.00092 U	0.0010 U	0.00097 U	–	**0.0017**	0.00073 U	0.00084 U	**0.0010**	**0.0018**	0.00080 U
(trans) 1,2-Dichloroethene	0.00091 U	0.00092 U	0.0010 U	0.00097 U	–	0.00075 U	0.00073 U	0.00084 U	0.00077 U	0.00080 U	0.00080 U
Vinyl Chloride	0.00091 U	0.00092 U	0.0010 U	0.00097 U	–	0.00075 U	0.00073 U	0.00084 U	0.00077 U	0.00080 U	0.00080 U
1,1,1-Trichloroethane	0.00091 U	0.00092 U	0.0010 U	0.00097 U	–	**0.0028**	0.00073 U	**0.0010**	0.00077 U	0.00080 U	0.00080 U
1,1-Dichloroethane	0.00091 U	0.00092 U	0.0010 U	0.00097 U	–	**0.0035**	0.00073 U	**0.0022**	0.00077 U	**0.0038**	0.00080 U
1,1-Dichloroethene	0.00091 U	0.00092 U	0.0010 U	0.00097 U	–	**0.0064**	**0.0010**	**0.0021**	**0.0023**	**0.0040**	0.00080 U
Benzene	0.00091 U	0.00092 U	0.0010 U	0.00097 U	–	0.00075 U	0.00073 U	0.00084 U	0.00077 U	**0.00096**	**0.0010**
2-Butanone (MEK) [7]	0.0046 U	0.0046 U	0.0050 U	0.0048 U	–	0.0037 U	0.0036 U	0.0042 U	0.0039 U	0.0040 U	0.0040 U
2-Hexanone [7]	0.0046 U	0.0046 U	0.0050 U	0.0048 U	–	0.0037 U	0.0036 U	0.0042 U	0.0039 U	0.0040 U	0.0040 U
Acetone [7]	0.0046 U	0.0046 U	0.0050 U	0.0048 U	–	0.0037 U	0.0036 U	**0.0044**	0.0039 U	**0.0096**	0.0040 U
Carbon Disulfide [7]	0.00091 U	0.00092 U	0.0010 U	0.00097 U	–	0.00075 U	0.00073 U	0.00084 U	0.00077 U	0.00080 U	0.00080 U
Naphthalene	0.0046 U	0.0046 U	0.0050 U	0.0048 U	–	0.00075 U	0.00073 U	0.00084 U	0.00077 U	0.00080 U	0.00080 U
PAHs [8] (mg/kg)											
1-Methylnaphthalene	0.0078 U	0.0079 U	0.0075 U	0.0075 U	0.0073 U	–	–	–	–	–	–
2-Methylnaphthalene	0.0078 U	**0.0085**	0.0075 U	0.0075 U	0.0073 U	–	–	–	–	–	–
Acenaphthene	0.0078 U	0.0079 U	0.0075 U	0.0075 U	0.0073 U	–	–	–	–	–	–
Acenaphthylene	0.0078 U	0.0079 U	0.0075 U	0.0075 U	**0.021**	–	–	–	–	–	–
Anthracene	0.0078 U	0.0079 U	0.0075 U	0.0075 U	**0.026**	–	–	–	–	–	–
Benzo[g,h,i]perylene	0.0078 U	0.0079 U	0.0075 U	0.0075 U	**0.064**	–	–	–	–	–	–
Fluoranthene	0.0078 U	0.0079 U	0.0075 U	0.0075 U	**0.17**	–	–	–	–	–	–
Fluorene	0.0078 U	0.0079 U	0.0075 U	0.0075 U	0.0073 U	–	–	–	–	–	–
Naphthalene	0.0078 U	**0.023**	0.0075 U	0.0075 U	**0.014**	–	–	–	–	–	–
Phenanthrene	0.0078 U	0.0079 U	0.0075 U	0.0075 U	**0.11**	–	–	–	–	–	–
Pyrene	0.0078 U	0.0079 U	0.0075 U	0.0075 U	**0.18**	–	–	–	–	–	–
Carcinogenic PAHs [8] (mg/kg)											
Benzo (a) anthracene (TEF 0.1)	0.0078 U	0.0079 U	0.0075 U	0.0075 U	**0.094**	–	–	–	–	–	–
Benzo (a) pyrene (TEF 1)	0.0078 U	0.0079 U	0.0075 U	0.0075 U	**0.11**	–	–	–	–	–	–
Benzo (b) fluoranthene (TEF 0.1)	0.0078 U	0.0079 U	0.0075 U	0.0075 U	**0.11**	–	–	–	–	–	–
Benzo (J,k) fluoranthene (TEF 0.1)	0.0078 U	0.0079 U	0.0075 U	0.0075 U	**0.036**	–	–	–	–	–	–
Chrysene (TEF 0.01)	0.0078 U	0.0079 U	0.0075 U	0.0075 U	**0.093**	–	–	–	–	–	–
Dibenz (a,h) anthracene (TEF 0.1)	0.0078 U	0.0079 U	0.0075 U	0.0075 U	**0.017**	–	–	–	–	–	–
Indeno (1,2,3-cd) pyrene (TEF 0.1)	0.0078 U	0.0079 U	0.0075 U	0.0075 U	**0.060**	–	–	–	–	–	–
Total TTEC of cPAHs (detect only)	N/A	N/A	N/A	N/A	**0.14**	–	–	–	–	–	–
Metals [9] (mg/kg)											
Arsenic	12 U	12 U	11 U	11 U	–	–	–	–	–	–	–
Barium	**48**	**57**	**33**	**47**	–	–	–	–	–	–	–
Cadmium	0.59 U	0.59 U	0.56 U	0.56 U	–	–	–	–	–	–	–
Chromium	**11**	**11**	**17**	**32**	–	–	–	–	–	–	–
Lead	5.9 U	5.9 U	5.6 U	5.6 U	–	–	–	–	–	–	–
Mercury	0.29 U	0.30 U	0.28 U	0.28 U	–	–	–	–	–	–	–
Selenium	12 U	12 U	11 U	11 U	–	–	–	–	–	–	–
Silver	1.2 U	1.2 U	1.1 U	1.1 U	–	–	–	–	–	–	–

Boring/Test Pit	UG-MW25D											UG-MW26	
Sample Identification [2]	UG-MW25D-1-2	UG-MW25D-2.5-3.5	UG-MW25D-6-7	UG-MW25D-12-13	UG-MW25D-13-14	UG-MW25D-17-18	UG-MW25D-18-19	UG-MW25D-24-25	UG-MW25D-34-35	UG-MW25D-42-43	UG-MW25D-43-44	UG-MW26-0-1	UG-MW26-2-3
Sample Depth (feet bgs)	1 to 2	2.5 to 3.5	6 to 7	12 to 13	13 to 14	17 to 18	18 to 19	24 to 25	34 to 35	42 to 43	43 to 44	0 to 1	2 to 3
Soil Type	Fill	Qvi	Qvi	Qvi	Qvi	Qvi	Qvi	Advance Outwash	Advance Outwash	Advance Outwash	Advance Outwash	Fill	Qvi
NWTPH-HCID [3] (mg/kg)													
Gasoline-Range	22 U	24 U	--	--	--	--	--	--	--	--	--	49 U	22 U
Diesel-Range	55 U	59 U	--	--	--	--	--	--	--	--	--	120 U	55 U
Lube Oil-Range	110 U	120 U	--	--	--	--	--	--	--	--	--	DET	110 U
NWTPH-Gx [4] (mg/kg)													
Gasoline-Range Petroleum Hydrocarbons	--	--	--	--	28 U	28 U	28 U	26 U	26 U	--	--	--	--
NWTPH-Dx [5] (mg/kg)													
Diesel-Range Petroleum Hydrocarbons	--	--	--	--	28 U	28 U	28 U	26 U	26 U	--	--	150 U	--
Lube Oil-Range Petroleum Hydrocarbons	--	--	--	--	56 U	56 U	55 U	52 U	53 U	--	--	1,900	--
VOCs [6] (mg/kg)													
Tetrachloroethene (PCE)	0.00092 U	0.00099 U	0.00082 U	0.00070 U	0.00075 U	0.00081 U	0.00084 U	0.00095 U	0.00096 U	0.00091 U	0.00083 U	0.0013 U	0.00070 U
Trichloroethene (TCE)	0.00092 U	0.0012	0.076	3.2	2.3	0.00081 U	0.00084 U	0.0039	0.00096 U	0.0017	0.00083 U	0.0013 U	0.00070 U
(cis) 1,2-Dichloroethene	0.00092 U	0.00099 U	0.00082 U	0.0026	0.0023	0.00081 U	0.00084 U	0.00095 U	0.00096 U	0.00091 U	0.00083 U	0.0013 U	0.00070 U
(trans) 1,2-Dichloroethene	0.00092 U	0.00099 U	0.00082 U	0.00070 U	0.00075 U	0.00081 U	0.00084 U	0.00095 U	0.00096 U	0.00091 U	0.00083 U	0.0013 U	0.00070 U
Vinyl Chloride	0.00092 U	0.00099 U	0.00082 U	0.00070 U	0.00075 U	0.00081 U	0.00084 U	0.00095 U	0.00096 U	0.00091 U	0.00083 U	0.0013 U	0.00070 U
1,1,1-Trichloroethane	0.00092 U	0.00099 U	0.00082 U	0.00070 U	0.00075 U	0.00081 U	0.00084 U	0.00095 U	0.00096 U	0.00091 U	0.00083 U	0.0013 U	0.00070 U
1,1-Dichloroethane	0.00092 U	0.00099 U	0.00082 U	0.0030	0.0023	0.0033	0.00084 U	0.00095 U	0.00096 U	0.00091 U	0.00083 U	0.0013 U	0.00070 U
1,1-Dichloroethene	0.00092 U	0.00099 U	0.00082 U	0.0067	0.0058	0.00081 U	0.00084 U	0.00095 U	0.00096 U	0.00091 U	0.00083 U	0.0013 U	0.00070 U
Benzene	0.00092 U	0.00099 U	0.00082 U	0.00070 U	0.00075 U	0.0017	0.00090	0.00095 U	0.00096 U	0.00091 U	0.00083 U	0.0013 U	0.00070 U
2-Butanone (MEK) [7]	0.0046 U	0.0049 U	0.0041 U	0.0035 U	0.0037 U	0.0040 U	0.0042 U	0.0048 U	0.067	0.0045 U	0.0041 U	0.0063 U	0.0035 U
2-Hexanone [7]	0.0046 U	0.0049 U	0.0041 U	0.0035 U	0.0037 U	0.0040 U	0.0042 U	0.0048 U	0.011	0.0045 U	0.0041 U	0.0063 U	0.0035 U
Acetone [7]	0.0046 U	0.0049 U	0.0041 U	0.0035 U	0.0037 U	0.0040 U	0.0043	0.0069	0.20 J	0.0045 U	0.011	0.0063 U	0.0035 U
Carbon Disulfide [7]	0.00092 U	0.00099 U	0.00082 U	0.00070 U	0.00075 U	0.00081 U	0.0038	0.00095 U	0.0050	0.00091 U	0.00083 U	0.0013 U	0.00070 U
Naphthalene	0.00092 U	0.00099 U	0.00082 U	0.00070 U	0.00075 U	0.00081 U	0.00084 U	0.00095 U	0.0026	0.00091 U	0.00083 U	0.0013 U	0.00070 U
PAHs [8] (mg/kg)													
1-Methylnaphthalene	0.0074 U	0.0079 U	--	--	--	--	--	--	0.0071 U	--	--	0.040 U	0.0073 U
2-Methylnaphthalene	0.0090	0.0079 U	--	--	--	--	--	--	0.0071 U	--	--	0.040 U	0.0073 U
Acenaphthene	0.0074 U	0.0079 U	--	--	--	--	--	--	0.0071 U	--	--	0.040 U	0.0073 U
Acenaphthylene	0.14	0.0079 U	--	--	--	--	--	--	0.0071 U	--	--	0.040 U	0.0073 U
Anthracene	0.070	0.0079 U	--	--	--	--	--	--	0.0071 U	--	--	0.048	0.0073 U
Benzo[g,h,i]perylene	0.13	0.0079 U	--	--	--	--	--	--	0.0071 U	--	--	0.069	0.0073 U
Fluoranthene	0.37	0.0079 U	--	--	--	--	--	--	0.0071 U	--	--	0.14	0.0073 U
Fluorene	0.0088	0.0079 U	--	--	--	--	--	--	0.0071 U	--	--	0.040 U	0.0073 U
Naphthalene	0.024	0.0079 U	--	--	--	--	--	--	0.0071 U	--	--	0.060	0.0073 U
Phenanthrene	0.090	0.0079 U	--	--	--	--	--	--	0.0071 U	--	--	0.15	0.0073 U
Pyrene	0.47	0.0079 U	--	--	--	--	--	--	0.0071 U	--	--	0.17	0.0073 U
Carcinogenic PAHs [8] (mg/kg)													
Benzo (a) anthracene (TEF 0.1)	0.30	0.0079 U	--	--	--	--	--	--	0.0071 U	--	--	0.077	0.0073 U
Benzo (a) pyrene (TEF 1)	0.31	0.0079 U	--	--	--	--	--	--	0.0071 U	--	--	0.11	0.0073 U
Benzo (b) fluoranthene (TEF 0.1)	0.33	0.0079 U	--	--	--	--	--	--	0.0071 U	--	--	0.13	0.0073 U
Benzo (J,k) fluoranthene (TEF 0.1)	0.080	0.0079 U	--	--	--	--	--	--	0.0071 U	--	--	0.044	0.0073 U
Chrysene (TEF 0.01)	0.22	0.0079 U	--	--	--	--	--	--	0.0071 U	--	--	0.12	0.0073 U
Dibenz (a,h) anthracene (TEF 0.1)	0.033	0.0079 U	--	--	--	--	--	--	0.0071 U	--	--	0.040 U	0.0073 U
Indeno (1,2,3-cd) pyrene (TEF 0.1)	0.12	0.0079 U	--	--	--	--	--	--	0.0071 U	--	--	0.054	0.0073 U
Total TTEC of cPAHs (detect only)	0.40	N/A	--	--	--	--	--	--	N/A	--	--	0.14	N/A
Metals [9] (mg/kg)													
Arsenic	11 U	12 U	--	--	--	--	--	--	11 U	--	--	15	11 U
Barium	97	79	--	--	--	--	--	--	36	--	--	140	45
Cadmium	0.55 U	0.59 U	--	--	--	--	--	--	0.53 U	--	--	0.82	0.55 U
Chromium	36	49	--	--	--	--	--	--	14	--	--	50	37
Lead	22	5.9 U	--	--	--	--	--	--	5.3 U	--	--	220	5.5 U
Mercury	0.28 U	0.29 U	--	--	--	--	--	--	0.26 U	--	--	0.30 U	0.27 U
Selenium	11 U	12 U	--	--	--	--	--	--	11 U	--	--	12 U	11 U
Silver	1.1 U	1.2 U	--	--	--	--	--	--	1.1 U	--	--	1.2 U	1.1 U

Boring/Test Pit	UG-MW37							UG-MW37			MTCA Method A ULU Cleanup Level	Reuse Criteria[13]
Sample Identification[2]	UG-MW37-0-1	UG-MW37-1-2	UG-MW37-7-8	UG-MW37-9-10	UG-MW37-11-12	UG-MW37-13-14	UG-MW37-14-15	UG-MW37-15-16	UG-MW37-16-17	UG-MW37-18-19		
Sample Depth (feet bgs)	0 to 1	1 to 2	7 to 8	9 to 10	11 to 12	13 to 14	14 to 15	15 to 16	16 to 17	18 to 19		
Soil Type	Fill	Fill	Qvi	Qvi	Qvi	Qvi	Silt	Silt	Advance Outwash	Advance Outwash		
NWTPH-HCID[3] (mg/kg)												
Gasoline-Range	22 U	23 U	--	--	--	--	--	--	--	--	30/100[10]	30
Diesel-Range	55 U	56 U	--	--	--	--	--	--	--	--	2,000	200
Lube Oil-Range	DET	110 U	--	--	--	--	--	--	--	--	2,000	200
NWTPH-Gx[4] (mg/kg)												
Gasoline-Range Petroleum Hydrocarbons	--	--	--	--	--	--	--	--	--	--	30/100[10]	30
NWTPH-Dx[5] (mg/kg)												
Diesel-Range Petroleum Hydrocarbons	57 U	--	--	--	--	--	--	--	--	--	2,000	200
Lube Oil-Range Petroleum Hydrocarbons	520	--	--	--	--	--	--	--	--	--	2,000	200
VOCs[6] (mg/kg)												
Tetrachloroethene (PCE)	0.00078 U	0.00061 U	0.00059 U	0.00056 U	0.00055 U	0.00059 U	0.00058 U	0.00075 U	0.00055 U	0.00065 U	0.05	DET
Trichloroethene (TCE)	0.00078 U	0.00061 U	0.00059 U	0.00056 U	0.00055 U	0.00059 U	0.00058 U	0.00075 U	0.0015	0.017	0.03	DET
(cis) 1,2-Dichloroethene	0.00078 U	0.00061 U	0.00059 U	0.00056 U	0.00055 U	0.00059 U	0.00058 U	0.00075 U	0.00055 U	0.00065 U	160[11]	DET
(trans) 1,2-Dichloroethene	0.00078 U	0.00061 U	0.00059 U	0.00056 U	0.00055 U	0.00059 U	0.00058 U	0.00075 U	0.00055 U	0.00065 U	1,600[11]	DET
Vinyl Chloride	0.00078 U	0.00061 U	0.00059 U	0.00056 U	0.00055 U	0.00059 U	0.00058 U	0.00075 U	0.00055 U	0.00065 U	0.67[11]	DET
1,1,1-Trichloroethane	0.00078 U	0.00061 U	0.00059 U	0.00056 U	0.00055 U	0.00059 U	0.00058 U	0.00075 U	0.00055 U	0.00065 U	2	DET
1,1-Dichloroethane	0.00078 U	0.00061 U	0.00059 U	0.00056 U	0.00055 U	0.00059 U	0.00058 U	0.00075 U	0.00055 U	0.00065 U	180[11]	NE
1,1-Dichloroethene	0.00078 U	0.00061 U	0.00059 U	0.00056 U	0.00055 U	0.00059 U	0.00058 U	0.00075 U	0.00055 U	0.00065 U	4,000[11]	NE
Benzene	0.00078 U	0.00061 U	0.00059 U	0.00056 U	0.00055 U	0.00059 U	0.00058 U	0.00075 U	0.00055 U	0.00065 U	0.03	0.03
2-Butanone (MEK)[7]	0.0039 U	0.0030 U	0.0030 U	0.0028 U	0.0028 U	0.0030 U	0.0029 U	0.0038 U	0.0028 U	0.0032 U	48,000[11]	NE
2-Hexanone[7]	0.0039 U	0.0030 U	0.0030 U	0.0028 U	0.0028 U	0.0030 U	0.0029 U	0.0038 U	0.0028 U	0.0032 U	NE	NE
Acetone[7]	0.0039 U	0.0030 U	0.0030 U	0.0028 U	0.0028 U	0.0030 U	0.0029 U	0.0038 U	0.0028 U	0.0032 U	72,000[11]	NE
Carbon Disulfide[7]	0.00078 U	0.00061 U	0.0025	0.00078	0.00063	0.00075	0.00064	0.00098	0.00055 U	0.00065 U	8,000[11]	NE
Naphthalene	0.00078 U	0.00061 U	0.00059 U	0.00056 U	0.00055 U	0.00059 U	0.00058 U	0.00075 U	0.00055 U	0.00065 U	5	5
PAHs[8] (mg/kg)												
1-Methylnaphthalene	0.0074 U	0.0075 U	--	--	--	--	--	--	--	--	35[11]	NE
2-Methylnaphthalene	0.0074 U	0.0075 U	--	--	--	--	--	--	--	--	320[11]	NE
Acenaphthene	0.0074 U	0.0075 U	--	--	--	--	--	--	--	--	4,800[11]	NE
Acenaphthylene	0.0074 U	0.0075 U	--	--	--	--	--	--	--	--	NE	NE
Anthracene	0.0074 U	0.0075 U	--	--	--	--	--	--	--	--	24,000[11]	NE
Benzo[g,h,i]perylene	0.026	0.0075 U	--	--	--	--	--	--	--	--	NE	NE
Fluoranthene	0.032	0.0075 U	--	--	--	--	--	--	--	--	3,200[11]	NE
Fluorene	0.0074 U	0.0075 U	--	--	--	--	--	--	--	--	3,200[11]	NE
Naphthalene	0.0074 U	0.0075 U	--	--	--	--	--	--	--	--	5	5
Phenanthrene	0.019	0.0075 U	--	--	--	--	--	--	--	--	NE	NE
Pyrene	0.033	0.0075 U	--	--	--	--	--	--	--	--	2,400[11]	NE
Carcinogenic PAHs[8] (mg/kg)												
Benzo (a) anthracene (TEF 0.1)	0.018	0.0075 U	--	--	--	--	--	--	--	--	MTCA ULU cleanup level for the sum of all cPAHs is 0.1 mg/kg	Reuse Criteria for the sum of all cPAHs is 0.1 mg/kg
Benzo (a) pyrene (TEF 1)	0.023	0.0075 U	--	--	--	--	--	--	--	--		
Benzo (b) fluoranthene (TEF 0.1)	0.027	0.0075 U	--	--	--	--	--	--	--	--		
Benzo (J,k) fluoranthene (TEF 0.1)	0.0084	0.0075 U	--	--	--	--	--	--	--	--		
Chrysene (TEF 0.01)	0.024	0.0075 U	--	--	--	--	--	--	--	--		
Dibenz (a,h) anthracene (TEF 0.1)	0.0074 U	0.0075 U	--	--	--	--	--	--	--	--		
Indeno (1,2,3-cd) pyrene (TEF 0.1)	0.014	0.0075 U	--	--	--	--	--	--	--	--		
Total TTEC of cPAHs (detect only)	0.030	N/A	--	--	--	--	--	--	--	--	0.1	0.1
Metals[9] (mg/kg)												
Arsenic	12	14	--	--	--	--	--	--	--	--	20	7
Barium	91	59	--	--	--	--	--	--	--	--	16,000[11]	NE
Cadmium	0.55 U	0.56 U	--	--	--	--	--	--	--	--	2.0	1
Chromium	24	45	--	--	--	--	--	--	--	--	2,000[12]	48[14]
Lead	12	5.6 U	--	--	--	--	--	--	--	--	250	50
Mercury	0.28 U	0.28 U	--	--	--	--	--	--	--	--	2.0	0.07
Selenium	11 U	11 U	--	--	--	--	--	--	--	--	400[11]	NE
Silver	1.1 U	1.1 U	--	--	--	--	--	--	--	--	400[11]	NE

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc., of Redmond, Washington.

[2] Sample ID = Area number - boring/test pit number - starting depth of sample [feet bgs] -end depth [feet bgs], Area 1B test pit 1 collected 0-1 feet bgs = 1B-TP1-0-1.

[3] Washington State Department of Ecology (Ecology)-approved method NWTPH-HCID.

[4] Ecology-approved method NWTPH-Gx.

[5] Ecology-approved method NWTPH-Dx.

[6] VOCs were analyzed by EPA method 8260B. Other VOCs were analyzed but not detected.

[7] This compound is a common laboratory contaminant.

[8] Polycyclic aromatic hydrocarbons (PAHs) and carcinogenic PAHs (cPAHs) were analyzed by U.S. Environmental Protection Agency (EPA) method 8270D/SIM. Other PAHs were analyzed but not detected.

[9] Resource Conservation Recovery Act (RCRA) metals analyzed by EPA 6000/7000 series method.

[10] MTCA Method A cleanup level for gasoline is 30 mg/kg if benzene is detected or if the sum of toluene, ethylbenzene and xylenes are equal to or greater than 1% of the total gasoline detection.

[11] MTCA Method B criteria represented because MTCA Method A cleanup level has not been established.

[12] MTCA Method A cleanup level for Trivalent Chromium.

[13] Guidance for Remediation of Petroleum Contaminated Sites (Publication 10-09-057) Ecology, October 2011; Summary Natural Background Soil Metals Concentrations in Washington State (Publication 94-115) dated October 1994; and Hazardous Waste Regulations 40 CFR Part 260.

[14] Chromium was not compared to the Reuse Criteria listed above for soils based on historic soil analytical results indicating chromium is not a prevalent chemical of concern on the UWT campus.

-- = sample not analyzed

mg/kg = milligram per kilogram

MTCA = Model Toxics Control Act

Qvi = Ice-contact deposit

N/A = not applicable

bgs = below ground surface

U = Analyte was not detected at or greater than the listed reporting limit

J = Estimated result by analytical laboratory.

TEF = Toxicity Equivalency Factor as defined in WAC 173-340-900 Table 708-2

Total Toxic Equivalent Concentration (TTEC) is the sum of each individual cPAH concentration multiplied by its corresponding TEF.

Bold type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Bold type and gray shading indicates that the detected concentration is greater than the respective MTCA cleanup level.

Dashed outline indicates the value is greater than the Reuse Criteria.

TABLE 2

SUMMARY OF CHEMICAL ANALYTICAL RESULTS[1] - GROUNDWATER

AREA 1B - TACOMA VACANT
PRIORITY DEVELOPMENT AREA - UNIVERSITY OF WASHINGTON TACOMA
TACOMA, WASHINGTON

Boring Identification	UG-MW24	UG-MW25D	UG-MW25S	UG-MW26	UG-MW37	MTCA Method A Groundwater Cleanup Level	MTCA Method B Indoor Air Screening Levels [14]
Sample ID [2]	UG-MW24-130715	UG-MW25D-130904	UG-MW25S-130904	UG-MW26-130930	UG-MW37-130930		
Sample Date	7/15/2013	9/4/2013	9/4/2013	9/30/2013	9/30/2013		
Approximate Depth to Groundwater (feet btoc) [3]	31.33	36.73	2.07	-0.25	1.51		
Approximate Elevation of Groundwater [3 and 4]	165.47	165.32	200.53	202.43	198.78		
Top of Well Screen Elevation (feet) [4]	132.08	157.64	195.08	195.62	191.78		
Bottom of Well Screen Elevation (feet) [4]	117.08	180.64	185.08	164.62	183.78		
Lithology At Well Screen	Advance Outwash	Advance Outwash	Qvi	Qvi	Qvi		
NWTPH-Gx [5] (µg/L)							
Gasoline-Range	100 U	100 U	100 U	100 U	100 U	800/1,000[11]	NE
NWTPH-Dx [6] (mg/L)							
Diesel-Range	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.5	NE
Lube Oil-Range	0.42 U	0.41 U	0.42 U	**0.46**	**0.55**	0.5	NE
VOCs [7] (µg/L)							
Trichloroethene (TCE)	0.20 U	0.20 U	**290**	0.20 U	0.20 U	5	1.5
Tetrachloroethene (PCE)	0.20 U	0.20 U	2.0 U	0.20 U	0.20 U	5	24
(cis) 1,2-Dichloroethene	0.20 U	0.20 U	**6.0**	0.20 U	0.20 U	16[12]	160
(trans) 1,2-Dichloroethene	0.20 U	0.20 U	2.0 U	0.20 U	0.20 U	160[12]	110
Vinyl Chloride	0.10 U	0.20 U	2.0 U	0.20 U	0.20 U	0.2	0.35
1,1-Dichloroethane	0.20 U	0.20 U	**15**	0.20 U	0.20 U	7.7[12]	11
1,1-Dichloroethene	0.20 U	0.20 U	**12**	0.20 U	0.20 U	400[12]	130
Benzene	0.20 U	0.20 U	**2.2**	0.20 U	0.20 U	5	2.4
Acetone [8]	5.0 U	5.0 U	50 U	5.0 U	**5.7**	7,200[12]	1.40E+07
PAHs [9] (µg/L)							
Naphthalene	0.096 U	0.095 U	0.095 U	0.096 U	0.097 U	160	NE
2-Methylnaphthalene	0.096 U	0.095 U	0.095 U	0.096 U	0.097 U	1.5[12]	NE
cPAHs [9] (µg/L)							
Benzo (a) anthracene (TEF 0.1)	0.0096 U	0.0095 U	0.0095 U	0.0096 U	**0.011**	MTCA ULU cleanup level for the sum of all cPAHs is 0.1 µg/L	NE
Benzo (a) pyrene (TEF 1)	0.0096 U	0.0095 U	0.0095 U	0.0096 U	0.0097 U		NE
Benzo (b) fluoranthene (TEF 0.1)	0.0096 U	0.0095 U	0.0095 U	0.0096 U	**0.012**		NE
Benzo (j,k) fluoranthene (TEF 0.1)	0.0096 U	0.0095 U	0.0095 U	0.0096 U	0.0097 U		NE
Chrysene (TEF 0.01)	0.0096 U	0.0095 U	0.0095 U	0.0096 U	0.0097 U		NE
Dibenz (a,h) anthracene (TEF 0.1)	0.0096 U	0.0095 U	0.0095 U	0.0096 U	0.0097 U		NE
Indeno (1,2,3-cd) pyrene (TEF 0.1)	0.0096 U	0.0095 U	0.0095 U	0.0096 U	0.0097 U		NE
Total TTEC of cPAHs (detect only)	N/A	N/A	N/A	N/A	**0.0023**	0.1	NE
Total Metals [10] (µg/L)							
Arsenic	3.3 U	**6.2**	3.3 U	3.0 U	3.0 U	5	NE
Barium	--	28 U	**49**	**40**	**68**	3,200[12]	NE
Cadmium	4.4 U	4.4 U	4.4 U	4.0 U	4.0 U	5	NE
Chromium	11 U	11 U	11 U	10 U	10 U	50[13]	NE
Lead	1.1 U	1.1 U	1.1 U	1.0 U	1.0 U	15	NE
Mercury	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	2	NE
Selenium	--	5.6 U	5.6 U	5.0 U	5.0 U	80[12]	NE
Silver	--	11 U	11 U	10 U	10 U	80[12]	NE
Dissolved Metals [10] (µg/L)							
Arsenic	--	**5.7**	--	--	--	5	NE

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc. in Redmond, Washington.

[2] Sample ID = Area number - Boring number - Date (i.e.., a water sample collected from UG-MW24 on July 15, 2013 = UG-MW24-130715).

[3] Groundwater level was measured below the top of casing on November 8, 2013.

[4] Based on survey completed by AHBL November 6, 2013. Horizontal datum - NAD 83/91 Washington State Plane - South Zone (City of Tacoma Horizontal control Holding City Monument Numbers 411 and 414). Vertical datum NGVD 29 (brass monument at South 19th and Fawcett Avenue, elevation 165.15).

[5] Washington State Department of Ecology (Ecology)-approved method NWTPH-Gx.

[6] Ecology-approved method NWTPH-Dx.

[7] Volatile organic compounds (VOCs) were analyzed by U.S. Environmental Protection Agency (EPA) method 8260C. Other VOCs were analyzed but not detected.

[8] This compound is a common laboratory contaminant.

[9] Polycyclic Aromatic Hydrocarbons (PAHs) and carcinogenic PAHs (cPAHs) analyzed by EPA method 8270D/SIM.

[10] Metals analyzed by EPA 200.8 or 7470A method.

[11] MTCA Method A cleanup level for gasoline-range petroleum hydrocarbons is 800 µg/L if benzene is present and 1,000 µg/L if benzene is not present.

[12] MTCA Method B criteria represented because MTCA Method A cleanup level has not been established.

[13] MTCA Method A cleanup level for total chromium shown. Cleanup level for hexavalent chromium is 48 µg/L.

[14] MTCA Method B Indoor Air Screening Level from Washington State Deportment of Ecology Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action. Values updated as appropriate to incorporate recent toxicity data.

MTCA = Model Toxics Control Act

-- = Analyte or sample not analyzed | N/A = not applicable | Qvi = Ice-contact deposit

µg/L = microgram per Liter | mg/L = milligram per liter | DCA = dichloroethane

U = Analyte was not detected at or greater than the listed reporting limit

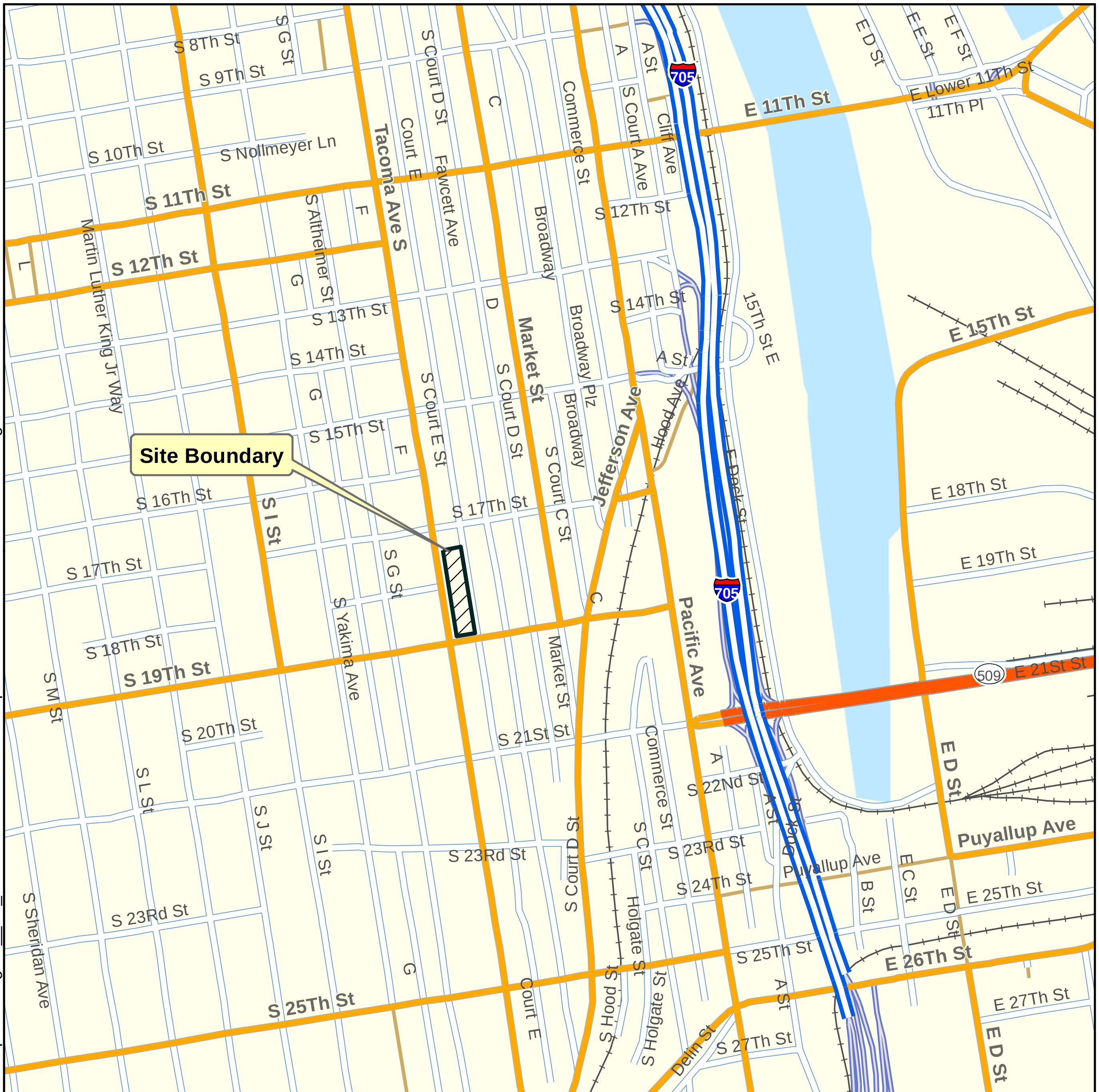
TEF = Toxicity Equivalency Factor as defined in WAC 173-340-900 Table 708-2

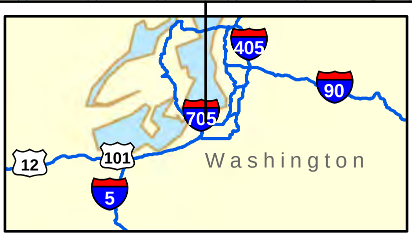
Total Toxic Equivalent Concentration (TTEC) is the sum of each individual cPAH concentration multiplied by its corresponding TEF.

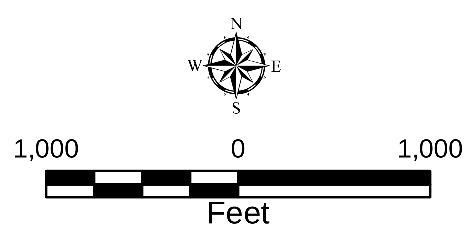
Bold type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Bold type and gray shading indicates analyte was detected at a concentration greater than the MTCA Method groundwater cleanup/criteria level.

Dashed outline indicates analyte was detected at a concentration greater than the MTCA Method B Indoor Air Screening Level.







Notes:
CPO = University of Washington Capital Project Office
UWT = University of Washington Tacoma
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Data Sources: ESRI Data & Maps

Projection: NAD 1983 UTM Zone 10N

Vicinity Map

UWT Environmental Investigation
Priority Development Areas - CPO Project No. 204277
Tacoma, Washington

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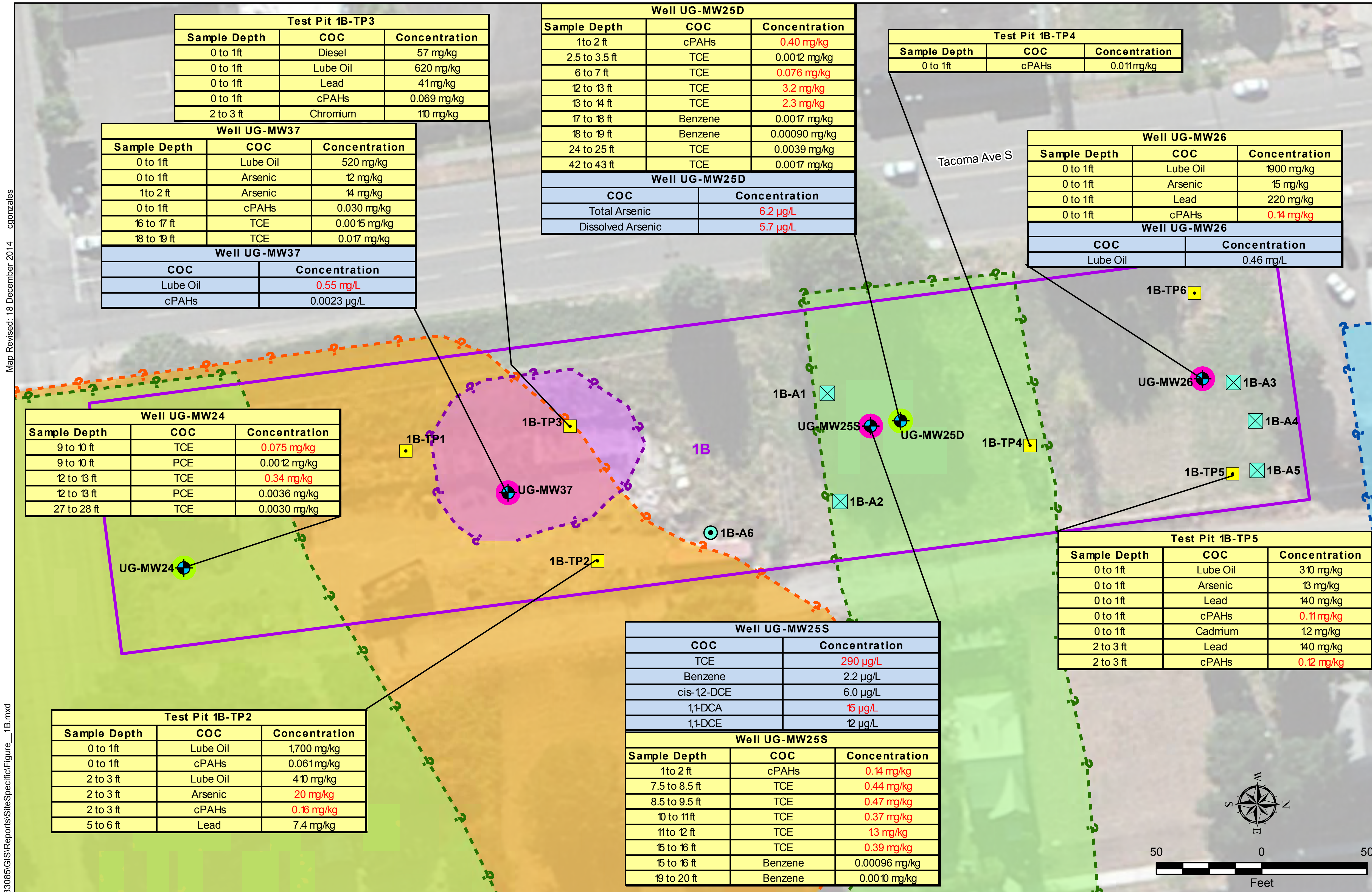
Figure 1

Office: TAC Path: \\tac\projects\0\0183085\GIS\Reports\SiteSpecific\Figure_1B_VM.mxd Map Revised: 17 December 2014 cgonzales



Test Pit 1B-TP3		
Sample Depth	COC	Concentration
0 to 1 ft	Diesel	57 mg/kg
0 to 1 ft	Lube Oil	620 mg/kg
0 to 1 ft	Lead	41 mg/kg
0 to 1 ft	cPAHs	0.069 mg/kg
2 to 3 ft	Chromium	110 mg/kg

Well UG-MW25D		
Sample Depth	COC	Concentration
1 to 2 ft	cPAHs	0.40 mg/kg
2.5 to 3.5 ft	TCE	0.0012 mg/kg
6 to 7 ft	TCE	0.076 mg/kg
12 to 13 ft	TCE	3.2 mg/kg
13 to 14 ft	TCE	2.3 mg/kg
17 to 18 ft	Benzene	0.0017 mg/kg
18 to 19 ft	Benzene	0.00090 mg/kg
24 to 25 ft	TCE	0.0039 mg/kg
42 to 43 ft	TCE	0.0017 mg/kg

Well UG-MW25D	
COC	Concentration
Total Arsenic	6.2 µg/L
Dissolved Arsenic	5.7 µg/L

Test Pit 1B-TP4		
Sample Depth	COC	Concentration
0 to 1 ft	cPAHs	0.011 mg/kg

Well UG-MW37		
Sample Depth	COC	Concentration
0 to 1 ft	Lube Oil	520 mg/kg
0 to 1 ft	Arsenic	12 mg/kg
1 to 2 ft	Arsenic	14 mg/kg
0 to 1 ft	cPAHs	0.030 mg/kg
16 to 17 ft	TCE	0.0015 mg/kg
18 to 19 ft	TCE	0.017 mg/kg

Well UG-MW37	
COC	Concentration
Lube Oil	0.55 mg/L
cPAHs	0.0023 µg/L

Well UG-MW26		
Sample Depth	COC	Concentration
0 to 1 ft	Lube Oil	1900 mg/kg
0 to 1 ft	Arsenic	15 mg/kg
0 to 1 ft	Lead	220 mg/kg
0 to 1 ft	cPAHs	0.14 mg/kg

Well UG-MW26	
COC	Concentration
Lube Oil	0.46 mg/L

Well UG-MW24		
Sample Depth	COC	Concentration
9 to 10 ft	TCE	0.075 mg/kg
9 to 10 ft	PCE	0.0012 mg/kg
12 to 13 ft	TCE	0.34 mg/kg
12 to 13 ft	PCE	0.0036 mg/kg
27 to 28 ft	TCE	0.0030 mg/kg

Test Pit 1B-TP5		
Sample Depth	COC	Concentration
0 to 1 ft	Lube Oil	310 mg/kg
0 to 1 ft	Arsenic	13 mg/kg
0 to 1 ft	Lead	140 mg/kg
0 to 1 ft	cPAHs	0.11 mg/kg
0 to 1 ft	Cadmium	12 mg/kg
2 to 3 ft	Lead	140 mg/kg
2 to 3 ft	cPAHs	0.12 mg/kg

Well UG-MW25S	
COC	Concentration
TCE	290 µg/L
Benzene	2.2 µg/L
cis-1,2-DCE	6.0 µg/L
1,1-DCA	15 µg/L
1,1-DCE	12 µg/L

Well UG-MW25S		
Sample Depth	COC	Concentration
1 to 2 ft	cPAHs	0.14 mg/kg
7.5 to 8.5 ft	TCE	0.44 mg/kg
8.5 to 9.5 ft	TCE	0.47 mg/kg
10 to 11 ft	TCE	0.37 mg/kg
11 to 12 ft	TCE	1.3 mg/kg
15 to 16 ft	TCE	0.39 mg/kg
15 to 16 ft	Benzene	0.00096 mg/kg
19 to 20 ft	Benzene	0.0010 mg/kg

Test Pit 1B-TP2		
Sample Depth	COC	Concentration
0 to 1 ft	Lube Oil	1,700 mg/kg
0 to 1 ft	cPAHs	0.061 mg/kg
2 to 3 ft	Lube Oil	410 mg/kg
2 to 3 ft	Arsenic	20 mg/kg
2 to 3 ft	cPAHs	0.16 mg/kg
5 to 6 ft	Lead	7.4 mg/kg

Soil Results*

Boring 2A-B7		
Sample Depth	COC	Concentration
2.5 to 3.5 feet bgs	Lead	200 mg/kg
2.5 to 3.5 feet bgs	cPAHs	0.64 mg/kg

Groundwater Results*

Well UG-MW13	
COC	Concentration
TCE	110 µg/L
PCE	14 µg/L

*Chemicals shown in red were detected at concentrations greater than the respective MTCA Method A cleanup levels.

Only analytical results of the chemicals of concern are shown if detected. Other chemicals that were analyzed and detected are not shown unless detected at concentrations greater than the respective MTCA cleanup levels.

Legend

Approximate Location of Priority Development Area 1B

Approximate Subsurface Location and Identification

Existing Monitoring Well

Direct Push Boring

Sonic Core Boring - Permanent New Monitoring Well

Test Pit

Magnetic Anomaly Where Test Pit Was Completed

Magnetic Anomaly Where Test Pit Was Not Completed (Potential UST)

Lithology of Well Screen Interval

Ice-Contact Deposit (Shallow Aquifer)

Advance Outwash (Deep Aquifer)

Approximate Lateral Extent of Lube Oil-Range Petroleum Hydrocarbon-Contaminated Groundwater Plume in Shallow Aquifer

Approximate Lateral Extent of PCE- and Breakdown Product Contaminated Groundwater Plume in Shallow Aquifer

Approximate Lateral Extent of TCE-Contaminated Groundwater Plume in Shallow Aquifer

Approximate Lateral Extent of TCE-Contaminated Groundwater Plume in Deep Aquifer

Approximate Lateral Extent of TCE-Contaminated Groundwater Plume in Shallow and Deep Aquifer

Notes:
cPAHs concentrations shown as TTEC.
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet
COC = Chemical of Concern
UWT = University of Washington Tacoma
PDA = Priority Development Area
PCE = tetrachloroethene
TCE = trichloroethene
cPAH = Carcinogenic Polycyclic Aromatic Hydrocarbons
mg/kg = milligram per kilogram
µg/L = microgram per Liter
bgs = Below Ground Surface
TTEC = Total Toxicity Equivalency Concentration
ULU = Unrestricted Land Use
MTCA = Model Toxics Control Act
UST = Underground Storage Tank
cis,1,1 DCE = cis1,1 dichlorethene
DCA = dichloroethane
DCE = dichloroethene

Soil MTCA Cleanup/Criteria Levels:
PCE = 0.05 mg/kg (Method A ULU)
TCE = 0.03 mg/kg (Method A ULU)
Benzene = 0.03 mg/kg (Method A ULU)
Vinyl Chloride = 0.67 mg/kg (Method B)
Lube Oil-Range Petroleum Hydrocarbons = 2,000 mg/kg (Method A ULU)
Diesel-Range Petroleum Hydrocarbons = 2,000 mg/kg (Method A ULU)
Gasoline-Range Petroleum Hydrocarbons = 100 mg/kg (Method A ULU)
cPAHs (TTEC) = 0.1 mg/kg (Method A ULU)
Lead = 250 mg/kg (Method A ULU)
Arsenic = 20 mg/kg (Method A ULU)
Cadmium = 2 mg/kg (Method A ULU)
Mercury = 2 mg/kg (Method A ULU)

Groundwater MTCA Cleanup/Criteria Levels:
PCE = 5 µg/L (Method A); 24 µg/L (Indoor Air)
TCE = 5 µg/L (Method A); 1.5 µg/L (Indoor Air)
cis-1,2-DCE= 16 µg/L (Method B); 160 µg/L (Indoor Air)
trans-1,2-DCE = 160 µg/L (Method B); 110 µg/L (Indoor Air)
1,1-DCA = 7.7 µg/L (Method B); 11 µg/L (Indoor Air)
1,1-DCE = 400 µg/L (Method B);130 µg/L (Indoor Air)
Vinyl Chloride = 0.2 µg/L (Method A); 0.35 µg/L (Indoor Air)
Benzene = 5 µg/L (Method A); 2.4 µg/L (Indoor Air)
Lube Oil-Range Petroleum Hydrocarbons = 0.5 mg/L (Method A)
Arsenic = 5 µg/L (Method A)
cPAHs= 0.1 µg/L (Method A)

Site Plan – PDA 1B/Tacoma Vacant

UWT Environmental Assessment
Priority Development Areas - CPO Project No. 204277
Tacoma, Washington

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Figure 2

Map Revised: 18 December 2014 cgonzales
Path: \\tac\projects\0\0183085\GIS\Reports\SiteSpecific\Figure__1B.mxd
Office: TAC

APPENDIX A
Report Limitations and Guidelines for Use

APPENDIX A
REPORT LIMITATIONS AND GUIDELINES FOR USE[1]

This appendix provides information to help you manage your risks with respect to the use of this report.

Environmental Services are Performed for Specific Purposes, Persons and Projects

This report has been prepared for use by University of Washington. This report is not intended for use by others, and the information contained herein is not applicable to other sites.

GeoEngineers structures our services to meet the specific needs of our clients. For example, an environmental site assessment study conducted for a property owner may not fulfill the needs of a prospective purchaser of the same property. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and project site. No one except University of Washington should rely on this environmental report without first conferring with GeoEngineers. This report should not be applied for any purpose or project except the one originally contemplated.

This Environmental Report is Based on a Unique Set of Project-Specific Factors

This report has been prepared for the Priority Development Areas (PDAs) Environmental Assessment Project at the UW – Tacoma (UWT) campus located in Tacoma, Washington. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, do not rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

If important changes are made after the date of this report, GeoEngineers should be given the opportunity to review our interpretations and recommendations and provide written modifications or confirmation, as appropriate.

Reliance Conditions for Third Parties

If a lending agency or other parties intend to place legal reliance on the product of our services, we require that those parties indicate in writing their acknowledgement that the scope of services provided, and the general conditions under which the services were rendered including the limitation of professional liability, are understood and accepted by them. This is to provide our firm

[1] Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions.

Environmental Regulations are Always Evolving

Some substances may be present in the site vicinity in quantities or under conditions that may have led, or may lead, to contamination of the subject site, but are not included in current local, state or federal regulatory definitions of hazardous substances or do not otherwise present current potential liability. GeoEngineers cannot be responsible if the standards for appropriate inquiry, or regulatory definitions of hazardous substance, change or if more stringent environmental standards are developed in the future.

Subsurface Conditions can Change

This environmental report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by manmade events such as construction on or adjacent to the site, by new releases of hazardous substances, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Always contact GeoEngineers before applying this report to determine if it is still applicable.

Topsoil

For the purposes of this report, we consider topsoil to consist of generally fine-grained soil with an appreciable amount of organic matter based on visual examination, and to be unsuitable for direct support of the proposed improvements. However, the organic content and other mineralogical and gradational characteristics used to evaluate the suitability of soil for use in landscaping and agricultural purposes was not determined, nor considered in our analyses. Therefore, the information and recommendations in this report, and our logs and descriptions should not be used as a basis for estimating the volume of topsoil available for such purposes.

Most Environmental Findings are Professional Opinions

Our interpretations of subsurface conditions are based on field observations and chemical analytical data from widely spaced sampling locations at the site. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ – sometimes significantly – from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

Do Not Redraw the Exploration Logs

Environmental scientists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in an environmental report should never be redrawn for inclusion in other design drawings. Only photographic or electronic reproduction is acceptable, but recognize that separating logs from the report can elevate risk.

Read These Provisions Closely

Some clients, design professionals and contractors may not recognize that the geoscience practices (geotechnical engineering, geology and environmental science) are far less exact than other engineering and natural science disciplines. This lack of understanding can create unrealistic expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory "limitations" provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you are unclear how these "Report Limitations and Guidelines for Use" apply to your project or site.

Geotechnical, Geologic and Geoenvironmental Reports Should Not Be Interchanged

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually relate any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding a specific project.

Biological Pollutants

GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention, or assessment of the presence of Biological Pollutants in or around any structure. Accordingly, this report includes no interpretations, recommendations, findings, or conclusions for the purpose of detecting, preventing, assessing, or abating Biological Pollutants. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts.

PDA 1C – Fawcett North

Priority Development Area 1C
Fawcett North
Environmental Subsurface Investigation

Environmental Subsurface Investigation Project
UW Capital Project Office Project No. 204277
1702 to 1720 South Fawcett Avenue
Tacoma, Washington

for
University of Washington

December 19, 2014

GeoEngineers

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253.383.4940

Priority Development Area 1C
Fawcett North
Environmental Subsurface Investigation

UW Capital Project Office
Project No. 204277
1702 to 1720 South Fawcett Avenue
Tacoma, Washington

File No. 0183-085-00

December 19, 2014

Prepared for:

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Associate

TSD:TRM:tt:ch

GeoEngineers

Table of Contents

1.0 INTRODUCTION 1

2.0 SITE HISTORICAL USE 1

3.0 CURRENT SITE FEATURES 2

4.0 ENVIRONMENTAL SUBSURFACE EXPLORATIONS 2

4.1. Historical Research and Magnetic Anomaly Findings 2
4.2. Soil Borings and Test Pits 2
4.3. Groundwater Sampling 3

5.0 SITE GEOLOGY AND HYDROGEOLOGY 3

5.1. Soil Conditions 3
5.2. Groundwater Conditions 3

6.0 CHEMICAL ANALYTICAL PROGRAM 4

6.1. General 4
6.2. Criteria for Characterization of Soil and Groundwater 4
6.3. Soil 5
6.3.1. Petroleum-Range Hydrocarbons 6
6.3.2. VOCs 6
6.3.3. PAHs 6
6.3.4. RCRA Metals 6
6.4. Groundwater 7
6.4.1. Petroleum-Range Hydrocarbons 8
6.4.2. VOCs 8
6.4.3. PAHs 9
6.4.4. Total RCRA Metals 9

7.0 CONCLUSIONS 9

7.1. Shallow Aquifer 9
7.2. Deep Aquifer 10
7.3. Contaminated and Impacted Soil 10

8.0 PROPOSED DEVELOPMENT PLANS 10

9.0 POTENTIAL IMPACTS AND MITIGATION MEASURES TO DESIGN AND CONSTRUCTION 10

9.1. PCE/TCE-Contaminated Groundwater 11
9.2. Soil is Contaminated with Chemicals of Concern 13

10.0 LIMITATIONS 14

11.0 REFERENCES 14

LIST OF TABLES

Table 1. Summary of Chemical Analytical Results – Soil
Table 2. Summary of Chemical Analytical Results – Groundwater

LIST OF FIGURES

Figure 1. Vicinity Map
Figure 2. Site Plan – PDA 1C/Fawcett North

APPENDIX

Appendix A. Report Limitations and Guidelines for Use

1.0 INTRODUCTION

This report presents the results of our environmental subsurface investigation completed for the University of Washington (UW) at the Fawcett North property (Priority Development Area [PDA] – 1C) located on the UW Tacoma (UWT) campus at 1702 to 1720 South Fawcett Avenue in Tacoma, Washington. The Fawcett North property is herein referred to as the "site." The site was identified as PDA 1C for this project. The site is bound by Court E to the west, South 17th Street to the north, South Fawcett Avenue to the east and a residential property to the south. A Vicinity Map of the site is included as Figure 1. See Figure 2 for the layout of the site in relation to adjacent properties.

This subsurface investigation was completed under the UWT Environmental Subsurface Investigation Project, UW project number 204277. This report was completed as a subset of the larger subsurface assessment report titled "2013 Environmental Subsurface Investigation – University of Washington-Tacoma, Tacoma, Washington" dated December 19, 2014 to assist with development of the property. This report should be used in context with the larger subsurface assessment report. Borings logs, subsurface investigation methodologies and chemical analytical data packages are included in the larger investigation report.

General impacts and potential mitigation measures are provided in this report that may be employed in design and construction. It is important to recognize that additional environmental investigations may be necessary prior to selection of the final mitigation measure. Mitigation measures and associated costs provided in this report will likely need refinement based on the results of the additional environmental investigations. The project team should contact UW Environmental Health & Safety (UW EH&S) to discuss the need for additional environmental investigations at this site. UW EH&S is the liaison with the Washington State Department of Ecology (Ecology) for review and approval of mitigation measures.

2.0 SITE HISTORICAL USE

The site was developed in the early 1900s with various single family residences and associated garages along with three apartment buildings and a store based on GeoEngineers' review of historical documents. Heating permits were generally noted for the former residences located along the west side of South Fawcett Avenue between the late 1960s to the early 1980s. A conversion from oil to natural gas occurred during this time period, possibly indicating that heating oil was used as a source of heat historically. It is unknown if potential heating oil USTs remain on the site as there were no records located within the records search indicating USTs were removed since the early 1960s.

The majority of the buildings were removed in the 1990s when UW purchased the site along South Fawcett Avenue. One building (a single family residence) owned by UW remains on the site.

3.0 CURRENT SITE FEATURES

A single family residence occupies the central portion of the site. The northern and southern portions of the site are currently undeveloped and vegetated with field grass. The site slopes up moderately from east to the west and gently slopes up from the south to north. The elevation varies from approximately 170 feet to 194 feet.

4.0 ENVIRONMENTAL SUBSURFACE EXPLORATIONS

The environmental subsurface investigation completed at the site consisted of a magnetic/ground penetrating radar (M/GPR) survey and associated test pits, test pit explorations for soil sampling, soil borings using rotosonic core drilling, monitoring well installation, groundwater development and sampling of new upgradient and on site monitoring wells. The subsurface investigation was completed between June and October 2013.

4.1. Historical Research and Magnetic Anomaly Findings

Historic research results indicated the potential for USTs to be present at the site given the age of the former buildings and the source of heat typically used during these time periods. In addition, heating conversion permits were listed in the permit records. An M/GPR survey was performed around the footprint of the existing structure in June 2013.

Two magnetic anomalies were identified near the northern and southern portions of the site. The magnetic anomalies were designated using the following identification nomenclature: 1C-A1 where 1C identifies the PDA and –A1 is the number of the anomaly at the site.

Test pit excavation activities were conducted in areas where USTs may be present based on the magnetic anomalies observed during the surveys. Two test pits were completed in the vicinity of magnetic anomalies 1C-A1 and 1C-A2 on June 26, 2013. Observations from the test pit explorations are discussed in the following list.

- Magnetic Anomaly 1C-A1. Fill material was observed to a depth of approximately 2 feet below ground surface (bgs). One 4-inch diameter metal pipe and other construction debris were observed within the fill material. Native soil was encountered at approximately 2 feet bgs. This magnetic anomaly was likely related to the metal pipe observed within the fill material.
- Magnetic Anomaly 1C-A2. Fill material was observed to a depth of approximately 2 feet bgs. Metal pipe, two metal 5-gallon buckets and construction debris were observed within the fill material. Native soil was encountered at approximately 2 feet bgs. This magnetic anomaly was likely related to the metal debris encountered within the fill material.

4.2. Soil Borings and Test Pits

Subsurface explorations included completing two test pits at the site on June 26, 2013 and advancing one soil boring using rotosonic core drilling methods on September 18, 2013.

The test pits (1C-TP1 and 1C-TP2) ranged in depth between approximately 6 and 7.5 feet bgs and were terminated when native soil was encountered. These test pits were completed separately from the test pits performed to investigate the magnetic anomalies. The soil boring (UG-MW33) was advanced to 15 feet bgs and was converted into a groundwater monitoring well.

4.3. Groundwater Sampling

Groundwater samples were collected from four permanent monitoring wells and one temporary monitoring well located on and upgradient of the site between June and October 2013. The locations of the wells are shown on Figure 2.

One monitoring well was installed on the site (UG-MW33). Three permanent monitoring wells (UG-MW25S, UG-MW25D and UG-MW26) and one temporary monitoring well (1A-B2) are located upgradient of the site. Monitoring wells UG-MW25S, UG-MW26 and UG-MW33 are screened within the shallow aquifer (ice-contact deposits). Temporary monitoring well 1A-B2 was screened within the fill in the shallow aquifer. Monitoring well UG-MW25D is screened within the deep aquifer (advance outwash).

5.0 SITE GEOLOGY AND HYDROGEOLOGY

5.1. Soil Conditions

Subsurface conditions consist of fill, ice-contact deposits, silt layer and advance outwash. The fill consists of silt and sand with gravel (silt with sand and gravel and/or sand with silt and gravel) from the ground surface to depths ranging from approximately 1 to 5 feet bgs.

Native soil conditions underlying the fill were observed at each subsurface exploration location consisting of glacially consolidated units (ice-contact deposits) comprised of silty sand to sand with gravel and silt. A unit of brown sandy silt was observed beneath the ice-contact deposits in monitoring wells UG-MW25S and UG-MW25D completed during this investigation. A unit of brown sandy silt with occasional gravel was observed below the ice-contact deposits in boring UG-MW33. Glacial advance outwash was observed beneath the silt unit in monitoring wells UG-MW33, UG-MW25S and UG-MW25D. The advance outwash consisted of sand with gravel with various amounts of silt to silty gravel with sand to the full depth explored.

5.2. Groundwater Conditions

It appears that groundwater conditions observed at the site consist of a shallow aquifer (ice-contact deposits) and deep aquifer (advance outwash) to the depths explored during this investigation. The shallow and deep aquifers appear to be separated by the silt layer between the ice-contact deposits and advance outwash.

Groundwater within the shallow aquifer appears to be present within the sand and gravel seams observed in the ice-contact deposits. The hydraulic connection of the sand and gravel seams within the ice-contact deposit unit is unknown in and around the project site. Groundwater within the deep aquifer of the upgradient monitoring well (UG-MW25D) appears to be continuous with interbeds of moist to wet silty sands at depth.

Groundwater elevation of the shallow aquifer ranged between 185 feet from the west to 165 feet to the east side of the site. Groundwater within the deep aquifer generally ranged between

Elevation 160 feet from the west to Elevation 150 feet on the east side of the site based on off-site well elevations.

6.0 CHEMICAL ANALYTICAL PROGRAM

6.1. General

Soil and groundwater samples were submitted to OnSite Environmental, Inc., in Redmond, Washington for chemical analysis. The chemical analytical data are summarized in Tables 1 and 2. Chemicals that were not detected at or greater than the laboratory reporting limits in the analyzed samples are typically not included on the tables.

6.2. Criteria for Characterization of Soil and Groundwater

The following criteria were used to evaluate impacted and contaminated soil and groundwater.

- Tetrachloroethene (PCE) and Trichloroethene (TCE) Impacted and Contaminated Soil
  - PCE, TCE and breakdown products at concentrations detected in the analyzed soil samples.
- Contaminated Soil
  - Petroleum hydrocarbons, carcinogenic polycyclic aromatic hydrocarbons (cPAHs), metals and volatile organic compounds (VOCs) were detected at concentrations greater than the Model Toxics Control Act (MTCA) Method A Unrestricted Land Use (ULU) cleanup level or MTCA Method B screening level.
- Impacted Soil

  Some contaminants were detected at concentrations less than the respective MTCA cleanup levels. UWT may be able to reuse certain types of soil depending on the sampling results. UW EH&S must review the chemical analytical data to evaluate if reuse or disposal at an offsite facility is necessary. Soil reuse and disposal are subject to Ecology Guidance for Remediation of Petroleum Contaminated Sites (Ecology, 2011), solid waste regulations and disposal facility permit conditions. The criteria below is herein referred to as "Reuse Criteria."

  - Petroleum hydrocarbons, cPAHs and/or Lead

    The Ecology guidance indicates that soil with diesel- and/or lube oil-range petroleum hydrocarbons detected at concentrations less than 200 milligrams per kilogram (mg/kg) and/or gasoline-range petroleum hydrocarbons detected at concentrations less than 30 mg/kg are suitable for reuse as commercial fill at UWT campus with the following limitations:

    - placed above the highest water table,
    - not within 100 feet of a drinking water well,
    - not within wellhead protection area of public water supply,
    - not within wetlands or where surface water contact is possible, and
    - not within a surface water infiltration facility or septic drain field.

If the concentrations exceed the above limits but are still less than respective MTCA cleanup levels the soil may be reused in road and bridge embankment construction, landfill daily cover or asphalt manufacturing with UW EH&S approval.

- Arsenic, Cadmium, and/or Mercury

  Soil with concentrations of arsenic, cadmium and/or mercury above what is normally found in the natural background environment (Puget Sound Background levels - Ecology, 1994) is typically suitable for disposal at an inert waste landfill or a Department of Natural Resources (DNR) reclamation pit. UW EH&S approval is necessary.

  Soil at and near the UWT campus has been well documented to contain chromium at concentrations slightly above the natural background level and is not considered in the "Reuse Criteria."

- Contaminated Groundwater
  - Petroleum hydrocarbons, PAHs and metals detected at concentrations greater than the respective MTCA Method A groundwater cleanup levels. Method B criteria were used for comparison of specific compounds if Method A groundwater cleanup levels are not established for those compounds.
  - VOCs detected at concentrations greater than the respective MTCA Method A groundwater cleanup levels, and MTCA Method B groundwater screening levels protective of indoor air. The updated TCE/PCE/(Cis) 1,2-Dichloroethene (DCE)/Vinyl Chloride screening levels were calculated using Equation 1 from Ecology's review draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action" dated October 2009 (Ecology, 2009) and Environmental Protection Agency's (EPA's) TCE, PCE, DCE and vinyl chloride toxicity factors updated in 2011 and available on EPA's online Integrated Risk Information System (IRIS). The other values were obtained from Ecology's review draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action."

6.3. Soil

Soil samples collected from the test pits, soil borings and monitoring well installation were submitted for chemical analysis. The soil samples collected from the subsurface explorations were identified using the following identification system: A#-TP/B#-start depth-end depth, where A# is the area designation number, TP/B# is the test pit/boring and start depth-end depth is the depth interval in feet below the ground of specific sample (e.g., 1C-TP1-2-3 was collected in Area 1C from test pit TP1 from 2 to 3 feet bgs).

Soil samples were submitted for chemical analysis based on the following criteria:

- Where field screening indicated the soil is impacted.
- Directly below potentially impacted soil to delineate the vertical extent.
- Where wet sand seams were encountered within the ice-contact deposits.
- At the soil/groundwater interface if groundwater was encountered.
- At the top of confining units if encountered.

The soil samples were submitted for chemical analysis of petroleum hydrocarbon identification by Ecology-approved method NWTPH-HCID (with appropriate follow-up analysis of diesel-range total petroleum hydrocarbons by Ecology-approved method NWTPH-Dx), VOCs by EPA method 8260C, polycyclic aromatic hydrocarbons (PAHs) by EPA method 8270DSIM, and Resource Conservation and Recovery Act (RCRA) metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver) by EPA method 6000/7000 series.

6.3.1. Petroleum-Range Hydrocarbons

Gasoline-, diesel- and lube-oil range petroleum-range hydrocarbons were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup level or the Reuse Criteria in the analyzed soil samples.

6.3.2. VOCs

WITHIN ICE-CONTACT DEPOSITS

PCE was detected at concentrations less than the MTCA Method A ULU cleanup level (0.05 mg/kg) in the following soil samples with the concentrations detected identified in parenthesis.

- 1C-TP2-3-4 (0.0021 mg/kg)
- 1C-TP2-6-7 (0.0074 mg/kg)

PCE was not detected in the remaining analyzed soil samples.

Other VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels or Method B criteria in the remaining analyzed soil samples.

WITHIN ADVANCE OUTWASH

VOCs were either not detected or detected at concentrations less than the MTCA Method B criteria in the remaining analyzed soil samples.

6.3.3. PAHs

CPAHs were detected at a total toxicity equivalent concentration (TTEC) greater than the MTCA Method A ULU cleanup level (0.1 mg/kg) in the following soil samples with the concentrations detected identified in parenthesis.

- 1C-TP1-0-1 (0.128 mg/kg)
- UG-MW33-0-1 (0.101 mg/kg)

Other PAHs and cPAHs were either not detected or detected at concentrations less than the respective MTCA Method A ULU and MTCA Method B criteria in the analyzed soil samples.

6.3.4. RCRA Metals

FILL

Arsenic was detected at a concentration (24 mg/kg) greater than the MTCA Method A ULU cleanup level (20 mg/kg) in soil sample 1C-TP1-0-1 collected from the ground surface to 1 foot bgs. Arsenic was also detected at concentrations greater than Reuse Criteria (7 mg/kg), but less than the MTCA Method A ULU cleanup level in soil samples collected from test pit 1C-TP3 and boring

UW-MW33 from the ground surface to depths ranging between 1 and 4 feet bgs. Arsenic was not detected in the remaining analyzed soil samples.

Lead was detected at a concentration greater than the MTCA Method A ULU cleanup level (250 mg/kg) in the following soil samples with the concentrations detected identified in parenthesis.

- 1C-TP1-0-1 (800 mg/kg)
- 1C-TP2-3-4 (750 mg/kg)

Lead was also detected at a concentration (230 mg/kg) greater than Reuse Criteria (50 mg/kg), but less than the MTCA Method A ULU cleanup level in the soil sample collected from UG-MW33 from the ground surface to 1 foot bgs. Lead was either not detected or was detected at concentrations less than the MTCA Method A ULU cleanup level and the Reuse Criteria level in the remaining analyzed soil samples.

Cadmium was detected at a concentration (3.5 mg/kg) greater than the MTCA Method A ULU cleanup level (2 mg/kg) in soil sample 1C-TP1-0-1 collected from the ground surface to 1 foot bgs. Cadmium was either not detected or was detected at concentrations less than the MTCA Method A ULU cleanup level or the Reuse Criteria in the remaining analyzed soil samples.

Mercury was detected at concentrations greater than Reuse Criteria (0.07 mg/kg), but less than the MTCA Method A ULU cleanup level (2 mg/kg) in two soil samples collected from test pit 1C-TP1 at depths ranging between the ground surface and 4 feet bgs. Mercury was not detected in the remaining analyzed soil samples.

Other RCRA metals were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels, Method B ULU criteria or the Reuse Criteria in the analyzed soil samples.

ICE CONTACT DEPOSITS

RCRA metals were either not detected or were detected at concentrations less than the respective MTCA Method A cleanup levels, Method B ULU criteria, or the Reuse Criteria in the analyzed soil sample.

6.4. Groundwater

Groundwater samples were collected from on site and upgradient groundwater wells for chemical analysis. The groundwater samples were identified using the following identification system: WELL-ID-yymmdd, where WELL-ID is the well identification number and yymmdd is the date when the sample was collected (e.g., UG-MW33-131002 was collected from monitoring well UG-MW33 on October 2, 2013).

Groundwater samples were submitted for chemical analysis of gasoline-range petroleum hydrocarbons by Ecology-approved method NWTPH-Gx, diesel- and lube oil-range petroleum hydrocarbons by Ecology-approved method NWTPH-Dx, VOCs by EPA method 8260C, PAHs by EPA method 8270DSIM, and total RCRA metals by EPA method 200.8 or 7470A. The chemical analytical data for groundwater are described below and summarized in Table 2.

6.4.1. Petroleum-Range Hydrocarbons

Lube oil-range petroleum hydrocarbons were detected at a concentration less than the MTCA Method A groundwater cleanup level (0.5 mg/L) in groundwater sample UG-MW26-130930 (0.46 mg/L) collected in upgradient well UG-MW26. Lube oil-range petroleum hydrocarbons were not detected in the remaining analyzed groundwater samples.

Gasoline- and diesel-range petroleum hydrocarbons were not detected in the analyzed groundwater samples.

6.4.2. VOCs

SHALLOW AQUIFER

PCE. PCE was detected at a concentration greater than the MTCA Method A groundwater cleanup level (5 µg/L) but less than the updated MTCA Method B groundwater screening levels protective of indoor air (24 µg/L) in the upgradient groundwater sample collected from temporary well 1A-B2 (6.5 µg/L).

TCE. TCE was detected at a concentration (290 µg/L) greater than the MTCA Method A groundwater cleanup level (5 µg/L) and the MTCA Method B groundwater screening levels protective of indoor air (1.5 µg/L) in groundwater sample UG-MW25S-130904 collected from upgradient monitoring well UG-MW25S. TCE was also detected at a concentration less than the MTCA Method A groundwater cleanup level (5 µg/L) but greater than the updated MTCA Method B groundwater screening levels protective of indoor air (1.5 µg/L) in groundwater sample collected from upgradient temporary well 1A-B2 (4.8 µg/L). TCE was not detected in the remaining analyzed groundwater samples.

(Cis) 1,2 Dichloroethene (DCE). Cis-1,2-DCE was detected at a concentration greater than the MTCA Method B groundwater criteria (16 µg/L) but less than the MTCA Method B groundwater screening levels protective of indoor air (160 µg/L) in groundwater sample 1A-B2-W (45 µg/L). It was also detected in monitoring well UG-MW25S at 6.0 µg/L at a concentration less than the MTCA criteria. Cis-1,2-DCE was not detected in the remaining analyzed groundwater samples.

Vinyl Chloride. Vinyl chloride was detected at a concentration (6.9 µg/L) greater than MTCA Method A groundwater cleanup level (0.2 µg/L) and greater than the MTCA Method B groundwater screening levels protective of indoor air (0.35 µg/L) in groundwater sample collected from the upgradient temporary well 1A-B2 (6.9 µg/L). Vinyl chloride was not detected in the remaining analyzed groundwater samples.

1,1 Dichloroethane (DCA). 1,1-DCA was detected at a concentration greater than the MTCA Method B groundwater criteria (7.7 µg/L) and the MTCA Method B groundwater screening levels protective of indoor air (11 µg/L) in groundwater sample collected from the upgradient well UG-MW25S (15 µg/L). 1,1-DCA is not a breakdown product of PCE.

Other VOCs. Other VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A groundwater cleanup level or MTCA Method B criteria in the analyzed groundwater samples collected within shallow aquifer.

DEEP AQUIFER

VOCs were not detected in the analyzed groundwater sample from monitoring well UG-MW25D screened in the deep aquifer.

6.4.3. PAHs

PAHs were not detected in the analyzed groundwater samples.

6.4.4. Total RCRA Metals

SHALLOW AQUIFER

Metals were either not detected or were detected at concentrations less than the MTCA Method A groundwater cleanup level and/or the MTCA Method B criteria.

DEEP AQUIFER

Total arsenic was detected at concentration greater than the MTCA Method A groundwater cleanup level (5 μg/L) in the groundwater sample collected from UG-MW25D (6.2 μg/L). The groundwater sample collected from UG-MW25D was submitted from follow-up chemical analysis of dissolved arsenic. Dissolved arsenic was detected at a concentration greater than the MTCA Method A groundwater cleanup level (5 μg/L) in the groundwater sample collected from UG-MW25D (5.7 μg/L). Arsenic was either not detected or was detected at concentrations less than the MTCA Method A cleanup levels or the Method B criteria in the remaining analyzed groundwater samples. Other total RCRA metals were either not detected or were detected at concentrations less than the MTCA Method A cleanup levels or the Method B criteria in the remaining analyzed groundwater samples.

7.0 CONCLUSIONS

PCE-impacted soil appears to be present on the site and PCE- and TCE-contaminated groundwater was identified in the shallow aquifers based on the results of this investigation. CPAHs- and metals- (arsenic, cadmium, lead, and mercury) contaminated-soil is present in surficial soil.

7.1. Shallow Aquifer

A former dry cleaner operated on the upgradient site (PDA 1A–Upton) from 1961 to the early 1970s. The shallow aquifer is contaminated with PCE. The full extent of PCE in the shallow aquifer is not known, but likely extends onto this site based on PCE-impacted soil present on the northern portion of the site. The elevation of shallow aquifer is 185 feet in this area.

TCE, 1,1-DCA and other solvents were detected in the upgradient soil and groundwater within ice-contact deposits/shallow aquifer in the central portion of PDA 1B-Tacoma Vacant (UG-MW25S). The TCE/1,1-DCA-contaminated groundwater plume may extend onto the southern portion of this site. The source of the TCE/1,1-DCA appears to be from an upgradient source; however, the exact location of the source is unknown.

7.2. Deep Aquifer

Groundwater within the deep aquifer on the site was not sampled as part of this investigation. Groundwater samples were collected from the deep aquifer well UG-MW25D located upgradient of the site. PCE and TCE were not detected in the groundwater samples collected from UG-MW25D. Arsenic-contaminated groundwater was present in the deep aquifer from well UG-MW25D.

7.3. Contaminated and Impacted Soil

Contaminated soil (arsenic, lead and/or cPAHs) is present from ground surface to 1 foot bgs on the southern portion and 4 feet bgs on the northern portion of PDA 1C.

Impacted soil (arsenic, lead, mercury) is present from the ground surface to 1 foot bgs on the southern portion and 4 feet bgs on the northern portion of PDA 1C. The impacted soil is in the same area as the PCE-impacted soil or arsenic, lead and/or cPAHs-contaminated soil.

8.0 PROPOSED DEVELOPMENT PLANS

We understand UWT plans to construct a new building at the site. GeoEngineers assumes the new building will be 32,000 square feet with a finished floor elevation of 172 feet. The estimated amount of soil to be generated based on the above assumptions is approximately 27,000 tons to excavate PDA 1C to subgrade (Elevation 171 feet). An additional 3,000 tons is estimated to be generated from the footings.

9.0 POTENTIAL IMPACTS AND MITIGATION MEASURES TO DESIGN AND CONSTRUCTION

We recommend UW develop and implement appropriate administrative institutional controls to limit or prohibit activities that may result in exposure to hazardous substances remaining at the site. Potential impacts to the design and construction of the site are the following:

- Groundwater is likely contaminated with PCE, TCE and 1,1-DCA.
- Soil is contaminated with chemicals of concern (cPAHs and metals).
- Soil is impacted with chemicals of concern (PCE/TCE/1,1-DCA and metals).

Potential Long-term impacts include:

- Long-term disposal of underslab/perimeter footing drain TCE/PCE/1,1-DCA-contaminated groundwater.
- Continued maintenance of vapor intrusion mitigation system, if necessary.
- Potential periodic indoor air sampling to confirm the vapor intrusion mitigation system may be necessary to evaluate the system is operating properly, if necessary.
- TCE/PCE/1,1-DCA-impacted soil may remain adjacent and beneath the building following construction activities. UW should develop and implement appropriate institutional controls to help prevent exposure to residual contamination.

The following sections described potential impacts, mitigation measures and estimated costs to design and construction.

9.1. PCE/TCE-Contaminated Groundwater

The presence of the contaminated PCE/TCE/1,1-DCA-contaminated groundwater within the shallow aquifer is anticipated based on the upgradient and downgradient PCE/TCE/1,1-DCA contaminated groundwater. PCE was also detected in the soil in the northern portion of the site. PCE-contaminated groundwater may be encountered during construction on the northern portions of the site. TCE-, and/or 1,1-DCA-contamianted groundwater may be encountered during construction on the southern portion of the site. This also indicates the PCE/TCE/1,1-DCA-contaminated groundwater may be in contact with the west side of the building and present beneath the building. Mitigation measures include:

Additional Investigation. Further subsurface investigation may be necessary to evaluate the vertical and lateral limits of the PCE/TCE/1,1-DCA-impacted soil and/or contaminated groundwater at the site. Soil vapor sampling is recommended to evaluate if a potential vapor intrusion pathway exists. The estimated cost for soil vapor sampling and additional investigation is $50,000 to $100,000.

Vapor Mitigation. Vapor intrusion occurs when VOCs migrate from contaminated soil or groundwater into overlying buildings through openings in the foundation. The route VOCs take from a subsurface source to the air inside a building is referred to as the vapor intrusion pathway. The most common sources of soil vapor are VOCs including TCE, PCE and 1,1-DCA, which may pose short-term (TCE only) and long-term (chronic) risks through inhalation of contaminated indoor air.

Groundwater and soil vapor concentrations are typically utilized as screening levels regarding the potential for vapor intrusion. TCE and 1,1-DCA were detected at a concentrations that exceeds the respective screening levels for updated MTCA Method B groundwater screening level protective of indoor air in the groundwater sample collected from upgradient monitoring wells screened within the shallow aquifer. PCE/TCE/1,1-DCA-contaminated groundwater in the shallow aquifer may be in contact with the west side of the finished building and present beneath the building.

Soil vapor sampling was not completed as part of this investigation. Additional on-site characterization and modeling may be necessary to evaluate the vertical and lateral limits of the PCE/TCE/1,1-DCA-impacted soil vapors. Soil vapor sampling is recommended near the elevation of the proposed subgrade to evaluate if a potential vapor intrusion pathway exists. If a potential vapor intrusion pathway exists, then a vapor intrusion mitigation system may be necessary. Potential mitigation options to prevent vapor intrusion include:

- A passive vapor barrier beneath the building. Passive vapor barriers are typically used in combination with another mitigation option (venting or building pressurization). We recommend the vapor barrier be installed below the elevation of penetrations (pipes, etc.) that may be installed after the programing is identified in the future. Penetrating the vapor barrier following construction will add to the cost of construction.

- Passive or active venting system beneath the building. The venting system may need to be combined with an underslab and perimeter drain to reduce the potential for shallow groundwater to enter the venting system.

The estimated cost for design and installation of indoor air mitigation system ranges between $5 per square foot to $12 per square foot of building space. The estimated costs for the vapor mitigation system for a building on the entire site is $160,000 to $384,000. Potential periodic indoor air sampling to confirm the vapor intrusion mitigation system may be necessary to evaluate the system is operating properly following construction of the building. The estimated cost for long-term monitoring is unknown.

Alternatively, the shallow aquifer does not appear to be impacted in the central portion of the site. If the building is located in this area, a vapor mitigation system may not be necessary, but additional investigation is recommended (as described above) to evaluate the lateral extent of the TCE-contaminated groundwater at the site.

Underslab/Footing Drainage. Underslab/footing drainage system may be required to prevent water from entering into the vapor mitigation vent system. The water will likely have to be directed to the City of Tacoma sanitary sewer based on concentrations of the chemicals of concern in the groundwater. A long-term cost may be associated with discharge of the water to the City sanitary sewer system. An underslab footing drain will likely be required based on the approximate elevation of the groundwater (85 feet). The estimated cost of the underslab footing drain is $96,000 to $192,000.

Construction Water Management. PCE/TCE/1,1-DCA-contaminated groundwater encountered during construction will have to be managed. Water generated during construction will likely be stored in tanks, sampled and analyzed. Water disposal will be coordinated with UW EH&S at a UW-approved disposal facility. It is anticipated that construction dewatering water will be suitable for discharge into the storm sewer based on the concentrations detected in the existing wells during this investigation. The water may be disposed in the City of Tacoma sanitary sewer. The City of Tacoma charges approximately $0.0034 per gallon of water. The estimated volume of water generated will be based on construction methods. The base cost estimate includes the cost of disposal of water for 120 days of earthwork construction, approximate cost of collecting 10 water samples over the course of the project ($15,000) and two 25,000-gallon storage tanks ($7,000 each per month).

Approximately 15,000 gallons per day is estimated to be generated on the site from dewatering activities. The estimated cost of construction water management if disposal into the City of Tacoma sanitary sewer is necessary is approximately $49,000.

Cross-Contamination. The potential for cross-contamination on the site could occur via two pathways. Cross-contamination may occur laterally between the potential southern TCE/1,1-DCA plume and northern PCE plume if the building drainage system connects both plumes. Cross-contamination may also occur between the shallow and deep aquifers based on the estimated elevation of the silt (175 feet) in the western portion of the building and the elevation of the proposed building.

Additional investigation will be necessary to evaluate the potential for cross-contamination between the two aquifers. This investigation could be completed in concurrence with the additional investigation to evaluate the lateral and vertical extent of the contamination. However, it appears that cross-contamination between the two aquifers is likely not warranted at this site. For budgeting purposes, additional construction cost is estimated to be between $16,000 and $96,000 if cross-contamination is identified as an impact.

Health and Safety. Workers who may be in contact with potentially contaminated soil or groundwater at a state-listed cleanup site have HAZWOPER training. The requirement is consistent with the Washington Administrative Code (WAC) 296-843-100, *Hazardous Waste Operations*, which indicates that on-site personnel are required to have current health and safety training in accordance with Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response requirements in 29 CFR 1910.120. The rule also requires the earthwork contractor and other personnel who could potentially contact contaminated materials to develop and implement a written health and safety program for their employees involved in hazardous waste operations under 29 CFR 1910.120. The estimated cost for the contractor to be HAZWOPER trained and have appropriate liability insurance and is roughly between $10,000 and $70,000 depending on the number of subcontractors that require training.

9.2. Soil is Contaminated with Chemicals of Concern

Contaminated soil (metals and cPAHs) and impacted soil (PCE, TCE, 1,1-DCA, metals and cPAHs) will likely be generated during construction activities. We recommend UW implement the following actions.

- Characterize Soil and Groundwater for Disposal. In-situ characterization or stockpiling and subsequent sampling will need to be performed on soil that is generated during construction in areas of metals- and cPAHs-contaminated and PCE-, metals- and cPAHs-impacted soil. The estimated cost of the soil sampling for soil disposal is $60,000 to $80,000 based on the mass of soil to be excavated.
- PCE/TCE/1,1-DCA-Impacted and Contaminated Soil. When PCE/TCE/1,1-DCA- and breakdown products are detected in soil, UW EH&S will work with Ecology to obtain a "contained-in determination" for disposal of the waste. The source of the solvent contamination, the concentration of the solvents and a Toxicity Characteristic Leaching Procedure (TCLP) analytical test result will be used when evaluating if the soil is disposed as hazardous waste by UW EH&S at a RCRA permitted Subtitle C landfill or as a solid waste at a UW-approved Subtitle D landfill. Past experience has demonstrated that it is fairly likely that the "contained-in determination" will be granted, thus we based our cost estimates on this assumption.
- The estimated cost to transport and dispose (not including excavation and loading) soil at a Subtitle D landfill with a contained-in determination is $80 to $100 per ton. The typical cost for transportation and disposal (not including excavation and loading) of soil at a RCRA Subtitle C Landfill is $250 to $300 per ton. The cost estimates provided in this report assume disposal at a Subtitle D landfill.

  The estimated amount of TCE/1,1-DCA-impacted soil on the southern portion of the site is 3,500 tons. The estimated amount of PCE-impacted soil on the northern portion of the site is 11,500 tons. The estimated amount in the northern portion of the site may be reduced if the upgradient former dry cleaner (PDA 1A-Upton) is the source and remediated prior to construction activities. The costs may also be reduced if the building is oriented outside the potential PCE- and TCE/1,1-DCA-plume areas.

The estimated costs for transportation and disposal of the PCE/TCE/1,1-DCA-contaminated and impacted soil is $1,120,000 to $1,400,000. These costs assume hazardous waste will not be generated during construction.

- **Lead- and cPAHs-Contaminated Soil.** Lead-, arsenic- and cPAHs-contaminated soil will be disposed at a UW-approved Subtitle D landfill. Soil shall be removed as necessary for construction and Ecology requirements. Metals- and cPAHs-contaminated soil shall be disposed at an UW-approved Subtitle D landfill. Metals- and cPAHs- contaminated soil left in place shall be capped with a building or hardscape as required by Ecology. The estimated cost for transportation and disposal at a RCRA-subtitle D facility is $60 to $80 per ton. The estimated amount of cPAHs- and lead-contaminated soil is 5,000 tons. This estimate assumes 2 feet of contaminated soil across the southern portion of the site. The estimated cost for transportation and disposal ranges between $300,000 and $400,000.
- **Health and Safety.** As discussed in the "Contaminated Groundwater" section, the law requires its earthwork contractor and other personnel who could potentially contact contaminated materials to comply with training requirements for handling soil and potentially groundwater on the site. The health and safety costs were already itemized in the groundwater section.

10.0 LIMITATIONS

This report has been prepared for use by the University of Washington for the Priority Development Area 1C – Fawcett North located in Tacoma, Washington at the University of Washington Tacoma campus.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

Please refer to Appendix A titled "Report Limitations and Guidelines for Use" for additional information pertaining to use of this report.

11.0 REFERENCES

Ecology, 2009. Washington State Department of Ecology. Draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action" dated October 2009.

Ecology, 2010. Washington State Department of Ecology. Guidance for Remediation of Petroleum Contaminated Sites. Publication No. 10-09-057. September 2011.

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EPA, 2002a. OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance). EPA530-D-02-004. November 2002.

EPA, 2012b. Memorandum: OEA Recommendations Regarding Trichloroethylene Toxicity in Human Health Risk Assessments. Office of Environmental Assessment, US Environmental Protection Agency, Region 10. 2012.

EPA, Contained-In Policy, 40 CFR Part 260 et al., Hazardous Remediation Waste Management Requirements, Final Rule, June 6, 1999.

EPA, Chemical Summary of Perchloroethylene, August 1994 http://www.epa.gov/chemfact/s_perchl.txt

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GeoEngineers, Inc., Sampling and Analysis and Quality Assurance Project Plan Addendum, UWT Environmental Investigation -CPO Project No. 204277 and 204286, South 17th Street to South 21st Street and South Tacoma Avenue to Pacific Avenue, Tacoma, Washington dated October 23, 2013.

Interstate Technology and Regulatory Council. Vapor Intrusion Pathway: A Practical Guideline. January 2007.

Interstate Technology and Regulatory Council. Vapor Intrusion Pathway: Investigative Approaches for Typical Scenarios (A Supplement to VI-1). January 2007.

United States Environmental Protection Agency. Conceptual Model Scenarios for Vapor Intrusion Pathway. EPA 530-R10-003. February 24, 2012. http://www.epa.gov/oswer/vaporintrusion/documents/vi-cms-v11final-2-24-2012.pdf

United States Environmental Protection Agency. TCE Toxicity Factors updated 2011 available online Integrated Risk Information System (IRIS). http://www.epa.gov/iris/subst/0199.htm

Washington Administrative Code [WAC]. Minimum Standards for Construction and Maintenance of Wells (Chapter 173-160). December 19, 2008.

Washington Administrative Code [WAC]. Model Toxics Control Act. 173-340. October 12, 2007.

Table 1

Summary of Chemical Analytical Results[1] - Soil

Area 1C - Fawcett North

Priority Development Area - University of Washington Tacoma

Tacoma, Washington

Boring/Test Pit	1C-TP1		1C-TP2			UG-MW33									MTCA Method A ULU Cleanup Level	Reuse Criteria[12]
Sample Identification[2]	1C-TP1-0-1	1C-TP1-2-3	1C-TP2-0-1	1C-TP2-3-4	1C-TP2-6-7	UG-MW33-0-1	UG-MW33-2-3	UG-MW33-6-7	UG-MW33-8-9	UG-MW33-11-12	UG-MW33-12-12.5	UG-MW33-13-13.5	UG-MW33-13.5-14	UG-MW33-14-15		
Sample Depth (feet bgs)	0 TO 1	2 TO 3	0 TO 1	3 TO 4	6 TO 7	0 to 1	2 to 3	6 to 7	8 to 9	11 to 12	12 to 12.5	13 to 13.5	13.5 to 14	14 to 15		
Soil Type	Fill	Fill	Fill	Fill	Qvi	Fill	Qvi	Qvi	Qvi	Silt	Outwash	Outwash	Outwash	Outwash		
NWTPH-HCID[3] (mg/kg)																
Gasoline-Range	27 U	23 U	21 U	25 U	25 U	25 U	23 U	--	--	--	--	--	--	--	30/100[9]	30
Diesel-Range	69 U	58 U	53 U	62 U	62 U	63 U	56 U	--	--	--	--	--	--	--	2,000	200
Lube Oil-Range	140 U	120 U	110 U	120 U	130 U	DET	110 U	--	--	--	--	--	--	--	2,000	200
NWTPH-Dx[4] (mg/kg)																
Diesel-Range Petroleum Hydrocarbons	--	--	--	--	--	47 U	--	--	--	--	--	--	--	--	2,000	200
Lube Oil-Range Petroleum Hydrocarbons	--	--	--	--	--	190	--	--	--	--	--	--	--	--	2,000	200
VOCs[5] (mg/kg)																
Tetrachloroethene (PCE)	0.0015 U	0.0010 U	0.00095 U	0.0021	0.0074	0.00078 U	0.00065 U	0.00065 U	0.00054 U	0.00056 U	0.00058 U	0.00067 U	0.00054 U	0.00062 U	0.05	DET
Trichloroethene (TCE)	0.0015 U	0.0010 U	0.00095 U	0.0010 U	0.0014 U	0.00078 U	0.00065 U	0.00065 U	0.00054 U	0.00056 U	0.00058 U	0.00067 U	0.00054 U	0.00062 U	0.03	DET
(cis) 1,2-Dichloroethene	0.0015 U	0.0010 U	0.00095 U	0.0010 U	0.0014 U	0.00078 U	0.00065 U	0.00065 U	0.00054 U	0.00056 U	0.00058 U	0.00067 U	0.00054 U	0.00062 U	160[10]	DET
(trans) 1,2-Dichloroethene	0.0015 U	0.0010 U	0.00095 U	0.0010 U	0.0014 U	0.00078 U	0.00065 U	0.00065 U	0.00054 U	0.00056 U	0.00058 U	0.00067 U	0.00054 U	0.00062 U	1,600[10]	DET
Vinyl Chloride	0.0015 U	0.0010 U	0.00095 U	0.0010 U	0.0014 U	0.00078 U	0.00065 U	0.00065 U	0.00054 U	0.00056 U	0.00058 U	0.00067 U	0.00054 U	0.00062 U	0.67[10]	DET
Carbon Disulfide[6]	0.0015 U	0.0010 U	0.00095 U	0.0010 U	0.0014 U	0.00078 U	0.00065 U	0.00065 U	0.00054 U	0.00056 U	0.00058 U	0.00067 U	0.0011	0.00062 U	8,000[10]	NE
PAHs[7] (mg/kg)																
1-Methylnaphthalene	0.036	0.0078 U	0.0071 U	0.011	0.0083 U	0.013	0.0075 U	--	--	--	--	--	--	--	35[10]	NE
2-Methylnaphthalene	0.037	0.0078 U	0.0071 U	0.011	0.0083 U	0.016	0.0075 U	--	--	--	--	--	--	--	320[10]	NE
Acenaphthene	0.0091 U	0.0078 U	0.0071 U	0.0082 U	0.0083 U	0.0083 U	0.0075 U	--	--	--	--	--	--	--	4,800[10]	NE
Acenaphthylene	0.024	0.0078 U	0.0071 U	0.012	0.0083 U	0.013	0.0075 U	--	--	--	--	--	--	--	NE	NE
Anthracene	0.029	0.0078 U	0.0071 U	0.031	0.0083 U	0.014	0.0075 U	--	--	--	--	--	--	--	24,000[10]	NE
Benzo[g,h,i]perylene	0.069	0.0078 U	0.0071 U	0.038	0.0083 U	0.047	0.0075 U	--	--	--	--	--	--	--	NE	NE
Fluoranthene	0.17	0.0078 U	0.0071 U	0.11	0.0083 U	0.12	0.0075 U	--	--	--	--	--	--	--	3,200[10]	NE
Fluorene	0.012	0.0078 U	0.0071 U	0.013	0.0083 U	0.0083 U	0.0075 U	--	--	--	--	--	--	--	3,200[10]	NE
Naphthalene	0.072	0.0078 U	0.0071 U	0.019	0.0083 U	0.043	0.0075 U	--	--	--	--	--	--	--	5	5
Phenanthrene	0.13	0.0078 U	0.0071 U	0.093	0.0083 U	0.066	0.0075 U	--	--	--	--	--	--	--	NE	NE
Pyrene	0.16	0.0078 U	0.0071 U	0.11	0.0083 U	0.10	0.0075 U	--	--	--	--	--	--	--	2,400[10]	NE
cPAHs[7] (mg/kg)																
Benzo (a) anthracene (TEF 0.1)	0.10	0.0078 U	0.0071 U	0.053	0.0083 U	0.055	0.0075 U	--	--	--	--	--	--	--	MTCA ULU cleanup level for the sum of all cPAHs is 0.1 mg/kg	Reuse Criteria for the sum of all cPAHs is 0.1 mg/kg
Benzo (a) pyrene (TEF 1)	0.090	0.0078 U	0.0071 U	0.054	0.0083 U	0.077	0.0075 U	--	--	--	--	--	--	--		
Benzo (b) fluoranthene (TEF 0.1)	0.14	0.0078 U	0.0071 U	0.064	0.0083 U	0.097	0.0075 U	--	--	--	--	--	--	--		
Benzo (J,k) fluoranthene (TEF 0.1)	0.043	0.0078 U	0.0071 U	0.022	0.0083 U	0.029	0.0075 U	--	--	--	--	--	--	--		
Chrysene (TEF 0.01)	0.11	0.0078 U	0.0071 U	0.053	0.0083 U	0.086	0.0075 U	--	--	--	--	--	--	--		
Dibenz (a,h) anthracene (TEF 0.1)	0.020	0.0078 U	0.0071 U	0.0095	0.0083 U	0.010	0.0075 U	--	--	--	--	--	--	--		
Indeno (1,2,3-cd) pyrene (TEF 0.1)	0.065	0.0078 U	0.0071 U	0.033	0.0083 U	0.040	0.0075 U	--	--	--	--	--	--	--		
Total TTEC of cPAHs (detect only)	0.128	N/A	N/A	0.073	N/A	0.101	N/A	--	--	--	--	--	--	--	0.1	0.1
Metals[8] (mg/kg)																
Arsenic	24	12 U	11 U	17	12 U	14	11 U	--	--	--	--	--	--	--	20	7
Barium	680	81	83	440	120	220	72	--	--	--	--	--	--	--	16,000[10]	NE
Cadmium	3.5	0.58 U	0.53 U	0.81	0.62 U	0.76	0.56 U	--	--	--	--	--	--	--	2.0	1
Chromium	64	50	33	60	50	58	46	--	--	--	--	--	--	--	2,000[11]	48[13]
Lead	800	10	19	750	6.2 U	230	5.6 U	--	--	--	--	--	--	--	250	50
Mercury	0.72	0.29 U	0.27 U	0.50	0.31 U	0.31 U	0.28 U	--	--	--	--	--	--	--	2.0	0.07 or DET
Selenium	14 U	12 U	11 U	12 U	12 U	13 U	11 U	--	--	--	--	--	--	--	400[10]	NE
Silver	1.4 U	1.2 U	1.1 U	1.2 U	1.2 U	1.3 U	1.1 U	--	--	--	--	--	--	--	400[10]	NE

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc., of Redmond, Washington.

[2] Sample ID = Area number - boring/test pit number - starting depth of sample [feet bgs] -end depth [feet bgs], Area 1C test pit 1 collected 2-3 feet bgs = 1C-TP1-2-3.

[3] Washington State Department of Ecology (Ecology)-approved method NWTPH-HCID.

[4] Ecology-approved method NWTPH-Dx.

[5] VOCs were analyzed by EPA method 8260B. Other VOCs were analyzed but not detected.

[6] This compound is a common laboratory contaminant.

[7] Polycyclic aromatic hydrocarbons (PAHs) and carcinogenic PAHs (cPAHs) were analyzed by U.S. Environmental Protection Agency (EPA) method 8270D/SIM. Other PAHs were analyzed but not detected.

[8] Resource Conservation Recovery Act (RCRA) metals analyzed by EPA 6000/7000 series method.

[9] MTCA Method A cleanup level for gasoline is 30 mg/kg if benzene is detected or if the sum of toluene, ethylbenzene and xylenes are equal to or greater than 1% of the total gasoline detection.

[10] MTCA Method B criteria represented because MTCA Method A cleanup level has not been established.

[11] MTCA Method A cleanup level for Trivalent Chromium.

[12] Guidance for Remediation of Petroleum Contaminated Sites (Publication 10-09-057) Ecology, October 2011; Summary Natural Background Soil Metals Concentrations in Washington State (Publication 94-115) dated October 1994; and Hazardous Waste Regulations 40 CFR Part 260.

[13] Chromium was not compared to the Reuse Criteria listed above for soils based on historic soil analytical results indicating chromium is not a prevalent chemical of concern on the UWT campus.

mg/kg = milligram per kilogram

-- = sample not analyzed

N/A = not applicable

DET = Detected greater than laboratory reporting limits

MTCA = Model Toxics Control Act

bgs = below ground surface

Qvi = Ice-contact deposit

U = Analyte was not detected at or greater than the listed reporting limit

TEF = Toxicity Equivalency Factor as defined in WAC 173-340-900 Table 708-2

Total Toxic Equivalent Concentration (TTEC) is the sum of each individual cPAH concentration multiplied by its corresponding TEF.

Bold font type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Bold font type and gray shading indicates that the detected concentration is greater than the respective MTCA cleanup level.

Dashed outline indicates the value is greater than the Reuse Criteria.

Table 2

Summary of Chemical Analytical Results[1] - Groundwater

Area 1C - Fawcett North
Priority Development Area - University of Washington Tacoma
Tacoma, Washington

Boring Identification	UG-MW25D	UG-MW25S	UG-MW33	UG-MW26	1A-B2	MTCA Method A Groundwater Cleanup Level	MTCA Method B Air Screening Levels [13]
Sample ID [2]	UG-MW25D-130904	UG-MW25S-130904	UG-MW33-131002	UG-MW26-130930	1A-B2-W		
Sample Date	9/4/2013	9/4/2013	10/2/2013	9/30/2013	6/13/2013		
Approximate Depth to Groundwater (feet btoc) [3]	36.73	2.07	6.61	-0.25	26		
Approximate Elevation of Groundwater [3 and 4]	165.32	200.53	176.96	202.43	194		
Top of Well Screen Elevation (feet) [4]	157.64	195.08	177.41	196	196		
Bottom of Well Screen Elevation (feet) [4]	180.64	185.08	172.41	186	191		
Lithology At Well Screen	Advance Outwash	Qvi	Qvi	Qvi	Fill		
Chemical							
NWTPH-Gx[5] (µg/L)							
Gasoline-Range	100 U	100 U	100 U	100 U	100 U	800/1,000[10]	NE
NWTPH-Dx[6] (mg/L)							
Diesel-Range	0.26 U	0.26 U	0.27 U	0.26 U	0.26 U	0.5	NE
Lube Oil-Range	0.41 U	0.42 U	0.43 U	0.46	0.42 U	0.5	NE
VOCs[7] (µg/L)							
Trichloroethene (TCE)	0.20 U	290	0.20 U	0.20 U	4.8	5	1.5
Tetrachloroethene (PCE)	0.20 U	2.0 U	0.20 U	0.20 U	6.5	5	24
(cis) 1,2-Dichloroethene (DCE)	0.20 U	6.0	0.20 U	0.20 U	45	16[11]	160
(trans) 1,2-DCE	0.20 U	2.0 U	0.20 U	0.20 U	2.9	160[11]	110
Vinyl Chloride	0.20 U	2.0 U	0.20 U	0.20 U	6.9	0.2	0.35
1,1-Dichloroethane (DCA)	0.20 U	15	0.20 U	0.20 U	0.20 U	7.7[11]	11
1,1-DCE	0.20 U	12	0.20 U	0.20 U	0.20 U	400[11]	130
Benzene	0.20 U	2.2	0.20 U	0.20 U	0.20 U	5	2.4
cPAHs[8] (µg/L)							
Benzo (a) anthracene (TEF 0.1)	0.0095 U	0.0095 U	0.010 U	0.0096 U	0.0098 U	MTCA ULU cleanup level for the sum of all cPAHs is 0.1 µg/L	NE
Benzo (a) pyrene (TEF 1)	0.0095 U	0.0095 U	0.010 U	0.0096 U	0.0098 U		NE
Benzo (b) fluoranthene (TEF 0.1)	0.0095 U	0.0095 U	0.010 U	0.0096 U	0.0098 U		NE
Benzo (j,k) fluoranthene (TEF 0.1)	0.0095 U	0.0095 U	0.010 U	0.0096 U	0.0098 U		NE
Chrysene (TEF 0.01)	0.0095 U	0.0095 U	0.010 U	0.0096 U	0.0098 U		NE
Dibenz (a,h) anthracene (TEF 0.1)	0.0095 U	0.0095 U	0.010 U	0.0096 U	0.0098 U		NE
Indeno (1,2,3-cd) pyrene (TEF 0.1)	0.0095 U	0.0095 U	0.010 U	0.0096 U	0.0098 U		NE
Total TTEC of cPAHs (detect only)	N/A	N/A	N/A	N/A	N/A	0.1	NE
Metals[9] (µg/L)							
Arsenic	6.2	3.3 U	3.3 U	0.20 U	--	5	NE
Barium	28 U	49	54	--	--	NE	NE
Cadmium	4.4 U	4.4 U	4.4 U	4.0 U	--	16[11]	NE
Chromium	11 U	11 U	11 U	11 U	--	50[12]	NE
Lead	1.1 U	1.1 U	1.1 U	1.1 U	--	15	NE
Mercury	0.50 U	0.50 U	0.50 U	0.50 U	--	2	NE
Selenium	5.6 U	5.6 U	5.6 U	--	--	80[11]	NE
Silver	11 U	11 U	11 U	--	--	80[11]	NE

Boring Identification	UG-MW25D	UG-MW25S	UG-MW33	UG-MW26	1A-B2	MTCA Method A Groundwater Cleanup Level	MTCA Method B Air Screening Levels [13]
Sample ID [2]	UG-MW25D-130904	UG-MW25S-130904	UG-MW33-131002	UG-MW26-130930	1A-B2-W		
Sample Date	9/4/2013	9/4/2013	10/2/2013	9/30/2013	6/13/2013		
Approximate Depth to Groundwater (feet btoc) [3]	36.73	2.07	6.61	-0.25	26		
Approximate Elevation of Groundwater [3 and 4]	165.32	200.53	176.96	202.43	194		
Top of Well Screen Elevation (feet) [4]	157.64	195.08	177.41	196	196		
Bottom of Well Screen Elevation (feet) [4]	180.64	185.08	172.41	186	191		
Lithology At Well Screen	Advance Outwash	Qvi	Qvi	Qvi	Fill		
Chemical							
Dissolved Metals [10] (μg/L)							
Arsenic	**5.7**	--	--	--	**4.3**	5	NE
Cadmium	--	--	--	--	4.0 U	5	NE
Chromium	--	--	--	--	10 U	50[12]	NE
Lead	--	--	--	--	1.0 U	15	NE
Mercury	--	--	--	--	0.50 U	2	NE

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc. in Redmond, Washington.

[2] Sample ID = Area number - Boring number - Date (i.e., a water sample collected from UG-MW24 on July 15, 2013 = UG-MW24-130715).

[3] Groundwater level was measured below the top of casing on November 8, 2013.

[4] Based on survey completed by AHBL November 6, 2013. Horizontal datum - NAD 83/91 Washington State Plane - South Zone (City of Tacoma Horizontal control Holding City Monument Numbers 411 and 414). Vertical datum NGVD 29 (brass monument at South 19th and Fawcett Avenue, Elevation 165.15).

[5] Washington State Department of Ecology (Ecology)-approved method NWTPH-Gx.

[6] Ecology-approved method NWTPH-Dx.

[7] Volatile organic compounds (VOCs) were analyzed by U.S. Environmental Protection Agency (EPA) method 8260C. Other VOCs were analyzed but not detected.

[8] Polycyclic Aromatic Hydrocarbons (PAHs) and carcinogenic PAHs (cPAHs) analyzed by EPA method 8270D/SIM.

[9] Metals analyzed by EPA 200.8 or 7470A method.

[10] MTCA Method A cleanup level for gasoline-range petroleum hydrocarbons is 800 μg/L if benzene is present and 1,000 μg/L if benzene is not present.

[11] MTCA Method B criteria represented because MTCA Method A cleanup level has not been established.

[12] MTCA Method A cleanup level for total chromium shown. Cleanup level for hexavalent chromium is 48 μg/L.

[13] MTCA Method B Indoor Air Screening Level from Washington State Deportment of Ecology Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action. Values updated as appropriate to incorporate recent toxicity data.

MTCA = Model Toxics Control Act

-- = Analyte or sample not analyzed

μg/L = microgram per Liter

U = Analyte was not detected at or greater than the listed reporting limit

TEF = Toxicity Equivalency Factor as defined in WAC 173-340-900 Table 708-2

Total Toxic Equivalent Concentration (TTEC) is the sum of each individual cPAH concentration multiplied by its corresponding TEF.

Qvi = Ice-contact deposit

DET = Detected greater than laboratory reporting limits

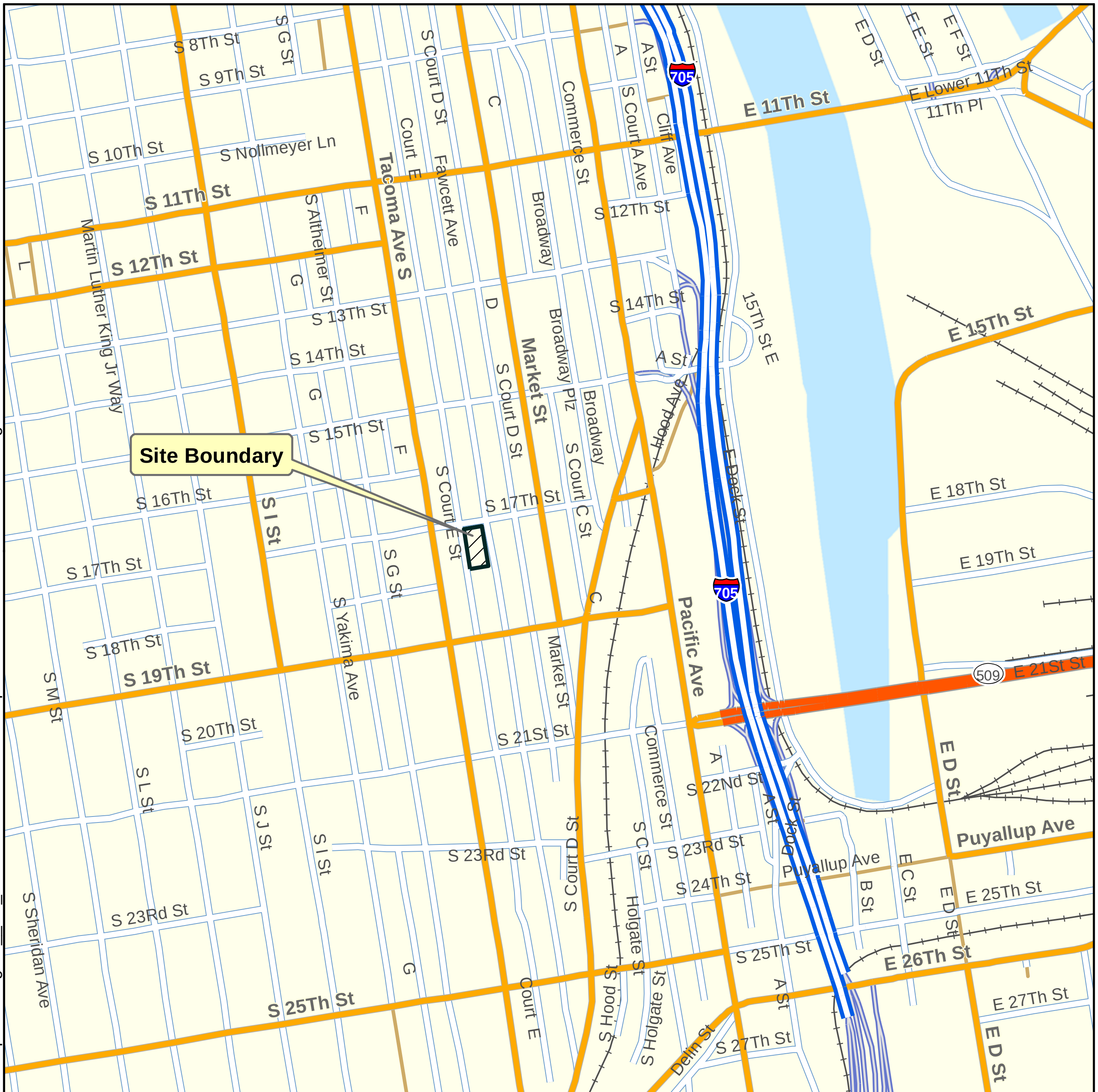
Dichloroethene = DCE

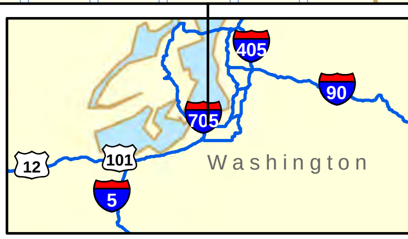
Dichloroethane = DCA

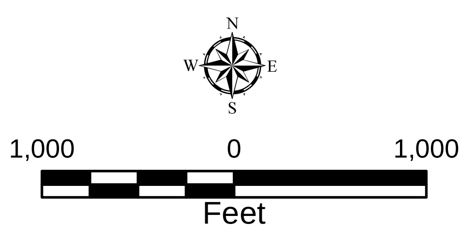
Bold font type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Bold font type and gray shading indicates analyte was detected at a concentration greater than the MTCA Method groundwater cleanup/criteria level.

Dashed outline indicates analyte was detected at a concentration greater than the MTCA Method B Indoor Air Screening Level.







Notes:
CPO = University of Washington Capital Project Office
UWT = University of Washington Tacoma
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Data Sources: ESRI Data & Maps

Projection: NAD 1983 UTM Zone 10N

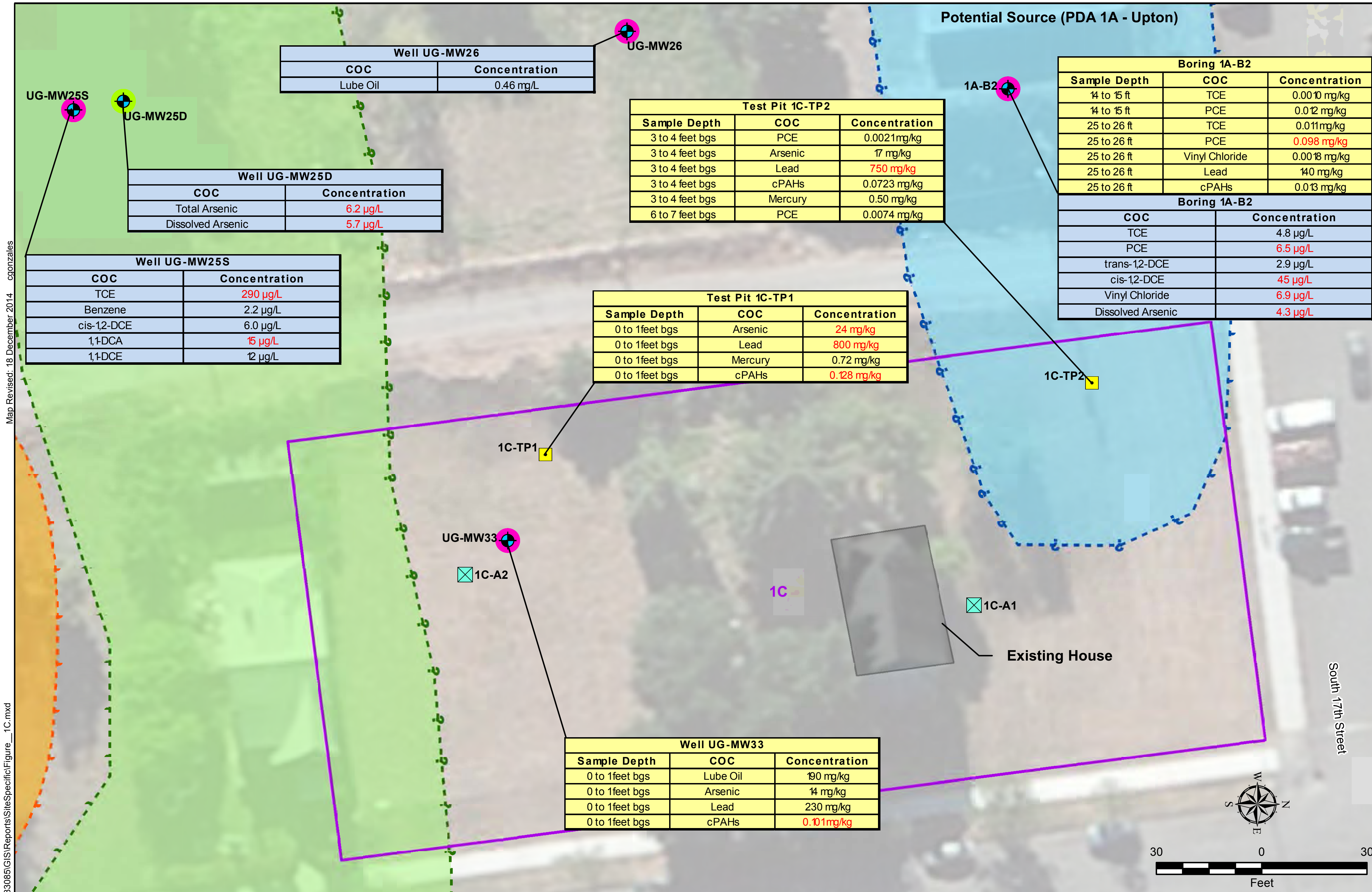
Vicinity Map

UWT Environmental Investigation
Priority Development Areas - CPO Project No. 204277
Tacoma, Washington

GeoEngineers

Figure 1

Office: TAC Path: \\tac\projects\0\0183085\GIS\Reports\SiteSpecific\Figure_1C_VM.mxd Map Revised: 17 December 2014 cgonzales



Well UG-MW26	
COC	Concentration
Lube Oil	0.46 mg/L

Well UG-MW25D	
COC	Concentration
Total Arsenic	6.2 µg/L
Dissolved Arsenic	5.7 µg/L

Well UG-MW25S	
COC	Concentration
TCE	290 µg/L
Benzene	2.2 µg/L
cis-1,2-DCE	6.0 µg/L
1,1-DCA	15 µg/L
1,1-DCE	12 µg/L

Test Pit 1C-TP2		
Sample Depth	COC	Concentration
3 to 4 feet bgs	PCE	0.0021 mg/kg
3 to 4 feet bgs	Arsenic	17 mg/kg
3 to 4 feet bgs	Lead	750 mg/kg
3 to 4 feet bgs	cPAHs	0.0723 mg/kg
3 to 4 feet bgs	Mercury	0.50 mg/kg
6 to 7 feet bgs	PCE	0.0074 mg/kg

Boring 1A-B2		
Sample Depth	COC	Concentration
14 to 15 ft	TCE	0.0010 mg/kg
14 to 15 ft	PCE	0.012 mg/kg
25 to 26 ft	TCE	0.011 mg/kg
25 to 26 ft	PCE	0.098 mg/kg
25 to 26 ft	Vinyl Chloride	0.0018 mg/kg
25 to 26 ft	Lead	140 mg/kg
25 to 26 ft	cPAHs	0.013 mg/kg

Boring 1A-B2	
COC	Concentration
TCE	4.8 µg/L
PCE	6.5 µg/L
trans-1,2-DCE	2.9 µg/L
cis-1,2-DCE	45 µg/L
Vinyl Chloride	6.9 µg/L
Dissolved Arsenic	4.3 µg/L

Test Pit 1C-TP1		
Sample Depth	COC	Concentration
0 to 1 feet bgs	Arsenic	24 mg/kg
0 to 1 feet bgs	Lead	800 mg/kg
0 to 1 feet bgs	Mercury	0.72 mg/kg
0 to 1 feet bgs	cPAHs	0.128 mg/kg

Well UG-MW33		
Sample Depth	COC	Concentration
0 to 1 feet bgs	Lube Oil	190 mg/kg
0 to 1 feet bgs	Arsenic	14 mg/kg
0 to 1 feet bgs	Lead	230 mg/kg
0 to 1 feet bgs	cPAHs	0.101 mg/kg

Soil Results*

Boring 2A-B7		
Sample Depth	COC	Concentration
2.5 to 3.5 feet bgs	Lead	200 mg/kg
2.5 to 3.5 feet bgs	cPAHs	0.64 mg/kg

Groundwater Results*

Well UG-MW13	
COC	Concentration
TCE	110 µg/L
PCE	1.4 µg/L

*Chemicals shown in red were detected at concentrations greater than the respective MTCA Method A cleanup levels.

Only analytical results of the chemicals of concern are shown if detected. Other chemicals that were analyzed and detected are not shown unless detected at concentrations greater than the respective MTCA cleanup levels.

Legend

Approximate Location of Priority Development Area 1C

Approximate Subsurface Location
Subsurface Exploration Location

Sonic Core Boring - Permanent New Monitoring Well

Test Pit

Magnetic Anomaly Where Test Pit Was Completed

Lithology of Well Screen Interval

Ice-Contact Deposit (Shallow Aquifer)

Advance Outwash (Deep Aquifer)

Approximate Lateral Extent of PCE- and Breakdown Product Contaminated Groundwater Plume in Shallow Aquifer

Approximate Lateral Extent of TCE-Contaminated Groundwater Plume in Shallow Aquifer

Approximate Lateral Extent of TCE-Contaminated Groundwater Plume in Deep Aquifer

Notes:
cPAHs concentrations shown as TTEC.
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet
COC = Chemical of Concern
UWT = University of Washington Tacoma
PDA = Priority Development Area
PCE = tetrachloroethene
TCE = trichloroethene
cPAH = Carcinogenic Polycyclic Aromatic Hydrocarbons
mg/kg = milligram per kilogram
µg/L = microgram per Liter
bgs = Below Ground Surface
TTEC = Total Toxicity Equivalency Concentration
ULU = Unrestricted Land Use
MTCA = Model Toxics Control Act
DCA = dichloroethane
DCE = dichloroethene

Soil MTCA Cleanup/Criteria Levels:
PCE = 0.05 mg/kg (Method A ULU)
TCE = 0.03 mg/kg (Method A ULU)
Benzene = 0.03 mg/kg (Method A ULU)
Vinyl Chloride = 0.67 mg/kg (Method B)
Lube Oil-Range Petroleum Hydrocarbons = 2,000 mg/kg (Method A ULU)
Diesel-Range Petroleum Hydrocarbons = 2,000 mg/kg (Method A ULU)
Gasoline-Range Petroleum Hydrocarbons = 100 mg/kg (Method A ULU)
cPAHs (TTEC) = 0.1 mg/kg (Method A ULU)
Lead = 250 mg/kg (Method A ULU)
Arsenic = 20 mg/kg (Method A ULU)
Cadmium = 2 mg/kg (Method A ULU)
Mercury = 2 mg/kg (Method A ULU)

Groundwater MTCA Cleanup/Criteria Levels:
PCE = 5 µg/L (Method A); 24 µg/L (Indoor Air)
TCE = 5 µg/L (Method A); 1.5 µg/L (Indoor Air)
cis-1,2-DCE= 16 µg/L (Method B); 160 µg/L (Indoor Air)
trans-1,2-DCE = 160 µg/L (Method B); 110 µg/L (Indoor Air)
1,1-DCA = 7.7 µg/L (Method B); 11 µg/L (Indoor Air)
1,1-DCE = 400 µg/L (Method B);130 µg/L (Indoor Air)
Vinyl Chloride = 0.2 µg/L (Method A); 0.35 µg/L (Indoor Air)
Benzene = 5 µg/L (Method A); 2.4 µg/L (Indoor Air)
Lube Oil-Range Petroleum Hydrocarbons = 0.5 mg/L (Method A)
Arsenic = 5 µg/L (Method A)
cPAHs= 0.1 µg/L (Method A)

Site Plan – PDA 1C/Fawcett North

UWT Environmental Assessment
Priority Development Areas - CPO Project No. 204277
Tacoma, Washington

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Figure 2

Office: TAC Path: \\tac\projects\0\0183085\GIS\Reports\SiteSpecific\Figure__1C.mxd Map Revised: 18 December 2014 cgonzales

APPENDIX A
Report Limitations and Guidelines for Use

APPENDIX A
REPORT LIMITATIONS AND GUIDELINES FOR USE[1]

This appendix provides information to help you manage your risks with respect to the use of this report.

Environmental Services are Performed for Specific Purposes, Persons and Projects

This report has been prepared for use by University of Washington. This report is not intended for use by others, and the information contained herein is not applicable to other sites.

GeoEngineers structures our services to meet the specific needs of our clients. For example, an environmental site assessment study conducted for a property owner may not fulfill the needs of a prospective purchaser of the same property. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and project site. No one except University of Washington should rely on this environmental report without first conferring with GeoEngineers. This report should not be applied for any purpose or project except the one originally contemplated.

This Environmental Report is Based on a Unique Set of Project-Specific Factors

This report has been prepared for the Priority Development Areas (PDAs) Environmental Assessment Project at the UW – Tacoma (UWT) campus located in Tacoma, Washington. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, do not rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

If important changes are made after the date of this report, GeoEngineers should be given the opportunity to review our interpretations and recommendations and provide written modifications or confirmation, as appropriate.

Reliance Conditions for Third Parties

If a lending agency or other parties intend to place legal reliance on the product of our services, we require that those parties indicate in writing their acknowledgement that the scope of services provided, and the general conditions under which the services were rendered including the limitation of professional liability, are understood and accepted by them. This is to provide our firm

---

[1] Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions.

Environmental Regulations are Always Evolving

Some substances may be present in the site vicinity in quantities or under conditions that may have led, or may lead, to contamination of the subject site, but are not included in current local, state or federal regulatory definitions of hazardous substances or do not otherwise present current potential liability. GeoEngineers cannot be responsible if the standards for appropriate inquiry, or regulatory definitions of hazardous substance, change or if more stringent environmental standards are developed in the future.

Subsurface Conditions can Change

This environmental report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by manmade events such as construction on or adjacent to the site, by new releases of hazardous substances, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Always contact GeoEngineers before applying this report to determine if it is still applicable.

Topsoil

For the purposes of this report, we consider topsoil to consist of generally fine-grained soil with an appreciable amount of organic matter based on visual examination, and to be unsuitable for direct support of the proposed improvements. However, the organic content and other mineralogical and gradational characteristics used to evaluate the suitability of soil for use in landscaping and agricultural purposes was not determined, nor considered in our analyses. Therefore, the information and recommendations in this report, and our logs and descriptions should not be used as a basis for estimating the volume of topsoil available for such purposes.

Most Environmental Findings are Professional Opinions

Our interpretations of subsurface conditions are based on field observations and chemical analytical data from widely spaced sampling locations at the site. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ – sometimes significantly – from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

Do Not Redraw the Exploration Logs

Environmental scientists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in an environmental report should never be redrawn for inclusion in other design drawings. Only photographic or electronic reproduction is acceptable, but recognize that separating logs from the report can elevate risk.

Read These Provisions Closely

Some clients, design professionals and contractors may not recognize that the geoscience practices (geotechnical engineering, geology and environmental science) are far less exact than other engineering and natural science disciplines. This lack of understanding can create unrealistic expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory “limitations” provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you are unclear how these “Report Limitations and Guidelines for Use” apply to your project or site.

Geotechnical, Geologic and Geoenvironmental Reports Should Not Be Interchanged

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually relate any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding a specific project.

Biological Pollutants

GeoEngineers’ Scope of Work specifically excludes the investigation, detection, prevention, or assessment of the presence of Biological Pollutants in or around any structure. Accordingly, this report includes no interpretations, recommendations, findings, or conclusions for the purpose of detecting, preventing, assessing, or abating Biological Pollutants. The term “Biological Pollutants” includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts.

PDA 1D – Fawcett South

Priority Development Area 1D
Fawcett South
Environmental Subsurface Investigation

Environmental Subsurface Investigation Project
UW Capital Project Office Project No. 204277
1730 to 1754 South Fawcett Avenue
Tacoma, Washington

for
University of Washington

December 19, 2014

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Priority Development Area 1D
Fawcett South
Environmental Subsurface Investigation

UW Capital Project Office
Project No. 204277
1730 to 1754 South Fawcett Avenue
Tacoma, Washington

File No. 0183-085-00

December 19, 2014

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GEOENGINEERS

Table of Contents

1.0 INTRODUCTION 1

2.0 SITE HISTORICAL USE 1

3.0 CURRENT SITE FEATURES 2

4.0 ENVIRONMENTAL SUBSURFACE EXPLORATIONS 2

4.1. Historical Research and Magnetic Anomaly Findings 2
4.2. Soil Borings and Test Pits 3
4.3. Groundwater Sampling 3

5.0 SITE GEOLOGY AND HYDROGEOLOGY 3

5.1. Soil Conditions 3
5.2. Groundwater Conditions 4

6.0 CHEMICAL ANALYTICAL PROGRAM 4

6.1. General 4
6.2. Criteria for Characterization of Soil and Groundwater 4
6.3. Soil 6
6.3.1. Petroleum Hydrocarbons 6
6.3.2. VOCs 7
6.3.3. PAHs 7
6.3.4. RCRA Metals 7
6.4. Groundwater 8
6.4.1. Petroleum Hydrocarbons 9
6.4.2. VOCs 9
6.4.3. PAHs 10
6.4.4. RCRA Metals 10

7.0 CONCLUSIONS 10

7.1. Groundwater 10
7.2. Soil 10

8.0 PROPOSED DEVELOPMENT PLANS 11

9.0 POTENTIAL IMPACTS AND MITIGATION MEASURES TO DESIGN AND CONSTRUCTION 11

9.1. TCE and 1,1-DCA-Contaminated Groundwater 11
9.2. Soil is Contaminated with Chemicals of Concern 13

10.0 LIMITATIONS 14

11.0 REFERENCES 15

LIST OF TABLES

Table 1. Summary of Chemical Analytical Results – Soil
Table 2. Summary of Chemical Analytical Results – Groundwater

LIST OF FIGURES

Figure 1. Vicinity Map
Figure 2. Site Plan – PDA 1D/Fawcettt South

APPENDICES

Appendix A. Report Limitations and Guidelines for Use

1.0 INTRODUCTION

This report presents the results of our environmental subsurface investigation completed for the University of Washington (UW) at the Fawcett South property (Priority Development Area [PDA] – 1D) located on the UW Tacoma (UWT) campus at 1730 to 1754 South Fawcett Avenue in Tacoma, Washington. The Fawcett South property is herein referred to as the "site." The site was identified as PDA 1D for this project. The site is bound by Court E to the west, a residential property to the north, South Fawcett Avenue to the east and a former granite and marble supply company to the south. A Vicinity Map of the site is included as Figure 1. See Figure 2 for the layout of the site.

The subsurface investigation was completed under the UWT Environmental Subsurface Investigation Project, UW project number 204277. This report was completed as a subset of the larger subsurface assessment report titled "2013 Environmental Subsurface Investigation – University of Washington-Tacoma, Tacoma, Washington" dated December 19, 2014 to assist with development of the property. This report should be used in context with the larger subsurface assessment report. Borings logs, subsurface investigation methodologies and chemical analytical data packages are included in the larger investigation report.

General impacts and potential mitigation measures are provided in this report that may be employed in design and construction. It is important to recognize that additional environmental investigations may be necessary prior to selection of the final mitigation measure. Mitigation measures and associated costs provided in this report will likely need refinement based on the results of the additional environmental investigations. The project team should contact UW Environmental Health & Safety (UW EH&S) to discuss the need for additional environmental investigations at this site. UW EH&S is the liaison with the Washington State Department of Ecology (Ecology) for review and approval of mitigation measures.

2.0 SITE HISTORICAL USE

The site was developed in the early 1900s with various single family residences and associated garages along with three apartment buildings and a store based, on our review of the historical documents. Since at least 1953, several businesses have occupied the building located on the northwest corner of Fawcett Avenue and South 19th Street, including an industrial refrigeration company, a trucking company, and a marble supply company. The northwest corner property is not owned by the UW. Storage and operations associated with the former marble supply company lot extend onto the UW-owned parcel.

Heating permits were generally noted for the former residences located along the west side of South Fawcett Avenue between the late 1960s to the early 1980s. A conversion from oil to natural gas occurred during this time period, possibly indicating that heating oil was historically used as the source of heat. It is unknown if potential heating oil underground storage tanks (USTs) were removed from the site as there were no records located within the records search indicating any USTs were removed since the early 1960s.

The majority of the buildings were removed in the 1990s when UW purchased the properties along South Fawcett Avenue.

3.0 CURRENT SITE FEATURES

The majority of the site is currently undeveloped and vegetated with trees and field grass. Topography slopes from Court E on the west to South Fawcett Avenue on the east of the site with the elevation varying as much as 20 feet in elevation. The southern portion of the site is unpaved and generally at the same elevation as Fawcett Avenue. Storage material (granite slabs) was observed on the southern portion of the site related to encroachment from current operations on the adjacent property to the south. The adjacent property to the south is not owned by UW.

4.0 ENVIRONMENTAL SUBSURFACE EXPLORATIONS

The environmental subsurface investigation completed at the site consisted of a magnetic/ground penetrating radar (M/GPR) survey, test pit explorations, direct-push soil borings, soil borings using rotosonic core drilling, monitoring well installation, groundwater development and sampling of new upgradient and on-site monitoring wells. The subsurface investigation was completed between June and September 2013.

4.1. Historical Research and Magnetic Anomaly Findings

Historic research results indicated the potential for USTs to be present at the site given the age of the former buildings and the source of heat typically used during these time periods. In addition, heating conversion permits were listed in the majority of the permit records. The M/GPR survey was conducted within PDA 1D in June 2013.

Five magnetic anomalies were identified near the northern and southern portions of the site. The magnetic anomalies were designated using the following identification nomenclature: 1C-A1 where 1C identifies the PDA and –A1 is the number of the anomaly at the site.

Test pit excavation activities were conducted in areas where USTs may be present based on the magnetic anomalies observed during the surveys. Four test pits were completed in the vicinity of magnetic anomalies 1D-A1 through 1D-A4. Magnetic anomaly 1D-A5 was not investigated because it was located near a former residence. Test pits were only completed in the vicinity of magnetic anomalies located near former commercial buildings or apartments where the UST are expected to be larger and take more resources to remove if encountered during construction than a residential UST.

Observations from the test pit explorations are discussed further below.

- Magnetic Anomaly 1D-A1. Fill material was observed to a depth of approximately 2.5 feet below ground surface (bgs). Two approximately 1.5-inch-diameter metal pipes were observed oriented east to west between 1 and 2 feet bgs. Various construction debris was observed to depths of approximately 2.5 feet bgs. Native soil was encountered at approximately 2.5 feet bgs. The magnetic anomaly identified was likely related to the metal pipes encountered in the sidewall of the test pit exploration. The metal pipes may represent fill or vent pipes associated with a former UST.
- Magnetic Anomaly 1D-A2. Fill material was observed including various metal debris (chicken wire, choker cable), tire and other construction debris to a depth of approximately 2.5 feet bgs. Native soil was encountered at approximately 2.5 feet bgs. The magnetic anomaly identified was likely related to the metal debris encountered within the fill material.

- Magnetic Anomaly 1D-A3. Fill material with an approximately 4-inch-diameter metal pipe was observed oriented east to west at a depth of 1 foot bgs. Also, a 5-gallon-metal bucket was observed. Native soil was encountered at approximately 2 feet bgs. The magnetic anomaly identified was likely related to the metal pipe and bucket encountered during the test pit exploration.
- Magnetic Anomaly 1D-B4. Fill material was observed at a depth of 1 foot bgs that included an approximately 4-inch-diameter metal pipe oriented in an east to west direction. A concrete slab was observed at 0.5 feet bgs and miscellaneous construction debris was observed to approximately 2 feet bgs. Native soil was encountered at approximately 2 feet bgs. The magnetic anomaly identified was likely related to the metal pipe observed in the test pit exploration.

4.2. Soil Borings and Test Pits

Subsurface explorations included completing two direct-push soil borings on June 14, 2013, three test pits at the site between June 24 and 25, 2013, and advancing two soil borings using rotosonic core drilling methods on September 18, 2013.

The direct-push borings (1D-B1 and 1D-B2) ranged in depth from 7 to 7.5 feet bgs and were terminated when practical refusal was encountered. The test pits (1D-TP1 and 1C-TP3) ranged in depth between approximately 5 and 6 feet bgs and were terminated when native soil was encountered. Rotosonic soil borings (UG-MW35 and UG-MW36) were advanced to depths ranging from 14 to 20 feet bgs and were converted into groundwater monitoring wells.

4.3. Groundwater Sampling

Groundwater samples were collected from two monitoring wells at the site (UG-MW35 and UG-MW36), three upgradient off site monitoring wells (UG-MW25S, UG-MW25D and UG-MW37) and one downgradient monitoring well (UG-MW32) between July 2013 and January 2014. Monitoring wells UG-MW25S, UG-MW32, UG-MW35, UG-MW36 and UG-MW37 are screened within the shallow aquifer (ice-contact deposits), while UG-MW25D is screened within the deep aquifer (advance outwash).

5.0 SITE GEOLOGY AND HYDROGEOLOGY

5.1. Soil Conditions

Subsurface conditions consist of fill, underlain by ice-contact deposits, silt layer and advance outwash. The fill consisted of silt and sand with gravel (silt with sand and gravel and/or sand with silt and gravel) from the ground surface to depths ranging from approximately 1.5 to 5.5 feet bgs.

Native soil conditions underlying the fill were observed at each subsurface exploration location consisting of glacially consolidated units (ice-contact deposits) comprised of silty sand to sand with gravel and silt.

A unit of brown silty sand with gravel was observed beneath the ice-contact deposits in the monitoring well UG-MW35 and UG-MW36 completed during this investigation at approximately 13 to 14.5 feet bgs.

Glacial advance outwash was observed beneath the silt at UG-MW35 and UG-MW36. The advance outwash consisted of sand with gravel with various amounts of silt to silty gravel with sand to the full depths explored.

5.2. Groundwater Conditions

It appears that groundwater conditions observed at the site consist of a shallow aquifer (ice-contact deposits) and deep aquifer (advance outwash) to the depths explored during this investigation. The shallow and deep aquifers appear to be separated by a silt layer with gravel located between the ice-contact deposits and advance outwash in UG-MW35 and UG-MW36.

Groundwater within the shallow aquifer appears to be present within the sand and gravel seams observed in the ice-contact deposits. The hydraulic connection of the sand and gravel seams within the ice-contact deposit unit is unknown in and around the project site. Groundwater within the deep aquifer appears to be continuous with interbeds of moist to wet silty sands and slit at depth.

Groundwater flows to the east down the hillside with a steep gradient. The elevation of groundwater in the shallow aquifer ranged from approximately 220.53 to 195.78 feet in the off site upgradient monitoring wells (UG-MW25S and UG-MW37). The elevation of the groundwater in the shallow aquifer ranged from approximately 173.21 to 172.02 feet in the on-site monitoring wells (UG-MW35 and UG-MW36). The elevation of the downgradient well (UG-MW32) was approximately 152.97 feet.

The elevation of the groundwater in the deep aquifer within the upgradient monitoring well (UG-MW25D) was approximately 165.32 feet.

6.0 CHEMICAL ANALYTICAL PROGRAM

6.1. General

Soil and groundwater samples were submitted to OnSite Environmental, Inc., in Redmond, Washington for chemical analysis. The chemical analytical data are summarized in Tables 1 and 2. Chemicals that were not detected at or greater than the laboratory reporting limits in the analyzed samples are typically not included on the tables.

6.2. Criteria for Characterization of Soil and Groundwater

The following criteria were used to evaluate impacted and contaminated soil and groundwater.

- Tetrachloroethene (PCE) and Trichloroethene (TCE) impacted and contaminated soil
  - PCE, TCE and breakdown products at concentrations detected in the analyzed soil samples.
- Contaminated Soil
  - Petroleum hydrocarbons, carcinogenic polycyclic aromatic hydrocarbons (cPAHs), metals and volatile organic compounds (VOCs) were detected at concentrations greater than the Model Toxics Control Act (MTCA) Method A Unrestricted Land Use (ULU) cleanup level or MTCA Method B screening level.
- Impacted Soil

  Some contaminants were detected at concentrations less than the respective MTCA cleanup levels. UWT may be able to reuse certain types of soil depending on the sampling results. UW EH&S must review the chemical analytical data to evaluate if reuse or disposal at an off site facility is necessary. Soil reuse and disposal are subject to Ecology Guidance for Remediation of Petroleum Contaminated

Sites (Ecology, 2011), solid waste regulations and disposal facility permit conditions. The criteria below is herein referred to as "Reuse Criteria."

- Petroleum hydrocarbons, cPAHs and/or Lead

  The Ecology guidance indicates that soil with diesel- and/or lube oil-range petroleum hydrocarbons detected at concentrations less than 200 milligrams per kilogram (mg/kg) and/or gasoline-range petroleum hydrocarbons detected at concentrations less than 30 mg/kg are suitable for reuse as commercial fill at UWT campus with the following limitations:

  - placed above the highest water table,
  - not within 100 feet of a drinking water well,
  - not within wellhead protection area of public water supply,
  - not within wetlands or where surface water contact is possible, and
  - not within a surface water infiltration facility or septic drain field.

  If the concentrations exceed the above limits but are still less than respective MTCA cleanup levels the soil may be reused in road and bridge embankment construction, landfill daily cover or asphalt manufacturing with UW EH&S approval.

- Arsenic, Cadmium, and/or Mercury

  Soil with concentrations of arsenic, cadmium and/or mercury above what is normally found in the natural background environment (Puget Sound Background levels -Ecology, 1994) is typically suitable for disposal at an inert waste landfill or a Department of Natural Resources (DNR) reclamation pit. UW EH&S approval is necessary.

  Soil at and near the UWT campus has been well documented to contain chromium at concentrations slightly above the natural background level and is not considered in the "Reuse Criteria."

■ Contaminated Groundwater

- Petroleum hydrocarbons, polycyclic aromatic hydrocarbons (PAHs) and metals detected at concentrations greater than the respective MTCA Method A groundwater cleanup levels. Method B criteria were used for comparison of specific compounds if Method A groundwater cleanup levels are not established for those compounds.
- VOCs detected at concentrations greater than the respective MTCA Method A groundwater cleanup levels, and MTCA Method B groundwater screening levels protective of indoor air. The updated TCE/PCE/1,1-dichloroethane (DCA) screening levels were calculated using Equation 1 from Ecology's review draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action" dated October 2009 (Ecology, 2009) and Environmental Protection Agency's (EPA's) TCE, PCE and 1,1-DCA toxicity factors updated in 2011 and available on EPA's online Integrated Risk Information System (IRIS). The other values were obtained from Ecology's review draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action."

6.3. Soil

The soil samples collected from the subsurface explorations were identified using the following identification system: A#-TP/B#-start depth-end depth, where A# is the area designation number, TP/B# is the test pit/boring and start depth-end depth is the depth interval in feet below the ground of specific sample (e.g., 1D-B1-6-7 was collected in PDA 1D from boring 1 from 6 to 7 feet bgs).

Soil samples were submitted for chemical analysis based on the following criteria:

- Where field screening indicated the soil is impacted.
- Directly below potentially impacted soil to delineate the vertical extent.
- Where wet sand seams were encountered within the ice-contact deposits.
- At the soil/groundwater interface if groundwater was encountered.
- At the top of confining units if encountered.

The soil samples were submitted for chemical analysis of petroleum hydrocarbon identification by Ecology-approved method NWTPH-HCID (with appropriate follow-up analysis of diesel range total petroleum hydrocarbons by Ecology-approved method NWTPH-Dx), VOCs by EPA method 8260C, PAHs by EPA method 8270DSIM, Resource Conservation and Recovery Act (RCRA) metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver) by EPA method 6000/7000 series and polychlorinated biphenyls (PCBs) by EPA method 8082A.

6.3.1. Petroleum Hydrocarbons

FILL

Lube oil-range petroleum hydrocarbons were detected at a concentration less than the MTCA Method A ULU cleanup level but greater than the Reuse Criteria in the following soil samples with the detected concentrations identified in parentheses.

- 1D-TP1-01 (280 mg/kg)
- 1D-TP3-0-1 (370 mg/kg)

Lube oil-range petroleum hydrocarbons were either not detected or were detected at concentrations less than the MTCA Method A ULU cleanup level and the Reuse Criteria in the remaining analyzed soil samples. Gasoline-range and diesel-range petroleum hydrocarbons were either not detected or detected at concentrations less than the MTCA Method A ULU cleanup level and the Reuse Criteria in the analyzed soil samples.

ICE-CONTACT DEPOSITS AND ADVANCE OUTWASH

Gasoline-, diesel, and lube oil-range petroleum hydrocarbons were not detected in the analyzed soil samples collected in the ice-contact deposits. Soil samples collected in the advance outwash were not submitted for chemical analysis of petroleum hydrocarbons.

6.3.2. VOCs

FILL

VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels in the analyzed soil samples collected within fill material.

ICE-CONTACT DEPOSITS

TCE was detected at a concentration less than the MTCA Method A ULU cleanup level (0.03 mg/kg) in soil sample 1D-B1-6-7 (0.0041 mg/kg). TCE was not detected in the remaining analyzed soil samples collected within ice-contact deposits.

Other VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels or Method B ULU criteria in the remaining analyzed soil samples.

ADVANCE OUTWASH

TCE was detected at concentrations less than the MTCA Method A ULU cleanup levels in five soil samples collected from 13 to 19 feet bgs in UG-MW35 and UG-MW36. TCE was not detected in the remaining analyzed soil samples collected within advance outwash.

Other VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels or Method B criteria in the analyzed soil samples collected within advance outwash.

6.3.3. PAHs

FILL

CPAHs were detected at a total toxicity equivalent concentration (TTEC) equivalent to the MTCA Method A ULU cleanup level (0.1 mg/kg) in soil sample 1D-TP3-0-1 (0.10 mg/kg). CPAHs were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup level in the remaining analyzed soil samples.

PAHs were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup level and Reuse Criteria in the analyzed soil samples.

ICE-CONTACT DEPOSITS AND ADVANCE OUTWASH

PAHs and cPAHs were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup level and Reuse Criteria in the analyzed soil samples. No soil samples collected within the advance outwash layer were analyzed for cPAHs and PAHs.

6.3.4. RCRA Metals

FILL

Lead was detected at a concentration equal to or greater than the MTCA Method A ULU cleanup level (250 mg/kg) in soil samples with the detected concentrations identified in parenthesis.

- 1D-TP2-0-1 (280 mg/kg)
- 1C-TP3-0-1 (950 mg/kg)
- 1D-TP3-2-3 (250 mg/kg)

- UG-MW36-0-1 (290 mg/kg)
- UG-MW36-1-3 (390 mg/kg)

Lead was detected at concentrations greater than the Reuse Criteria (50 mg/kg) but less than the MTCA Method A ULU cleanup level in soil samples collected from the ground surface to 2 feet bgs in boring UG-MW35 and test pit 1D-TP1. Lead was either not detected or was detected at concentrations less than the MTCA Method A ULU cleanup level and Reuse Criteria in the remaining analyzed soil samples.

Cadmium was detected at concentrations less than the MTCA Method A cleanup level (2 mg/kg), but equal to or greater than the Reuse Criteria in two soil samples collected from the ground surface to 1 foot bgs in test pits 1D-TP2 and 1D-TP3. Cadmium was either not detected or was detected at concentrations less than the Reuse Criteria in the remaining analyzed soil samples.

Mercury was detected at concentrations greater than the Reuse Criteria (0.07 mg/kg), but less than the MTCA Method A ULU cleanup level (2 mg/kg) four soil samples collected from borings/test pits 1D-TP2, 1D-TP3 and UG-MW35 from the ground surface to depths ranging between 1 and 3 feet bgs. Mercury was not detected in the remaining analyzed soil samples.

Other RCRA metals were either not detected or were detected at concentrations less than the respective MTCA Method A cleanup levels Reuse Criteria in the remaining analyzed soil samples.

ICE-CONTACT DEPOSITS

RCRA metals were either not detected or were detected at concentrations less than the respective MTCA Method A cleanup levels and Reuse Criteria in the remaining analyzed soil samples. No soil samples collected in the advance outwash layer were analyzed for RCRA metals.

6.4. Groundwater

Groundwater samples were collected for chemical analysis from two on-site monitoring wells (UG-MW35 and UG-MW36) and from four off site monitoring wells (UG-MW25S, UG-MW25D, UG-MW32 and UG-MW37). The groundwater samples collected from the wells were identified using the following identification system: WELL-ID-yymmdd, where WELL-ID is the well identification number and yymmdd is the date when the sample was collected (e.g., UG-MW35-140122 was collected from monitoring well UG-MW35 on January 22, 2014).

The groundwater samples collected from UG-MW25S, UG-MW25D, UG-MW32 and UG-MW37 were submitted for chemical analysis of gasoline-range petroleum hydrocarbons by Ecology-approved method NWTPH-Gx, diesel- and lube oil-range petroleum hydrocarbons by Ecology-approved method NWTPH-Dx, VOCs by EPA method 8260C, PAHs by EPA method 8270DSIM and Total RCRA metals by EPA method 200.8 or 7470A. The groundwater samples from UG-MW35 and UG-MW36 were submitted for chemical analysis of gasoline-range petroleum hydrocarbons by Ecology-approved method NWTPH-Gx and VOCs by EPA method 8260C due to limited water volume within the wells. The chemical analytical data for groundwater are described below and summarized in Table 2 and Figure 2.

6.4.1. Petroleum Hydrocarbons

SHALLOW AQUIFER

Lube oil-range petroleum hydrocarbons were detected at a concentration greater than the MTCA Method A groundwater cleanup level (0.5 milligram per liter [mg/l]) in groundwater sample UG-MW37-130930 collected from upgradient monitoring well UG-MW37 (0.55 mg/L). Lube oil-range petroleum hydrocarbons were not detected in the remaining analyzed groundwater samples collected from the shallow aquifer.

Gasoline- and diesel-range petroleum hydrocarbons were not detected in the analyzed groundwater samples.

DEEP AQUIFER

Gasoline-, diesel- and lube oil-range petroleum hydrocarbons were not detected in the analyzed groundwater samples.

6.4.2. VOCs

SHALLOW AQUIFER

TCE. TCE was detected at a concentration of 290 micrograms per liter (µg/L) in upgradient groundwater sample UG-MW25S-130904. TCE was also detected at a concentration of 39 µg/L in downgradient sample UG-MW32-131003. These detected concentrations of TCE are greater than the MTCA Method A groundwater cleanup level (5 µg/L) and greater than the MTCA Method B groundwater screening level protective of indoor air (1.5 µg/L).

TCE was detected in the shallow aquifer wells (UG-MW35) at a concentration (0.24 µg/L) less than the MTCA Method A groundwater cleanup level (5 µg/L) and the MTCA Method B groundwater screening level protective of indoor air (1.5 µg/L).

TCE was either not detected in the remaining analyzed groundwater samples.

Miscellaneous Solvents. 1,1-dichloroethane (DCA) was detected in groundwater samples collected from upgradient well UG-MW25S and downgradient well UG-MW32. UG-MW32 is located directly downgradient of UG-MW25S.

1,1-DCA was detected at a concentration greater than the respective MTCA Method B Groundwater Criteria (7.7 µg/L) and the MTCA Method B groundwater screening level protective of indoor air (11 µg/L) in upgradient well UG-MW25S (15 µg/L). 1,1-DCA was detected at a concentration less than the MTCA Method B Groundwater Criteria (7.7 µg/L) and the MTCA Method B groundwater screening level protective of indoor air (11 µg/L) in downgradient well UG-MW32 (0.21 µg/L).

Other VOCs. Other VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A groundwater cleanup level or MTCA Method B criteria in the remaining analyzed groundwater samples.

DEEP AQUIFER

VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A groundwater cleanup level or MTCA Method B criteria in the groundwater samples collected from upgradient monitoring wells UG-MW24 and UG-MW25D.

6.4.3. PAHs

PAHs and cPAHs were not detected in the analyzed groundwater samples.

6.4.4. RCRA Metals

Total arsenic was detected at a concentration (6.2 µg/L) greater than the MTCA Method A groundwater cleanup level (5 µg/L) in the groundwater sample UG-MW25D-130904 from upgradient monitoring well UG-MW25D. This sample was then submitted for follow-up chemical analysis of dissolved arsenic, with a resulting concentration of 5.7 µg/L.

Total RCRA metals were either not detected or were detected at concentrations less than the MTCA Method A cleanup levels or the Method B criteria in the remaining analyzed groundwater samples.

7.0 CONCLUSIONS

7.1. Groundwater

Three areas within Area 1D may potentially contain TCE and/or 1,1-DCA-contaminated groundwater based on the on-site soil containing TCE and TCE detected in off site wells. The three areas consist of the following:

- Shallow Aquifer – Northern Portion of Site. 1,1-DCA was detected in groundwater samples collected from upgradient well UG-MW25S and downgradient well UG-MW32. 1,1-DCA was not detected in other monitoring wells in the area. TCE-contaminated groundwater was also detected in UG-MW25S and UG-MW32. 1,1-DCA may be an indicator chemical of TCE-contaminated groundwater being present on the northern portion of the site. The 1,1-DCA detected in both wells may be from the same upgradient source and the groundwater plume may extend across the northern portion of the site.
- Shallow Aquifer – Southern Portion of the Site. TCE-impacted soil was detected on the southern portion of the site in boring 1D-B1. The TCE-impacted soil is an indicator that groundwater may also be contaminated on the southern portion of the site. TCE-impacted groundwater (concentration at 0.24 µg/L) was detected in on-site well UG-MW35 indicating this may be the northern edge of an area-wide TCE groundwater plume.
- Deep Aquifer – Entire Site. TCE was detected in soil samples collected within the advance outwash in UG-MW35 and UG-MW36 located on the northern and southern portion of the site. The TCE-impacted soil is an indicator that groundwater may also be contaminated.

The TCE appears to originate from an upgradient source. The identified historical property uses at the site are unlikely to be the source of TCE and PCE contamination based on information reviewed to date. However, the actual source is unknown at the time of this report. Additional investigation is necessary to further define the extent of the potential TCE and 1,1-DCA groundwater plumes.

7.2. Soil

Lead-, and/or cPAHs-contaminated soil was present in soil from the ground surface to 2 feet bgs on the southern portion and 3 feet bgs on the northern portion of PDA 1D. Petroleum-, metals- and cPAHs-impacted soil is present from the ground surface to 3 feet bgs on the remaining portions of PDA 1D. In general, soil in the northern two-thirds of the site is contaminated or impacted.

8.0 PROPOSED DEVELOPMENT PLANS

We understand UWT plans to construct a new building at PDA 1D. GeoEngineers assumes the new building will be 32,000 square feet with a finished floor elevation of 168 feet. The estimated amount of soil to be generated based on the above assumptions is approximately 28,000 tons to excavate PDA 1D to subgrade (Elevation 167 feet). An additional 3,000 tons is estimated to be generated from the footings.

9.0 POTENTIAL IMPACTS AND MITIGATION MEASURES TO DESIGN AND CONSTRUCTION

We recommend UW develop and implement appropriate administrative institutional controls to limit or prohibit activities that may result in exposure to hazardous substances remaining at the site. Potential impacts to the design and construction of the site are the following:

- Groundwater may be contaminated with TCE and 1,1-DCE.
- Soil is contaminated with chemicals of concern (metals and cPAHs).
- Soil is impacted with chemicals of concern (TCE, metals and cPAHs).

Potential long-term impacts include:

- Long-term disposal of underslab/perimeter footing drain PCE-impacted groundwater.
- Continued maintenance of vapor intrusion mitigation system, if necessary.
- Potential periodic indoor air sampling to confirm the vapor intrusion mitigation system may be necessary to evaluate the system is operating properly, if necessary.
- TCE-contaminated or TCE-impacted soil may remain adjacent and beneath the building following construction activities. UW should develop and implement appropriate institutional controls to help prevent exposure to residual contamination.

The following sections describe potential impacts, mitigation measures and estimated costs to design and construction.

9.1. TCE and 1,1-DCA-Contaminated Groundwater

TCE and 1,1-DCA-Contaminated Groundwater. TCE- and 1,1-DCA-contaminated groundwater is present upgradient and/or downgradient of the site. TCE and 1,1-DCA may be present on the site and may be encountered during construction along the west side of the site. TCE- and 1,1-DCA-contaminated groundwater may become in contact with the west side and beneath of the proposed building.

Additional Investigation. Further subsurface investigation may be necessary to evaluate the vertical and lateral limits of the TCE-impacted soil and/or groundwater at the site. Soil vapor sampling is recommended to evaluate if a potential vapor intrusion pathway exists. The estimated cost for soil vapor sampling and additional investigation is $50,000 to $100,000.

Vapor Mitigation. Vapor intrusion occurs when VOCs migrate from contaminated soil or groundwater into overlying buildings through openings in the foundation. The route VOCs take from a subsurface source to the air inside a building is referred to as the vapor intrusion pathway. The most common sources of soil vapor are VOCs including TCE, PCE and 1,1-DCA, which may pose short-term (TCE only) and long-term (chronic) risks through inhalation of contaminated indoor air. Groundwater and soil vapor concentrations are typically utilized as screening levels regarding the potential for vapor intrusion. Groundwater was encountered in subsurface explorations during this investigation. The TCE- and 1,1-DCA-contamination located adjacent and upgradient of the site exceeds the screening level for updated MTCA Method B groundwater screening level protective of indoor air.

Soil vapor sampling was not completed as part of this investigation. Additional on site characterization may be necessary to evaluate the vertical and lateral limits of the soil vapors. Soil vapor sampling is recommended to evaluate whether a potential vapor intrusion pathway exists. If a potential vapor intrusion pathway exists, then a vapor intrusion mitigation system may be necessary. Potential mitigation options to prevent vapor intrusion include:

- A passive vapor barrier beneath the building. Passive vapor barriers are typically used in combination with another mitigation option (venting or building pressurization). We recommend the vapor barrier be installed below the elevation of penetrations (pipes, etc.) that may be installed after the programing is identified in the future. Penetrating the vapor barrier following the construction will add to the cost of construction.
- Passive or active venting system beneath the building. The venting system may need to be combined with an underslab and perimeter drain to reduce the potential for shallow groundwater to enter the venting system.

The estimated cost for design and installation of indoor air mitigation system ranges between $5 per square foot to $12 per square foot of building space. The estimated costs for the vapor mitigation system for a building on the entire site is between $160,000 and $384,000. Potential periodic indoor air sampling to confirm the vapor intrusion mitigation system may be necessary to evaluate the system is operating properly following construction of the building. The estimated cost for long-term monitoring is unknown.

The source of the potential TCE-contaminated groundwater in the shallow and deep aquifers is unknown. The costs may be reduced if the buildings are oriented outside of the potential TCE-plume areas and the building is raised so it does not penetrate the silt layer at 175 feet on the western portion of the site.

Underslab/Footing Drainage. An Underslab/footing drainage system may be required to prevent water from entering into the vapor mitigation vent system. The water will likely have to be directed to the City of Tacoma sanitary sewer, but may be directed to the storm sewer based on concentrations of the chemicals of concern in the groundwater. A long-term cost may be associated with discharge of the water to the City sanitary sewer system. However, the groundwater may be suitable for discharge to the storm system based on the concentrations detected in the existing wells during this investigation. An underslab footing drain will likely be required based on the elevation of the groundwater (173 feet). The estimated cost of the underslab footing drain is between $96,000 and $192,000.

Construction Water Management. TCE and 1,1-DCA-contaminated groundwater encountered during construction will have to be managed. Water generated during construction will likely be stored in tanks, sampled and analyzed. Water disposal will be coordinated with UW EH&S at a UW-approved disposal facility. It is anticipated the construction dewatering water will be suitable for discharge into the storm sewer based on the concentrations detected in the existing wells during this investigation. The water may be disposed in the City of Tacoma sanitary sewer. The City of Tacoma charges approximately $0.0034 per gallon of water. The estimated volume of water generated will be based on construction methods. The base cost estimate includes the cost of disposal of water for 120 days of earthwork construction, approximate cost of collecting ten water samples over the course of the project ($15,000) and two 25,000 gallon storage tanks ($7,000 each per month).

Approximately 15,000 gallons per day is estimated to be generated on the site from dewatering activities. The estimated cost of construction water management if disposal into the City of Tacoma sanitary sewer is necessary is approximately $49,000.

Cross Contamination. The proposed building will cut through the silt layer that typically is a semi-confining to confining unit for the shallow and deep aquifers. However, the silt layer on the site is less than 6-inches-thick and contains gravel and TCE-contaminated groundwater appears to be present in the shallow and deep aquifers.

Additional investigation will be necessary to evaluate the potential for cross-contamination between the two aquifers. This investigation would be completed in concurrence with the additional investigation to evaluate the lateral and vertical extent of the contamination. For budgeting purposes, additional construction costs may be $16,000 to $96,000 if cross contamination is identified as an impact. However, it appears concern for cross contamination between the two aquifers may not be warranted at this site.

Health and Safety. Workers who may be in contact with potentially contaminated soil or groundwater at a state-listed cleanup site have HAZWOPER training. The requirement is consistent with the Washington Administrative Code (WAC) 296-843-100, *Hazardous Waste Operations*, which indicates that on-site personnel are required to have current health and safety training in accordance with Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response requirements in 29 CFR 1910.120. The rule also requires the earthwork contractor and other personnel who could potentially contact contaminated materials to develop and implement a written safety and health program for their employees involved in hazardous waste operations under 29 CFR 1910.120. The estimated cost for the contractor to be HAZWOPER trained and have appropriate liability insurance is roughly between $10,000 and $70,000 depending on the number of subcontractors that require training, and the contractor markup factor.

9.2. Soil is Contaminated with Chemicals of Concern

Contaminated soil (lead and cPAHs), and impacted soil (lube oil-range petroleum hydrocarbons, TCE, metals and PAHs) will likely be generated during construction activities. We recommend UW implement the following actions.

- Characterize Soil and Groundwater for Disposal. In-situ characterization or stockpiling and subsequent sampling will need to be performed on soil that is generated during construction in areas of PCE-impacted, PCE and TCE-impacted and cPAH/lead-contaminated and cPAHs/metals-impacted soil. The estimated cost of soil sampling for soil disposal is $60,000 to $80,000 based on the amount of soil to be excavated.
- TCE-Impacted and Contaminated Soil. When TCE breakdown products and other regulated solvents are detected in soil, UW EH&S will work with Ecology on obtaining a “contained-in determination” for disposal of the waste. The source of the solvent contamination, the concentration of the solvents and a Toxicity Characteristic Leaching Procedure (TCLP) analytical test result will be used when evaluating if the soil is disposed as hazardous waste by UW EH&S at a RCRA permitted Subtitle C landfill or as a solid waste at a UW-approved Subtitle D landfill. Past experience has demonstrated that it is fairly

likely that the "contained-in determination" will be granted, thus we based our cost estimates on this assumption.

- The estimated cost to transport and dispose (not including excavation and loading) soil at a Subtitle D landfill with a contained-in determination is $80 to $100 per ton. The typical cost for transportation and disposal (not including excavation and loading) of soil at a RCRA Subtitle C Landfill is $250 to $300 per ton. The cost estimates provided in this report assume disposal at a Subtitle D landfill.

  The estimated amount of TCE-impacted soil on the southern portion of the site is 11,000 tons for the main cut to subgrade. This estimate assumes the TCE-impacted soil is present for the full depth of the cut on northern and southern portions of the site (shallow and deep aquifer contaminated) and the TCE-impacted soil only in the deep aquifer in the central portion of the site. The additional estimated volume from the footings is 3,000 tons. The costs may be reduced if the buildings are oriented outside the potential TCE-plume areas and the building is raised so it does not penetrate the silt layer at 175 feet on the western portion of the site. Total estimated transport and disposal costs for these areas ranges from $1,040,000 to $1,300,000.

- Lead- and cPAHs-Contaminated Soil. The contaminated soil will be removed as necessary for construction or as required by Ecology. CPAHs- and metals-contaminated soil will be disposed at an UW-approved RCRA permitted Subtitle D landfill. The estimated cost for transportation and disposal at a RCRA-subtitle D facility is $60 to $80 per ton. We estimate the amount of the lead- and cPAHs-contaminated soil to be 3,500 tons. This estimate assumes the surficial 2 feet in the southern portion of the site, and 3 feet on the northern portion will characterize as contaminated soil. The estimated cost for transportation and disposal is between $210,000 and $280,000.

- Metals-, Petroleum-, cPAHs-Impacted Soil. Metals-, petroleum- and cPAHs-impacted soil is present on the west-central portion of the site to a depth of approximately 2 feet bgs. Soil is impacted with cPAHs, petroleum hydrocarbons and metals. Metals- petroleum-, and cPAHs-impacted soil is typically suitable for disposal at a UW-approved permitted inert waste landfill or reclamation pit. For budgeting purposes, we assumed the transportation and disposal of cPAHs-, metals- and petroleum-impacted soil is $30 to $50 per ton. We estimate the mass of the metals- and cPAHs-impacted soil to be 10,000 tons. This estimate assumes the surficial 2 feet across the entire site is impacted. The estimated cost for transportation and disposal is between $300,000 and $500,000. If soil is reused as fill on site, the cost would be reduced because off site disposal of the impacted soil will not be required.

- Health and Safety. As discussed in the contaminated groundwater section, UW requires its earthwork contractor and other personnel who could potentially contact contaminated materials to comply with training requirements for handling soil and potentially groundwater on the site. The health and safety costs are not included as separate item in the soil, because the costs in the groundwater section will apply.

10.0 LIMITATIONS

This report has been prepared for use by the University of Washington for the Priority Development PDA 1D – Fawcett South property located in Tacoma, Washington at the University of Washington Tacoma campus.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

Please refer to Appendix A titled "Report Limitations and Guidelines for Use" for additional information pertaining to use of this report.

11.0 REFERENCES

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TABLE 1

SUMMARY OF CHEMICAL ANALYTICAL RESULTS[1] - SOIL

AREA 1D - FAWCETT SOUTH
PRIORITY DEVELOPMENT AREAS - UNIVERSITY OF WASHINGTON TACOMA
TACOMA, WASHINGTON

Boring/Test Pit	1D-B1		1D-B2		1D-TP1		1D-TP2		1D-TP3			UG-MW35							UG-MW36				MTCA Method A ULU Cleanup Level	Reuse Criteria [14]
Sample Identification [2]	1D-B1-0-1	1D-B1-6-7	1D-B2-0-1	1D-B2-6-7	1D-TP1-0-1	1D-TP1-2-3	1D-TP2-0-1	1D-TP2-3.5-4.5	1D-TP3-0-1	1D-TP3-2-3	1D-TP3-5-6	UG-MW35-0-2	UG-MW35-4-5	UG-MW35-15-16	UG-MW35-16-17	UG-MW35-18-19	UG-MW35-19-19.5	UG-MW35-19.5-20	UG-MW36-0-1	UG-MW36-1-3	UG-MW36-4-5	UG-MW36-13-14		
Sample Depth (feet bgs)	0 to 1	6 to 7	0 to 1	6 to 7	0 to 1	2 to 3	0 to 1	3.5 to 4.5	0 to 1	2 to 3	5 to 6	0 to 2	4 to 5	15 to 16	16 to 17	18 to 19	19 to 19.5	19.5 to 20	0 to 1	1 to 3	4 to 5	13 to 14		
Soil Type	Fill	Qvi	Fill	Qvi	Fill	Fill	Fill	Qvi	Fill	Fill	Fill	Fill	Fill	Outwash	Outwash	Outwash	Outwash	Outwash	Fill	Fill	Qvi	Outwash		
NWTPH-HCID [3] (mg/kg)																								
Gasoline-Range	22 U	21 U	23 U	22 U	22 U	26 U	25 U	25 U	27 U	25 U	–	22 U	22 U	–	–	–	–	–	23 U	22 U	21 U	–	30/100[10]	30
Diesel-Range	54 U	53 U	57 U	55 U	55 U	65 U	63 U	62 U	67 U	62 U	–	55 U	55 U	–	–	–	–	–	58 U	56 U	53 U	–	2,000	200
Lube Oil-Range	110 U	110 U	110 U	110 U	DET	130 U	130 U	120 U	DET	120 U	–	110 U	110 U	–	–	–	–	–	DET	DET	110 U	–	2,000	200
NWTPH-Dx [4] (mg/kg)																								
Diesel-Range Petroleum Hydrocarbons	–	–	–	–	34 J	–	–	–	45 J	–	–	–	–	–	–	–	–	–	29 U	31 U	–	–	2,000	200
Lube Oil-Range Petroleum Hydrocarbons	–	–	–	–	280	–	–	–	370	–	–	–	–	–	–	–	–	–	160	170	–	–	2,000	200
VOCs [5] (mg/kg)																								
Tetrachloroethene (PCE)	0.00079 U	0.00089 U	0.00078 U	0.00083 U	0.00097 U	0.0012 U	0.0014 U	0.00096 U	0.0015 U	0.0012 U	–	0.00072 U	0.00065 U	0.00057 U	0.00059 U	0.00062 U	0.00057 U	0.00095 U	0.00074 U	0.00071 U	0.00058 U	0.00063 U	0.05	DET
Trichloroethene (TCE)	0.00079 U	0.0041	0.00078 U	0.00083 U	0.00097 U	0.0012 U	0.0014 U	0.00096 U	0.0015 U	0.0012 U	–	0.00072 U	0.00065 U	0.00067	0.0063	0.0016	0.00057 U	0.0012	0.00074 U	0.00071 U	0.00058 U	0.002	0.03	DET
(cis) 1,2-Dichloroethene	0.00079 U	0.00089 U	0.00078 U	0.00083 U	0.00097 U	0.0012 U	0.0014 U	0.00096 U	0.0015 U	0.0012 U	–	0.00072 U	0.00065 U	0.00057 U	0.00059 U	0.00062 U	0.00057 U	0.00095 U	0.00074 U	0.00071 U	0.00058 U	0.00063 U	160[11]	DET
(trans) 1,2-Dichloroethene	0.00079 U	0.00089 U	0.00078 U	0.00083 U	0.00097 U	0.0012 U	0.0014 U	0.00096 U	0.0015 U	0.0012 U	–	0.00072 U	0.00065 U	0.00057 U	0.00059 U	0.00062 U	0.00057 U	0.00095 U	0.00074 U	0.00071 U	0.00058 U	0.00063 U	1,600[11]	DET
Vinyl Chloride	0.00079 U	0.00089 U	0.00078 U	0.00083 U	0.00097 U	0.0012 U	0.0014 U	0.00096 U	0.0015 U	0.0012 U	–	0.00072 U	0.00065 U	0.00057 U	0.00059 U	0.00062 U	0.00057 U	0.00095 U	0.00074 U	0.00071 U	0.00058 U	0.00063 U	0.67[11]	DET
2-Butanone (MEK)	0.0040 U	0.0044 U	0.0039 U	0.0041 U	0.0049 U	0.0061 U	0.0068 U	0.0048 U	0.0073 U	0.0062 U	–	0.0036 U	0.0032 U	0.0028 U	0.0029 U	0.0031 U	0.0028 U	0.0048 U	0.00074 U	0.0061	0.0029 U	0.0032 U	48,000[11]	NE
Acetone	0.0040 U	0.0044 U	0.0039 U	0.0041 U	0.0049 U	0.0061 U	0.0068 U	0.0048 U	0.0073 U	0.0062 U	–	0.0036 U	0.0032 U	0.0078	0.0029 U	0.0031 U	0.0028 U	0.0048 U	0.00074 U	0.046	0.0037	0.0032 U	7,2000[11]	NE
Carbon Disulfide	0.00079 U	0.00089 U	0.00078 U	0.00083 U	0.00097 U	0.0012 U	0.0014 U	0.00096 U	0.0015 U	0.0012 U	–	0.00072 U	0.00065 U	0.00065	0.00059 U	0.00062 U	0.0051	0.00095 U	0.00074 U	0.00071 U	0.00058 U	0.00063 U	8,000[11]	NE
PAHs [6] (mg/kg)																								
1-Methylnaphthalene	0.0072 U	0.0071 U	0.0076 U	0.0074 U	0.0074 U	0.0086 U	0.016	0.0082 U	0.044	0.056	–	0.0073 U	0.0073 U	–	–	–	–	–	0.014	0.017	0.0070 U	–	35[11]	NE
2-Methylnaphthalene	0.0072 U	0.0071 U	0.0076 U	0.0074 U	0.0074 U	0.0086 U	0.018	0.0082 U	0.054	0.073	–	0.0073 U	0.0073 U	–	–	–	–	–	0.015	0.019	0.0070 U	–	320[11]	NE
Acenaphthene	0.0072 U	0.0071 U	0.0076 U	0.0074 U	0.0074 U	0.0086 U	0.0084 U	0.0082 U	0.0090 U	0.0082 U	–	0.0073 U	0.0073 U	–	–	–	–	–	0.0077 U	0.0075 U	0.0070 U	–	4,800[11]	NE
Acenaphthylene	0.0072 U	0.0071 U	0.0076 U	0.0074 U	0.0074 U	0.0086 U	0.011	0.0082 U	0.042	0.0082 U	–	0.0073 U	0.0073 U	–	–	–	–	–	0.0077 U	0.012	0.0070 U	–	NE	NE
Anthracene	0.0072 U	0.0071 U	0.0076 U	0.0074 U	0.0074 U	0.0086 U	0.011	0.0082 U	0.030	0.012	–	0.0073 U	0.0073 U	–	–	–	–	–	0.0083	0.019	0.0070 U	–	24,000[11]	NE
Benzo[g,h,i]perylene	0.0072 U	0.0071 U	0.0076 U	0.0074 U	0.0074 U	0.0086 U	0.039	0.0082 U	0.068	0.024	–	0.018	0.0073 U	–	–	–	–	–	0.027	0.041	0.0070 U	–	NE	NE
Fluoranthene	0.0072 U	0.0071 U	0.0076 U	0.0074 U	0.0074 U	0.021	0.063	0.0082 U	0.13	0.060	–	0.047	0.0073 U	–	–	–	–	–	0.061	0.11	0.0070 U	–	3,200[11]	NE
Fluorene	0.0072 U	0.0071 U	0.0076 U	0.0074 U	0.0074 U	0.0086 U	0.0084 U	0.0082 U	0.011	0.0082 U	–	0.0073 U	0.0073 U	–	–	–	–	–	0.0077 U	0.0094	0.0070 U	–	3,200[11]	NE
Naphthalene	0.0072 U	0.0071 U	0.0076 U	0.0074 U	0.0074 U	0.0086 U	0.022	0.0082 U	0.061	0.064	–	0.0073 U	0.0073 U	–	–	–	–	–	0.018	0.029	0.0070 U	–	5	NE
Phenanthrene	0.0072 U	0.0071 U	0.0076 U	0.0074 U	0.0074 U	0.013	0.039	0.0082 U	0.091	0.065	–	0.035	0.0073 U	–	–	–	–	–	0.042	0.092	0.0070 U	–	NE	NE
Pyrene	0.0072 U	0.0071 U	0.0076 U	0.0074 U	0.0074 U	0.017	0.065	0.0082 U	0.12	0.060	–	0.042	0.0073 U	–	–	–	–	–	0.057	0.10	0.0070 U	–	2,400[11]	NE
Carcinogenic PAHs [6] (mg/kg)																								
Benzo (a) anthracene (TEF 0.1)	0.0072 U	0.0071 U	0.0076 U	0.0074 U	0.0074 U	0.0088	0.043	0.0082 U	0.074	0.034	–	0.013	0.0073 U	–	–	–	–	–	0.032	0.054	0.0070 U	–	MTCA ULU cleanup level for the sum of all cPAHs is 0.1 mg/kg	Reuse Criteria for the sum of all cPAHs is 0.1 mg/kg
Benzo (a) pyrene (TEF 1)	0.0072 U	0.0071 U	0.0076 U	0.0074 U	0.0074 U	0.0086 U	0.048	0.0082 U	0.071	0.029	–	0.024	0.0073 U	–	–	–	–	–	0.043	0.069	0.0070 U	–		
Benzo (b) fluoranthene (TEF 0.1)	0.0072 U	0.0071 U	0.0076 U	0.0074 U	0.0074 U	0.010	0.073	0.0082 U	0.13	0.045	–	0.032	0.0073 U	–	–	–	–	–	0.058	0.087	0.0070 U	–		
Benzo (J,k) fluoranthene (TEF 0.1)	0.0072 U	0.0071 U	0.0076 U	0.0074 U	0.0074 U	0.0086 U	0.019	0.0082 U	0.030	0.011	–	0.0092	0.0073 U	–	–	–	–	–	0.015	0.024	0.0070 U	–		
Chrysene (TEF 0.01)	0.0072 U	0.0071 U	0.0076 U	0.0074 U	0.0074 U	0.0086 U	0.056	0.0082 U	0.096	0.040	–	0.027	0.0073 U	–	–	–	–	–	0.048	0.081	0.0070 U	–		
Dibenz (a,h) anthracene (TEF 0.1)	0.0072 U	0.0071 U	0.0076 U	0.0074 U	0.0074 U	0.0086 U	0.012	0.0082 U	0.015	0.0082 U	–	0.0073 U	0.0073 U	–	–	–	–	–	0.0077 U	0.0095	0.0070 U	–		
Indeno (1,2,3-cd) pyrene (TEF 0.1)	0.0072 U	0.0071 U	0.0076 U	0.0074 U	0.0074 U	0.0086 U	0.033	0.0082 U	0.056	0.021	–	0.015	0.0073 U	–	–	–	–	–	0.024	0.037	0.0070 U	–		
Total TTEC of cPAHs (detect only)	N/A	N/A	N/A	N/A	N/A	0.002	0.067	N/A	0.10	0.041	–	0.031	N/A	–	–	–	–	–	0.056	0.091	N/A	–	0.1	0.1
Metals [7] (mg/kg)																								
Arsenic	11 U	11 U	11 U	11 U	11 U	13 U	13 U	12 U	14	12 U	–	11 U	11 U	–	–	–	–	–	12 U	11 U	11 U	–	20	7
Barium	40	41	75	46	83	120	240	82	480	220	–	140	85	–	–	–	–	–	200	200	67	–	16,000[11]	NE
Cadmium	0.54 U	0.53 U	0.57 U	0.55 U	0.55 U	0.65 U	1.0	0.62 U	1.6	0.80	–	0.55 U	0.55 U	–	–	–	–	–	0.62	0.66	0.53 U	–	2.0	1
Chromium	25	25	43	36	26	36	48	57	51	51	–	44	61	–	–	–	–	–	61	58	39	–	2,000[12]	48[15]
Lead	5.4 U	5.3 U	5.7 U	5.5 U	150	31	280	6.2 U	950	250	20	170	5.8	–	–	–	–	–	290	390	5.3 U	–	250	50
Mercury	0.27 U	0.26 U	0.28 U	0.28 U	0.28 U	0.32 U	1.1	0.31 U	0.51	0.35	–	0.27 U	0.27 U	–	–	–	–	–	1.1	0.28 U	0.26 U	–	2.0	0.07 or DET
Selenium	11 U	11 U	11 U	11 U	11 U	13 U	13 U	12 U	13 U	12 U	–	11 U	11 U	–	–	–	–	–	12 U	11 U	11 U	–	400[11]	NE
Silver	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.3 U	1.3 U	1.2 U	1.3 U	1.2 U	–	1.1 U	1.1 U	–	–	–	–	–	1.2 U	1.1 U	1.1 U	–	400[11]	NE
PCBs [8] (mg/kg)																								
PCBs[9]	0.054 U	0.053 U	0.057 U	0.055 U	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1[13]	DET

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc., of Redmond, Washington.

[2] Sample ID = Area number - boring/test pit number - starting depth of sample [feet bgs] -end depth [feet bgs], Area 1D Boring 1 collected 6-7 feet bgs = 1D-B1-6-7.

[3] Washington State Department of Ecology (Ecology)-approved method NWTPH-HCID.

[4] Washington Department of Ecology-approved method NWTPH-Dx.

[5] VOCs were analyzed by EPA method 8260B. Other VOCs were analyzed but not detected.

[6] Polycyclic aromatic hydrocarbons (PAHs) and carcinogenic PAHs (cPAHs) were analyzed by U.S. Environmental Protection Agency (EPA) method 8270D/SIM. Other PAHs were analyzed but not detected.

[7] Resource Conservation Recovery Act (RCRA) metals analyzed by EPA 6000/7000 series method.

[8] Polychlorinated biphenyls (PCBs) were analyzed by U.S. Environmental Protection Agency (EPA) method 8082.

[9] All PCB aroclors not detected. The higher detection limit is shown.

[10] MTCA Method A cleanup level for gasoline is 30 mg/kg if benzene is detected or if the sum of toluene, ethylbenzene and xylenes are equal to or greater than 1% of the total gasoline detection.

[11] MTCA Method B criteria represented because MTCA Method A cleanup level has not been established.

[12] MTCA Method A cleanup level for Trivalent Chromium.

[13] MTCA ULU cleanup level for the sum of all PCBs is 1 mg/kg.

[14] Guidance for Remediation of Petroleum Contaminated Sites (Publication 10-09-057) Ecology, October 2011; Summary Natural Background Soil Metals Concentrations in Washington State (Publication 94-115) dated October 1994; and Hazardous Waste Regulations 40 CFR Part 260.

[15] Chromium was not compared to the Reuse Criteria listed above for soils based on historic soil analytical results indicating chromium is not a prevalent chemical of concern on the UWT campus.

-- = sample not analyzed

Qvi = Ice-contact deposit

mg/kg = milligram per kilogram

N/A = not applicable

DET = Detected at concentrations greater than the laboratory reporting limit.

MTCA = Model Toxics Control Act

bgs = below ground surface

U = Analyte was not detected at or greater than the listed reporting limit

J = Estimated result.

TEF = Toxicity Equivalency Factor as defined in WAC 173-340-900 Table 708-2

Total Toxic Equivalent Concentration (TTEC) is the sum of each individual cPAH concentration multiplied by its corresponding TEF.

Bold font type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Bold font type and gray shading indicates that the detected concentration is greater than the respective MTCA cleanup level.

Dashed outline indicates the value is greater than the Reuse Criteria.

TABLE 2

SUMMARY OF CHEMICAL ANALYTICAL RESULTS[1] - GROUNDWATER

AREA 1D - FAWCETT SOUTH

PRIORITY DEVELOPMENT AREA - UNIVERSITY OF WASHINGTON TACOMA

TACOMA, WASHINGTON

Boring Identification	UG-MW32	UG-MW25D	UG-MW25S	UG-MW35	UG-MW36	UG-MW37	MTCA Method A Groundwater Cleanup Level	MTCA Method B Air Screening Levels[14]
Sample ID[2]	UG-MW32-131003	UG-MW25D-130904	UG-MW25S-130904	UG-MW35-140122	UG-MW36-140122	UG-MW37-130930		
Sample Date	10/3/2013	9/4/2013	9/4/2013	1/22/2014	1/22/2014	9/30/2013		
Approximate Depth to Groundwater (feet btoc)[3]	6.91	36.73	2.07	8.39	8.22	1.51		
Approximate Elevation of Groundwater[4]	152.97	165.32	200.53	173.21	172.02	198.78		
Top of Well Screen Elevation (feet)[4]	150.38	157.64	195.08	175.91	174.57	191.78		
Bottom of Well Screen Elevation (feet)[4]	145.38	180.64	185.08	169.41	169.57	183.78		
Lithology At Well Screen	Qvi	Advance Outwash	Qvi	Qvi	Qvi	Qvi		
Chemical								
NWTPH-Gx[5] (µg/L)								
Gasoline-Range	100 U	100 U	100 U	100 U	100 U	100 U	800/1,000[11]	NE
NWTPH-Dx[6] (mg/L)								
Diesel-Range	0.26 U	0.26 U	0.26 U	--	--	0.26 U	0.5	NE
Lube Oil-Range	0.41 U	0.41 U	0.42 U	--	--	0.55	0.5	NE
VOCs[7] (µg/L)								
Trichloroethene (TCE)	39	0.20 U	290	0.24	0.20 U	0.20 U	5	1.5
Tetrachloroethene (PCE)	0.20 U	0.20 U	2.0 U	0.20 U	0.20 U	0.20 U	5	24
(cis) 1,2-Dichloroethene	0.20 U	0.20 U	6.0	0.20 U	0.20 U	0.20 U	16[12]	160
(trans) 1,2-Dichloroethene	0.20 U	0.20 U	2.0 U	0.20 U	0.20 U	0.20 U	160[12]	110
Vinyl Chloride	0.20 U	0.20 U	2.0 U	0.20 U	0.20 U	0.20 U	0.2	0.35
1,1-Dichloroethane	0.21	0.20 U	15	0.20 U	0.20 U	0.20 U	7.7[12]	11
1,1-Dichloroethene	0.20 U	0.20 U	12	0.20 U	0.20 U	0.20 U	400[12]	130
Benzene	0.20 U	0.20 U	2.2	0.20 U	0.20 U	0.20 U	5	2.4
Acetone[8]	5.0 U	5.0 U	50 U	5.0 U	5.0 U	5.7	7,200[12]	1.40E+07
PAHs[9] (µg/L)								
Naphthalene	0.097 U	0.095 U	0.095 U	--	--	0.097 U	160	NE
2-Methylnaphthalene	0.097 U	0.095 U	0.095 U	--	--	0.097 U	1.5[12]	NE
cPAHs[9] (µg/L)								
Benzo (a) anthracene (TEF 0.1)	0.0097 U	0.0095 U	0.0095 U	--	--	0.011	MTCA ULU cleanup level for the sum of all cPAHs is 0.1 µg/L	NE
Benzo (a) pyrene (TEF 1)	0.0097 U	0.0095 U	0.0095 U	--	--	0.0097 U		NE
Benzo (b) fluoranthene (TEF 0.1)	0.0097 U	0.0095 U	0.0095 U	--	--	0.012		NE
Benzo (j,k) fluoranthene (TEF 0.1)	0.0097 U	0.0095 U	0.0095 U	--	--	0.0097 U		NE
Chrysene (TEF 0.01)	0.0097 U	0.0095 U	0.0095 U	--	--	0.0097 U		NE
Dibenz (a,h) anthracene (TEF 0.1)	0.0097 U	0.0095 U	0.0095 U	--	--	0.0097 U		NE
Indeno (1,2,3-cd) pyrene (TEF 0.1)	0.0097 U	0.0095 U	0.0095 U	--	--	0.0097 U		NE
Total TTEC of cPAHs (detect only)	N/A	N/A	N/A	--	--	0.0023	0.1	NE

Boring Identification	UG-MW32	UG-MW25D	UG-MW25S	UG-MW35	UG-MW36	UG-MW37	MTCA Method A Groundwater Cleanup Level	MTCA Method B Air Screening Levels [14]
Sample ID[2]	UG-MW32-131003	UG-MW25D-130904	UG-MW25S-130904	UG-MW35-140122	UG-MW36-140122	UG-MW37-130930		
Sample Date	10/3/2013	9/4/2013	9/4/2013	1/22/2014	1/22/2014	9/30/2013		
Approximate Depth to Groundwater (feet btoc)[3]	6.91	36.73	2.07	8.39	8.22	1.51		
Approximate Elevation of Groundwater [4]	152.97	165.32	200.53	173.21	172.02	198.78		
Top of Well Screen Elevation (feet) [4]	150.38	157.64	195.08	175.91	174.57	191.78		
Bottom of Well Screen Elevation (feet) [4]	145.38	180.64	185.08	169.41	169.57	183.78		
Lithology At Well Screen	Qvi	Advance Outwash	Qvi	Qvi	Qvi	Qvi		
Chemical								
Total Metals [10] (µg/L)								
Arsenic	3.3 U	**6.2**	3.3 U	--	--	3.0 U	5	NE
Barium	28 U	28 U	**49**	--	--	**68**	3,200[12]	NE
Cadmium	4.4 U	4.4 U	4.4 U	--	--	4.0 U	5	NE
Chromium	11 U	11 U	11 U	--	--	10 U	50[13]	NE
Lead	1.1 U	1.1 U	1.1 U	--	--	1.0 U	15	NE
Mercury	0.50 U	0.50 U	0.50 U	--	--	0.50 U	2	NE
Dissolved Metals [10] (µg/L)								
Arsenic	--	**5.7**	--	--	--	--	5	NE

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc. in Redmond, Washington.

[2] Sample ID = Area number - Boring number - Date (i.e.., a water sample collected from UG-MW24 on July 15, 2013 = UG-MW24-130715).

[3] Groundwater level was measured below the top of casing on November 8, 2013.

[4] Based on survey completed by AHBL November 6, 2013. Horizontal datum - NAD 83/91 Washington State Plane - South Zone (City of Tacoma Horizontal control Holding City Monument Numbers 411 and 414). Vertical datum NGVD 29 (brass monument at South 19th and Fawcett Avenue, elevation 165.15).

[5] Washington State Department of Ecology (Ecology)-approved method NWTPH-Gx.

[6] Ecology-approved method NWTPH-Dx.

[7] Volatile organic compounds (VOCs) were analyzed by U.S. Environmental Protection Agency (EPA) method 8260C. Other VOCs were analyzed but not detected.

[8] This compound is a common laboratory contaminant.

[9] Polycyclic Aromatic Hydrocarbons (PAHs) and carcinogenic PAHs (cPAHs) analyzed by EPA method 8270D/SIM.

[10] Metals analyzed by EPA 200.8 or 7470A method.

[11] MTCA Method A cleanup level for gasoline-range petroleum hydrocarbons is 800 µg/L if benzene is present and 1,000 µg/L if benzene is not present.

[12] MTCA Method B criteria represented because MTCA Method A cleanup level has not been established.

[13] MTCA Method A cleanup level for total chromium shown. Cleanup level for hexavalent chromium is 48 µg/L.

[14] MTCA Method B Indoor Air Screening Level from Washington State Deportment of Ecology Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action. Values updated as appropriate to incorporate recent toxicity data.

MTCA = Model Toxics Control Act

-- = Analyte or sample not analyzed

µg/L = microgram per Liter

U = Analyte was not detected at or greater than the listed reporting limit

TEF = Toxicity Equivalency Factor as defined in WAC 173-340-900 Table 708-2

Total Toxic Equivalent Concentration (TTEC) is the sum of each individual cPAH concentration multiplied by its corresponding TEF.

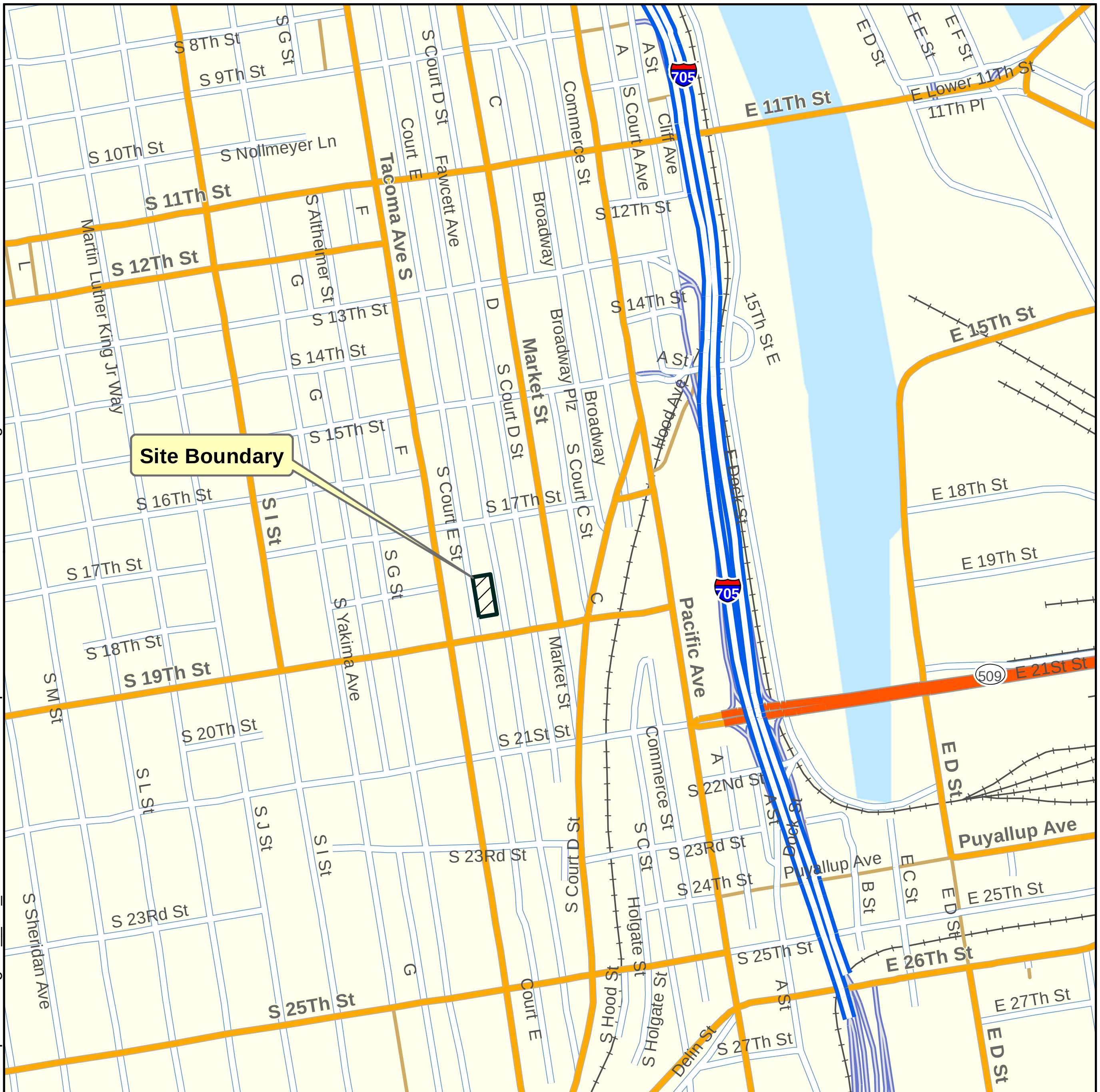
Qvi = Ice-contact deposit

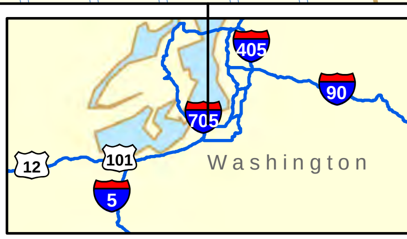
DET = Detected greater than laboratory reporting limits

Bold font type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Bold type and gray shading indicates analyte was detected at a concentration greater than the MTCA Method groundwater cleanup/criteria level.

Dashed outline indicates analyte is detected at a concentration greater than the MTCA Method B Indoor Air Screening Level.





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Feet

Notes:
CPO = University of Washington Capital Project Office
UWT = University of Washington Tacoma
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
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Data Sources: ESRI Data & Maps

Projection: NAD 1983 UTM Zone 10N

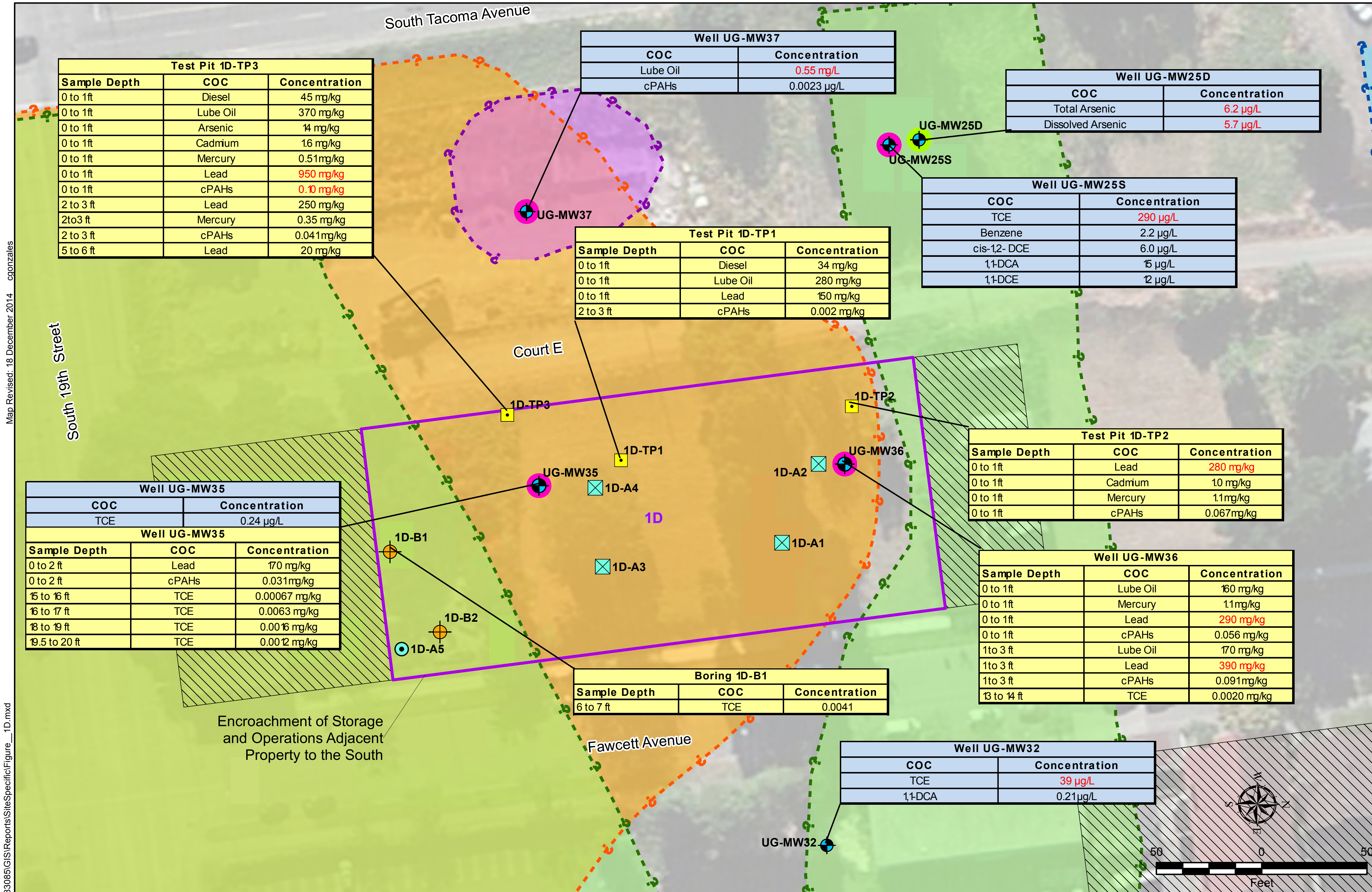
Vicinity Map

UWT Environmental Investigation
Priority Development Areas - CPO Project No. 204277
Tacoma, Washington

GeoEngineers

Figure 1

Office: SEA Path: \\tac\projects\0\0183085\GIS\Reports\SiteSpecific\Figure_1D_VM.mxd Map Revised: 17 December 2014 cgonzales



Test Pit 1D-TP3		
Sample Depth	COC	Concentration
0 to 1 ft	Diesel	45 mg/kg
0 to 1 ft	Lube Oil	370 mg/kg
0 to 1 ft	Arsenic	14 mg/kg
0 to 1 ft	Cadmium	1.6 mg/kg
0 to 1 ft	Mercury	0.51 mg/kg
0 to 1 ft	Lead	950 mg/kg
0 to 1 ft	cPAHs	0.10 mg/kg
2 to 3 ft	Lead	250 mg/kg
2to3 ft	Mercury	0.35 mg/kg
2 to 3 ft	cPAHs	0.041 mg/kg
5 to 6 ft	Lead	20 mg/kg

Well UG-MW37	
COC	Concentration
Lube Oil	0.55 mg/L
cPAHs	0.0023 µg/L

Well UG-MW25D	
COC	Concentration
Total Arsenic	6.2 µg/L
Dissolved Arsenic	5.7 µg/L

Well UG-MW25S	
COC	Concentration
TCE	290 µg/L
Benzene	2.2 µg/L
cis-1,2- DCE	6.0 µg/L
1,1-DCA	15 µg/L
1,1-DCE	12 µg/L

Test Pit 1D-TP1		
Sample Depth	COC	Concentration
0 to 1 ft	Diesel	34 mg/kg
0 to 1 ft	Lube Oil	280 mg/kg
0 to 1 ft	Lead	150 mg/kg
2 to 3 ft	cPAHs	0.002 mg/kg

Test Pit 1D-TP2		
Sample Depth	COC	Concentration
0 to 1 ft	Lead	280 mg/kg
0 to 1 ft	Cadmium	1.0 mg/kg
0 to 1 ft	Mercury	1.1 mg/kg
0 to 1 ft	cPAHs	0.067 mg/kg

Well UG-MW35	
COC	Concentration
TCE	0.24 µg/L

Well UG-MW35		
Sample Depth	COC	Concentration
0 to 2 ft	Lead	170 mg/kg
0 to 2 ft	cPAHs	0.031 mg/kg
15 to 16 ft	TCE	0.00067 mg/kg
16 to 17 ft	TCE	0.0063 mg/kg
18 to 19 ft	TCE	0.0016 mg/kg
19.5 to 20 ft	TCE	0.0012 mg/kg

Well UG-MW36		
Sample Depth	COC	Concentration
0 to 1 ft	Lube Oil	160 mg/kg
0 to 1 ft	Mercury	1.1 mg/kg
0 to 1 ft	Lead	290 mg/kg
0 to 1 ft	cPAHs	0.056 mg/kg
1 to 3 ft	Lube Oil	170 mg/kg
1 to 3 ft	Lead	390 mg/kg
1 to 3 ft	cPAHs	0.091 mg/kg
13 to 14 ft	TCE	0.0020 mg/kg

Boring 1D-B1		
Sample Depth	COC	Concentration
6 to 7 ft	TCE	0.0041

Well UG-MW32	
COC	Concentration
TCE	39 µg/L
1,1-DCA	0.21 µg/L

Soil Results*

Boring 2A-B7		
Sample Depth	COC	Concentration
2.5 to 3.5 feet bgs	Lead	200 mg/kg
2.5 to 3.5 feet bgs	cPAHs	0.64 mg/kg

Groundwater Results*

Well UG-MW13	
COC	Concentration
TCE	110 µg/L
PCE	1.4 µg/L

*Chemicals shown in red were detected at concentrations greater than the respective MTCA Method A cleanup levels.

Only analytical results of the chemicals of concern are shown if detected. Other chemicals that were analyzed and detected are not shown unless detected at concentrations greater than the respective MTCA cleanup levels.

Legend

Approximate Location of Priority Development Area 1D

Approximate Subsurface Location
Subsurface Exploration Location

Sonic Core Boring - Permanent New Monitoring Well

Test Pit

Magnetic Anomaly Where Test Pit Was Completed

Magnetic Anomaly Where Test Pit Was Not Completed (Potential UST)

Lithology of Well Screen Interval

Ice-Contact Deposit (Shallow Aquifer)

Advance Outwash (Deep Aquifer)

Approximate Lateral Extent of Lube Oil-Range Petroleum Hydrocarbon-Contaminated Groundwater Plume in Shallow Aquifer

Approximate Lateral Extent of PCE- and Breakdown Product Contaminated Groundwater Plume in Shallow Aquifer

Approximate Lateral Extent of TCE-Contaminated Groundwater Plume in Shallow Aquifer

Approximate Lateral Extent of TCE-Contaminated Groundwater Plume in Deep Aquifer

Approximate Lateral Extent of TCE-Contaminated Groundwater Plume in Shallow and Deep Aquifers

Parcel Not Owned by UW But Within Master Plan Boundary

Map Revised: 18 December 2014 cgonzales

Notes:
cPAHs concentrations shown as TTEC.
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet
COC = Chemical of Concern
UWT = University of Washington Tacoma
PDA = Priority Development Area
PCE = tetrachloroethene
TCE = trichloroethene
cPAH = Carcinogenic Polycyclic Aromatic Hydrocarbons
mg/kg = milligram per kilogram
µg/L = microgram per Liter
bgs = Below Ground Surface
TTEC = Total Toxicity Equivalency Concentration
ULU = Unrestricted Land Use
MTCA = Model Toxics Control Act
UST = Underground Storage Tank
DCA = dichloroethane
DCE = dichloroethene

Soil MTCA Cleanup/Criteria Levels:
PCE = 0.05 mg/kg (Method A ULU)
TCE = 0.03 mg/kg (Method A ULU)
Benzene = 0.03 mg/kg (Method A ULU)
Vinyl Chloride = 0.67 mg/kg (Method B)
Lube Oil-Range Petroleum Hydrocarbons = 2,000 mg/kg (Method A ULU)
Diesel-Range Petroleum Hydrocarbons = 2,000 mg/kg (Method A ULU)
Gasoline-Range Petroleum Hydrocarbons = 100 mg/kg (Method A ULU)
cPAHs (TTEC) = 0.1 mg/kg (Method A ULU)
Lead = 250 mg/kg (Method A ULU)
Arsenic = 20 mg/kg (Method A ULU)
Cadmium = 2 mg/kg (Method A ULU)
Mercury = 2 mg/kg (Method A ULU)

Groundwater MTCA Cleanup/Criteria Levels:
PCE = 5 µg/L (Method A); 24 µg/L (Indoor Air)
TCE = 5 µg/L (Method A); 1.5 µg/L (Indoor Air)
cis-1,2-DCE= 16 µg/L (Method B); 160 µg/L (Indoor Air)
trans-1,2-DCE = 160 µg/L (Method B); 110 µg/L (Indoor Air)
1,1-DCA = 7.7 µg/L (Method B); 11 µg/L (Indoor Air)
Vinyl Chloride = 0.2 µg/L (Method A); 0.35 µg/L (Indoor Air)
Benzene = 5 µg/L (Method A); 2.4 µg/L (Indoor Air)
Lube Oil-Range Petroleum Hydrocarbons = 0.5 mg/L (Method A)
Arsenic = 5 µg/L (Method A)
cPAHs= 0.1 µg/L (Method A)

Site Plan – PDA 1D/Fawcett South

UWT Environmental Investigation
Priority Development Areas - CPO Project No. 204277
Tacoma, Washington

GEOENGINEERS

Figure 2

Path: \\tac\projects\0\0183085\GIS\Reports\SiteSpecific\Figure__1D.mxd
Office: TAC

APPENDIX A
Report Limitations and Guidelines for Use

APPENDIX A
REPORT LIMITATIONS AND GUIDELINES FOR USE[1]

This appendix provides information to help you manage your risks with respect to the use of this report.

Environmental Services are Performed for Specific Purposes, Persons and Projects

This report has been prepared for use by University of Washington. This report is not intended for use by others, and the information contained herein is not applicable to other sites.

GeoEngineers structures our services to meet the specific needs of our clients. For example, an environmental site assessment study conducted for a property owner may not fulfill the needs of a prospective purchaser of the same property. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and project site. No one except University of Washington should rely on this environmental report without first conferring with GeoEngineers. This report should not be applied for any purpose or project except the one originally contemplated.

This Environmental Report is Based on a Unique Set of Project-Specific Factors

This report has been prepared for the Priority Development Areas (PDAs) Environmental Assessment Project at the UW – Tacoma (UWT) campus located in Tacoma, Washington. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, do not rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

If important changes are made after the date of this report, GeoEngineers should be given the opportunity to review our interpretations and recommendations and provide written modifications or confirmation, as appropriate.

Reliance Conditions for Third Parties

If a lending agency or other parties intend to place legal reliance on the product of our services, we require that those parties indicate in writing their acknowledgement that the scope of services provided, and the general conditions under which the services were rendered including the limitation of professional liability, are understood and accepted by them. This is to provide our firm with reasonable protection against open-

[1] Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions.

Environmental Regulations are Always Evolving

Some substances may be present in the site vicinity in quantities or under conditions that may have led, or may lead, to contamination of the subject site, but are not included in current local, state or federal regulatory definitions of hazardous substances or do not otherwise present current potential liability. GeoEngineers cannot be responsible if the standards for appropriate inquiry, or regulatory definitions of hazardous substance, change or if more stringent environmental standards are developed in the future.

Subsurface Conditions can Change

This environmental report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by manmade events such as construction on or adjacent to the site, by new releases of hazardous substances, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Always contact GeoEngineers before applying this report to determine if it is still applicable.

Topsoil

For the purposes of this report, we consider topsoil to consist of generally fine-grained soil with an appreciable amount of organic matter based on visual examination, and to be unsuitable for direct support of the proposed improvements. However, the organic content and other mineralogical and gradational characteristics used to evaluate the suitability of soil for use in landscaping and agricultural purposes was not determined, nor considered in our analyses. Therefore, the information and recommendations in this report, and our logs and descriptions should not be used as a basis for estimating the volume of topsoil available for such purposes.

Most Environmental Findings are Professional Opinions

Our interpretations of subsurface conditions are based on field observations and chemical analytical data from widely spaced sampling locations at the site. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ – sometimes significantly – from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

Do Not Redraw the Exploration Logs

Environmental scientists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in an environmental report should never be redrawn for inclusion in other design drawings. Only photographic or electronic reproduction is acceptable, but recognize that separating logs from the report can elevate risk.

Read These Provisions Closely

Some clients, design professionals and contractors may not recognize that the geoscience practices (geotechnical engineering, geology and environmental science) are far less exact than other engineering

and natural science disciplines. This lack of understanding can create unrealistic expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory "limitations" provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you are unclear how these "Report Limitations and Guidelines for Use" apply to your project or site.

Geotechnical, Geologic and Geoenvironmental Reports Should Not Be Interchanged

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually relate any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding a specific project.

Biological Pollutants

GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention, or assessment of the presence of Biological Pollutants in or around any structure. Accordingly, this report includes no interpretations, recommendations, findings, or conclusions for the purpose of detecting, preventing, assessing, or abating Biological Pollutants. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts.

PDA 1E - Strom

Priority Development Area 1E
Strom Property
Environmental Subsurface Investigation

Environmental Subsurface Investigation Project
UW Capital Project Office Project No. 204277
1701 Tacoma Avenue
Tacoma, Washington

for
University of Washington

December 19, 2014

GeoEngineers

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Priority Development Area 1E
Strom Property
Environmental Subsurface Investigation
UW Capital Project Office
Project No. 204277
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File No. 0183-085-00

December 19, 2014

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Table of Contents

1.0 INTRODUCTION 1

2.0 HISTORICAL USE 1

3.0 CURRENT SITE FEATURES 2

4.0 ENVIRONMENTAL SUBSURFACE INVESTIGATION 2

4.1. Historical Research Findings 2
4.2. Soil Explorations 2
4.3. Groundwater Sampling 2

5.0 SOIL AND GROUNDWATER CONDITIONS 3

5.1. Soil Conditions 3
5.2. Groundwater Conditions 3

6.0 CHEMICAL ANALYTICAL PROGRAM 4

6.1. General 4
6.2. Criteria for Characterization of Soil and Groundwater 4
6.3. Soil 5
6.3.1. Petroleum-Range Hydrocarbons 6
6.3.2. VOCs 6
6.3.3. PAHs 6
6.3.4. RCRA Metals 7
6.4. Groundwater 7
6.4.1. Petroleum-Range Hydrocarbons 7
6.4.2. VOCs 7
6.4.3. PAHs 8
6.4.4. Metals 8

7.0 CONCLUSIONS 8

8.0 PROPOSED DEVELOPMENT PLANS 8

9.0 POTENTIAL IMPACTS AND MITIGATION MEASURES TO DESIGN AND CONSTRUCTION 8

9.1. TCE-Contaminated Groundwater 9
9.2. Soil is Contaminated with Chemicals of Concern 11

10.0 LIMITATIONS 12

11.0 REFERENCES 12

LIST OF TABLES

Table 1. Summary of Chemical Analytical Results – Soil
Table 2. Summary of Chemical Analytical Results - Groundwater

LIST OF FIGURES

Figure 1. Vicinity Map
Figure 2. Site Plan – PDA 1E/Strom

APPENDICES

Appendix A. Report Limitations and Guidelines for Use

1.0 INTRODUCTION

This report presents the results of our environmental subsurface investigation completed for the University of Washington (UW) at the Strom property (Priority Development Area [PDA] 1E) located on the UW Tacoma (UWT) campus in the 1700 block of South Fawcett Avenue in Tacoma, Washington. The property is herein referred to as the “site.” The site is identified as Area 1E - Strom Property for this project. The Strom property is bound by South Fawcett Avenue to the west, the Tacoma Hongwanji Buddhist temple to the north (property not owned by UW), Court D to the east and the Fawcett Parking/Lot T47 (PDA 1F) to the south. A vicinity map of the site is included as Figure 1. See Figure 2 for the layout of the site.

The subsurface investigation was completed under the UWT Environmental Subsurface Investigation Project, UW project number 204277. This report was completed as a subset of the larger subsurface assessment report titled “2013 Environmental Subsurface Investigation – University of Washington-Tacoma, Tacoma Washington” dated December 19, 2014 to assist with development of the property. This report should be used in context with the larger subsurface assessment report. Borings logs, subsurface investigation methodologies and chemical analytical data packages are included in the larger investigation report.

General impacts and potential mitigation measures are provided in this report that may be employed in design and construction. It is important to recognize that additional environmental investigations may be necessary prior to selection of the final mitigation measure. Mitigation measures and associated costs provided in this report will likely need refinement based on the results of the additional environmental investigations. The project team should contact UW Environmental Health & Safety (UW EH&S) to discuss the need for additional environmental investigations at this site. UW EH&S is the liaison with the Washington State Department of Ecology (Ecology) for review and approval of mitigation measures.

2.0 HISTORICAL USE

The northern portion of site was developed as early as 1888 with residences. The city stables were present on the southern portion of the site beginning in 1896 and until at least as late as 1912. Later uses included an apartment building north of the stables from at least 1912 until 1962 when the apartment building was demolished following a fire.

The existing “L”-shaped building was constructed in 1958 and was owned and operated by Norman Strom until the mid-2000s when UW purchased the property. Strom operated a construction company and car restoration shop within the building. Four bays under the building were used for auto restoration and storage. A nuclear packaging company (a package manufacturer) was listed at the 1733 address (former apartment building) in 1978.

Generally poor housekeeping practices were noted in the Phase I ESA completed prior to the purchase of the property. A previous investigation and cleanup was completed in the area of a former sink discharge near Bay 1 and near the southern storage area. Diesel- and lube oil-range petroleum hydrocarbons, lead and polycyclic aromatic hydrocarbons (PAHs) were detected in the soil at concentrations greater than the respective Model Toxics Control Act (MTCA) Method A Unrestricted Land Use (ULU) cleanup level. The soil was reportedly excavated by the owner and confirmation soil samples were collected by UW's consultant. The confirmation soil samples were not analyzed for PAHs. Surface staining was observed within the excavation as well.

3.0 CURRENT SITE FEATURES

The "L"-shaped building constructed in 1958 is still present on the property with access to the garage bays from the Court D side of the property. A gravel driveway and storage area is located east of the existing building. UWT Facilities currently use the building as a maintenance and storage facility.

The southern portion of the property was a vegetable garden area during our site visit and subsurface investigation in the summer of 2013. The area is currently vacant. Surface staining was observed in the area of the southern storage area. The northern bay was also observed to be approximately 1 foot higher in elevation than the southern bays.

The majority of the site is generally the same elevation as Court D (Elevation 154 feet) and slopes to the elevation of South Fawcett Avenue (Elevation 168 feet) on the southwest portion of the site. The building itself serves as a vertical retaining wall on the northwest portion of the site.

4.0 ENVIRONMENTAL SUBSURFACE INVESTIGATION

The environmental subsurface investigation completed at the site consisted of a magnetic/GPR (M/GPR) survey, direct-push borings and groundwater development and sampling of existing monitoring wells. The investigations were completed between June and September 2013.

4.1. Historical Research Findings

Historic research results indicated the potential for underground storage tanks (USTs) to be present at the site given the age of the former buildings and the source of heat typically used during these time periods. In addition, heating conversion permits were listed in the permit records. An M/GPR survey was performed in the areas around the footprint of the existing building in June 2013. The M/GPR survey was not conducted inside the existing structure on the northern portion of the site or the garden area on the southern portion of the site. Anomalies were not identified during the M/GPR survey.

4.2. Soil Explorations

Six direct-push borings (1A-B1 and 1A-B6) were completed at the site in June 2013. The direct-push borings were completed to depths ranging between 7 and 10 feet below ground surface (bgs), when practical refusal was encountered. New monitoring well UG-MW32 was drilled to a total depth of 15 feet bgs with sonic core drilling technology.

4.3. Groundwater Sampling

Groundwater samples were collected from newly installed on-site monitoring well UG-MW32. Monitoring well UG-MW32 was screened in the shallow aquifer within the ice-contact deposits at approximately Elevation 145 to 150 feet. A groundwater sample was collected from UG-MW32 on October 3, 2013.

5.0 SOIL AND GROUNDWATER CONDITIONS

5.1. Soil Conditions

Subsurface conditions consist of fill, ice-contact deposits, silt layer and advance outwash. The fill consist of silty sand with gravel and brick debris fill from below the surface to depths ranging from approximately 1 to 3 feet bgs.

Native soil conditions observed below the fill consists of glacially consolidated ice-contact deposits comprised of cemented fine sand to gravel with silt. A saturated seam of fine sand was observed below the cemented fine sand to gravel with silt (approximate Elevation 153 feet and 149 feet) in three of the borings (1E-B4, 1E-B5 and UW-MW32). The sand seam appeared to be part of the ice-contact deposits.

A semi-confining to confining silt unit was observed to depths ranging from 12 feet bgs in UG-MW32 (Elevation 146.5 feet) and 7 feet bgs (Elevation 152 feet) in boring 1E-B6. The silt was observed at the base of the saturated fine sand seam. The silt layer in UG-MW32 was observed to contain gravel.

Advance outwash consisting for silty sand and gravel is likely present beneath the silt layer based on our experience on adjacent properties.

5.2. Groundwater Conditions

It appears that groundwater conditions observed consist of a shallow aquifer (ice-contact deposits) and deep aquifer (advance outwash) to the depths explored during the larger investigation. The shallow and deep aquifers appear to be separated by the silt layer located between the ice-contact deposits and advance outwash. The silt layer was observed to contain gravel.

Groundwater within the shallow aquifer appears to be present within the sand and gravel seams in the ice-contact deposits. The hydraulic connection of the sand seams within the shallow aquifer is unknown in and around the project site. Groundwater within the deep aquifer appears to be continuous with interbeds of moist to wet silt at depth. The deep aquifer within the advance outwash appears to be under a confined condition based on surrounding monitoring wells in the area.

Depth to groundwater in monitoring well UG-MW32 in the shallow aquifer was 6.91 feet below top of casing (btoc) (Elevation 152.97 feet) in November 2013. The shallow aquifer groundwater level is estimated to range between Elevation 155 feet and 140 feet from the west to east side of the site. No groundwater monitoring wells were installed within the advance outwash. The deep aquifer elevation is estimated to range between Elevation 145 and 130 feet from the west to east side of the site based on wells in the area.

6.0 CHEMICAL ANALYTICAL PROGRAM

6.1. General

Soil and groundwater samples were submitted to OnSite Laboratories Inc., in Redmond, Washington for chemical analysis. The chemical analytical data are summarized in Tables 1 and 2. Chemicals that were not detected at or greater than the laboratory reporting limits in the analyzed samples are typically not included on the tables.

6.2. Criteria for Characterization of Soil and Groundwater

The following criteria were used to evaluate impacted and contaminated soil and groundwater.

- Tetrachloroethene (PCE), Trichloroethene (TCE) Impacted or Contaminated Soil
    - PCE, TCE and breakdown products at concentrations detected in the analyzed soil samples.
- Contaminated Soil
    - Petroleum hydrocarbons, carcinogenic polycyclic aromatic hydrocarbons (cPAHs), metals and volatile organic compounds (VOCs) detected at concentrations greater than the MTCA Method A ULU cleanup level or MTCA B screening level.
- Impacted Soil

  Some contaminants were detected at concentrations less than the respective MTCA cleanup levels. UWT may be able to reuse certain types of soil depending on the sampling results. UW EH&S must review the chemical analytical data to determine if reuse or disposal at an off site facility is necessary. Soil reuse and disposal are subject to Ecology Guidance for Remediation of Petroleum Contaminated Sites (Ecology, 2011), solid waste regulations and disposal facility permit conditions. The criteria below is herein referred to as “Reuse Criteria.”

    - Petroleum hydrocarbons, cPAHs and/or Lead

      The Ecology guidance indicates that soil with diesel- and/or lube oil-range petroleum hydrocarbons detected at concentrations less than 200 milligrams per kilogram (mg/kg) and/or gasoline-range petroleum hydrocarbons detected at concentrations less than 30 mg/kg are suitable for reuse as commercial fill at UWT campus with the following limitations:

        - placed above the highest water table,
        - not within 100 feet of a drinking water well,
        - not within wellhead protection area of public water supply,
        - not within wetlands or where surface water contact is possible, and
        - not within a surface water infiltration facility or septic drain field.

      If the concentrations exceed the above limits but are still less than respective MTCA cleanup levels the soil may be reused in road and bridge embankment construction, landfill daily cover or asphalt manufacturing with UW EH&S approval.

    - Arsenic, Cadmium, and/or Mercury

Soil with concentrations of arsenic, cadmium and/or mercury above what is normally found in the natural background environment (Puget Sound Background levels - Ecology, 1994) is typically suitable for disposal at an inert waste landfill or a Department of Natural Resources (DNR) reclamation pit. UW EH&S approval is necessary.

Soil at and near the UWT campus has been well documented to contain chromium at concentrations slightly above the natural background level and is not considered in the "Reuse Criteria."

- Contaminated Groundwater
  - Petroleum hydrocarbons, PAHs and metals detected at concentrations greater than the respective MTCA Method A groundwater cleanup levels. Method B criteria were used for comparison of specific compounds if Method A groundwater cleanup levels are not established for those compounds.
  - VOCs detected at concentrations greater than the respective MTCA Method A groundwater cleanup levels, and MTCA Method B groundwater screening levels protective of indoor air. The updated TCE/PCE/1,1-dichloroethane (DCA) screening levels were calculated using Equation 1 from Ecology's review draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action" dated October 2009 (Ecology, 2009) and Environmental Protection Agency's (EPA's) TCE, PCE and 1,1-DCA toxicity factors updated in 2011 and available on EPA's online Integrated Risk Information System (IRIS). The other values were obtained from Ecology's review draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action."

6.3. Soil

Soil samples collected from the soil borings and during the installation of monitoring well UG-MW32 were submitted for chemical analysis. The soil samples collected from the subsurface explorations were identified using the following identification system: A#-B#-start depth-end depth, where A# is the area designation number, B/TP# is the boring/test pit number and start depth-end depth is the depth interval in feet below the ground surface of specific sample (e.g., 1E-B2-6-7 was collected in Area 1E from boring 2 from 6 to 7 feet bgs).

Soil samples were submitted for chemical analysis based on the following:

- Where field screening indicated the soil is impacted.
- Directly below potentially impacted soil to delineate the vertical extent.
- Where wet sand seams were encountered in the ice-contact deposits or advance outwash.
- At the soil/groundwater interface if groundwater was encountered.
- At the top of confining units if encountered.

The soil samples were submitted for chemical analysis of petroleum hydrocarbon identification by Ecology-approved method NWPTH-HCID with appropriate follow up of gasoline-range petroleum hydrocarbons by Ecology-approved method NWTPH-Gx and/or diesel- and lube oil-range petroleum hydrocarbons by Ecology-approved method NWTPH-Dx; VOCs by Environmental Protection Agency (EPA) method 8260C, PAHs by EPA method 8270DSIM, and Resource Conservation and Recovery Act (RCRA) metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver) by EPA method 6000/7000 series.

6.3.1. Petroleum-Range Hydrocarbons

FILL

Lube oil-range petroleum hydrocarbons were detected at a concentration less than the MTCA Method A ULU cleanup (2,000 mg/kg) level but greater the Reuse Criteria (50 mg/kg) in one soil sample collected from 1E-B2 from the ground surface to 1 foot bgs (250 mg/kg). Lube oil-range petroleum hydrocarbons were not detected in the remaining soil samples. Gasoline- and diesel-range petroleum hydrocarbons were not detected in the analyzed soil samples.

ICE CONTACT DEPOSITS

Gasoline-, diesel-, and lube oil-range petroleum hydrocarbons were not detected in the analyzed soil samples.

6.3.2. VOCs

FILL

PCE, TCE and associated breakdown products were not detected in the analyzed soil samples. Other VOCs were not detected in the analyzed soil samples.

ICE CONTACT DEPOSITS

TCE was detected at a concentration (0.0019 mg/kg) less than the MTCA Method A ULU cleanup level of 0.03 mg/kg in soil sample UG-MW32-12-13 from 12 to 13 feet bgs. VOCs were not detected in the remaining analyzed soil samples collected within the ice-contact deposits.

Other VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels or Method B ULU criteria in the analyzed soil samples collected within the ice-contact deposits and silt layer.

6.3.3. PAHs

FILL

CPAHs were detected at concentrations greater than the MTCA Method A ULU cleanup level (Total Toxic Equivalent Concentration [TTEC] = 0.1 mg/kg) in soil sample 1E-B6-0-1 with at TTEC of 0.42 mg/kg.

Other PAHs and cPAHs were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup level and Method B ULU criteria in the remaining analyzed fill samples.

ICE CONTACT DEPOSITS

PAHs and cPAHs were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup level and Method B criteria in the ice-contact deposit samples.

6.3.4. RCRA Metals

FILL

Cadmium was detected at a concentration greater than the MTCA Method A ULU cleanup level (2.0 mg/kg) in soil sample 1E-B1-0-1 (4.5 mg/kg). Cadmium was detected at concentrations greater than Reuse Criteria (1.0 mg/kg), but less than the MTCA Method A ULU cleanup level in the soil sample 1E-B6-01 (1.2 mg/kg). Cadmium was not detected in the remaining analyzed soil samples.

Lead was detected at a concentration greater than the MTCA Method A ULU cleanup level (250 mg/kg) in soil sample 1E-B6-0-1 (610 mg/kg). Lead was either not detected or was detected at concentrations less than the MTCA Method A cleanup level and the Reuse Criteria in the remaining analyzed soil samples.

Other Metals. Other RCRA metals were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels, the Method B criteria or Reuse Criteria in the analyzed soil samples collected within the fill material.

ICE CONTACT DEPOSITS

RCRA metals were either not detected or were detected at concentrations less than the respective MTCA Method A cleanup levels, Method B criteria or Reuse Criteria in the analyzed soil samples.

6.4. Groundwater

A groundwater sample was collected from the new on-site monitoring well UG-MW32. The sample was submitted for chemical analysis of gasoline-range petroleum hydrocarbons by Ecology-approved method NWTPH-Gx, diesel- and lube oil-range petroleum hydrocarbons by Ecology-approved method NWTPH-Dx, VOCs by EPA method 8260C, PAHs by EPA method 8270DSIM, and Total MTCA metals by EPA method 200.8 or 7470A.

6.4.1. Petroleum-Range Hydrocarbons

Lube, gasoline-, and diesel-range petroleum hydrocarbons were not detected in the analyzed groundwater sample.

6.4.2. VOCs

TCE was detected at a concentration greater than the MTCA Method A groundwater cleanup level (5 micrograms per liter [µg/L]) and the MTCA Method B groundwater screening level protective of indoor air (1.5 µg/L) in the groundwater sample collected from UG-MW32 (39 µg/L).

1,1-dichloroethane (DCA) was detected at a concentration less than the MTCA Method A groundwater cleanup level (7.7 micrograms per liter [µg/L]) and the MTCA Method B groundwater screening level protective of indoor air (11 µg/L) in the groundwater sample collected from UG-MW32 (0.21 µg/L).

Other VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A groundwater cleanup level or MTCA Method B criteria in the analyzed groundwater sample.

6.4.3. PAHs

PAHs and cPAHs were not detected in the analyzed groundwater sample.

6.4.4. Metals

Metals were not detected in the analyzed groundwater sample.

7.0 CONCLUSIONS

TCE-contaminated groundwater and soil is present in the shallow aquifer in on-site well UG-MW32. The estimated groundwater elevation of the shallow aquifer ranges between approximately 140 feet to 155 feet. Groundwater samples within the deep aquifer were not sampled during this investigation but the estimated groundwater elevation is estimated to range between 130 to 145 feet. The source of the TCE-contaminated groundwater appears to be from an upgradient source based on groundwater data from monitoring wells in the area.

Contaminated (lead, cadmium and cPAH) and impacted (cadmium and petroleum hydrocarbons) soil is present in the surficial soils on the site.

- Lead and cPAH-contaminated and cadmium-impacted soil is present from the ground surface to 1 foot bgs in the area of boring 1E-B6.
- Cadmium-contaminated soil is present from the ground surface to 1 foot bgs in the area of boring 1E-B1.
- Petroleum-impacted soil is present from the ground surface to 1 foot bgs in the area of boring 1E-B2.

8.0 PROPOSED DEVELOPMENT PLANS

We understand UWT plans to construct a new building at the site. GeoEngineers assumes the building will be 25,000 square feet with a finished floor elevation of 152 feet. The estimated amount of soil to be generated based on the above assumptions is approximately 15,000 tons to excavate the site to subgrade (Elevation 151 feet). An additional 3,000 tons is estimated to be generated from the footings.

9.0 POTENTIAL IMPACTS AND MITIGATION MEASURES TO DESIGN AND CONSTRUCTION

We recommend UW develop and implement appropriate administrative institutional controls to limit or prohibit activities that may result in exposure to hazardous substances remaining at the site. Potential impacts to the design and construction of the site are the following:

- Groundwater is contaminated with TCE.
- Soil is contaminated with chemicals of concern (metals and cPAHs).
- Soil is impacted with chemicals of concern (TCE, petroleum hydrocarbons and metals).

Potential long-term impacts include:

- Long-term disposal of underslab/perimeter footing drain TCE-impacted groundwater.
- Continued maintenance of vapor intrusion mitigation system, if necessary.
- Potential periodic indoor air sampling to confirm the vapor intrusion mitigation system may be necessary to evaluate the system is operating properly, if necessary.
- TCE-contaminated or TCE-impacted soil may remain adjacent and beneath the building following construction activities. UW should develop and implement appropriate institutional controls to help prevent exposure to residual contamination.

The following sections described potential impacts, mitigation measures and estimated costs to design and construction.

9.1. TCE-Contaminated Groundwater

TCE-contaminated shallow aquifer groundwater will likely be encountered during construction based on the elevation of the groundwater (140 to 155 feet) of the shallow and the anticipated cut of the building to 151 feet. This also indicates the TCE-contaminated groundwater will be in contact with the west side of the building and present beneath the building. TCE-contaminated deep aquifer groundwater will likely not be encountered during excavation of the footings, but may be encountered for deep excavations (elevator or shoring). Mitigation measures include:

Additional Investigation. Further subsurface investigation may be necessary to evaluate the vertical and lateral limits of the TCE-impacted soil and/or groundwater at the site. Soil vapor sampling is recommended to evaluate if a potential vapor intrusion pathway exists. The estimated cost for soil vapor sampling and additional investigation is $25,000 to $75,000.

Vapor Mitigation. Vapor intrusion occurs when VOCs migrate from contaminated soil or groundwater into overlying buildings through openings in the foundation. The route VOCs take from a subsurface source to the air inside a building is referred to as the vapor intrusion pathway. The most common sources of soil vapor are VOCs including TCE, PCE and 1,1-DCA, which may pose short-term (TCE only) and long-term (chronic) risks through inhalation of contaminated indoor air.

Groundwater and soil vapor concentrations are typically utilized as screening levels regarding the potential for vapor intrusion. TCE was detected at a concentration that exceeds the screening level for updated MTCA Method B groundwater screening level protective of indoor air in the groundwater sample collected from monitoring well UG-MW32 screened within the shallow aquifer. TCE-contaminated groundwater in the shallow aquifer may be in contact with the west side of the finished building and present beneath the building.

Soil vapor sampling was not completed as part of this investigation. Additional on-site characterization may be necessary to evaluate the vertical and lateral limits of the TCE-contaminated impacted soil vapors. Soil vapor sampling is recommended near the elevation of the proposed subgrade to evaluate if a potential vapor intrusion pathway exists. If a potential vapor intrusion pathway exists, then a vapor intrusion mitigation system may be necessary. Potential mitigation options to prevent vapor intrusion include:

- A passive vapor barrier beneath the building. Passive vapor barriers are typically used in combination with another mitigation option (venting or building pressurization). We recommend the vapor barrier be installed below the elevation of penetrations (pipes, etc.) that may be installed after the programing is identified in the future. Penetrating the vapor barrier following the construction will add to the cost of construction.
- Passive or active venting system beneath the building. The venting system may need to be combined with an underslab and perimeter drain to reduce the potential for shallow groundwater to enter the venting system.

The estimated cost for design and installation of indoor air mitigation system ranges between $5/square foot to $12/square foot of building space. The estimated costs for the vapor mitigation system for a building on the entire site is $125,000 to $300,000. Potential periodic indoor air sampling to confirm the vapor intrusion mitigation system may be necessary to evaluate the system is operating properly following construction of the building. The estimated cost for long-term monitoring is unknown.

Underslab/Footing Drainage. Underslab/footing drainage system may be required to prevent water from entering into the vapor mitigation vent system. The water will likely be able to be directed to the City of Tacoma sanitary sewer based on concentrations of the chemicals of concern in the groundwater. A long-term cost may be associated with discharge of the water to the City sanitary sewer system. However, the groundwater may be suitable for discharge to the storm system based on the concentrations detected in the existing well during this investigation. An underslab footing drain will likely be required based on the elevation of the groundwater (85 feet). The estimated cost of the underslab footing drain is $75,000 to $150,000.

Construction Water Management. TCE-contaminated groundwater encountered during construction will have to be managed. Water generated during construction will likely be stored in tanks, sampled and analyzed. Water disposal will be coordinated with UW EH&S at a UW-approved disposal facility. It is anticipated the construction dewatering water will be suitable for discharge into the storm sewer based on the concentrations detected in the existing wells during this investigation. The water may be disposed in the City of Tacoma sanitary sewer. The City of Tacoma charges approximately $0.0034 per gallon of water. The estimated volume of water generated will be based on construction methods. The base cost estimate includes the cost of disposal of water for 120 days of earthwork construction, approximate cost of collecting 10 water samples over the course of the project ($15,000) and two 25,000-gallon storage tanks ($7,000 each per month).

Approximately 12,000 gallons per day is estimated to be generated on the site from dewatering activities. The estimated cost of construction water management if disposal into the City of Tacoma sanitary sewer is necessary is approximately $48,000.

Cross Contamination. The vertical and lateral extent of the TCE-contaminated groundwater in the shallow aquifer is not known. A building with a finished floor of Elevation 152 feet will likely encounter the shallow aquifer and may encounter the deeper aquifer. The design should consider the potential for cross contamination in the subgrade excavations and the deeper excavations at the western retaining wall and elevator shaft.

Additional investigation will be necessary to evaluate the potential for cross contamination between to the two aquifers. This investigation would be completed in concurrence with the additional investigation to evaluate the lateral and vertical extent of the contamination. If cross contamination between aquifers is considered an impact, additional construction costs will likely apply. For budgeting purposes, additional construction cost is estimated to be between $12,500 and $75,000.

Health and Safety. Workers who may be in contact with potentially contaminated soil or groundwater at a state-listed cleanup site have HAZWOPER training. The requirement is consistent with the Washington Administrative Code (WAC) 296-843-100, *Hazardous Waste Operations*, which indicates that on-site personnel are required to have current health and safety training in accordance with Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response requirements in 29 CFR 1910.120. The rule also requires the earthwork contractor and other personnel who could potentially contact contaminated materials to develop and implement a written safety and health program for their employees involved in hazardous waste operations under 29 CFR 1910.120. The estimated cost for the contractor to be HAZWOPER trained and have appropriate liability insurance and is roughly between $10,000 and $70,000 depending on the number of subcontractors that require training.

9.2. Soil is Contaminated with Chemicals of Concern

Contaminated soil (metals and cPAHs) and impacted soil (TCE, petroleum, metals and cPAHs) will likely be generated during construction activities. We recommend UW implement the following actions.

- **Characterize Soil and Groundwater for Disposal.** In-situ characterization or stockpiling and subsequent sampling will need to be performed on soil that is generated during construction in areas of TCE-impacted, metal/cPAH contaminated and petroleum, metals/cPAH-impacted soil. The estimated cost of the soil sampling for soil disposal is $60,000 to $80,000 based on the mass of soil to be excavated.
- **TCE-Impacted and Contaminated Soil.** When TCE and breakdown products are detected in soil, UW EH&S will work with Ecology on obtaining a “contained-in determination” for disposal of the waste. The source of the solvent contamination, the concentration of the solvents and a Toxicity Characteristic Leaching Procedure (TCLP) analytical test result will be used when evaluating if the soil is disposed as hazardous waste by UW EH&S at a RCRA permitted Subtitle C landfill or as a solid waste at a UW-approved Subtitle D landfill. Past experience has demonstrated that it is fairly likely that the “contained-in determination” will be granted, thus we based our cost estimates on this assumption.
- The estimated cost to transport and dispose (not including excavation and loading) soil at a Subtitle D landfill with a contained-in determination is $80 to $100 per ton. The typical cost for transportation and disposal (not including excavation and loading) of soil at a RCRA Subtitle C Landfill is $250 to $300 per ton. The cost estimates provided in this report assume disposal at a Subtitle D landfill.

  The estimated mass of TCE-contaminated and impacted soil is approximately 2,000 tons. This estimate assumes the soil below Elevation 153 feet on the northwestern 1/4 of the site is impacted with TCE. The estimated cost for transportation and disposal of the

TCE-contaminated and impacted soil is $160,000 to $200,000. This estimate could be reduced if the building was raised in elevation.

- Lead and cPAH-Contaminated Soil. Lead and cPAH-contaminated soil will be disposed at a UW-approved RCRA permitted Subtitle D landfill. The contaminated soil will be removed as necessary for construction and as required by Ecology. CPAHs- and metals-contaminated soil will be disposed at an UW-approved RCRA permitted Subtitle D landfill. The estimated cost for transportation and disposal at a RCRA-subtitle D facility is $60 to $80 per ton. The estimated amount of the lead and cPAH-contaminated soil is 600 tons. This estimate assumes the top foot of soil in the eastern portion of the site is contaminated. The estimated cost for transportation and disposal is $36,000 to $48,000.
- Metals- and Petroleum Hydrocarbon-Impacted Soil. Metals- and petroleum hydrocarbon-impacted soil is present on the northern portion of the site to a depth of approximately 1 foot bgs. Metals-, and petroleum hydrocarbon-impacted soil is typically suitable for disposal at a UW-approved permitted inert waste landfill or reclamation pit. For budgeting purposes, we assumed the transportation and disposal of metals- and petroleum hydrocarbon-impacted soil is $30 to $50 per ton. We estimate the mass of the metals- and petroleum hydrocarbon-impacted soil to be 600 tons. This estimate assumes the top foot of soil in the northern portion of the site contains impacted soil. The estimated cost for transportation and disposal is $18,000 to $30,000. If soil is reused as fill on site, the cost would be reduced because off-site disposal of the impacted soil will not be required.
- Health and Safety. As discussed in the “Contaminated Groundwater” section, Washington State requires earthwork contractor and other personnel who could potentially contact contaminated materials to comply with training requirements for handling soil and potentially groundwater on the site. The health and safety costs are not included as a separate item in the soil, because the costs in the groundwater section will apply.

10.0 LIMITATIONS

This report has been prepared for use by the University of Washington for the Priority Development Area 1E – Strom property located in Tacoma, Washington at the University of Washington Tacoma campus.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

Please refer to Appendix A titled “Report Limitations and Guidelines for Use” for additional information pertaining to use of this report.

11.0 REFERENCES

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Table 1

Summary of Chemical Analytical Results[1] – Soil

Area 1E - Strom

Priority Development Area - University of Washington Tacoma

Tacoma, Washington

Boring/Test Pit	1E-B1		1E-B2		1E-B3		1E-B4		1E-B5		1E-B6		UG-MW32				MTCA Method A ULU Cleanup Level	Reuse Criteria[12]
Sample Identification[2]	1E-B1-0-1	1E-B1-7-8	1E-B2-0-1	1E-B2-6-7	1E-B3-1-2	1E-B3-6-7	1E-B4-2-3	1E-B4-7-8	1E-B5-0-1	1E-B5-5-6	1E-B6-0-1	1E-B6-5-6	UG-MW32-1-2	UG-MW32-3.5-4.5	UG-MW32-12-13	UG-MW32-14-15		
Sample Depth (feet bgs)	0 to 1	7 to 8	0 to 1	6 to 7	1 to 2	6 to 7	2 to 3	7 to 8	0 to 1	5 to 6	0 to 1	5 to 6	1 to 2	3.5 to 4.5	12 to 13	14 to 15		
Soil Type	Fill	Qvi	Fill	Qvi	Fill	Qvi	Qvi	Qvi	Qvi	Qvi	Fill	Qvi	Qvi	Qvi	Qvi	Silt		
NWTPH-HCID[3] (mg/kg)																		
Gasoline-Range	23 U	23 U	22 U	--	22 U	23 U	22 U	23 U	23 U	24 U	24 U	23 U	22 U	22 U	--	--	30/100[9]	30
Diesel-Range	57 U	56 U	55 U	--	55 U	57 U	55 U	57 U	57 U	60 U	60 U	56 U	54 U	55 U	--	--	2,000	200
Lube Oil-Range	110 U	110 U	DET	--	110 U	120 U	110 U	110 U	110 U	120 U	120 U	110 U	110 U	110 U	--	--	2,000	200
NWTPH-Dx[4] (mg/kg)																		
Diesel-Range Petroleum Hydrocarbons	--	--	30 U	--	--	--	--	--	--	--	--	--	--	--	--	--	2,000	200
Lube Oil-Range Petroleum Hydrocarbons	--	--	250	--	--	--	--	--	--	--	--	--	--	--	--	--	2,000	200
VOCs[5] (mg/kg)																		
Tetrachloroethene (PCE)	0.00091 U	0.00086 U	0.00095 U	0.00085 U	0.00077 U	0.00086 U	0.00096 U	0.00078 U	0.0012 U	0.00087 U	0.0011 U	0.00086 U	0.00078 U	0.00074 U	0.00099 U	0.0011 U	0.05	DET
Trichloroethene (TCE)	0.00091 U	0.00086 U	0.00095 U	0.00085 U	0.00077 U	0.00086 U	0.00096 U	0.00078 U	0.0012 U	0.00087 U	0.0011 U	0.00086 U	0.00078 U	0.00074 U	0.0019	0.0011 U	0.03	DET
(cis) 1,2-Dichloroethene	0.00091 U	0.00086 U	0.00095 U	0.00085 U	0.00077 U	0.00086 U	0.00096 U	0.00078 U	0.0012 U	0.00087 U	0.0011 U	0.00086 U	0.00078 U	0.00074 U	0.00099 U	0.0011 U	160[10]	DET
(trans) 1,2-Dichloroethene	0.00091 U	0.00086 U	0.00095 U	0.00085 U	0.00077 U	0.00086 U	0.00096 U	0.00078 U	0.0012 U	0.00087 U	0.0011 U	0.00086 U	0.00078 U	0.00074 U	0.00099 U	0.0011 U	1,600[10]	DET
Vinyl Chloride	0.00091 U	0.00086 U	0.00095 U	0.00085 U	0.00077 U	0.00086 U	0.00096 U	0.00078 U	0.0012 U	0.00087 U	0.0011 U	0.00086 U	0.00078 U	0.00074 U	0.00099 U	0.0011 U	0.67[10]	DET
Acetone[6]	0.0045 U	0.0043 U	0.0047 U	0.0042 U	0.0038 U	0.0043 U	0.0048 U	0.0039 U	0.012	0.0043 U	0.0053 U	0.0043 U	0.012	0.0037 U	0.0050 U	0.0011 U	72,000[10]	NE
Carbon Disulfide[6]	0.0017	0.00086 U	0.00095 U	0.00085 U	0.00077 U	0.00086 U	0.00096 U	0.00078 U	0.0012 U	0.00087 U	0.0011 U	0.00086 U	0.00078 U	0.00074 U	0.00099 U	0.0021	8,000[10]	NE
PAHs[7] (mg/kg)																		
1-Methylnaphthalene	0.0076 U	0.0075 U	0.0073 U	--	0.0073 U	0.0076 U	0.0073 U	0.0076 U	0.0076 U	0.0081 U	0.025	0.0075 U	0.0073 U	0.0073 U	--	--	35[10]	NE
2-Methylnaphthalene	0.0076 U	0.0075 U	0.0073 U	--	0.0073 U	0.0076 U	0.0073 U	0.0076 U	0.0076 U	0.0081 U	0.025	0.0075 U	0.0073 U	0.0073 U	--	--	320[10]	NE
Acenaphthene	0.0076 U	0.0075 U	0.0073 U	--	0.0073 U	0.0076 U	0.0073 U	0.0076 U	0.0076 U	0.0081 U	0.054	0.0075 U	0.0073 U	0.0073 U	--	--	4,800[10]	NE
Acenaphthylene	0.0076 U	0.0075 U	0.0073 U	--	0.0073 U	0.0076 U	0.0073 U	0.0076 U	0.0076 U	0.0081 U	0.032	0.0075 U	0.0073 U	0.0073 U	--	--	NE	NE
Anthracene	0.0076 U	0.0075 U	0.0073 U	--	0.0073 U	0.0076 U	0.0073 U	0.0076 U	0.0076 U	0.0081 U	0.11	0.0075 U	0.0073 U	0.0073 U	--	--	24,000[10]	NE
Benzo[g,h,i]perylene	0.014	0.0075 U	0.0073	--	0.0073 U	0.0076 U	0.0073 U	0.0076 U	0.0076 U	0.0081 U	0.21	0.0075 U	0.0073 U	0.0073 U	--	--	NE	NE
Fluoranthene	0.021	0.0075 U	0.017	--	0.0080	0.0076 U	0.0073 U	0.0076 U	0.0077	0.0081 U	0.51	0.0075 U	0.0073 U	0.0073 U	--	--	3,200[10]	NE
Fluorene	0.0076 U	0.0075 U	0.0073 U	--	0.0073 U	0.0076 U	0.0073 U	0.0076 U	0.0076 U	0.0081 U	0.044	0.0075 U	0.0073 U	0.0073 U	--	--	3,200[10]	NE
Naphthalene	0.0076 U	0.0075 U	0.0073 U	--	0.0073 U	0.0076 U	0.0073 U	0.0076 U	0.0076 U	0.0081 U	0.051	0.0075 U	0.0073 U	0.0073 U	--	--	5	NE
Phenanthrene	0.015	0.0075 U	0.024	--	0.023	0.0076 U	0.0073 U	0.0076 U	0.0076 U	0.0081 U	0.47	0.0075 U	0.0073 U	0.0073 U	--	--	NE	NE
Pyrene	0.018	0.0075 U	0.026	--	0.0073 U	0.0076 U	0.0073 U	0.0076 U	0.0076	0.0081 U	0.60	0.0075 U	0.0073 U	0.0073 U	--	--	2,400[10]	NE
Carcinogenic PAHs[7] (mg/kg)																		
Benzo (a) anthracene (TEF 0.1)	0.010	0.0075 U	0.010	--	0.0073 U	0.0076 U	0.0073 U	0.0076 U	0.0076 U	0.0081 U	0.25	0.0075 U	0.0073 U	0.0073 U	--	--	MTCA ULU cleanup level for the sum of all cPAHs is 0.1 mg/kg	Reuse Criteria for the sum of all cPAHs is 0.1 mg/kg
Benzo (a) pyrene (TEF 1)	0.014	0.0075 U	0.010	--	0.0073 U	0.0076 U	0.0073 U	0.0076 U	0.0076 U	0.0081 U	0.32	0.0075 U	0.0073 U	0.0073 U	--	--		
Benzo (b) fluoranthene (TEF 0.1)	0.020	0.0075 U	0.011	--	0.0073 U	0.0076 U	0.0073 U	0.0076 U	0.0076 U	0.0081 U	0.37	0.0075 U	0.0073 U	0.0073 U	--	--		
Benzo (J,k) fluoranthene (TEF 0.1)	0.0076 U	0.0075 U	0.0073 U	--	0.0073 U	0.0076 U	0.0073 U	0.0076 U	0.0076 U	0.0081 U	0.12	0.0075 U	0.0073 U	0.0073 U	--	--		
Chrysene (TEF 0.01)	0.013	0.0075 U	0.024	--	0.0073 U	0.0076 U	0.0073 U	0.0076 U	0.0076 U	0.0081 U	0.32	0.0075 U	0.0073 U	0.0073 U	--	--		
Dibenz (a,h) anthracene (TEF 0.1)	0.0076 U	0.0075 U	0.0073 U	--	0.0073 U	0.0076 U	0.0073 U	0.0076 U	0.0076 U	0.0081 U	0.050	0.0075 U	0.0073 U	0.0073 U	--	--		
Indeno (1,2,3-cd) pyrene (TEF 0.1)	0.010	0.0075 U	0.0073 U	--	0.0073 U	0.0076 U	0.0073 U	0.0076 U	0.0076 U	0.0081 U	0.18	0.0075 U	0.0073 U	0.0073 U	--	--		
Total TTEC of cPAHs (detect only)	0.018	N/A	0.012	--	N/A	N/A	N/A	N/A	N/A	N/A	0.42	N/A	N/A	N/A	--	--	0.1	0.1

GeoEngineers

Boring/Test Pit	1E-B1		1E-B2		1E-B3		1E-B4		1E-B5		1E-B6		UG-MW32				MTCA Method A ULU Cleanup Level	Reuse Criteria[12]
Sample Identification [2]	1E-B1-0-1	1E-B1-7-8	1E-B2-0-1	1E-B2-6-7	1E-B3-1-2	1E-B3-6-7	1E-B4-2-3	1E-B4-7-8	1E-B5-0-1	1E-B5-5-6	1E-B6-0-1	1E-B6-5-6	UG-MW32-1-2	UG-MW32-3.5-4.5	UG-MW32-12-13	UG-MW32-14-15		
Sample Depth (feet bgs)	0 to 1	7 to 8	0 to 1	6 to 7	1 to 2	6 to 7	2 to 3	7 to 8	0 to 1	5 to 6	0 to 1	5 to 6	1 to 2	3.5 to 4.5	12 to 13	14 to 15		
Soil Type	Fill	Qvi	Fill	Qvi	Fill	Qvi	Qvi	Qvi	Qvi	Qvi	Fill	Qvi	Qvi	Qvi	Qvi	Silt		
Metals[8] (mg/kg)																		
Arsenic	11 U	11 U	11 U	--	11 U	11 U	11 U	11 U	11 U	12 U	12 U	11 U	11 U	11 U	--	--	20	7
Barium	**280**	**43**	**49**	--	**79**	**32**	**42**	**22**	**50**	**29**	**340**	**34**	**59**	**47**	--	--	16,000[10]	NE
Cadmium	**4.5**	0.56 U	0.55 U	--	0.55 U	0.57 U	0.55 U	0.57 U	0.57 U	0.60 U	**1.2**	0.56 U	0.54 U	0.55 U	--	--	2.0	1
Chromium	**43**	**24**	**31**	--	**37**	**17**	**25**	**20**	**33**	**22**	**57**	**36**	**44 J**	**46 J**	--	--	2,000 [11]	48[13]
Lead	**30**	5.6 U	**14**	--	5.5 U	5.7 U	5.5 U	5.7 U	5.7 U	6.0 U	**610**	5.6 U	5.4 U	5.5 U	--	--	250	50
Mercury	0.28 U	0.28 U	0.27 U	--	0.28 U	0.29 U	0.27 U	0.29 U	0.28 U	0.30 U	0.30 U	0.28 U	0.27 U	0.27 U	--	--	2.0	0.07 or DET
Selenium	11 U	11 U	11 U	--	11 U	11 U	11 U	11 U	11 U	12 U	12 U	11 U	11 U	11 U	--	--	400[10]	NE
Silver	**1.5**	1.1 U	1.1 U	--	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.2 U	1.2 U	1.1 U	1.1 U	1.1 U	--	--	400[10]	NE

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc., of Redmond, Washington.

[2] Sample ID = Area number - boring/test pit number - starting depth of sample [feet bgs] -end depth [feet bgs], Area 1E Boring 2 collected 6-7 feet bgs = 1E-B2-6-7.

[3] Washington State Department of Ecology (Ecology)-approved method NWTPH-HCID.

[4] Washington Department of Ecology-approved method NWTPH-Dx.

[5] VOCs were analyzed by EPA method 8260B. Other VOCs were analyzed but not detected.

[6] This compound is considered a common laboratory contaminant.

[7] Polycyclic aromatic hydrocarbons (PAHs) and carcinogenic PAHs (cPAHs) were analyzed by U.S. Environmental Protection Agency (EPA) method 8270D/SIM. Other PAHs were analyzed but not detected.

[8] Resource Conservation Recovery Act (RCRA) metals analyzed by EPA 6000/7000 series method.

[9] MTCA Method A cleanup level for gasoline is 30 mg/kg if benzene is detected or if the sum of toluene, ethylbenzene and xylenes are equal to or greater than 1% of the total gasoline detection.

[10] MTCA Method B criteria represented because MTCA Method A cleanup level has not been established.

[11] MTCA Method A cleanup level for Trivalent Chromium.

[12] Guidance for Remediation of Petroleum Contaminated Sites (Publication 10-09-057) Ecology, October 2011; Summary Natural Background Soil Metals Concentrations in Washington State (Publication 94-115) dated October 1994; and Hazardous Waste Regulations 40 CFR Part 260.

[14] Chromium was not compared to the Reuse Criteria listed above for soils based on historic soil analytical results indicating chromium is not a prevalent chemical of concern on the UWT campus.

mg/kg = milligram per kilogram

-- = sample not analyzed

N/A = not applicable

DET = Detected greater than laboratory reporting limits

MTCA = Model Toxics Control Act

bgs = below ground surface

Qvi = Ice-contact deposit

U = Analyte was not detected at or greater than the listed reporting limit

J = Estimated result by the analytical laboratory.

TEF = Toxicity Equivalency Factor as defined in WAC 173-340-900 Table 708-2

Total Toxic Equivalent Concentration (TTEC) is the sum of each individual cPAH concentration multiplied by its corresponding TEF.

Bold type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Bold font type and gray shading indicates that the detected concentration is greater than the respective MTCA cleanup level.

Dashed outline indicates the value is greater than the Reuse Criteria.

Table 2

Summary of Chemical Analytical Results[1] – Groundwater

Area 1E - Strom
Priority Development Area - University of Washington Tacoma
Tacoma, Washington

Boring Identification	UG-MW27	UG-MW28	UG-MW32	UG-MW35	UG-MW36	1F-B7	MTCA Method A Groundwater Cleanup Level	MTCA Method B Air Screening Levels[13]
Sample ID[2]	UG-MW27-130702	UG-MW28-130702	UG-MW32-131003	UG-MW35-140122	UG-MW36-140122	1F-B7-W		
Sample Date	7/2/2013	7/2/2013	10/3/2013	1/22/2014	1/22/2014	6/11/2013		
Approximate Depth to Groundwater (feet btoc)[3]	23.16	19.81	6.91	8.39	8.22	14		
Approximate Elevation of Groundwater[4]	125.52	131.33	152.97	173.21	172.02	144		
Top of Well Screen Elevation (feet)[4]	108.68	143	150.38	175.91	174.57	146		
Bottom of Well Screen Elevation (feet)[4]	93.68	128	145.38	169.41	169.57	141		
Lithology At Well Screen	Outwash	Qvi	Qvi	Qvi	Qvi	Qvi		
NWTPH-Gx[5] (µg/L)								
Gasoline-Range	100 U	100 U	100 U	100 U	100 U	100 U	800/1,000[10]	NE
NWTPH-Dx[6] (mg/L)								
Diesel-Range	0.26 U	0.25 U	0.26 U	--	--	0.26 U	0.5	NE
Lube Oil-Range	0.41 U	0.41 U	0.41 U	--	--	0.41 U	0.5	NE
VOCs[7] (µg/L)								
Trichloroethene (TCE)	0.20 U	0.21	39	0.24	0.20 U	30	5	1.5
Tetrachloroethene (PCE)	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5	24
(cis) 1,2-Dichloroethene (DCE)	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	16[11]	160
(trans) 1,2-DCE	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	160[11]	110
Vinyl Chloride	0.10 U	0.10 U	0.20 U	0.20 U	0.20 U	0.10 U	0.2	0.35
1,1-Dichloroethane (DCA)	0.20 U	0.20 U	0.21	0.20 U	0.20 U	0.20 U	7.7[11]	11
cPAHs[8] (µg/L)								
Benzo (a) anthracene (TEF 0.1)	0.010 U	0.010 U	0.0097 U	--	--	0.011	MTCA ULU cleanup level for the sum of all cPAHs is 0.1 µg/L	NE
Benzo (a) pyrene (TEF 1)	0.010 U	0.010 U	0.0097 U	--	--	0.0095 U		NE
Benzo (b) fluoranthene (TEF 0.1)	0.010 U	0.010 U	0.0097 U	--	--	0.0095 U		NE
Benzo (j,k) fluoranthene (TEF 0.1)	0.010 U	0.010 U	0.0097 U	--	--	0.0095 U		NE
Chrysene (TEF 0.01)	0.010 U	0.010 U	0.0097 U	--	--	0.0095 U		NE
Dibenz (a,h) anthracene (TEF 0.1)	0.010 U	0.010 U	0.0097 U	--	--	0.0095 U		NE
Indeno (1,2,3-cd) pyrene (TEF 0.1)	0.010 U	0.010 U	0.0097 U	--	--	0.0095 U		NE
Total TTEC of cPAHs (detect only)	N/A	N/A	N/A	--	--	0.0011	0.1	NE
Dissolved Metals[9] (µg/L)								
Arsenic		--	--	--	--	3.0 U	5	NE
Cadmium		--	--	--	--	4.0 U	5	NE
Chromium		--	--	--	--	10 U	50[12]	NE
Lead		--	--	--	--	1.0 U	15	NE
Mercury		--	--	--	--	0.50 U	2	NE
Total Metals[9] (µg/L)								
Arsenic	3.3 U	3.3 U	3.3 U	--	--	--	5	NE
Barium	28 U	33	28 U	--	--	--	3,200[11]	NE
Cadmium	4.4 U	4.4 U	4.4 U	--	--	--	5	NE
Chromium	11 U	11 U	11 U	--	--	--	50[12]	NE
Lead	1.1 U	1.1 U	1.1 U	--	--	--	15	NE
Mercury	0.50 U	0.50 U	0.50 U	--	--	--	2	NE
Selenium	5.6 U	5.6 U	5.6 U	--	--	--	80[11]	NE
Silver	11 U	11 U	11 U	--	--	--	80[11]	NE

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc. in Redmond, Washington.

[2] Sample ID = Area number - Boring number - Date (i.e., a water sample collected from UG-MW32 on October 3, 2013= UG-MW32-131003).

[3] Groundwater level was measured below the top of casing on November 8, 2013.

[4] Based on survey completed by AHBL November 6, 2013. Horizontal datum - NAD 83/91 Washington State Plane - South Zone (City of Tacoma Horizontal Control Holding City Monument Numbers 411 and 414). Vertical datum NGVD 29 (brass monument at South 19th and Fawcett Avenue, Elevation 165.15).

[5] Washington State Department of Ecology (Ecology)-approved method NWTPH-Gx.

[6] Ecology-approved method NWTPH-Dx.

[7] Volatile organic compounds (VOCs) were analyzed by U.S. Environmental Protection Agency (EPA) method 8260C. Other VOCs were analyzed but not detected.

[8] Polycyclic Aromatic Hydrocarbons (PAHs) and carcinogenic PAHs (cPAHs) analyzed by EPA method 8270D/SIM.

[9] Metals analyzed by EPA 200.8 or 7470A method.

[10] MTCA Method A cleanup level for gasoline-range petroleum hydrocarbons is 800 μg/L if benzene is present and 1,000 μg/L if benzene is not present.

[11] MTCA Method B criteria represented because MTCA Method A cleanup level has not been established.

[12] MTCA Method A cleanup level for total chromium shown. Cleanup level for hexavalent chromium is 48 μg/L.

[13] MTCA Method B Indoor Air Screening Level from Washington State Deportment of Ecology Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action. Values updated as appropriate to incorporate recent toxicity data.

MTCA = Model Toxics Control Act

-- = Analyte or sample not analyzed.

Qvi = Ice-contact deposit

Outwash = Advance Outwash

μg/L = microgram per Liter

DET = Detected greater than laboratory reporting limits

U = Analyte was not detected at or greater than the listed reporting limit

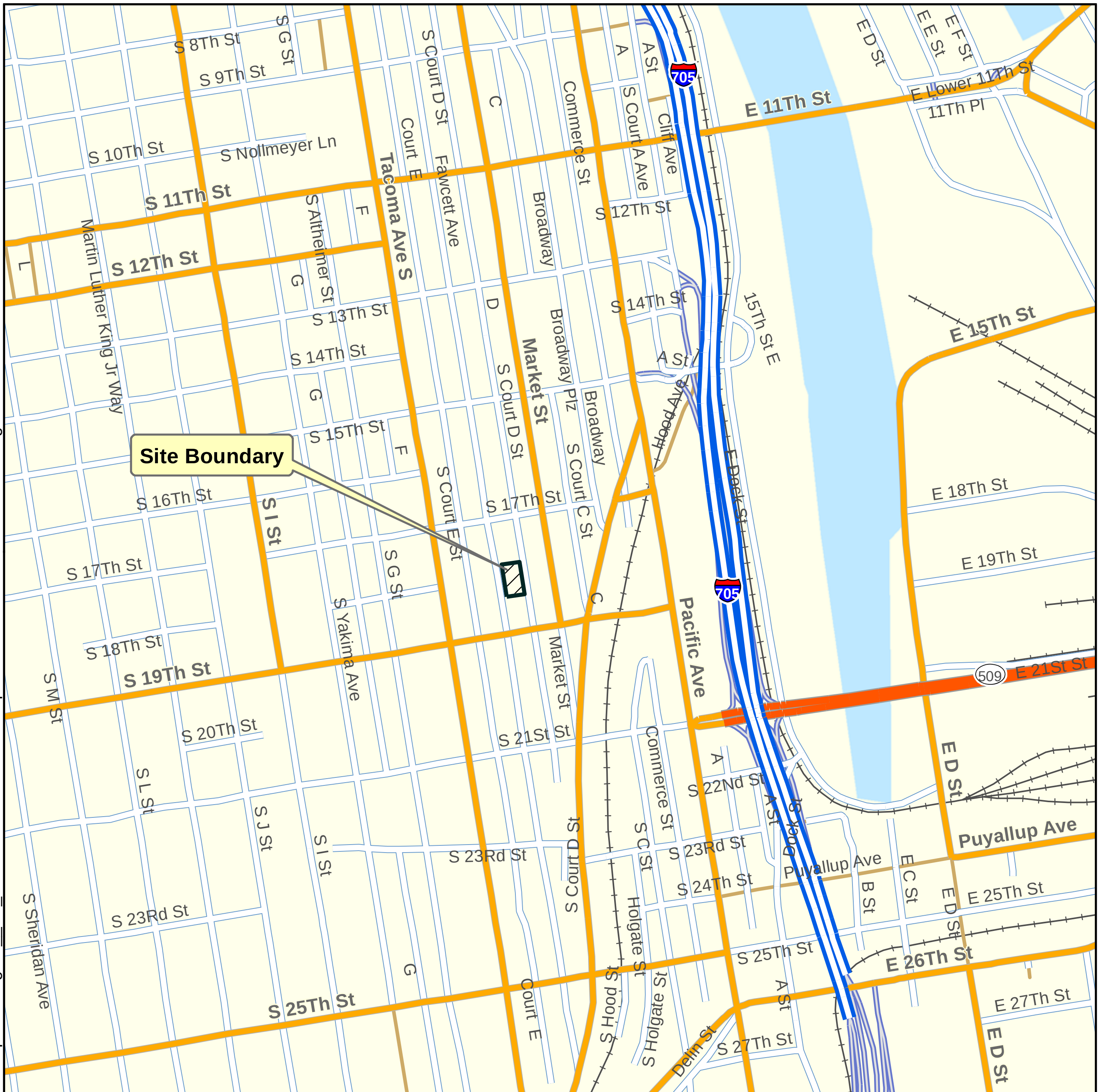
TEF = Toxicity Equivalency Factor as defined in WAC 173-340-900 Table 708-2

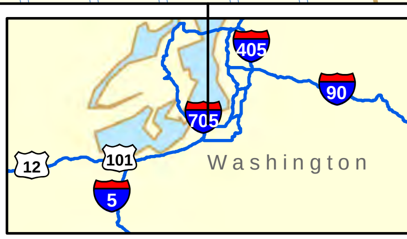
Total Toxic Equivalent Concentration (TTEC) is the sum of each individual cPAH concentration multiplied by its corresponding TEF.

Bold font type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Bold type and gray shading indicates analyte was detected at a concentration greater than the MTCA Method groundwater cleanup/criteria level.

Dashed outline indicates analyte was detected at a concentration greater than the MTCA Method B Indoor Air Screening Level.





N
W E
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1,000 0 1,000

Feet

Notes:
CPO = University of Washington Capital Project Office
UWT = University of Washington Tacoma
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
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Data Sources: ESRI Data & Maps

Projection: NAD 1983 UTM Zone 10N

Vicinity Map

UWT Environmental Investigation
Priority Development Areas - CPO Project No. 204277
Tacoma, Washington

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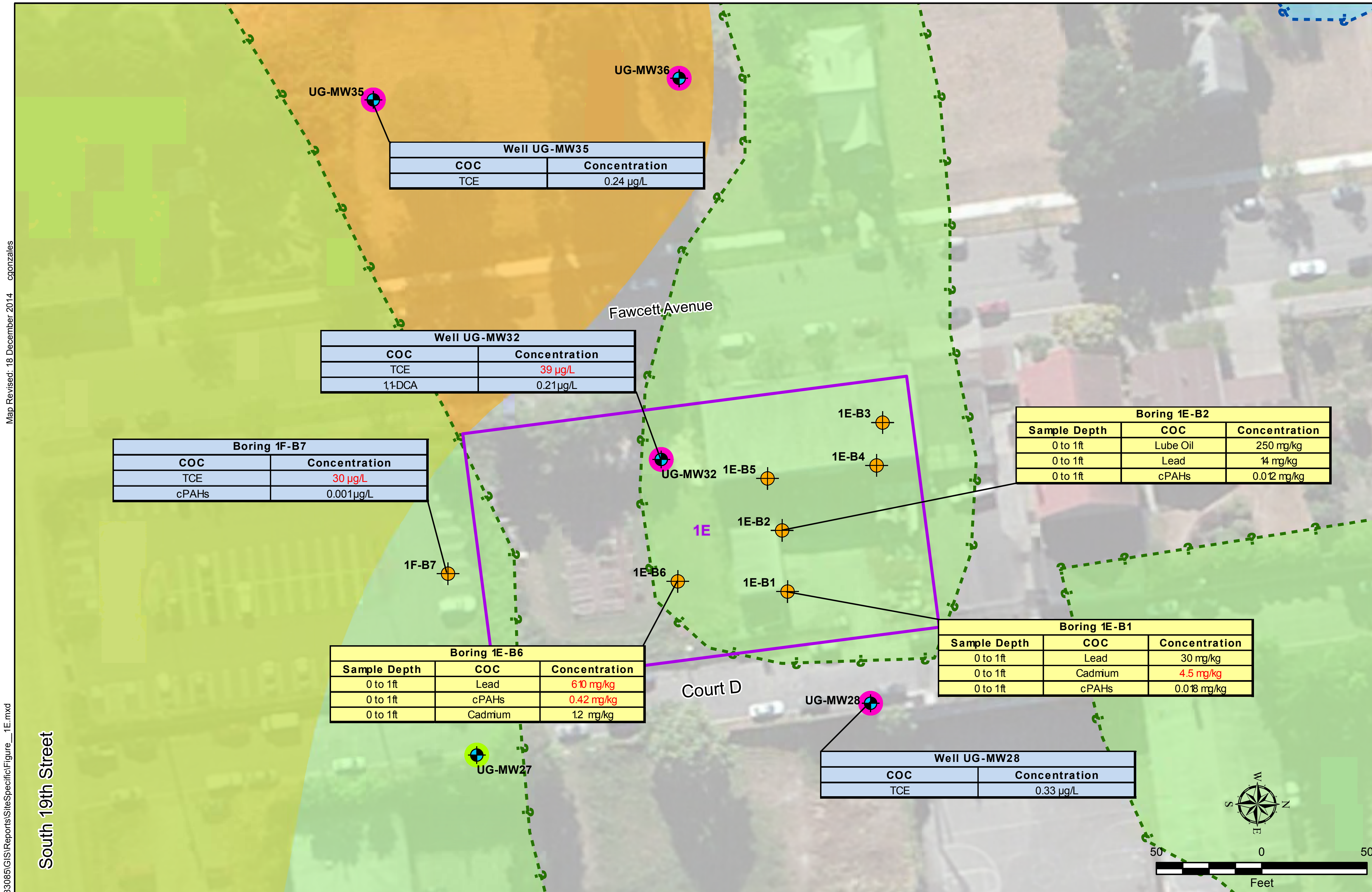
Figure 1

Office: TAC Path: \\tac\projects\0\0183085\GIS\Reports\SiteSpecific\Figure_1E_VM.mxd Map Revised: 17 December 2014 cgonzales



Soil Results*

Boring 2A-B7		
Sample Depth	COC	Concentration
2.5 to 3.5 feet bgs	Lead	200 mg/kg
2.5 to 3.5 feet bgs	cPAHs	0.64 mg/kg

Groundwater Results*

Well UG-MW13	
COC	Concentration
TCE	110 µg/L
PCE	1.4 µg/L

*Chemicals shown in red were detected at concentrations greater than the respective MTCA Method A cleanup levels.

Only analytical results of the chemicals of concern are shown if detected. Other chemicals that were analyzed and detected are not shown unless detected at concentrations greater than the respective MTCA cleanup levels.

Legend

Approximate Location of Priority Development Area 1E

Approximate Subsurface Location Subsurface Exploration Location

Existing Monitoring Well

Direct Push Boring

Sonic Core Boring - Permanent New Monitoring Well

Lithology of Well Screen Interval

Ice-Contact Deposit (Shallow Aquifer)

Advance Outwash (Deep Aquifer)

Approximate Lateral Extent of PCE- and Breakdown Product Contaminated Groundwater Plume in Shallow Aquifer

Approximate Lateral Extent of TCE-Contaminated Groundwater Plume in Shallow Aquifer

Approximate Lateral Extent of TCE-Contaminated Groundwater Plume in Deep Aquifer

Approximate Lateral Extent of TCE-Contaminated Groundwater Plume in Shallow and Deep Aquifers

Map Revised: 18 December 2014 cgonzales

Path: \\tac\projects\0\0183085\GIS\Reports\SiteSpecific\Figure__1E.mxd

Office: TAC

Notes:
cPAHs concentrations shown as TTEC.
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet
COC = Chemical of Concern
UWT = University of Washington Tacoma
PDA = Priority Development Area
PCE = tetrachloroethene
TCE = trichloroethene
cPAH = Carcinogenic Polycyclic Aromatic Hydrocarbons
mg/kg = milligram per kilogram
µg/L = microgram per Liter
bgs = Below Ground Surface
TTEC = Total Toxicity Equivalency Concentration
DCA = dichloroethane
ULU = Unrestricted Land Use
MTCA = Model Toxics Control Act
DCA = dichloroethane

Soil MTCA Cleanup/Criteria Levels:
PCE = 0.05 mg/kg (Method A ULU)
TCE = 0.03 mg/kg (Method A ULU)
Benzene = 0.03 mg/kg (Method A ULU)
Vinyl Chloride = 0.67 mg/kg (Method B)
Lube Oil-Range Petroleum Hydrocarbons = 2,000 mg/kg (Method A ULU)
Diesel-Range Petroleum Hydrocarbons = 2,000 mg/kg (Method A ULU)
Gasoline-Range Petroleum Hydrocarbons = 100 mg/kg (Method A ULU)
cPAHs (TTEC) = 0.1 mg/kg (Method A ULU)
Lead = 250 mg/kg (Method A ULU)
Arsenic = 20 mg/kg (Method A ULU)
Cadmium = 2 mg/kg (Method A ULU)
Mercury = 2 mg/kg (Method A ULU)

Groundwater MTCA Cleanup/Criteria Levels:
PCE = 5 µg/L (Method A); 24 µg/L (Indoor Air)
TCE = 5 µg/L (Method A); 1.5 µg/L (Indoor Air)
cis-1,2-DCE= 16 µg/L (Method B); 160 µg/L (Indoor Air)
trans-1,2-DCE = 160 µg/L (Method B); 110 µg/L (Indoor Air)
1,1-DCA = 7.7 µg/L (Method B); 11 µg/L (Indoor Air)
Vinyl Chloride = 0.2 µg/L (Method A); 0.35 µg/L (Indoor Air)
Benzene = 5 µg/L (Method A); 2.4 µg/L (Indoor Air)
Lube Oil-Range Petroleum Hydrocarbons = 0.5 mg/L (Method A)
Arsenic = 5 µg/L (Method A)
cPAHs= 0.1 µg/L (Method A)

Site Plan – PDA 1E/Strom Property

UWT Environmental Investigation
Priority Development Areas - CPO Project No. 204277
Tacoma, Washington

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Figure 2

APPENDIX A
Report Limitations and Guidelines for Use

APPENDIX A
REPORT LIMITATIONS AND GUIDELINES FOR USE[1]

This appendix provides information to help you manage your risks with respect to the use of this report.

Environmental Services are Performed for Specific Purposes, Persons and Projects

This report has been prepared for use by University of Washington. This report is not intended for use by others, and the information contained herein is not applicable to other sites.

GeoEngineers structures our services to meet the specific needs of our clients. For example, an environmental site assessment study conducted for a property owner may not fulfill the needs of a prospective purchaser of the same property. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and project site. No one except University of Washington should rely on this environmental report without first conferring with GeoEngineers. This report should not be applied for any purpose or project except the one originally contemplated.

This Environmental Report is Based on a Unique Set of Project-Specific Factors

This report has been prepared for the Priority Development Areas (PDAs) Environmental Assessment Project at the UW – Tacoma (UWT) campus located in Tacoma, Washington. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, do not rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

If important changes are made after the date of this report, GeoEngineers should be given the opportunity to review our interpretations and recommendations and provide written modifications or confirmation, as appropriate.

Reliance Conditions for Third Parties

If a lending agency or other parties intend to place legal reliance on the product of our services, we require that those parties indicate in writing their acknowledgement that the scope of services provided, and the general conditions under which the services were rendered including the limitation of professional liability, are understood and accepted by them. This is to provide our firm

[1] Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions.

Environmental Regulations are Always Evolving

Some substances may be present in the site vicinity in quantities or under conditions that may have led, or may lead, to contamination of the subject site, but are not included in current local, state or federal regulatory definitions of hazardous substances or do not otherwise present current potential liability. GeoEngineers cannot be responsible if the standards for appropriate inquiry, or regulatory definitions of hazardous substance, change or if more stringent environmental standards are developed in the future.

Subsurface Conditions can Change

This environmental report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by manmade events such as construction on or adjacent to the site, by new releases of hazardous substances, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Always contact GeoEngineers before applying this report to determine if it is still applicable.

Topsoil

For the purposes of this report, we consider topsoil to consist of generally fine-grained soil with an appreciable amount of organic matter based on visual examination, and to be unsuitable for direct support of the proposed improvements. However, the organic content and other mineralogical and gradational characteristics used to evaluate the suitability of soil for use in landscaping and agricultural purposes was not determined, nor considered in our analyses. Therefore, the information and recommendations in this report, and our logs and descriptions should not be used as a basis for estimating the volume of topsoil available for such purposes.

Most Environmental Findings are Professional Opinions

Our interpretations of subsurface conditions are based on field observations and chemical analytical data from widely spaced sampling locations at the site. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ – sometimes significantly – from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

Do Not Redraw the Exploration Logs

Environmental scientists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in an environmental report should never be redrawn for inclusion in other design drawings. Only photographic or electronic reproduction is acceptable, but recognize that separating logs from the report can elevate risk.

Read These Provisions Closely

Some clients, design professionals and contractors may not recognize that the geoscience practices (geotechnical engineering, geology and environmental science) are far less exact than other engineering and natural science disciplines. This lack of understanding can create unrealistic expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory "limitations" provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you are unclear how these "Report Limitations and Guidelines for Use" apply to your project or site.

Geotechnical, Geologic and Geoenvironmental Reports Should Not Be Interchanged

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually relate any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding a specific project.

Biological Pollutants

GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention, or assessment of the presence of Biological Pollutants in or around any structure. Accordingly, this report includes no interpretations, recommendations, findings, or conclusions for the purpose of detecting, preventing, assessing, or abating Biological Pollutants. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts.

PDA 1F – Fawcett Parking/Lot T47 and T48

Priority Development Area 1F
Fawcett Parking/Lot T47 and T48
Environmental Subsurface Investigation

Environmental Subsurface Investigation Project
UW Capital Project Office Project No. 204277
1800 Block of South Fawcett Avenue
Tacoma, Washington

for
University of Washington

December 19, 2014

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Tacoma, Washington 98402
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Priority Development Area 1F
Fawcett Parking/Lot T47 and T48
Environmental Subsurface Investigation
UW Capital Project Office
Project No. 204277
1800 Block of South Fawcett Avenue
Tacoma, Washington

File No. 0183-085-00

December 19, 2014

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GeoEngineers

Table of Contents

1.0 INTRODUCTION 1

2.0 SITE HISTORICAL USE 1

3.0 CURRENT SITE FEATURES 2

4.0 ENVIRONMENTAL SUBSURFACE INVESTIGATION 2

4.1. Historic Research and Magnetic Anomaly Findings 2
4.2. Soil Explorations 2
4.3. Groundwater Sampling 2

5.0 SOIL AND GROUNDWATER CONDITIONS 3

5.1. Soil Conditions 3
5.2. Groundwater Conditions 3

6.0 CHEMICAL ANALYTICAL PROGRAM 3

6.1. General 3
6.2. Criteria for Characterization of Soil and Groundwater 4
6.3. Soil 5
 6.3.1. Petroleum-Range Hydrocarbons 6
 6.3.2. VOCs 6
 6.3.3. PAHs 6
 6.3.4. RCRA Metals 7
 6.3.1. PCBs 7
6.4. Groundwater 7
 6.4.1. Petroleum-Range Hydrocarbons 7
 6.4.2. VOCs 7
 6.4.3. PAHs 8
 6.4.4. Metals 8
 6.4.5. PCBs 8

7.0 CONCLUSIONS 8

7.1. Soil 8
7.2. Groundwater 8

8.0 PROPOSED DEVELOPMENT PLANS 9

9.0 POTENTIAL IMPACTS AND MITIGATION MEASURES TO DESIGN AND CONSTRUCTION 9

9.1. Site is Potential Source 10
9.2. Potential UST 10
9.3. TCE-Contaminated Groundwater 10
9.4. Soil is Contaminated with Chemicals of Concern 12

10.0 LIMITATIONS 13

11.0 REFERENCES 14

LIST OF TABLES

Table 1. Summary of Chemical Analytical Results – Soil
Table 2. Summary of Chemical Analytical Results – Groundwater

LIST OF FIGURES

Figure 1. Vicinity Map
Figure 2. Site Plan – PDA 1F - Fawcett Parking/Lot T47 and T48

APPENDICES

Appendix A. Report Limitations and Guidelines for Use

1.0 INTRODUCTION

This report presents the results of our environmental subsurface investigation completed for the University of Washington (UW) at the Area 1F – Fawcett Parking Lot T47/48 property (Priority Development Area [PDA]) located on the UW Tacoma (UWT) campus in the 1800 block of South Fawcett Avenue in Tacoma, Washington. The property is herein referred to as the “site.” The site is identified as Area 1F - Fawcett Parking Lot T47/48 for this project. The Fawcett Parking Lot T47/48 property is bound by South Fawcett Avenue to the west, the Strom property to the north, Court D alleyway to the east and South 19th Street to the south. A Vicinity Map of the site is included as Figure 1. See Figure 2 for the layout of the site.

The subsurface investigation was completed under the UWT Environmental Subsurface Investigation Project, UW project number 204277. This report was completed as a subset of the larger subsurface investigation report titled “2013 Environmental Subsurface Investigation – University of Washington-Tacoma, Tacoma Washington” dated Demceber 19, 2014 to assist with development of the property. This report should be used in context with the larger subsurface investigation report. Borings logs, subsurface investigation methodologies and chemical analytical data packages are included in the larger investigation report.

General impacts and potential mitigation measures are provided in this report that may be employed in design and construction. It is important to recognize that additional environmental investigations may be necessary prior to selection of the final mitigation measure. Mitigation measures and associated costs provided in this report will likely need refinement based on the results of the additional environmental investigations. The project team should contact UW Environmental Health & Safety (UW EH&S) to discuss the need for additional environmental investigations at this site. UW EH&S is the liaison with the Washington State Department of Ecology (Ecology) for review and approval of mitigation measures.

2.0 SITE HISTORICAL USE

Multiple residences and associated sheds/stables were constructed on the site between 1888 and 1912. The last residence had been demolished by 1974. An area noted as "City Yard" was present on the northern portion of the site in 1896 and appears to have been associated with City Stables to the north (PDA 1E - Strom Property). An apartment building was constructed on the northern portion of the site in 1925. City records indicate a conversion burner permit was issued in 1964 for the apartment building. The apartment building was demolished in 1995.

A review of the 1940 aerial photograph indicated a large building was present on the southern portion of the site which operated as a winery, indoor golf and grocer between 1931 and 1936. By 1942, a motorcycle sales and service shop was present on the southern portion of site through at least 1969 with an address listed as 1755 Fawcett Avenue. Two garages with miscellaneous storage and debris were located north of the southern building between 1961 and 1990. The historic maps indicate a business with an address of 415 South 19th Street operated in the southeast portion of the same building. E I Cleaners (dry cleaner) was listed as the business in operation in 1931 at the 415 South 19th Street address. The southern building and associated garages were demolished in 1992. City records indicate an underground storage tank (UST) was left in place; located approximately 4 feet west of the Court D alley, 4 feet north of the sidewalk and 2 feet deep. This area is currently in a vegetated area near a retaining wall.

3.0 CURRENT SITE FEATURES

The entire property presently is generally flat with a paved asphalt cover that serves as a parking lot for the UWT campus. Vegetation is limited to the parking islands and along the perimeter of the site beyond the paved areas. The entire site is fenced with access open to the south from 19th Street. Topography slopes by approximately 15 feet in elevation from Fawcett Avenue to Court D. A stone retaining wall is present along the entire western boundary of the site between Fawcett Avenue and the parking lot. A second stone retaining wall on the eastern boundary runs along the entire length of the site separating the lot from Court D to the east. The second retaining wall is approximately 6 feet greater in height in some places.

4.0 ENVIRONMENTAL SUBSURFACE INVESTIGATION

The environmental subsurface investigation activities completed at the site consisted of a magnetic/ground penetrating radar (M/GPR) survey, direct-push borings, groundwater development and sampling of existing monitoring wells. The investigation activities were completed in June 2013.

4.1. Historic Research and Magnetic Anomaly Findings

Historic research results indicated the potential for USTs to be present at the site given the age of the former buildings and the source of heat typically used during these time periods. In addition, heating conversion permits were listed in the permit records. An M/GPR survey was performed on the exterior of the structure in June 2013. The M/GPR survey was not performed within the vegetated areas on the perimeter of the site specifically the southeast corner in the area of the potential UST based on permit records. Magnetic anomalies were not identified during the survey.

4.2. Soil Explorations

Subsurface explorations consisted of advancing seven soil borings using direct-push drilling methods from June 11 through July 18, 2013.

The soil borings (1F-B1 through 1F-B7) ranged in depth from 10.5 to 17 feet bgs. A total of three soil borings (1F-B3, 1F-B5 and 1F-B7) were installed as temporary groundwater monitoring wells and abandoned upon the completion of the groundwater sampling.

4.3. Groundwater Sampling

Groundwater samples were collected from existing on-site monitoring wells UG-MW16 and UG-MW17. In addition, groundwater samples were also collected from temporary monitoring wells installed in borings 1F-B3, 1F-B5, and 1F-B7. The three temporary monitoring wells were installed with 5-foot well screen interval within the shallow aquifer (ice-contact deposit). The two existing monitoring wells installed with 15-foot well screen intervals within the deep aquifer (advance outwash). Groundwater samples were collected from the three temporary wells on June 11 and June 12, 2013. The two existing permanent groundwater monitoring wells were sampled on June 17, 2013.

5.0 SOIL AND GROUNDWATER CONDITIONS

5.1. Soil Conditions

Subsurface conditions consist of fill, ice-contact deposits (native), and advance outwash (native). The fill consists of fine to coarse sand and with silt and gravel from the surface to depths ranging typically to about 2 to 8 feet bgs before encountering native soil. The ice-contact deposits consist of silty sand to sand with gravel and silt. The silt layer was observed between the ice-contact deposits and advance outwash in borings completed in the vicinity of the site but was not observed in borings completed on the site. The silt layer may also have been removed during development of the site.

Glacial advance outwash was observed in existing monitoring wells UG-MW16 and UG-MW17. The advance outwash consisted of sand with gravel with various amounts of silt to silty gravel with sand to the full depth explored.

5.2. Groundwater Conditions

It appears that the shallow and deep aquifers may have comingled in the vicinity of the site because the silt layer may have been removed during development of the site.

Groundwater with wells screened within ice-contact deposits appears to be present in sand and gravel seams. The continuity and connectedness of the sand and gravel seams within the ice-contact deposit unit is unknown within the site. Depth to groundwater within the ice-contact deposits in the temporary wells ranged from approximately 6 (1F-B3) to 14 (1F-B7) feet bgs (approximate Elevation 144 to 149 feet).

Groundwater within the advance outwash appears to be continuous with interbeds of wet fine to coarse sands transitioning to coarse sands with gravels with increasing depth. Depth to groundwater of wells screened within the advance outwash in the existing monitoring wells ranged from 3.8 (UG-MW17) to 9.30 (UG-MW16) feet below top of casing (btoc) (Elevation 142 to 152 feet).

6.0 CHEMICAL ANALYTICAL PROGRAM

6.1. General

Soil and groundwater samples were submitted to OnSite Environmental, Inc., in Redmond, Washington for chemical analysis. The chemical analytical data are summarized in Tables 1 and 2. Chemicals that were not detected at or greater than the laboratory reporting limits in the analyzed samples are typically not included on the tables.

6.2. Criteria for Characterization of Soil and Groundwater

The following criteria were used to evaluate impacted and contaminated soil and groundwater.

- Tetrachloroethene (PCE) and Trichloroethene (TCE) Impacted or Contaminated Soil
  - PCE, TCE and breakdown products at concentrations detected in the analyzed soil samples.
- Contaminated Soil
  - Petroleum hydrocarbons, carcinogenic polycyclic aromatic hydrocarbons (cPAHs), metals and volatile organic compounds (VOCs) detected at concentrations greater than the Model Toxics Control Act (MTCA) Method A Unrestricted Land Use (ULU) cleanup level or MTCA B screening level.
- Impacted Soil

  Some contaminants were detected at concentrations less than the respective MTCA cleanup levels. UWT may be able to reuse certain types of soil depending on the sampling results. UW EH&S must review the chemical analytical data to evaluate if reuse or disposal at an off site facility is necessary. Soil reuse and disposal are subject to Ecology Guidance for Remediation of Petroleum Contaminated Sites (Ecology, 2011), solid waste regulations and disposal facility permit conditions. The criteria below is herein referred to as “Reuse Criteria.”

  - Petroleum hydrocarbons, cPAHs and/or Lead

    The Ecology guidance indicates that soil with diesel- and/or lube oil-range petroleum hydrocarbons detected at concentrations less than 200 milligrams per kilogram (mg/kg) and/or gasoline-range petroleum hydrocarbons detected at concentrations less than 30 mg/kg are suitable for reuse as commercial fill at UWT campus with the following limitations:

    - placed above the highest water table,
    - not within 100 feet of a drinking water well,
    - not within wellhead protection area of public water supply,
    - not within wetlands or where surface water contact is possible, and
    - not within a surface water infiltration facility or septic drain field.

    If the concentrations exceed the above limits but are still less than respective MTCA cleanup levels the soil may be reused in road and bridge embankment construction, landfill daily cover or asphalt manufacturing with UW EH&S approval.

  - Arsenic, Cadmium, and/or Mercury

    Soil with concentrations of arsenic, cadmium and/or mercury above what is normally found in the natural background environment (Puget Sound Background levels - Ecology, 1994) is typically suitable for disposal at an inert waste landfill or a Department of Natural Resources (DNR) reclamation pit. UW EH&S approval is necessary.

Soil at and near the UWT campus has been well documented to contain chromium at concentrations slightly above the natural background level and is not considered in the "Reuse Criteria."

- Contaminated Groundwater
  - Petroleum hydrocarbons, PAHs and metals detected at concentrations greater than the respective MTCA Method A groundwater cleanup levels. Method B criteria were used for comparison of specific compounds if Method A groundwater cleanup levels are not established for those compounds.
  - VOCs detected at concentrations greater than the respective MTCA Method A groundwater cleanup levels, and MTCA Method B groundwater screening levels protective of indoor air. The updated TCE/PCE screening levels were calculated using Equation 1 from Ecology's review draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action" dated October 2009 (Ecology, 2009) and Environmental Protection Agency's (EPA's) TCE and PCE toxicity factors updated in 2011 and available on EPA's online Integrated Risk Information System (IRIS). The other values were obtained from Ecology's review draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action."

6.3. Soil

Soil samples were submitted for chemical analysis. The soil samples collected from the subsurface explorations were identified using the following identification system: A#-B#-start depth-end depth, where A# is the area designation number, B/TP# is the boring/test pit number and start depth-end depth is the depth interval in feet below the ground surface of specific sample (e.g., 1F-B1-9-10 was collected in Area 1F from boring 1 between 9 and 10 feet bgs).

Soil samples were submitted for chemical analysis based on the following:

- Where field screening indicated the soil is impacted.
- Directly below potentially impacted soil to delineate the vertical extent.
- Where wet sand seams were encountered in the ice-contact deposits or advance outwash.
- At the soil/groundwater interface if groundwater was encountered.
- At the top of confining units if encountered.

The soil samples were submitted for chemical analysis of petroleum hydrocarbon identification by Ecology-approved method NWTPH-HCID with appropriate follow up of gasoline-range petroleum hydrocarbons by Ecology-approved method NWTPH-Gx and/or diesel- and lube oil-range petroleum hydrocarbons by Ecology-approved method NWTPH-Dx; VOCs by EPA method 8260C, polycyclic aromatic hydrocarbons (PAHs) by EPA method 8270DSIM, and Resource Conservation and Recovery Act (RCRA) metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver) by EPA method 6000/7000 series.

6.3.1. Petroleum-Range Hydrocarbons

WITHIN FILL MATERIAL

A total of four soil samples collected within the fill material were submitted for petroleum hydrocarbon identification analysis. Gasoline-range petroleum hydrocarbons were detected in one soil sample, 1F-B2-7-8 at a concentration greater than the MTCA Method A ULU cleanup level of 100 mg/kg with a concentration of 940 mg/kg. Lube oil-range petroleum hydrocarbons were also detected in the same soil sample, at a concentration of 200 mg/kg, which is equivalent to the Reuse Criterion for lube oil-range hydrocarbons. Gasoline and lube oil-range petroleum hydrocarbons were not detected in the remaining analyzed soil samples. Diesel-range petroleum hydrocarbons were not detected in the analyzed soil samples.

WITHIN ICE-CONTACT DEPOSITS

A total of 13 soil samples collected within the ice-contact deposits were submitted for analysis of petroleum hydrocarbons by NWTPH-HCID. Gasoline-, diesel- and lube oil-range petroleum hydrocarbons were not detected in the soil samples collected from the ice-contact deposits.

6.3.2. VOCs

WITHIN FILL MATERIAL

VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels or Method B criteria in the analyzed soil samples collected from within the fill material.

WITHIN ICE-CONTACT DEPOSITS

PCE. PCE was not detected in the analyzed soil samples collected from within the ice-contact deposits.

TCE. TCE was detected at concentrations less than the MTCA Method A ULU cleanup level in the following soil samples with the concentrations detected identified in parenthesis.

- 1F-B1-9-10 (0.0021 mg/kg)
- 1F-B4-13-14 (0.0076 mg/kg)
- 1F-B5-7-8 (0.0054 mg/kg)
- 1F-B7-14-15 (0.0087 mg/kg)

TCE was not detected in the remaining analyzed soil samples collected within the ice-contact deposits.

Other VOCs. Other VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels or Method B criteria in the analyzed soil samples collected within the ice-contact deposits.

6.3.3. PAHs

PAHs were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup level and Method B criteria in the analyzed soil samples.

6.3.4. RCRA Metals

WITHIN FILL MATERIAL

RCRA metals were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels, the Method B criteria or Reuse Criteria in the four analyzed soil samples collected within the fill material.

WITHIN ICE-CONTACT DEPOSITS

RCRA metals were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels, the Method B criteria or Reuse Criteria in the analyzed soil samples collected within ice-contact deposits.

6.3.1. PCBs

PCBs were not detected in the two analyzed soil samples within the site.

6.4. Groundwater

Groundwater samples were collected from existing on-site monitoring wells UG-MW16 and UG-MW17. Groundwater samples were also collected from temporary wells installed in borings 1F-B3, 1F-B5, and 1F-B7. Groundwater samples collected from these temporary wells were submitted for chemical analysis of gasoline-range petroleum hydrocarbons by Ecology-approved method NWTPH-Gx, diesel- and lube oil-range petroleum hydrocarbons by Ecology-approved method NWTPH-Dx, VOCs by EPA method 8260C, PAHs by EPA method 8270DSIM, Total MTCA metals by EPA method 200.8 or 7470A. Additionally, samples from 1F-B3 and 1F-B5 were analyzed for PCB Aroclors by EPA method 8082. The groundwater samples from UG-MW16 and UG-MW17 were submitted for chemical analysis of VOCs by EPA method 8260C and PCB Aroclors by EPA method 8082.

6.4.1. Petroleum-Range Hydrocarbons

Diesel- and lube oil-range petroleum hydrocarbons were detected at a concentration less than the MTCA Method A groundwater cleanup level (0.5 milligram per liter [mg/L]) in the groundwater sample collected from temporary monitoring well 1F-B5 (0.46 mg/L and 0.42 mg/L, respectively). Diesel- and lube oil-range petroleum hydrocarbons were not detected in the remaining analyzed groundwater samples. Gasoline--range petroleum hydrocarbons were not detected in the analyzed groundwater samples.

6.4.2. VOCs

TCE was detected at a concentration greater than the MTCA Method A groundwater cleanup level (5 micrograms per liter [µg/L]) and the MTCA Method B groundwater screening level protective of indoor air (1.5 µg/L) in the five analyzed groundwater samples collected from the site. Concentrations are shown in parentheses.

- Screened within Shallow Aquifer
  - 1F-B3-W (180 µg/l)
  - 1F-B5-W (35 µg/l)
  - 1F-B7-W (30 µg/l)

- Screened Within Deep Aquifer
  - UG-MW-16 (170 µg/l)
  - UG-MW-17 (250 µg/l)

TCE was not detected in the remaining analyzed groundwater samples.

PCE was detected at concentrations less than the MTCA Method A groundwater cleanup level (5 µg/L) and the MTCA Method B groundwater screening level protective of indoor air (24 µg/L) in two samples (1F-B3-W [1.2 µg/l] and UG-MW-16 [(1.9 µg/L]). PCE was not detected in the remaining analyzed groundwater samples.

Cis-1,2-DCE was detected in two samples as well (1F-B5-W [1.4 µg/l] and UG-MW-16 [1.1 µg/L]) at concentrations less than the MTCA Method B groundwater cleanup level (16 µg/L) and the MTCA Method B groundwater screening level protective of indoor air (160 µg/L). Cis-1,2-DCE was not detected in the remaining analyzed groundwater samples.

Other VOCs were not detected in the analyzed groundwater samples.

6.4.3. PAHs

CPAHs were detected at a concentration less than the MTCA Method A groundwater cleanup level (0.1 µg/L) and the Method B criteria (0.012 µg/L) in sample at location 1F-B7 (TTEC concentration of 0.0011 µg/L). CPAHs were not detected in the remaining analyzed groundwater samples.

6.4.4. Metals

Metals were not detected in the analyzed groundwater samples.

6.4.5. PCBs

PCB Aroclors were not detected in the analyzed groundwater samples.

7.0 CONCLUSIONS

7.1. Soil

Gasoline-contaminated and lube oil-impacted soil is present within the fill material on the southeastern portion of the site (1F-B2) from 7 to 8 feet bgs.

TCE-impacted soil was observed in the ice-contact deposits on the central and western portion of the site at depths ranging between 7 and 15 feet bgs (1F-B2, 1F-B4, 1F-B5 and 1F-B7).

7.2. Groundwater

TCE-contaminated groundwater was detected in the permanent and temporary monitoring wells completed on the site. The permanent monitoring wells appeared to be screened within the advance outwash. The temporary monitoring wells were screened within the ice-contact deposits. It is possible the shallow and deep aquifers observed in the vicinity of the site may be comingling at the site based on a review of the available borings logs and water levels measured during the investigations. The estimated groundwater elevation ranges between approximately Elevation 155 and 140 feet from the west to the east side of the site.

PDA 1F is situated in the central portion of the Westerly Plume, which is comprised primarily of TCE. The source of the TCE within the Westerly Plume is not known. The identified historical property use (former dry cleaner and motorcycle service) indicates the site may also be a source of TCE. However, existing chemical analytical data on the site does not indicate an on-site source area. Additional investigation is necessary to further evaluate the site.

8.0 PROPOSED DEVELOPMENT PLANS

We understand UWT plans to construct new building at the site. We have assumed the following for the construction of the new building:

- The building will include the entire lot (25,000 square feet).
- The finished floor of the building will be the same elevation as Court D (approximately Elevation 146 feet).
- The bottom of the capillary break will be 1-foot below finished grade (Elevation 145 feet).
- Footings and utilities will extend 5 feet deeper than finished grade (approximately Elevation 140 feet).
- The west side of the building will be 16 feet high and will be adjacent to Fawcett Avenue.
- The estimated amount of soil to be generated based on the above assumptions is approximately 19,000 tons to excavate the site to subgrade (Elevation 145 feet). An additional 3,000 tons is estimated to be generated from the footings.

9.0 POTENTIAL IMPACTS AND MITIGATION MEASURES TO DESIGN AND CONSTRUCTION

We recommend UW develop and implement appropriate administrative institutional controls to limit or prohibit activities that may result in exposure to hazardous substances remaining at the site. Potential impacts to the design and construction of the site are the following:

- Site is a potential source.
- Potential UST.
- Groundwater is contaminated with TCE.
- Soil is contaminated with chemicals of concern (petroleum hydrocarbons).

Soil is impacted with chemicals of concern (TCE and petroleum hydrocarbons). Potential long-term impacts include:

- Long term disposal of underslab/perimeter footing drain TCE-impacted groundwater.
- Continued maintenance of vapor intrusion mitigation system, if necessary.

- Potential periodic indoor air sampling to confirm the vapor intrusion mitigation system may be necessary to evaluate the system is operating properly, if necessary.
- TCE-contaminated or TCE-impacted soil may remain adjacent and beneath the building following construction activities. UW should develop and implement appropriate institutional controls to help prevent exposure to residual contamination.

The following sections described potential impacts, mitigation measures and estimated costs to design and construction.

9.1. Site is Potential Source

This site is considered a potential source of TCE- and PCE-contaminated groundwater based on historical operations related to the former motorcycle repair and dry cleaner facilities. However, existing chemical analytical data on the site does not indicate an on-site source area. PDA 1F is also situated in the central portion of the larger Westerly Plume, which is comprised primarily of TCE. The source of the Westerly Plume is located upgradient of the site. Therefore full remediation is not feasible until the upgradient sources are remediated. Additional investigation will be necessary to evaluate soil and groundwater conditions in order to rule out the site as a source of TCE and PCE prior to development.

9.2. Potential UST

City records indicate a UST was left in place within the southwest portion of the site. Field screening results indicate gasoline may be present at a depth of approximately 7 feet bgs in boring 1F-B2. Additionally, a void space was encountered at approximately 8 feet bgs in this boring. The magnetic survey results did not indicate a potential UST in the area. However, the stormcepter and metal manholes in the area may have affected the magnetic survey results.

9.3. TCE-Contaminated Groundwater

TCE was detected in groundwater at concentrations greater than the MTCA Method A groundwater cleanup level and/or updated MTCA Method B groundwater screening level protective of indoor air in the shallow and deep aquifer wells located on the entire site.

TCE-contaminated groundwater will likely be encountered during construction based on the elevation of the groundwater (140 to 155 feet) and the anticipated cut of the building to 145 feet. This also indicates the TCE-contaminated groundwater will be in contact with the west side of the building and present beneath the building. Mitigation measures include:

Additional Investigation. Further subsurface investigation may be necessary to evaluate the vertical and lateral limits of the TCE-impacted soil and/or groundwater at the site. Soil vapor sampling is recommended to evaluate if a potential vapor intrusion pathway exists. The estimated cost for soil vapor sampling and additional investigation is $30,000 to $100,000.

Vapor Mitigation. Vapor intrusion occurs when VOCs migrate from contaminated soil or groundwater into overlying buildings through openings in the foundation. The route VOCs take from a subsurface source to the air inside a building is referred to as the vapor intrusion pathway. The most common sources of soil vapor are VOCs including TCE and PCE, which may pose short-term (TCE only) and long-term (chronic) risks through inhalation of contaminated indoor air.

Groundwater and soil vapor concentrations are typically utilized as screening levels regarding the potential for vapor intrusion. TCE was detected at a concentration that exceeds the screening level for updated MTCA Method B groundwater screening level protective of indoor air in the groundwater sample collected from the temporary and permanent monitoring wells on-site. TCE-contaminated groundwater in the shallow aquifer may be in contact with the west side of the finished building and present beneath the building.

Soil vapor sampling was not completed as part of this investigation. Additional on-site characterization may be necessary to evaluate the vertical and lateral limits of the TCE soil vapors. Soil vapor sampling is recommended near the elevation of the proposed subgrade to evaluate if a potential vapor intrusion pathway exists. If a potential vapor intrusion pathway exists, then a vapor intrusion mitigation system may be necessary. Potential mitigation options to prevent vapor intrusion include:

- A passive vapor barrier beneath the building. Passive vapor barriers are typically used in combination with another mitigation option (venting or building pressurization). We recommend the vapor barrier be installed below the elevation of penetrations (pipes, etc.) that may be installed after the programing is identified in the future. Penetrating the vapor barrier following the construction will add to the cost of construction.
- Passive or active venting system beneath the building. The venting system may need to be combined with an underslab and perimeter drain to reduce the potential for shallow groundwater to enter the venting system.

The estimated cost for design and installation of indoor air mitigation system ranges between $5 per square foot to $12 per square foot of building space. The estimated costs for the vapor mitigation system for a building on the entire site may range between $125,000 and $300,000. Potential periodic indoor air sampling to confirm the vapor intrusion mitigation system may be necessary to evaluate the system is operating properly following construction of the building. The estimated cost for long term monitoring is unknown.

Underslab/Footing Drainage. Underslab/footing drainage system may be required to prevent water from entering into the vapor mitigation vent system. The water will likely have to be directed to the City of Tacoma sanitary sewer based on concentrations of the chemicals of concern detected in the groundwater. A long-term cost may be associated with discharge of the water to the City sanitary sewer system. An underslab footing drain will likely be required based on the elevation of the groundwater (140 to 155-feet). The estimated cost of the underslab footing drain is $75,000 to $150,000.

Construction Water Management. TCE-contaminated groundwater encountered during construction will have to be managed. Water generated during construction will likely be stored in tanks, sampled and analyzed. Water disposal will be coordinated with UW EH&S at a UW-approved disposal facility. It is anticipated the construction dewatering water will be suitable for discharge into the storm sewer based on the concentrations detected in the existing wells during this investigation. The water may be disposed in the City of Tacoma sanitary sewer. The City of Tacoma charges approximately $0.0034 per gallon of water. The estimated volume of water generated will be based on construction methods. The base cost estimate includes the cost of disposal of water for 120 days of earthwork construction, approximate cost of collecting ten water samples over the course of the project ($15,000) and two 25,000 gallon storage tanks ($7,000 each per month).

Approximately 12,000 gallons per day is estimated to be generated on the site from dewatering activities. The estimated cost of construction water management if disposal into the City of Tacoma sanitary sewer is necessary is approximately $48,000.

Cross-Contamination. The vertical and lateral extent of the TCE-contaminated groundwater. The presence of the shallow and deep aquifer is not known. Additional investigation will be necessary to evaluate the presence and the potential for cross contamination between the two potential aquifers. This investigation would be completed in concurrence with the additional investigation to evaluate the lateral and vertical extent of the contamination. If cross-contamination between aquifers is an impact, additional construction costs will likely apply. However it appears concern for cross contamination between the two aquifers may not be warranted at this site. For budgeting purposes, additional construction cost is estimated to be between $12,500 and $75,000 if cross-contamination is identified as an impact.

Health and Safety. Workers who may be in contact with potentially contaminated soil or groundwater at a state-listed cleanup site have HAZWOPER training. The requirement is consistent with the Washington Administrative Code (WAC) 296-843-100, *Hazardous Waste Operations*, which indicates that on-site personnel are required to have current health and safety training in accordance with Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response requirements in 29 CFR 1910.120. The rule also requires the earthwork contractor and other personnel who could potentially contact contaminated materials to develop and implement a written safety and health program for their employees involved in hazardous waste operations under 29 CFR 1910.120. The estimated cost for the contractor to be HAZWOPER trained and have appropriate liability insurance is roughly between $10,000 and $70,000 depending on the number of subcontractors that require training.

9.4. Soil is Contaminated with Chemicals of Concern

Contaminated soil (petroleum hydrocarbons) and impacted soil (TCE and cPAHs) will likely be generated during construction activities. We recommend UW implement the following actions.

- Characterize Soil and Groundwater for Disposal. In-situ characterization or stockpiling and subsequent sampling will need to be performed on soil that is generated during construction in areas of TCE-impacted, petroleum- and cPAH-contaminated and cPAH-impacted soil. The estimate cost of the soil sampling for soil disposal is $60,000 to $80,000 based on the mass of soil to be excavated. This cost may be reduced if the mass of soil is reduced by not removing the soil prism in Court C.
- Complete Remedial Excavation of Petroleum-Contaminated Soil. Gasoline-range petroleum hydrocarbons soil is present in the southeast portion of the site. Remedial excavation of the gasoline-contaminated soil may be required during construction of the building. The mass of soil to be excavated is approximately 150 tons. The estimated cost for excavation, transportation and disposal at a UW-approved Subtitle D landfill or treatment facility is $21,000 to 24,000 assuming the contractor has mobilized to the site and restoration of the area is completed as part of the building construction project.

- **TCE-Impacted and Contaminated Soil.** When TCE and breakdown products are detected in soil, UW EH&S will work with Ecology on obtaining a "contained-in determination" for disposal of the waste. The source of the solvent contamination, the concentration of the solvents and a Toxicity Characteristic Leaching Procedure (TCLP) analytical test result will be used when evaluating if the soil is disposed as hazardous waste by UW EH&S at a RCRA-permitted Subtitle C landfill or as a solid waste at a UW-approved Subtitle D landfill. Past experience has demonstrated that it is fairly likely that the "contained-in determination" will be granted, thus we based our cost estimates on this assumption.

  The estimated cost for transportation and disposal (not including excavation and loading) of soil to a Subtitle D landfill with a contained-in determination is $80 to $100 per ton. The cost for transportation and disposal (not including excavation and loading) of soil to a RCRA Subtitle C Landfill is $250 to $300 per ton. The cost estimates do not include disposal of soil as a dangerous waste at a RCRA Subtitle C landfill.

  The estimated mass of TCE-contaminated and impacted soil is approximately 14,000 tons. This estimate assumes soil below Elevation 151 feet is considered TCE-impacted soil on the entire site. The estimated cost for transportation and disposal of the TCE-contaminated and impacted soil is $1,120,000 to $1,400,000. This estimate could be reduced if the building was raised in elevation.

- **CPAHs-Impacted Soil.** CPAHs-impacted soil is present to a depth of approximately 7 feet bgs on the eastern portion of the site. For budgeting purposes, we assumed the transportation and disposal of cPAH-impacted soil is $30 to $50 per ton. We estimate the mass of the cPAH-impacted soil to be 200 tons. This estimate assumes a limited area of impact, but to a depth of 7 feet bgs. The estimated cost for transportation and disposal ranges between $7,500 and $12,500. If soil is reused as fill on site, the cost would be reduced because offsite disposal of the impacted soil will not be required.

- **Health and Safety.** As discussed in the contaminated groundwater section, WAC 296-843-100 requires its earthwork contractor and other personnel who could potentially contact contaminated materials to comply with HAZWOPER training requirements for handling soil and potentially groundwater on the site. The health and safety costs are not included as a separate item in the soil, because the costs in the groundwater section will apply.

10.0 LIMITATIONS

This report has been prepared for use by the University of Washington for the Priority Development Area 1F – Fawcett Parking Lot T47/48 property located in Tacoma, Washington at the University of Washington Tacoma campus.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

Please refer to Appendix A titled "Report Limitations and Guidelines for Use" for additional information pertaining to use of this report.

11.0 REFERENCES

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Table 1

Summary of Chemical Analytical Results[1] - Soil

Area 1F - Fawcett Parking/Lot T47 and 48
Priority Development Areas - University of Washington Tacoma
Tacoma, Washington

Boring/Test Pit	1F-B1			1F-B2			1F-B3		1F-B4		1F-B5		1F-B6		1F-B7			MTCA Method A ULU Cleanup Level	Reuse Criteria [16]
Sample Identification [2]	1F-B1-0.3-1.3	1F-B1-4-5	1F-B1-9-10	1F-B2-0.3-1.3	1F-B2-7-8	1F-B2-9-10	1F-B3-2-3	1F-B3-5-6	1F-B4-2-3	1F-B4-13-14	1F-B5-3-4	1F-B5-7-8	1F-B6-4-5	1F-B6-12-13	1F-B7-3-4	1F-B7-9-10	1F-B7-14-15		
Sample Depth (feet bgs)	0.3 to 1.3	4 to 5	9 to 10	0.3 to 1.3	7 to 8	9 to 10	2 to 3	5 to 6	2 to 3	13 to 14	3 to 4	7 to 8	4 to 5	12 to 13	3 to 4	9 to 10	14 to 15		
Soil Type	Fill	Qvi	Qvi	Fill	Fill	Qvi	Qvi	Qvi	Qvi	Qvi	Qvi	Qvi	Fill	Qvi	Fill	Qvi	Qvi		
NWTPH-HCID [3] (mg/kg)																			
Gasoline-Range	21 U	22 U	23 U	21 U	DET	22 U	24 U	23 U	22 U	24 U	22 U	22 U	21 U	22 U	21 U	--	24 U	30/100[12]	30
Diesel-Range	53 U	56 U	56 U	52 U	55 U	55 U	60 U	57 U	54 U	59 U	54 U	56 U	53 U	55 U	53 U	--	59 U	2,000	200
Lube Oil-Range	110 U	110 U	110 U	110 U	DET	110 U	120 U	110 U	110 U	120 U	110 U	110 U	110 U	110 U	110 U	--	120 U	2,000	200
NWTPH-Gx [4] (mg/kg)																			
Gasoline-Range Petroleum Hydrocarbons	--	--	--	--	940 J	--	--	--	--	--	--	--	--	--	--	--	--	30/100[12]	30
NWTPH-Dx [5] (mg/kg)																			
Diesel-Range Petroleum Hydrocarbons	--	--	--	--	94 J	--	--	--	--	--	--	--	--	--	--	--	--	2,000	200
Lube Oil-Range Petroleum Hydrocarbons	--	--	--	--	200	--	--	--	--	--	--	--	--	--	--	--	--	2,000	200
VOCs [6] (mg/kg)																			
Tetrachloroethene (PCE)	0.0013 U	0.00094 U	0.00080 U	0.00085 U	0.00065 U	0.00071 U	0.00089 U	0.00078 U	0.00084 U	0.00085 U	0.00086 U	0.00083 U	0.00098 U	0.00071 U	0.0010 U	0.00088 U	0.00093 U	0.05	DET
Trichloroethene (TCE)	0.0013 U	0.00094 U	0.0021	0.00085 U	0.00065 U	0.00071 U	0.00089 U	0.00078 U	0.00084 U	0.0076	0.00086 U	0.0054	0.00098 U	0.00071 U	0.0010 U	0.00088 U	0.0087	0.03	DET
(cis) 1,2-Dichloroethene	0.0013 U	0.00094 U	0.00080 U	0.00085 U	0.00065 U	0.00071 U	0.00089 U	0.00078 U	0.00084 U	0.00085 U	0.00086 U	0.00083 U	0.00098 U	0.00071 U	0.0010 U	0.00088 U	0.00093 U	160[13]	DET
(trans) 1,2-Dichloroethene	0.0013 U	0.00094 U	0.00080 U	0.00085 U	0.00065 U	0.00071 U	0.00089 U	0.00078 U	0.00084 U	0.00085 U	0.00086 U	0.00083 U	0.00098 U	0.00071 U	0.0010 U	0.00088 U	0.00093 U	1,600[13]	DET
Vinyl Chloride	0.0013 U	0.00094 U	0.00080 U	0.00085 U	0.00065 U	0.00071 U	0.00089 U	0.00078 U	0.00084 U	0.00085 U	0.00086 U	0.00083 U	0.00098 U	0.00071 U	0.0010 U	0.00088 U	0.00093 U	0.67[13]	DET
Ethylbenzene	0.0013 U	0.00094 U	0.00080 U	0.00085 U	0.00065 U	0.00071 U	0.00089 U	0.00078 U	0.00084 U	0.00085 U	0.00086 U	0.00083 U	0.00098 U	0.00071 U	0.0010 U	0.00088 U	0.00093 U	6	6
Naphthalene	0.0013 U	0.00094 U	0.00080 U	0.00085 U	0.0031	0.00071 U	0.00089 U	0.00078 U	0.00084 U	0.00085 U	0.00086 U	0.00083 U	0.00098 U	0.00071 U	0.0010 U	0.00088 U	0.00093 U	5	5
Isopropylbenzene (Cumene)	0.0013 U	0.00094 U	0.00080 U	0.00085 U	0.0039	0.00071 U	0.00089 U	0.00078 U	0.00084 U	0.00085 U	0.00086 U	0.00083 U	0.00098 U	0.00071 U	0.0010 U	0.00088 U	0.00093 U	8,000[13]	NE
n-Butylbenzene	0.0013 U	0.00094 U	0.00080 U	0.00085 U	0.013	0.00071 U	0.00089 U	0.00078 U	0.00084 U	0.00085 U	0.00086 U	0.00083 U	0.00098 U	0.00071 U	0.0010 U	0.00088 U	0.00093 U	4,000[13]	NE
n-Propylbenzene	0.0013 U	0.00094 U	0.00080 U	0.00085 U	0.0085	0.00071 U	0.00089 U	0.00078 U	0.00084 U	0.00085 U	0.00086 U	0.00083 U	0.00098 U	0.00071 U	0.0010 U	0.00088 U	0.00093 U	8,000[13]	NE
p-Isopropyltoluene	0.0013 U	0.00094 U	0.00080 U	0.00085 U	0.0048	0.00071 U	0.00089 U	0.00078 U	0.00084 U	0.00085 U	0.00086 U	0.00083 U	0.00098 U	0.00071 U	0.0010 U	0.00088 U	0.00093 U	NE	NE
Sec-Butylbenzene	0.0013 U	0.00094 U	0.00080 U	0.00085 U	0.013	0.00071 U	0.00089 U	0.00078 U	0.00084 U	0.00085 U	0.00086 U	0.00083 U	0.00098 U	0.00071 U	0.0010 U	0.00088 U	0.00093 U	8,000[13]	NE
Tert-Butylbenzene	0.0013 U	0.00094 U	0.00080 U	0.00085 U	0.00093	0.00071 U	0.00089 U	0.00078 U	0.00084 U	0.00085 U	0.00086 U	0.00083 U	0.00098 U	0.00071 U	0.0010 U	0.00088 U	0.00093 U	8,000[13]	NE
1,2,4-Trimethylbenzene[7]	0.0013 U	0.00094 U	0.00080 U	0.00085 U	0.050	0.00071 U	0.00089 U	0.00078 U	0.00084 U	0.00085 U	0.00086 U	0.00083 U	0.00098 U	0.00071 U	0.0010 U	0.00088 U	0.00093 U	NE	NE
1,3,5-Trimethylbenzene[7]	0.0013 U	0.00094 U	0.00080 U	0.00085 U	0.0033	0.00071 U	0.00089 U	0.00078 U	0.00084 U	0.00085 U	0.00086 U	0.00083 U	0.00098 U	0.00071 U	0.0010 U	0.00088 U	0.00093 U	8,000[13]	NE
2-Butanone (MEK)[7]	0.0065 U	0.0047 U	0.0040 U	0.0043 U	0.0032 U	0.0035 U	0.0044 U	0.0039 U	0.0042 U	0.0043 U	0.0043 U	0.0042 U	0.0079	0.0035 U	0.0052 U	0.0044 U	0.0047 U	48,000[13]	NE
Acetone[7]	0.0065 U	0.0047 U	0.0040 U	0.0043 U	0.022	0.0035 U	0.0044 U	0.0039 U	0.0042 U	0.0043 U	0.0043 U	0.0042 U	0.038	0.0035 U	0.0052 U	0.0044 U	0.0047 U	72,000[13]	NE
Carbon Disulfide[7]	0.0013 U	0.00094 U	0.00080 U	0.00085 U	0.00065 U	0.00071 U	0.00089 U	0.00078 U	0.00084 U	0.00085 U	0.00086 U	0.00083 U	0.0013	0.00071 U	0.0010 U	0.00088 U	0.00093 U	8,000[13]	NE
PAHs [8] (mg/kg)																			
1-Methylnaphthalene	0.0070 U	0.0074 U	0.0075 U	0.0070 U	0.016	0.0073 U	0.0079 U	0.0076 U	0.0073 U	0.0078 U	0.0072 U	0.0075 U	0.0071 U	0.0074 U	0.0070 U	--	0.0079 U	35[13]	NE
2-Methylnaphthalene	0.0070 U	0.0074 U	0.0075 U	0.0070 U	0.027	0.0073 U	0.0079 U	0.0076 U	0.0073 U	0.0078 U	0.0072 U	0.0075 U	0.0071 U	0.0074 U	0.0070 U	--	0.0079 U	320[13]	NE
Acenaphthene	0.0070 U	0.0074 U	0.0075 U	0.0070 U	0.0073 U	0.0073 U	0.0079 U	0.0076 U	0.0073 U	0.0078 U	0.0072 U	0.0075 U	0.0071 U	0.0074 U	0.0070 U	--	0.0079 U	4,800[13]	NE
Acenaphthylene	0.0070 U	0.0074 U	0.0075 U	0.0070 U	0.0073 U	0.0073 U	0.0079 U	0.0076 U	0.0073 U	0.0078 U	0.0072 U	0.0075 U	0.0071 U	0.0074 U	0.0070 U	--	0.0079 U	NE	NE
Anthracene	0.0070 U	0.0074 U	0.0075 U	0.0070 U	0.0073 U	0.0073 U	0.0079 U	0.011	0.0073 U	0.0078 U	0.0072 U	0.0075 U	0.012	0.0074 U	0.0070 U	--	0.0079 U	24,000[13]	NE
Benzo[g,h,i]perylene	0.0070 U	0.0074 U	0.0075 U	0.0084	0.0073 U	0.0073 U	0.0079 U	0.0076 U	0.0073 U	0.0078 U	0.0072 U	0.0075 U	0.021	0.0074 U	0.0070 U	--	0.0079 U	NE	NE
Fluoranthene	0.0070 U	0.0074 U	0.0075 U	0.019	0.0073 U	0.0073 U	0.0079 U	0.0076 U	0.0073 U	0.0078 U	0.0072 U	0.0075 U	0.063	0.0074 U	0.0070 U	--	0.0079 U	3,200[13]	NE
Fluorene	0.0070 U	0.0074 U	0.0075 U	0.0070 U	0.0073 U	0.0073 U	0.0079 U	0.0076 U	0.0073 U	0.0078 U	0.0072 U	0.0075 U	0.0071 U	0.0074 U	0.0070 U	--	0.0079 U	3,200[13]	NE
Naphthalene	0.0070 U	0.0074 U	0.0075 U	0.0070 U	0.030	0.0073 U	0.0079 U	0.0076 U	0.0073 U	0.0078 U	0.0072 U	0.0075 U	0.010	0.0074 U	0.0070 U	--	0.0079 U	5	5
Phenanthrene	0.0070 U	0.0074 U	0.0075 U	0.011	0.011	0.0073 U	0.0079 U	0.011	0.0073 U	0.0078 U	0.0072 U	0.0075 U	0.055	0.0074 U	0.0070 U	--	0.0079 U	NE	NE
Pyrene	0.0070 U	0.0074 U	0.0075 U	0.030	0.0073 U	0.0073 U	0.0079 U	0.0076 U	0.0073 U	0.0078 U	0.0072 U	0.0075 U	0.078	0.0074 U	0.0070 U	--	0.0079 U	2,400[13]	NE

Boring/Test Pit	1F-B1			1F-B2			1F-B3		1F-B4		1F-B5		1F-B6		1F-B7			MTCA Method A ULU Cleanup Level	Reuse Criteria [16]
Sample Identification [2]	1F-B1-0.3-1.3	1F-B1-4-5	1F-B1-9-10	1F-B2-0.3-1.3	1F-B2-7-8	1F-B2-9-10	1F-B3-2-3	1F-B3-5-6	1F-B4-2-3	1F-B4-13-14	1F-B5-3-4	1F-B5-7-8	1F-B6-4-5	1F-B6-12-13	1F-B7-3-4	1F-B7-9-10	1F-B7-14-15		
Sample Depth (feet bgs)	0.3 to 1.3	4 to 5	9 to 10	0.3 to 1.3	7 to 8	9 to 10	2 to 3	5 to 6	2 to 3	13 to 14	3 to 4	7 to 8	4 to 5	12 to 13	3 to 4	9 to 10	14 to 15		
Soil Type	Fill	Qvi	Qvi	Fill	Fill	Qvi	Qvi	Qvi	Qvi	Qvi	Qvi	Qvi	Fill	Qvi	Fill	Qvi	Qvi		
cPAHs[8] (mg/kg)																			
Benzo (a) anthracene (TEF 0.1)	0.0070 U	0.0074 U	0.0075 U	**0.017**	0.0073 U	0.0073 U	0.0079 U	**0.011**	0.0073 U	0.0078 U	0.0072 U	0.0075 U	**0.032**	0.0074 U	0.0070 U	--	0.0079 U	MTCA ULU cleanup level for the sum of all cPAHs is 0.1 mg/kg	Reuse Criteria for the sum of all cPAHs is 0.1 mg/kg
Benzo (a) pyrene (TEF 1)	0.0070 U	0.0074 U	0.0075 U	**0.015**	0.0073 U	0.0073 U	0.0079 U	0.0076 U	0.0073 U	0.0078 U	0.0072 U	0.0075 U	**0.035**	0.0074 U	0.0070 U	--	0.0079 U		
Benzo (b) fluoranthene (TEF 0.1)	0.0070 U	0.0074 U	0.0075 U	**0.014**	0.0073 U	0.0073 U	0.0079 U	0.0076 U	0.0073 U	0.0078 U	0.0072 U	0.0075 U	**0.038**	0.0074 U	0.0070 U	--	0.0079 U		
Benzo (J,k) fluoranthene (TEF 0.1)	0.0070 U	0.0074 U	0.0075 U	0.0070 U	0.0073 U	0.0073 U	0.0079 U	0.0076 U	0.0073 U	0.0078 U	0.0072 U	0.0075 U	**0.013**	0.0074 U	0.0070 U	--	0.0079 U		
Chrysene (TEF 0.01)	0.0070 U	0.0074 U	0.0075 U	**0.015**	**0.012**	0.0073 U	0.0079 U	0.0076 U	0.0073 U	0.0078 U	0.0072 U	0.0075 U	**0.038**	0.0074 U	0.0070 U	--	0.0079 U		
Dibenz (a,h) anthracene (TEF 0.1)	0.0070 U	0.0074 U	0.0075 U	0.0070 U	0.0073 U	0.0073 U	0.0079 U	0.0076 U	0.0073 U	0.0078 U	0.0072 U	0.0075 U	0.0071 U	0.0074 U	0.0070 U	--	0.0079 U		
Indeno (1,2,3-cd) pyrene (TEF 0.1)	0.0070 U	0.0074 U	0.0075 U	0.0070 U	0.0073 U	0.0073 U	0.0079 U	0.0076 U	0.0073 U	0.0078 U	0.0072 U	0.0075 U	**0.017**	0.0074 U	0.0070 U	--	0.0079 U		
Total TTEC of cPAHs (detect only)	N/A	N/A	N/A	**0.018**	**0.0001**	N/A	N/A	**0.001**	N/A	N/A	N/A	N/A	**0.045**	N/A	N/A	--	N/A	0.1	0.1
Metals[9] (mg/kg)																			
Arsenic	11 U	11 U	11 U	10 U	11 U	11 U	12 U	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	--	12 U	20	7
Barium	**71**	**44**	**53**	**44**	**49**	**43**	**76**	**53**	**38**	**61**	**34**	**48**	**61**	**48**	**71**	--	**39**	16,000[13]	NE
Cadmium	0.53 U	0.56 U	0.56 U	0.52 U	0.55 U	0.55 U	0.60 U	0.57 U	0.54 U	0.59 U	0.54 U	0.56 U	0.53 U	0.55 U	0.53 U	--	0.59 U	2.0	1.0
Chromium	**27**	**29**	**45**	**14**	**30**	**27**	**35**	**49**	**22**	**28**	**29**	**29**	**18**	**43**	**22**	--	**17**	2,000 [14]	48[17]
Lead	5.3 U	5.6 U	5.6 U	5.2 U	5.5 U	5.5 U	6.0 U	5.7 U	5.4 U	5.9 U	5.4 U	5.6 U	5.3 U	5.5 U	5.3 U	--	5.9 U	250	50
Mercury	0.26 U	0.28 U	0.28 U	0.26 U	0.27 U	0.27 U	0.30 U	0.29 U	0.27 U	0.29 U	0.27 U	0.28 U	0.27 U	0.28 U	0.26 U	--	0.30 U	2.0	0.07 or DET
Selenium	11 U	11 U	11 U	10 U	11 U	11 U	12 U	11 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U	--	12 U	400[13]	NE
Silver	1.1 U	1.1 U	1.1 U	1.0 U	1.1 U	1.1 U	1.2 U	1.1 U	1.1 U	1.2 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	--	1.2 U	400[13]	NE
PCBs[10] (mg/kg)																			
PCBs[11]	--	--	--	--	--	--	0.060 U	0.057 U	--	--	--	--	--	--	--	--	--	1[15]	DET

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc., of Redmond, Washington.

[2] Sample ID = Area number - boring/test pit number - starting depth of sample [feet bgs] -end depth [feet bgs], Area 1F Boring 1 collected 4-5 feet bgs = 1F-B1-4-5.

[3] Washington State Department of Ecology (Ecology)-approved method NWTPH-HCID.

[4] Ecology-approved method NWTPH-Gx.

[5] Ecology-approved method NWTPH-Dx.

[6] VOCs were analyzed by EPA method 8260B. Other VOCs were analyzed but not detected.

[7] This compound is a common laboratory contaminant.

[8] Polycyclic aromatic hydrocarbons (PAHs) and carcinogenic PAHs (cPAHs) were analyzed by U.S. Environmental Protection Agency (EPA) method 8270D/SIM. Other PAHs were analyzed but not detected.

[9] Resource Conservation Recovery Act (RCRA) metals analyzed by EPA 6000/7000 series method.

[10] Polychlorinated biphenyls (PCBs) were analyzed by U.S. Environmental Protection Agency (EPA) method 8082.

[11] All PCB aroclors were not detected. The higher detection limit is shown.

[12] MTCA Method A cleanup level for gasoline is 30 mg/kg if benzene is detected or if the sum of toluene, ethylbenzene and xylenes are equal to or greater than 1% of the total gasoline detection.

[13] MTCA Method B criteria represented because MTCA Method A cleanup level has not been established.

[14] MTCA Method A cleanup level for Trivalent Chromium.

[15] MTCA ULU cleanup level for the sum of all PCBs is 1 mg/kg.

[16] Guidance for Remediation of Petroleum Contaminated Sites (Publication 10-09-057) Ecology, October 2011; Summary Natural Background Soil Metals Concentrations in Washington State (Publication 94-115) dated October 1994; and Hazardous Waste Regulations 40 CFR Part 260.

[17] Chromium was not compared to the Reuse Criteria listed above for soils based on historic soil analytical results indicating chromium is not a prevalent chemical of concern on the UWT campus.

mg/kg = milligram per kilogram

-- = sample not analyzed

N/A = not applicable

DET = Detected greater than laboratory reporting limits

MTCA = Model Toxics Control Act

bgs = below ground surface

Qvi = Ice-contact deposit

U = Analyte was not detected at or greater than the listed reporting limit

J = Estimated result by the analytical laboratory.

TEF = Toxicity Equivalency Factor as defined in WAC 173-340-900 Table 708-2

Total Toxic Equivalent Concentration (TTEC) is the sum of each individual cPAH concentration multiplied by its corresponding TEF.

Bold type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Bold font type and gray shading indicates that the detected concentration is greater than the respective MTCA cleanup level.

Dashed outline indicates the value is greater than the Reuse Criteria.

Table 2

Summary of Chemical Analytical Results[1] - Groundwater

Area 1F - Fawcett Parking/Lot T47 and 48
Priority Development Areas - University of Washington Tacoma
Tacoma, Washington

Boring Identification	1F-B3	1F-B5	1F-B7	UG-MW16	UG-MW17	MTCA Method A Groundwater Cleanup Level	MTCA Method B Air Screening Level [14]
Sample ID [2]	1F-B3-W	1F-B5-W	1F-B7-W	UG-MW16-130617	UG-MW17-130617		
Sample Date	6/12/2013	6/12/2013	6/11/2013	6/17/2013	6/17/2013		
Approximate Depth to Groundwater (feet bgs) [3]	6	8.5	14	9.30	3.80		
Approximate Elevation of Groundwater [4]	148	149.5	144	141.69	151.66		
Top of Well Screen Elevation (feet) [4]	149	151	146	144	153		
Bottom of Well Screen Elevation (feet) [4]	144	146	141	129	138		
Lithology At Well Screen	Qvi	Qvi	Qvi	Outwash	Outwash		
Chemical							
NWTPH-Gx [5] (µg/L)							
Gasoline-Range	100 U	100 U	100 U	--	--	800/1,000[11]	NE
NWTPH-Dx [6] (mg/L)							
Diesel-Range	0.25 U	**0.46**	0.26 U	--	--	0.5	NE
Lube Oil-Range	0.41 U	**0.42**	0.41 U	--	--	0.5	NE
VOCs [7] (µg/L)							
Trichloroethene (TCE)	**180**	**35**	**30**	**170**	**250**	5	1.5
Tetrachloroethene (PCE)	**1.2**	0.20 U	0.20 U	**1.9**	2.0 U	5	24
(cis) 1,2-Dichloroethene	1.0 U	**1.4**	0.20 U	**1.1**	2.0 U	16[12]	160
(trans) 1,2-Dichloroethene	1.0 U	0.20 U	0.20 U	1.0 U	2.0 U	160[12]	110
Vinyl Chloride	0.50 U	0.10 U	0.10 U	0.50 U	1.0 U	0.2	0.35
cPAHs [8] (µg/L)							
Benzo (a) anthracene (TEF 0.1)	0.010 U	0.010 U	**0.011**	--	--	MTCA ULU cleanup level for the sum of all cPAHs is 0.1 µg/L	NE
Benzo (a) pyrene (TEF 1)	0.010 U	0.010 U	0.0095 U	--	--		NE
Benzo (b) fluoranthene (TEF 0.1)	0.010 U	0.010 U	0.0095 U	--	--		NE
Benzo (j,k) fluoranthene (TEF 0.1)	0.010 U	0.010 U	0.0095 U	--	--		NE
Chrysene (TEF 0.01)	0.010 U	0.010 U	0.0095 U	--	--		NE
Dibenz (a,h) anthracene (TEF 0.1)	0.010 U	0.010 U	0.0095 U	--	--		NE
Indeno (1,2,3-cd) pyrene (TEF 0.1)	0.010 U	0.010 U	0.0095 U	--	--		NE
Total TTEC of cPAHs (detect only)	N/A	N/A	**0.0011**	--	--	0.1	NE
Dissolved Metals [9] (µg/L)							
Arsenic	3.0 U	3.0 U	3.0 U	--	--	5	NE
Cadmium	4.0 U	4.0 U	4.0 U	--	--	5	NE
Total Chromium	10 U	10 U	10 U	--	--	50[13]	NE
Lead	1.0 U	1.0 U	1.0 U	--	--	15	NE
Mercury	0.50 U	0.50 U	0.50 U	--	--	2	NE
PCB Aroclors [10]							
PCB-aroclor 1016	0.048 U	0.093 U	--	0.048 U	0.051 U	MTCA ULU cleanup level for the sum of all PCBs is 0.1 µg/L	NE
PCB-aroclor 1221	0.048 U	0.093 U	--	0.048 U	0.051 U		NE
PCB-aroclor 1232	0.048 U	0.093 U	--	0.048 U	0.051 U		NE
PCB-aroclor 1242	0.048 U	0.093 U	--	0.048 U	0.051 U		NE
PCB-aroclor 1248	0.048 U	0.093 U	--	0.048 U	0.051 U		NE
PCB-aroclor 1254	0.048 U	0.093 U	--	0.048 U	0.051 U		NE
PCB-aroclor 1260	0.048 U	0.093 U	--	0.048 U	0.051 U		NE

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc. in Redmond, Washington.

[2] Sample ID = Area number - Boring number - Water sample (i.e., a water sample collected from Area F, Boring 3 = 1F-B3-W)

[3] Groundwater level was measured below the existing ground surface in the temporary well. Groundwater level measured below top of casing in permanent monitoring wells

[4] Based on survey completed by AHBL November 6, 2013. Horizontal datum - NAD 83/91 Washington State Plane - South Zone (City of Tacoma Horizontal Control Holding City Monument Numbers 411 and 414). Vertical datum NGVD 29 (brass monument at South 19th and Fawcett Avenue, Elevation 165.15).

[5] Washington State Department of Ecology (Ecology)-approved method NWTPH-Gx.

[6] Ecology-approved method NWTPH-Dx.

[7] Volatile organic compounds (VOCs) were analyzed by EPA method 8260C. Other VOCs were analyzed but not detected.

[8] Polycyclic Aromatic Hydrocarbons (PAHs) analyzed by EPA method 8270D/SIM. Other PAHs were analyzed but not detected.

[9] Metals analyzed by U.S. Environmental Protection Agency (EPA) 200.8 or 7470A method.

[10] Polychlorinated biphenyls (PCBs) analyzed by EPA method 8082.

[11] MTCA Method A cleanup level for gasoline-range petroleum hydrocarbons is 800 µg/L if benzene is present and 1,000 µg/L if benzene is not present.

[12] MTCA Method B criteria represented because MTCA Method A cleanup level has not been established.

[12] MTCA Method A cleanup level for total chromium shown. Cleanup level for hexavalent chromium is 48 µg/L.

[14] MTCA Method B Indoor Air Screening Level from Washington State Deportment of Ecology Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action. Values updated as appropriate to incorporate recent toxicity data.

MTCA = Model Toxics Control Act

-- = sample not analyzed.

µg/L = microgram per Liter

U = Analyte was not detected at or greater than the listed reporting limit

Outwash = Advance Outwash

N/A = not applicable

Qvi = Ice-contact deposit

TEF = Toxicity Equivalency Factor as defined in WAC 173-340-900 Table 708-2

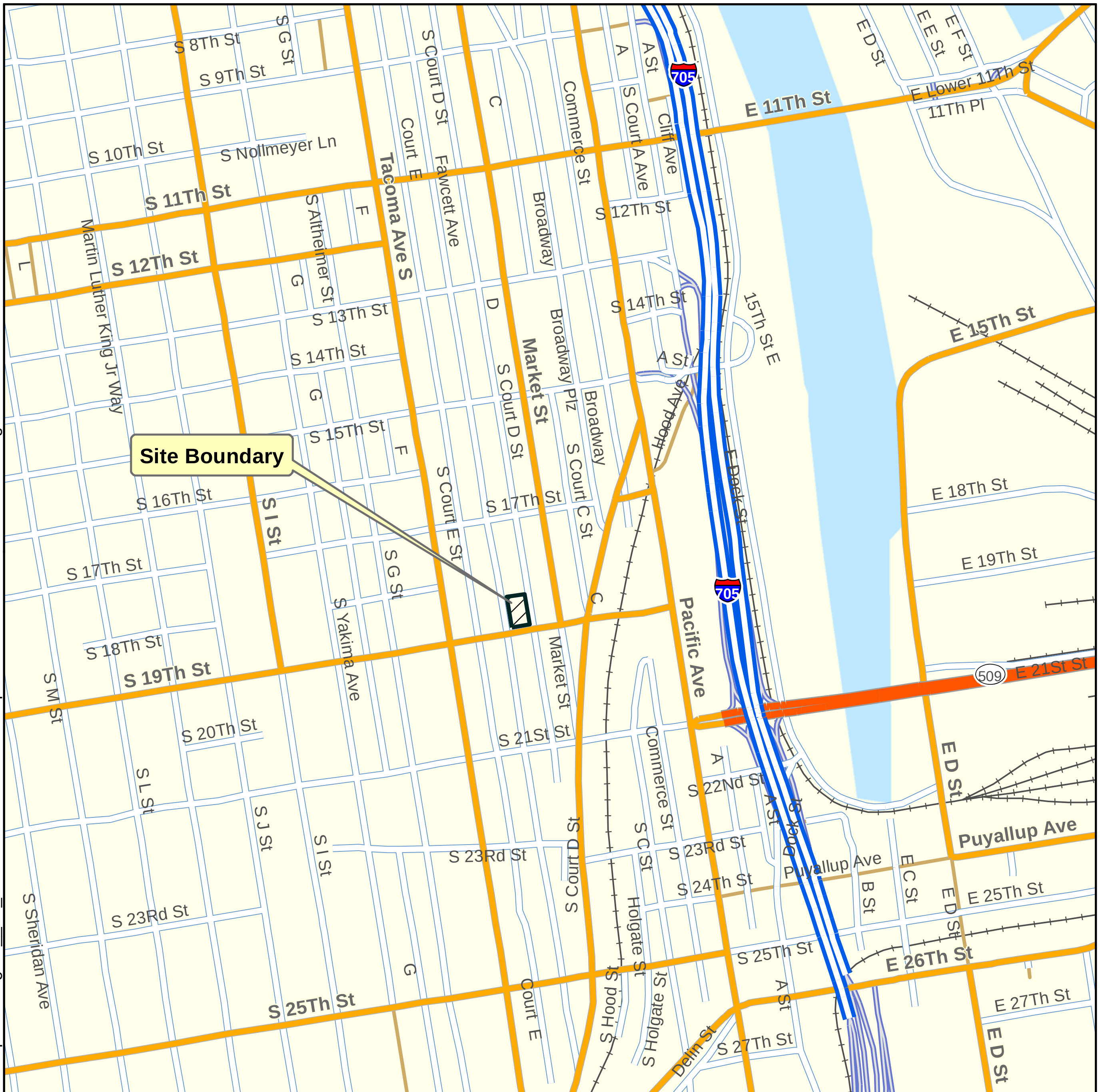
Total Toxic Equivalent Concentration (TTEC) is the sum of each individual cPAH concentration multiplied by its corresponding TEF.

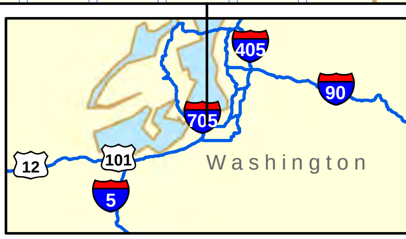
Y = The calibration verification for this analyte exceeded the 20 percent drift specified in method 8260C, and therefore the reported result should be considered an estimate. The overall perfor

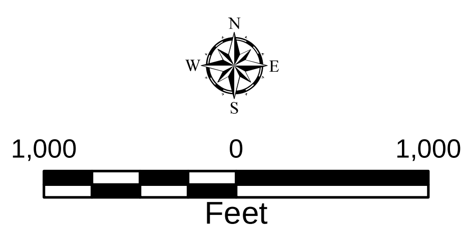
Bold font type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit

Bold font type and gray shading indicates analyte was detected at a concentration greater than the MTCA Method groundwater cleanup/criteria level

Dashed outline indicates analyte was detected at a concentration greater than the MTCA Method B Indoor Air Screening Level.







Notes:
CPO = University of Washington Capital Project Office
UWT = University of Washington Tacoma
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Data Sources: ESRI Data & Maps

Projection: NAD 1983 UTM Zone 10N

Vicinity Map

UWT Environmental Investigation
Priority Development Areas - CPO Project No. 204277
Tacoma, Washington

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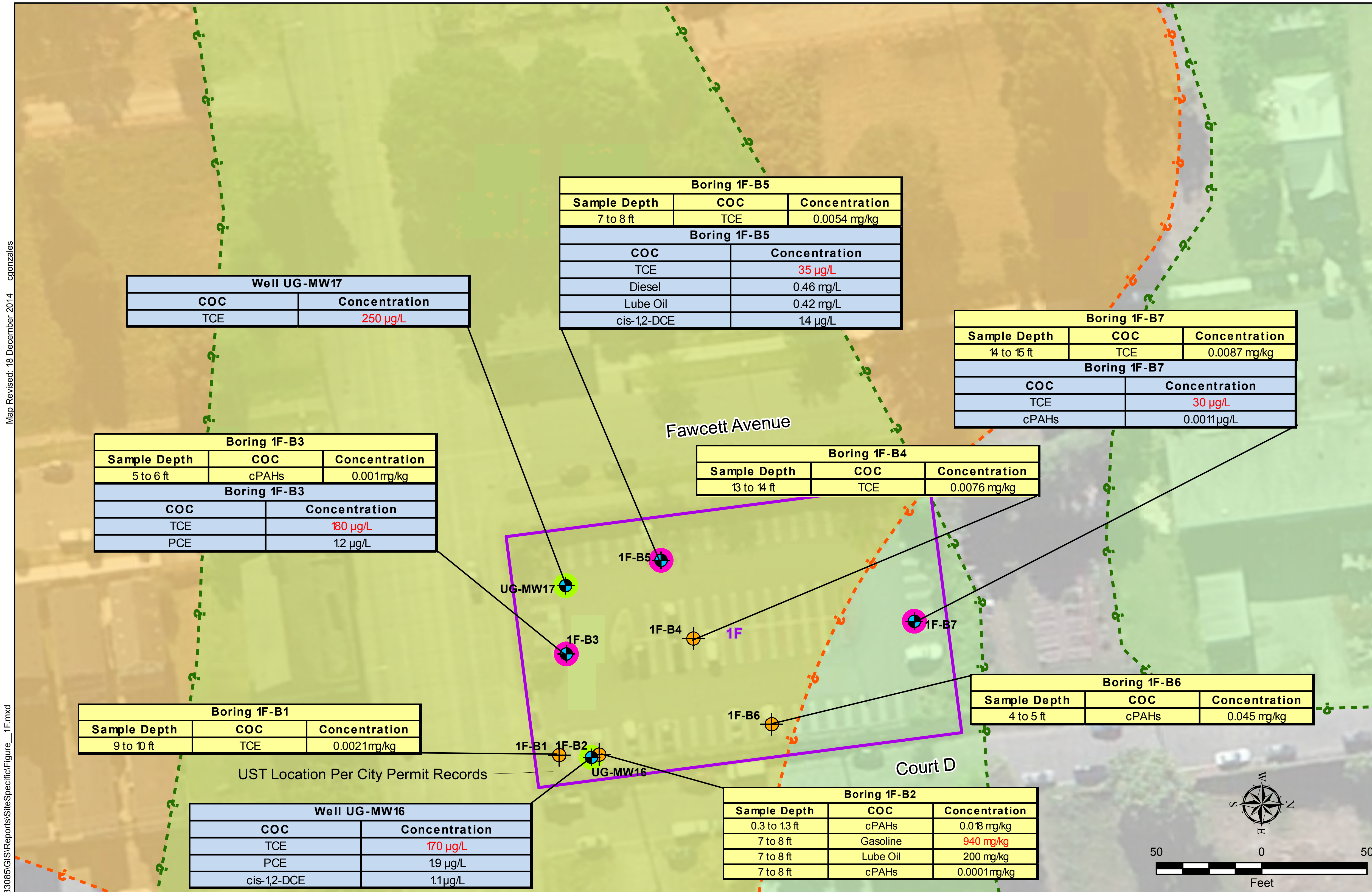
Figure 1

Office: TAC Path: \\tac\projects\0\0183085\GIS\Reports\SiteSpecific\Figure_1F_VM.mxd Map Revised: 17 December 2014 cgonzales



Well UG-MW17	
COC	Concentration
TCE	250 µg/L

Boring 1F-B5		
Sample Depth	COC	Concentration
7 to 8 ft	TCE	0.0054 mg/kg

Boring 1F-B5	
COC	Concentration
TCE	35 µg/L
Diesel	0.46 mg/L
Lube Oil	0.42 mg/L
cis-1,2-DCE	1.4 µg/L

Boring 1F-B7		
Sample Depth	COC	Concentration
14 to 15 ft	TCE	0.0087 mg/kg

Boring 1F-B7	
COC	Concentration
TCE	30 µg/L
cPAHs	0.0011 µg/L

Boring 1F-B3		
Sample Depth	COC	Concentration
5 to 6 ft	cPAHs	0.001 mg/kg

Boring 1F-B3	
COC	Concentration
TCE	180 µg/L
PCE	1.2 µg/L

Boring 1F-B4		
Sample Depth	COC	Concentration
13 to 14 ft	TCE	0.0076 mg/kg

Boring 1F-B6		
Sample Depth	COC	Concentration
4 to 5 ft	cPAHs	0.045 mg/kg

Boring 1F-B1		
Sample Depth	COC	Concentration
9 to 10 ft	TCE	0.0021 mg/kg

Well UG-MW16	
COC	Concentration
TCE	170 µg/L
PCE	1.9 µg/L
cis-1,2-DCE	1.1 µg/L

Boring 1F-B2		
Sample Depth	COC	Concentration
0.3 to 13 ft	cPAHs	0.018 mg/kg
7 to 8 ft	Gasoline	940 mg/kg
7 to 8 ft	Lube Oil	200 mg/kg
7 to 8 ft	cPAHs	0.0001 mg/kg

Soil Results*

Boring 2A-B7		
Sample Depth	COC	Concentration
2.5 to 3.5 feet bgs	Lead	200 mg/kg
2.5 to 3.5 feet bgs	cPAHs	0.64 mg/kg

Groundwater Results*

Well UG-MW13	
COC	Concentration
TCE	110 µg/L
PCE	1.4 µg/L

*Chemicals shown in red were detected at concentrations greater than the respective MTCA Method A cleanup levels.

Only analytical results of the chemicals of concern are shown if detected. Other chemicals that were analyzed and detected are not shown unless detected at concentrations greater than the respective MTCA cleanup levels.

Legend

Approximate Location of Priority Development Area 1F

Approximate Subsurface Location Subsurface Exploration Location

Direct Push Boring

Sonic Core Boring - Permanent New Monitoring Well

Lithology of Well Screen Interval

Advance Outwash

Ice-Contact Deposit

Approximate Lateral Extent of TCE-Contaminated Groundwater Plume in Shallow Aquifer

Approximate Lateral Extent of TCE-Contaminated Groundwater Plume in Deep Aquifer

Approximate Lateral Extent of TCE-Contaminated Groundwater Plume in Shallow and Deep Aquifers

Map Revised: 18 December 2014 cgonzales

Path: \\tac\projects\0\0183085\GIS\Reports\SiteSpecific\Figure__1F.mxd

Office: TAC

Notes:
cPAHs concentrations shown as TTEC.
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet
COC = Chemical of Concern
UWT = University of Washington Tacoma
PDA = Priority Development Area
PCE = tetrachloroethene
TCE = trichloroethene
cPAH = Carcinogenic Polycyclic Aromatic Hydrocarbons
mg/kg = milligram per kilogram
µg/L = microgram per Liter
bgs = Below Ground Surface
TTEC = Total Toxicity Equivalency Concentration
UST = Underground Storage Tanks
ULU = Unrestricted Land Use
MTCA = Model Toxics Control Act
DCE = dichloroethene

Soil MTCA Cleanup/Criteria Levels:
PCE = 0.05 mg/kg (Method A ULU)
TCE = 0.03 mg/kg (Method A ULU)
Benzene = 0.03 mg/kg (Method A ULU)
Vinyl Chloride = 0.67 mg/kg (Method B)
Lube Oil-Range Petroleum Hydrocarbons = 2,000 mg/kg (Method A ULU)
Diesel-Range Petroleum Hydrocarbons = 2,000 mg/kg (Method A ULU)
Gasoline-Range Petroleum Hydrocarbons = 100 mg/kg (Method A ULU)
cPAHs (TTEC) = 0.1 mg/kg (Method A ULU)
Lead = 250 mg/kg (Method A ULU)
Arsenic = 20 mg/kg (Method A ULU)
Cadmium = 2 mg/kg (Method A ULU)
Mercury = 2 mg/kg (Method A ULU)

Groundwater MTCA Cleanup/Criteria Levels:
PCE = 5 µg/L (Method A); 24 µg/L (Indoor Air)
TCE = 5 µg/L (Method A); 1.5 µg/L (Indoor Air)
cis-1,2-DCE= 16 µg/L (Method B); 160 µg/L (Indoor Air)
Vinyl Chloride = 0.2 µg/L (Method A); 0.35 µg/L (Indoor Air)
Benzene = 5 µg/L (Method A); 2.4 µg/L (Indoor Air)
Lube Oil-Range Petroleum Hydrocarbons = 0.5 mg/L (Method A)
Arsenic = 5 µg/L (Method A)
cPAHs= 0.1 µg/L (Method A)

Site Plan – PDA 1F/Fawcett Parking/ Lot T47 and T48

UWT Environmental Investigation
Priority Development Areas - CPO Project No. 204277
Tacoma, Washington

GEOENGINEERS

Figure 2

APPENDIX A
Report Limitations and Guidelines for Use

APPENDIX A
REPORT LIMITATIONS AND GUIDELINES FOR USE[1]

This appendix provides information to help you manage your risks with respect to the use of this report.

Environmental Services are Performed for Specific Purposes, Persons and Projects

This report has been prepared for use by University of Washington. This report is not intended for use by others, and the information contained herein is not applicable to other sites.

GeoEngineers structures our services to meet the specific needs of our clients. For example, an environmental site assessment study conducted for a property owner may not fulfill the needs of a prospective purchaser of the same property. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and project site. No one except University of Washington should rely on this environmental report without first conferring with GeoEngineers. This report should not be applied for any purpose or project except the one originally contemplated.

This Environmental Report is Based on a Unique Set of Project-Specific Factors

This report has been prepared for the Priority Development Areas (PDAs) Environmental Assessment Project at the UW – Tacoma (UWT) campus located in Tacoma, Washington. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, do not rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

If important changes are made after the date of this report, GeoEngineers should be given the opportunity to review our interpretations and recommendations and provide written modifications or confirmation, as appropriate.

Reliance Conditions for Third Parties

If a lending agency or other parties intend to place legal reliance on the product of our services, we require that those parties indicate in writing their acknowledgement that the scope of services provided, and the general conditions under which the services were rendered including the

[1] Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

limitation of professional liability, are understood and accepted by them. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions.

Environmental Regulations are Always Evolving

Some substances may be present in the site vicinity in quantities or under conditions that may have led, or may lead, to contamination of the subject site, but are not included in current local, state or federal regulatory definitions of hazardous substances or do not otherwise present current potential liability. GeoEngineers cannot be responsible if the standards for appropriate inquiry, or regulatory definitions of hazardous substance, change or if more stringent environmental standards are developed in the future.

Subsurface Conditions can Change

This environmental report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by manmade events such as construction on or adjacent to the site, by new releases of hazardous substances, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Always contact GeoEngineers before applying this report to determine if it is still applicable.

Topsoil

For the purposes of this report, we consider topsoil to consist of generally fine-grained soil with an appreciable amount of organic matter based on visual examination, and to be unsuitable for direct support of the proposed improvements. However, the organic content and other mineralogical and gradational characteristics used to evaluate the suitability of soil for use in landscaping and agricultural purposes was not determined, nor considered in our analyses. Therefore, the information and recommendations in this report, and our logs and descriptions should not be used as a basis for estimating the volume of topsoil available for such purposes.

Most Environmental Findings are Professional Opinions

Our interpretations of subsurface conditions are based on field observations and chemical analytical data from widely spaced sampling locations at the site. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ – sometimes significantly – from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

Do Not Redraw the Exploration Logs

Environmental scientists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in an environmental report should never be redrawn for inclusion in other design drawings. Only photographic or electronic reproduction is acceptable, but recognize that separating logs from the report can elevate risk.

Read These Provisions Closely

Some clients, design professionals and contractors may not recognize that the geoscience practices (geotechnical engineering, geology and environmental science) are far less exact than other engineering and natural science disciplines. This lack of understanding can create unrealistic expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory "limitations" provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you are unclear how these "Report Limitations and Guidelines for Use" apply to your project or site.

Geotechnical, Geologic and Geoenvironmental Reports Should Not Be Interchanged

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually relate any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding a specific project.

Biological Pollutants

GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention, or assessment of the presence of Biological Pollutants in or around any structure. Accordingly, this report includes no interpretations, recommendations, findings, or conclusions for the purpose of detecting, preventing, assessing, or abating Biological Pollutants. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts.

PDA 1G – Laborers/Lot T39 and T40

Priority Development Area 1G
Laborers/Lot T39 and T40
Environmental Subsurface Investigation

Environmental Subsurface Investigation Project
UW Capital Project Office Project No. 204277
1701 Tacoma Avenue
Tacoma, Washington

for
University of Washington

December 19, 2014

GeoEngineers

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Tacoma, Washington 98402
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Priority Development PDA 1G Laborers/Lot T39 and T40 Environmental Subsurface Investigation UW Capital Project Office Project No. 204277 1701 Tacoma Avenue Tacoma, Washington

File No. 0183-085-00

December 19, 2014

Prepared for:

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Table of Contents

1.0 INTRODUCTION 1

2.0 HISTORICAL USE 1

3.0 CURRENT SITE FEATURES 2

4.0 ENVIRONMENTAL SUBSURFACE INVESTIGATION 2

4.1. Historical Research and Magnetic Anomaly Findings 2
4.2. Subsurface Explorations 2
4.3. Groundwater Sampling – Monitoring Wells 3

5.0 SOIL AND GROUNDWATER CONDITIONS 3

5.1. Soil Conditions 3
5.2. Groundwater Conditions 3

6.0 CHEMICAL ANALYTICAL PROGRAM 4

6.1. General 4
6.2. Criteria for Characterization of Soil and Groundwater 4
6.3. Soil 5
6.3.1. Petroleum-Range Hydrocarbons 6
6.3.2. VOCs 6
6.3.3. PAHs 7
6.3.4. RCRA Metals 7
6.4. Groundwater 7
6.4.1. Petroleum-Range Hydrocarbons 8
6.4.2. VOCs 8
6.4.3. PAHs 8
6.4.4. Metals 8

7.0 CONCLUSIONS 8

8.0 PROPOSED DEVELOPMENT PLANS 9

9.0 POTENTIAL IMPACTS AND MITIGATION MEASURES TO DESIGN AND CONSTRUCTION 9

9.1. Potential UST 10
9.2. TCE-Contaminated Groundwater 10
9.2.1. Building Option A 10
9.2.2. Building Option B 10
9.2.3. Mitigation Measures for Building Options A and B 10
9.3. Soil is Contaminated with Chemicals of Concern 13

10.0 LIMITATIONS 14

11.0 REFERENCES 14

LIST OF TABLES

Table 1. Summary of Chemical Analytical Results – Soil
Table 2. Summary of Chemical Analytical Results – Groundwater

LIST OF FIGURES

Figure 1. Vicinity Map
Figure 2. Site Plan PDA 1G - Laborers/Lot T39 and T40

APPENDIX

Appendix A – Report Limitations and Guidelines for Use

1.0 INTRODUCTION

This report presents the results of our environmental subsurface investigation completed for the University of Washington (UW) at the Laborers/Lot T39 and T40 property (Priority Development Area [PDA] – 1G) located on the UW Tacoma (UWT) campus at 1710 to 1742 Market Street in Tacoma, Washington. The property is herein referred to as the "site." The site is identified as PDA 1G - Laborers/Lot T39 and T40 for this project. The Laborers property is bound by the Strom Property and Fawcett Parking/Lot T47 and T48 to the west, the Y Student Center to the north, Market Street to the east and South 19th Street to the south. A Vicinity Map of the site is included as Figure 1. See Figure 2 for the layout of the site in relation to adjacent properties.

The subsurface investigation was completed under the UWT Environmental Subsurface Investigation Project, UW project number 204277. This report was completed as a subset of the larger subsurface investigation report titled "2013 Environmental Subsurface Investigation – University of Washington Tacoma, Tacoma, Washington dated December 19, 2014 to assist with development of the property. This report should be used in context with the larger subsurface investigation report. Borings logs, subsurface investigation methodologies and chemical analytical data packages are included in the larger investigation report.

General impacts and potential mitigation measures are provided in this report that may be employed in design and construction. It is important to recognize that additional environmental investigations may be necessary prior to selection of the final mitigation measure. Mitigation measures and associated costs provided in this report will likely need refinement based on the results of the additional environmental investigations. The project team should contact UW Environmental Health & Safety (UW EH&S) to discuss the need for additional environmental investigations at this site. UW EH&S is the liaison with the Washington State Department of Ecology (Ecology) for review and approval of mitigation measures.

2.0 HISTORICAL USE

The site was developed with multiple single family residences in the early 1900s along the west side of Market Street. Sheds and stables were typically located on the east side of the Court D alleyway with the exception of the southernmost parcel. At this parcel, residences were located on all sides with sheds in the central portion.

A hand laundry business is listed at 1738 Market Street in 1926 in the city directory. The majority of the residences were demolished in the 1950s to 1960s, with the exception of the residences on the southern parcel and the apartment building at 1732 Market Street. The residences on the southern portion were demolished by 1973. The apartment building was demolished in 2003 based on information provided in a Phase I ESA completed prior to demolition.

The current Laborers Building (1742 Market Street) was constructed in 1961. Natural gas has been the heat source for the building since construction according to City of Tacoma permit records.

3.0 CURRENT SITE FEATURES

The existing site uses consist of four main areas:

- The northern portion of the property was vegetated with grass and trees during the subsurface investigation. This area was partially regraded in the fall of 2013 and is being used as a laydown yard for Y Student center contractor. The elevation in this area is generally about 15 feet higher than the elevation of Market Street.
- The central portion of the site consists of the UWT Student Health Services Center building including a paved parking lot. The elevation in this area is at a similar elevation of Market Street. A vertical cut approximately 20 feet high is present on the west side in this area.
- The southern portion of the property consists of a gravel parking lot placed atop an elevated area that borders the southern side of the UWT Student Health Services Center.
- The entire western portion of the property consists of the paved Court D alley.

4.0 ENVIRONMENTAL SUBSURFACE INVESTIGATION

The environmental subsurface investigation activities completed on the site consisted of a magnetic/ground penetrating radar (M/GPR) survey test pits, direct-push borings, and rotosonic core borings resulting in monitoring well installation and groundwater development and sampling of these new monitoring wells. The investigation activities were completed between June and October 2013.

4.1. Historical Research and Magnetic Anomaly Findings

Historic research suggested underground storage tanks could be present beneath the site, given the age of the historic residences present at the site and the source of heat typically used during these time periods. An M/GPR survey was performed on the entire site in June 2013. The M/GPR survey was not performed inside the existing structure at 1742 Market Street. Two magnetic anomalies were identified on the site as shown on Figure 2. No test pit excavations were conducted to address these anomalies because of their location near former houses.

4.2. Subsurface Explorations

Subsurface explorations included completing two test pits, advancing five direct-push borings (1G-B1 through 1G-B5) and three rotosonic borings (UG-MW27, UG-MW31 and UG-MW34) to evaluate soil and groundwater conditions at the site. The investigation was completed between June 2013 and October 2013.

The two test pits (1G-TP1 and 1G-TP2) were completed to depths ranging between 5.5 and 7 feet below ground surface (bgs) using a backhoe. The direct-push soil borings ranged in depth from 4.5 to 12 feet bgs. Each boring was terminated when practical drilling refusal was encountered. The borings were abandoned in accordance with Ecology requirements following soil sample collection.

The soil borings (UG-MW27, UG-MW31 and UG-MW34) ranged in depths from 35 to 56 feet bgs using rotosonic drilling methods. The three rotosonic borings were converted into groundwater monitoring wells. The deeper soil borings were telescoped between the ice-contact deposits and advance outwash to prevent cross-contamination between the two aquifers. Monitoring wells UG-MW31 and UG-MW34 were screened within the shallow aquifer. Monitoring well UG-MW27 was screened within the deep aquifer.

4.3. Groundwater Sampling – Monitoring Wells

Groundwater samples were collected from existing on-site monitoring wells (UG-MW9, UG-MW14 and BA-MW1) screened within the deep aquifer in June 2013. Groundwater samples were collected from the new monitoring wells (UG-MW27, UG-MW31 and UG-MW34) between June and September 2013.

5.0 SOIL AND GROUNDWATER CONDITIONS

5.1. Soil Conditions

Subsurface conditions consist of fill, ice-contact deposits, silt layer and advance outwash. The fill consists of silt and sand with gravel (primarily sand with silt and gravel) from below the existing ground surface to depths ranging from 1 to 7 feet bgs.

Native soil conditions observed below the fill consists of glacially consolidated ice-contact deposits comprised of silty sand to sand with gravel and silt. A semi-confining to confining silt layer was observed to depths ranging from 26 to 34 feet bgs (Elevation 115 to 123 feet) in UG-MW27, 20 to 21 feet bgs in UG-MW31 (Elevation 122 to 124 feet),and 20 to 23 feet bgs (Elevation 121 to 122 feet) in UG-MW34. The silt layer was also observed directly below the asphalt in direct-push boring 1G-B3 located at approximately Elevation 124 feet. Gravel was observed within the silt layer in well UG-MW31.

Advance outwash was observed beneath the silt layer in borings UG-MW27, UG-MW31 and UG-MW34. The advance outwash consisted of sand with gravel with various amounts of silt to silty gravel with sand in the three soil borings.

5.2. Groundwater Conditions

It appears that site conditions consist of a shallow aquifer in the ice-contact deposit and a deep aquifer in the advance outwash based on the lithology encountered from the borings advanced at this site. The aquifers appear to be separated by the silt layer between the ice-contact deposits and advance outwash.

Groundwater within the shallow aquifer appears to be present in sand and gravel layers. The continuity and connectivity of the sand and gravel layers within the ice-contact deposit unit could not be identified from the relatively small number of borings. The elevation of the groundwater within the shallow aquifer is estimated to range between 135 feet on the west side of the site to 110 feet on the east side of the site.

Groundwater within the advance outwash appears to be fairly continuous consisting primarily of moist silty fine sands to wet silty gravels beneath PDA 1G. The estimated groundwater elevation within the deep aquifer is estimated to range between 130 feet on the west side of the site to 100 feet on east side of the site.

6.0 CHEMICAL ANALYTICAL PROGRAM

6.1. General

Soil and groundwater samples were submitted to OnSite Laboratories Inc., in Redmond, Washington for chemical analysis. The chemical analytical data are summarized in Tables 1 and 2. Chemicals that were not detected at or greater than the laboratory reporting limits in the analyzed samples are typically not included on the tables.

6.2. Criteria for Characterization of Soil and Groundwater

The following criteria were used to evaluate impacted and contaminated soil and groundwater.

- Tetrachloroethene (PCE) and Trichloroethene (TCE) Impacted or Contaminated Soil
    - PCE, TCE and breakdown products at concentrations detected in the analyzed soil samples.
- Contaminated Soil
    - Petroleum hydrocarbons, carcinogenic polycyclic aromatic hydrocarbons (cPAHs), metals and volatile organic compounds (VOCs) detected at concentrations greater than the Model Toxics Control Act (MTCA) Method A Unrestricted Land Use (ULU) cleanup level or MTCA B screening level.
- Impacted Soil

  Some contaminants were detected at concentrations less than the respective MTCA cleanup levels. UWT may be able to reuse certain types of soil depending on the sampling results. UW EH&S must review the chemical analytical data to evaluate if reuse or disposal at an off site facility is necessary. Soil reuse and disposal are subject to Ecology Guidance for Remediation of Petroleum Contaminated Sites (Ecology, 2011), solid waste regulations and disposal facility permit conditions. The criteria below is herein referred to as "Reuse Criteria."

    - Petroleum hydrocarbons, cPAHs and/or Lead

      The Ecology guidance indicates that soil with diesel- and/or lube oil-range petroleum hydrocarbons detected at concentrations less than 200 milligrams per kilogram (mg/kg) and/or gasoline-range petroleum hydrocarbons detected at concentrations less than 30 mg/kg are suitable for reuse as commercial fill at UWT campus with the following limitations:

        - placed above the highest water table,
        - not within 100 feet of a drinking water well,
        - not within wellhead protection area of public water supply,
        - not within wetlands or where surface water contact is possible, and
        - not within a surface water infiltration facility or septic drain field.

      If the concentrations exceed the above limits but are still less than respective MTCA cleanup levels the soil may be reused in road and bridge embankment construction, landfill daily cover or asphalt manufacturing with UW EH&S approval.

    - Arsenic, Cadmium, and/or Mercury

Soil with concentrations of arsenic, cadmium and/or mercury above what is normally found in the natural background environment (Puget Sound Background levels Ecology, 1994) is typically suitable for disposal at an inert waste landfill or a Department of Natural Resources (DNR) reclamation pit. UW EH&S approval is necessary.

Soil at and near the UWT campus has been well documented to contain chromium at concentrations slightly above the natural background level and is not considered in the "Reuse Criteria."

- Contaminated Groundwater
  - Petroleum hydrocarbons, PAHs and metals detected at concentrations greater than the respective MTCA Method A groundwater cleanup levels. Method B criteria were used for comparison of specific compounds if Method A groundwater cleanup levels are not established for those compounds.
  - VOCs detected at concentrations greater than the respective MTCA Method A groundwater cleanup levels, and MTCA Method B groundwater screening levels protective of indoor air. The updated TCE/PCE screening levels were calculated using Equation 1 from Ecology's review draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action" dated October 2009 (Ecology, 2009) and Environmental Protection Agency's (EPA's) TCE and PCE toxicity factors updated in 2011 and available on EPA's online Integrated Risk Information System (IRIS). The other values were obtained from Ecology's review draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action."

6.3. Soil

Soil samples were submitted for chemical analysis. The soil samples collected from the subsurface explorations were identified using the following identification system: A#-B#-start depth-end depth, where A# is the area designation number, B/TP# is the boring/test pit number and start depth-end depth is the depth interval in feet below the ground surface of specific sample (e.g., 1G-TP2-3-4 was collected in Area 1G from test pit 2 from 3 to 4 feet bgs).

Soil samples were submitted for chemical analysis based on the following:

- Where field screening indicated the soil is impacted.
- Directly below potentially impacted soil to delineate the vertical extent.
- Where wet sand seams were encountered in the ice-contact deposits or advance outwash.
- At the soil/groundwater interface if groundwater was encountered.
- At the top of confining units if encountered.

The soil samples were submitted for chemical analysis of petroleum hydrocarbon identification by Ecology-approved method NWPTH-HCID with appropriate follow up of gasoline-range petroleum hydrocarbons by Ecology-approved method NWTPH-Gx and/or diesel- and lube oil-range petroleum hydrocarbons by Ecology-approved method NWTPH-Dx; VOCs by Environmental Protection Agency (EPA) method 8260C, polycyclic aromatic hydrocarbons (PAHs) by EPA method 8270DSIM, and Resource Conservation and Recovery Act (RCRA) metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver) by EPA method 6000/7000 series. The chemical analytical data for soil are described below and summarized in Table 1.

6.3.1. Petroleum-Range Hydrocarbons

Gasoline-, diesel-, and lube oil-range petroleum hydrocarbons were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup level and Reuse Criteria.

6.3.2. VOCs

WITHIN FILL MATERIAL

VOCs were either not detected or were detected at a concentrations less than the MTCA Method A ULU cleanup level, MTCA Method B criteria and Reuse Criteria in the analyzed soil samples collected from the fill material.

WITHIN ICE-CONTACT DEPOSITS

PCE. PCE was detected at a concentration less than the MTCA Method A ULU cleanup level (0.05 mg/kg) in sample UG-MW31-16.5-17 (0.0091 mg/kg) collected from 16.5 to 17 feet bgs. PCE was not detected in the remaining analyzed soil samples collected within the ice-contact deposits.

TCE. TCE was detected at concentrations less than the MTCA Method A ULU cleanup level (0.03 mg/kg) in the following soil samples with the concentrations detected identified in parenthesis.

- 1G-B5-10-11 (0.012 mg/kg)
- UG-MW27-25-26 (0.0011 mg/kg)
- UG-MW31-11-12 (0.002 mg/kg)
- UG-MW31-15-16 (0.0077 mg/kg)
- UG-MW31-16.5-17 (0.0.026 mg/kg)

TCE was not detected in the remaining analyzed soil samples collected within the ice-contact deposits.

Other VOCs. Other VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels and Method B criteria in the analyzed soil samples collected within the ice-contact deposits.

WITHIN SILT

TCE was detected at a concentration less than the MTCA Method A ULU cleanup level (0.03 mg/kg) in sample UG-MW31-20-21 (0.0045 mg/kg) collected from 20 to 21 feet bgs. Other samples were not collected within the silt.

WITHIN ADVANCE OUTWASH

TCE. TCE was detected at concentrations less than the MTCA Method A ULU cleanup level in the following soil samples with the concentrations detected identified in parenthesis.

- UG-MW31-22-23 (0.006 mg/kg)
- UG-MW31-29.5-30 (0.0024 mg/kg)
- UG-MW31-32-33 (0.0088 mg/kg)

TCE was not detected in the remaining analyzed soil samples collected within the advance outwash.

Other VOCs. Other VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels and Method B criteria in the analyzed soil samples collected within the advance outwash.

6.3.3. PAHs

Carcinogenic PAHs (cPAHs) were detected at concentrations greater than the MTCA Method A ULU cleanup level (0.10 mg/kg) in sample 1G-TP2-0-1 (0.12 mg/kg) collected within the fill material. CPAHs were either not detected or were detected at concentrations less than the MTCA Method A ULU cleanup level in the remaining analyzed samples within the fill but also the analyzed samples collected from within the ice-contact deposits and advance outwash.

PAHs were either not detected or were detected at concentrations less than the MTCA Method A ULU cleanup level and Method B criteria in the analyzed soil samples collected within the fill material, ice-contact deposits and advance outwash.

6.3.4. RCRA Metals

WITHIN FILL MATERIAL

Lead was detected at a concentration equal to the MTCA Method A ULU cleanup level (250 mg/kg) in soil sample 1G-TP2-0-1 (250 mg/kg). Lead was either not detected or was detected at concentrations less than the MTCA Method A cleanup level and the Reuse Criteria in the remaining analyzed soil samples collected within fill material.

Other RCRA metals were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels, the Method B criteria or Reuse Criteria in the analyzed soil samples collected within fill material.

WITHIN ICE-CONTACT DEPOSITS AND ADVANCE OUTWASH

Lead was detected at a concentration greater than the Reuse Criteria but less than the MTCA Method A ULU cleanup level in soil sample 1G-TP2-3-4 (220 mg/kg) collected in the ice-contact deposits. Lead was either not detected or was detected at concentrations less than the MTCA Method A ULU cleanup level and Reuse Criteria in the remaining analyzed soil samples.

Mercury was detected at a concentration greater than Reuse Criteria (0.07 mg/kg) but less than the MTCA Method A ULU cleanup level (2.0 mg/kg) in soil sample 1G-TP1-4-5 (0.42 mg/kg) collected in the ice-contact deposits. Mercury was not detected in the remaining analyzed soil samples.

Other RCRA metals were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels, Method B criteria or Reuse Criteria in the analyzed soil samples collected within ice-contact deposits and advance outwash.

6.4. Groundwater

Groundwater samples were collected from six on-site monitoring wells (BA-MW2, UG-MW9, UG-MW14, UG-MW27, UG-MW31, and UG-MW34) for chemical analysis. The groundwater samples collected from the wells were identified using the following identification system: WELL-ID-yymmdd, where WELL-ID is the well identification number and yymmdd is the date when the sample was collected (e.g., UG-MW4-130619 was collected from monitoring well UG-MW4 on June 19, 2013).

The groundwater samples were submitted for chemical analysis of VOCs by EPA method 8260C. Groundwater samples collected from monitoring wells UG-MW27, UG-MW31 and UG-MW34 were also submitted for chemical analysis of gasoline-range petroleum hydrocarbons by Ecology-approved method NWTPH-Gx, diesel- and lube oil-range petroleum hydrocarbons by Ecology-approved method NWTPH-Dx, PAHs by EPA method 8270DSIM, Total MTCA metals by EPA method 200.8 or 7470A.

6.4.1. Petroleum-Range Hydrocarbons

Lube oil-, gasoline-, and diesel-range petroleum hydrocarbons were not detected in the analyzed groundwater samples.

6.4.2. VOCs

SHALLOW AQUIFER

TCE was detected at a concentration greater than the MTCA Method A groundwater cleanup level (5 micrograms per liter [µg/L]) and the MTCA Method B groundwater screening level protective of indoor air (1.5 µg/L) in the groundwater sample collected from UG-MW31 (120 µg/L). TCE was not detected in the remaining analyzed groundwater sample collected within the shallow aquifer.

Other VOCs were either not detected or were detected at concentrations less than their respective MTCA Method A groundwater cleanup level or MTCA Method B in the analyzed groundwater samples.

DEEP AQUIFER

TCE was detected at a concentration greater than the MTCA Method A groundwater cleanup level and the MTCA Method B groundwater screening level protective of indoor air in the groundwater sample collected from UG-MW14 (110 µg/L). TCE was not detected in the remaining analyzed groundwater samples collected within the deep aquifer.

Other VOCs were either not detected or were detected at concentrations less than their respective MTCA Method A groundwater cleanup level or MTCA Method B in the analyzed groundwater samples.

6.4.3. PAHs

PAHs and cPAHs were not detected in the analyzed groundwater samples.

6.4.4. Metals

Total RCRA metals were either not detected or were detected at concentrations less than the MTCA Method A cleanup levels or the Method B criteria in the analyzed groundwater samples.

7.0 CONCLUSIONS

The following summarizes the chemical analytical results on the site.

- TCE-impacted soil was detected in the ice-contact deposits (UG-MW31, UG-MW27 and 1G-B5) in the central and southern portion of the site. The soil samples were collected below the shallow aquifer water table. TCE-contaminated groundwater was present in monitoring well UG-MW31 screened in the shallow aquifer (ice-contact deposits). The estimated lateral extent of the TCE-contaminated groundwater in the shallow aquifer is shown on Figure 2. The elevation of groundwater within the shallow aquifer is estimated to be 135 to 110 feet from the west to east side of the site.

- The TCE-impacted soil was detected in the advance outwash deposits in boring UG-MW31. This indicates that the deep aquifer is likely contaminated with TCE on the southern portion of the site. TCE-contaminated groundwater is also present in well UG-MW14, screened in the deep aquifer. The estimated lateral extent of the TCE-contaminated groundwater in the deep aquifer is shown on Figure 2. The elevation of groundwater within the deep aquifer is estimated to be 130 to 100 feet from the west to east side of the site.
- Lead and cPAHs contaminated soil is present on the northern portion of the site (1G-TP2) from the ground surface to approximately 1 foot bgs.
- Lead-, mercury-s, and cPAHs-impacted soil is present from the ground surface to depths up to 5 feet bgs on the northern portion of the site (1G-TP2 and 1G-TP1).

8.0 PROPOSED DEVELOPMENT PLANS

We understand UWT plans to construct a new building at the site. For this site, we provided two building options (Option A and Option B) because limited contamination was observed on the northern portion of the site. The two building options are shown on Figure 2.

- Building Option A: the building will be placed on the southern portion of the lot (21,000 square feet)
- Building Option B: the building will be placed on the northern portion of the lot (33,000 square feet)

We have assumed the following for the construction of the new building for both options:

- The finished floor of the building will be at the same elevation as Market Street (approximately Elevation 126 feet)
- The bottom of the capillary break will be 1 foot below the finished grade (Elevation 125 feet)
- Footings and utilities will extend 5 feet deeper than finished grade (approximately Elevation 121 feet).
- The back of the wall will be 25 feet high and will abut against Court D.

The estimated mass of soil to be generated is approximately 27,000 tons for Option A, and 42,000 tons for Option B based on the existing topography of the area and the above-mentioned assumptions. This estimate assumes a 30 percent fluff factor and a soil density of 1.5 tons/cubic yard.

9.0 POTENTIAL IMPACTS AND MITIGATION MEASURES TO DESIGN AND CONSTRUCTION

We recommend UW develop and implement appropriate administrative institutional controls to limit or prohibit activities that may result in exposure to hazardous substances remaining at the site. Potential impacts to the design and construction of the site are the following:

- Two potential underground storage tanks (USTs) are present on the site (Building Options A and B).

- TCE-contaminated groundwater is present in the shallow and deep aquifers on the southern portion of the site (Building Option A).
- Soil is contaminated and impacted with chemicals of concern (metals and cPAHs) (Building Option B).

Potential Long-Term Impacts include:

- Long-term disposal of underslab/perimeter footing drain TCE-impacted groundwater.
- Continued maintenance of vapor intrusion mitigation system, if necessary.
- Potential periodic indoor air sampling to confirm the vapor intrusion mitigation system may be necessary to evaluate the system is operating properly, if necessary.
- TCE-contaminated or TCE-impacted soil may remain adjacent and beneath the building following construction activities. UW should develop and implement appropriate institutional controls to help prevent exposure to residual contamination.

The following sections describe the potential impacts, mitigation measures and estimated costs to design and construction.

9.1. Potential UST

Two magnetic anomalies were identified but not investigated because the anomalies were located near the former house. Heating oil USTs may be present in the area of the anomalies. The estimated costs to remove one heating oil UST under Option A and B is $10,000 to $20,000 for each option.

9.2. TCE-Contaminated Groundwater

9.2.1. Building Option A

TCE was detected in groundwater at concentrations greater than the MTCA Method A groundwater cleanup level and/or updated MTCA Method B groundwater screening level protective of indoor air in the shallow and deep aquifer wells located on the southern portion of the site (Building Option A).

TCE-contaminated groundwater within the shallow aquifer will likely be encountered during construction in the southwest portion of the site based on the elevation of the groundwater of the shallow and deep aquifers and the anticipated elevation cut of the building to 124 feet. This also indicates the TCE-contaminated groundwater will be in contact with the west side of the building and present beneath the building from both the shallow and deep aquifers.

9.2.2. Building Option B

The shallow and deep aquifers do not appear to be impacted on the northern portion of the site (Building Option B). TCE-contaminated groundwater is present within the shallow aquifer approximately 180 feet upgradient of the site.

9.2.3. Mitigation Measures for Building Options A and B

Mitigation measures for Building Options A and B include:

Additional Investigation. Further subsurface investigation may be necessary to evaluate the vertical and lateral extent of the TCE-impacted soil and/or groundwater at the site. Soil vapor sampling is recommended to evaluate if a potential vapor intrusion pathway exists. The estimated cost for soil vapor sampling and additional investigation for Option A is $30,000 to $100,000. The estimated cost for narrowly focused soil vapor sampling and additional investigation on Option B is $20,000 to $70,000.

Vapor Mitigation. Vapor intrusion occurs when VOCs migrate from contaminated soil or groundwater into overlying buildings through openings in the foundation. The route VOCs take from a subsurface source to the air inside a building is referred to as the vapor intrusion pathway. The most common sources of soil vapor are VOCs including TCE and PCE, which may pose short-term (TCE only) and long-term (chronic) risks through inhalation of contaminated indoor air.

Groundwater and soil vapor concentrations are typically utilized as screening levels regarding the potential for vapor intrusion. TCE was detected at a concentration that exceeds the screening level for updated MTCA Method B groundwater screening level protective of indoor air in the groundwater sample collected from monitoring well UG-MW31 screened within the shallow aquifer and UG-MW14 screened in the deep aquifer within Option A. TCE-contaminated groundwater in the shallow and deep aquifers may be in contact with the west side of the finished and present beneath the building under Option A. It is unknown if TCE-contaminated groundwater will be in contact with the building under Option B. As discussed above, additional investigation will be needed to evaluate the need for a vapor mitigation system on the northern portion of the site. For budgeting purposes we have assumed a vapor mitigation system will be required.

Soil vapor sampling was not completed as part of this investigation. Additional on-site characterization may be necessary to evaluate the vertical and lateral limits of the TCE soil vapors. Soil vapor sampling is recommended near the elevation of the proposed subgrade to evaluate if a potential vapor intrusion pathway exists. If a potential vapor intrusion pathway exists, then a vapor intrusion mitigation system may be necessary. Potential mitigation options to prevent vapor intrusion include:

- A passive vapor barrier beneath the building. Passive vapor barriers are typically used in combination with another mitigation option (venting or building pressurization). We recommend the vapor barrier be installed below the elevation of penetrations (pipes, etc.) that may be installed after the programing is identified in the future. Penetrating the vapor barrier following the construction will add to the cost of construction.
- Passive or active venting system beneath the building. The venting system may need to be combined with an underslab and perimeter drain to reduce the potential for shallow groundwater to enter the venting system.

The estimated cost for design and installation of indoor air mitigation system ranges between $5 per square foot and $12 per square foot of building space. The estimated costs for the vapor mitigation system for a building on the Option A building is $105,000 to $252,000. The estimated costs for the vapor mitigation system for a building on the Option B building is $165,000 to $396,000. Potential periodic indoor air sampling to confirm the vapor intrusion mitigation system may be necessary to evaluate the system is operating properly following construction of the building. The estimated cost for long term monitoring is unknown.

Underslab/Footing Drainage. Underslab/footing drainage system may be required to prevent water from entering into the vapor mitigation vent system. The water will likely have to be directed to the City of

Tacoma sanitary sewer based on concentrations of the chemicals of concern in the groundwater. A long-term cost may be associated with discharge of the water to the City sanitary sewer system. An underslab footing drain will likely be required based on the elevation of the groundwater (135 to 110 feet). The estimated cost of the underslab footing drain in Option A building is $63,000 to $126,000. The estimated cost of the underslab footing drain in Option B building is $99,000 to $198,000.

Construction Water Management. TCE-contaminated water encountered during construction will have to be managed. Water generated during construction will likely be stored in tanks, sampled and analyzed. Water disposal will be coordinated with UW EH&S at a UW-approved disposal facility. It is anticipated the construction dewatering water will be suitable for discharge into the storm sewer based on the concentrations detected in the existing wells during this investigation. The water may be disposed in the City of Tacoma sanitary sewer. The City of Tacoma charges approximately $0.0034 per gallon of water. The estimated volume of water generated will be based on construction methods. The base cost estimate includes the cost of disposal of water for 120 days of earthwork construction, approximate cost of collecting 10 water samples over the course of the project ($15,000) and two 25,000-gallon storage tanks ($7,000 each per month).

Approximately 16,000 gallons per day is estimated to be generated on the site from dewatering activities. The estimated cost of construction water management if disposal into the City of Tacoma sanitary sewer is necessary is approximately $50,000 for Option A and B each.

Cross Contamination. TCE-contaminated groundwater is present in the shallow and deep aquifers on the southern portion of the site (Option A). TCE was not detected in wells on the northern portion of the site (Option B) but was detected in upgradient wells approximately 180 feet away.

- Option A. TCE-contaminated groundwater is present in the shallow and deep aquifers. It appears a building with subgrade at Elevation 125 feet and footings extending to Elevation 120 feet would penetrate the silt. Additional investigation will be necessary to evaluate the potential for cross-contamination between the two aquifers. This investigation would be completed in concurrence with the additional investigation to evaluate the lateral and vertical extent of the contamination. If cross-contamination between aquifers is an impact, additional construction costs will likely apply. However, it appears concern for cross-contamination between the two aquifers may not be warranted at this site because the shallow and deep aquifers are both impacted in the area. For budgeting purposes, additional construction cost is estimated to be between $10,500 and $63,000 if cross-contamination is identified as an impact.
- Option B. TCE-contaminated groundwater does not appear to be present on this site. Therefore, costs associated with cross-contamination mitigation measures are not applicable. If TCE-contaminated soil migrates from upgradient PDA 1E - Strom, cross-contamination mitigation measures would be applicable because the proposed building elevation would penetrate the silt layer between the shallow and deep aquifers. Additional investigation will be necessary to evaluate the potential for cross-contamination between the two aquifers. This investigation could be completed in concurrence with the additional investigation to evaluate the lateral and vertical extent of the contamination. However, it appears that cross-contamination between the two aquifers is likely not warranted at this site. For budgeting purposes, additional construction cost is estimated to be between $16,500 and $99,000 if cross-contamination is identified as an impact.

Health and Safety. Workers who may be in contact with potentially contaminated soil or groundwater at a state-listed cleanup site have HAZWOPER training. The requirement is consistent with the Washington Administrative Code (WAC) 296-843-100, *Hazardous Waste Operations*, which indicates that on-site personnel are required to have current health and safety training in accordance with Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response requirements in 29 CFR 1910.120. The rule also requires the earthwork contractor and other personnel who could potentially contact contaminated materials to develop and implement a written safety and health program for their employees involved in hazardous waste operations under 29 CFR 1910.120. The estimated cost for the contractor to be HAZWOPER trained and have appropriate liability insurance and is roughly between $10,000 and $70,000 depending on the number of subcontractors that require training.

9.3. Soil is Contaminated with Chemicals of Concern

Contaminated soil (metals and cPAHs) and impacted soil (TCE, metals and cPAHs) will likely be generated during construction activities. We recommend UW implement the following actions.

- **Characterize Soil and Groundwater for Disposal.** In-situ characterization or stockpiling and subsequent sampling will need to be performed on soil that is generated during construction in areas of TCE-impacted, metals-/cPAHs-contaminated and metals-/cPAHs-impacted soil. The estimate cost of the soil sampling for soil disposal is $60,000 to $80,000 for Option A and B each based on the mass of soil to be excavated. This cost may be reduced if the mass of soil is reduced by not removing the soil prism in Court D.
- **PCE and TCE-Impacted and Contaminated Soil.** When PCE and TCE and breakdown products are detected in soil, UW EH&S will work with Ecology on obtaining a “contained-in determination” for disposal of the waste. The source of the solvent contamination, the concentration of the solvents and a Toxicity Characteristic Leaching Procedure (TCLP) analytical test result will be used when evaluating if the soil is disposed as hazardous waste by UW EH&S at a RCRA permitted Subtitle C landfill or as a solid waste at a UW-approved Subtitle D landfill. Past experience has demonstrated that it is fairly likely that the “contained-in determination” will be granted, thus we based our cost estimates on this assumption. The estimated cost to transport and dispose (not including excavation and loading) soil at a Subtitle D landfill with a contained-in determination is $80 to $100 per ton. The typical cost for transportation and disposal (not including excavation and loading) of soil at a RCRA Subtitle C Landfill is $250 to $300 per ton. The cost estimates provided in this report assume disposal at a Subtitle D landfill.

  The estimated mass of TCE-impacted soil at Option A is approximately 15,000 tons. This estimate assumes soil impacted across the southwest portion of the site, beginning at approximately Elevation 142 and following the slope of the shallow aquifer. This area also includes Court D. The estimated cost for transportation and disposal of the TCE-contaminated and impacted soil is $1,200,000 to 1,500,000. This estimate could be reduced if the building was raised in elevation or soil prism within Court D was not removed.
- **Lead and cPAH-Contaminated Soil.** Lead and cPAH-contaminated soil is present using Option B. Lead and cPAHs-contaminated soil will not be encountered using Option A. Lead- and cPAHs-contaminated soil will be disposed at a UW-approved RCRA permitted Subtitle D landfill. The contaminated soil will be removed as necessary for construction and as required by Ecology. CPAHs- and metals-contaminated soil will be disposed at an UW-approved RCRA permitted Subtitle D

landfill. CPAHs- and metals-contaminated soil left in place shall be capped with a building and hardscape as required by Ecology. The estimated cost for transportation and disposal at a RCRA-subtitle D facility is $60 to $80 per ton. The estimated amount of the cPAH and lead-contaminated soil is 600 tons. This estimate assumes contamination is limited to the southwest portion of the site to a depth of 2 feet. The estimated cost for transportation and disposal for lead and cPAH-contaminated soil under Option B is $420,000 to $560,000.

- Metals-, Petroleum-, cPAH-Impacted Soil. Metals- and cPAHs-impacted soil is present to a depth of 5 feet bgs on northern portion of the site (Option B). Metals and cPAH-impacted soil were was not detected on Option A. Metals- and cPAH-impacted soil is typically suitable for disposal at a UW-approved permitted inert waste landfill or reclamation pit. For budgeting purposes, we assumed the transportation and disposal of metals- and cPAHs-impacted soil is $30 to $50 per ton. We estimate the mass of the metal and metals- and cPAHs-impacted soil to be 350 tons. This estimate assumes contamination may be present in the site to depths of 5 feet bgs. The estimated cost for transportation and disposal under Option B is $10,500 to $17,500.
- Health and Safety. As discussed in the "Contaminated Groundwater" section, Washington State requires its earthwork contractor and other personnel who could potentially contact contaminated materials to comply with training requirements for handling soil and potentially groundwater on the site. The health and safety costs are not included as separate item in the soil, because the costs in the groundwater section will apply.

10.0 LIMITATIONS

This report has been prepared for use by the University of Washington for the Priority Development Area 1G – Laborers/Lot T39 and T40 located in Tacoma, Washington at the University of Washington Tacoma campus.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

Please refer to Appendix A titled "Report Limitations and Guidelines for Use" for additional information pertaining to use of this report.

11.0 REFERENCES

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Table 1

Summary of Chemical Analytical Results[1] - Soil

Area 1G - Laborers/Lot T39 and T40
University of Washington Tacoma Priority Development Areas
Tacoma, Washington

Boring/Test Pit	1G-B1		1G-B2		1G-B3	1G-B4	1G-B5		1G-TP1			1G-TP2			UG-MW27			
Sample Identification [2]	1G-B1-2-3	1G-B1-7-8	1G-B2-2-3	1G-B2-9-10	1G-B3-2-3	1G-B4-1-2	1G-B5-3-4	1G-B5-10-11	1G-TP1-0-1	1G-TP1-2-3	1G-TP1-4-5	1G-TP2-0-1	1G-TP2-3-4	1G-TP2-6-7	UG-MW27-16-17	UG-MW27-25-26	UG-MW27-30-31	UG-MW27-54-55
Sample Depth (feet bgs)	2 to 3	7 to 8	2 to 3	9 to 10	2 to 3	1 to 2	3 to 4	10 to 11	0 to 1	2 to 3	4 to 5	0 to 1	3 to 4	6 to 7	16 to 17	25 to 26	30 to 31	54 to 55
Soil Type	Qvi	Qvi	Qvi	Qvi	Qvi	Qvi	Qvi	Qvi	Fill	Qvi	Qvi	Fill	Qvi	Qvi	Qvi	Qvi	Silt	Outwash
NWTPH-HCID [3] (mg/kg)																		
Gasoline-Range	22 U	--	23 U	22 U	22 U	22 U	22 U	--	22 U	22 U	22 U	23 U	24 U	24 U	--	--	--	--
Diesel-Range	55 U	--	57 U	55 U	56 U	54 U	54 U	--	54 U	55 U	56 U	57 U	61 U	60 U	--	--	--	--
Lube Oil-Range	110 U	--	110 U	110 U	110 U	DET	110 U	--	110 U	110 U	110 U	110 U	DET	120 U	--	--	--	--
NWTPH-Dx [4] (mg/kg)																		
Diesel-Range Petroleum Hydrocarbons	--	--	--	--	--	27 U	--	--	--	--	--	--	30 U	--	28 U	31 U	31 U	31 U
Lube Oil-Range Petroleum Hydrocarbons	--	--	--	--	--	**88**	--	--	--	--	--	--	**99**	--	56 U	61 U	61 U	62 U
VOCs [5] (mg/kg)																		
Tetrachloroethene (PCE)	0.00081 U	0.00088 UJ	0.00085 U	0.00085 U	0.00094 U	0.0016 U	0.00081 U	0.00087 U	0.00097 U	0.00095 U	0.00088 U	0.0010 U	0.0016 U	0.0011 U	0.00072 U	0.00098 U	0.0010 U	0.0010 U
Trichloroethene (TCE)	0.00081 U	0.00088 UJ	0.00085 U	0.00085 U	0.00094 U	0.0016 U	0.00081 U	**0.012**	0.00097 U	0.00095 U	0.00088 U	0.0010 U	0.0016 U	0.0011 U	0.00072 U	**0.0011**	0.0010 U	0.0010 U
(cis) 1,2-Dichloroethene	0.00081 U	0.00088 UJ	0.00085 U	0.00085 U	0.00094 U	0.0016 U	0.00081 U	0.00087 U	0.00097 U	0.00095 U	0.00088 U	0.0010 U	0.0016 U	0.0011 U	0.00072 U	0.00098 U	0.0010 U	0.0010 U
(trans) 1,2-Dichloroethene	0.00081 U	0.00088 UJ	0.00085 U	0.00085 U	0.00094 U	0.0016 U	0.00081 U	0.00087 U	0.00097 U	0.00095 U	0.00088 U	0.0010 U	0.0016 U	0.0011 U	0.00072 U	0.00098 U	0.0010 U	0.0010 U
Vinyl Chloride	0.00081 U	0.00088 UJ	0.00085 U	0.00085 U	0.00094 U	0.0016 U	0.00081 U	0.00087 U	0.00097 U	0.00095 U	0.00088 U	0.0010 U	0.0016 U	0.0011 U	0.00072 U	0.00098 U	0.0010 U	0.0010 U
1,2,4-Trimethylbenzene	0.00081 U	0.00088 UJ	0.00085 U	0.00085 U	0.00094 U	0.0016 U	0.00081 U	0.00087 U	0.00097 U	0.00095 U	0.00088 U	0.0010 U	0.0016 U	0.0011 U	0.00072 U	0.00098 U	0.0010 U	0.0010 U
Acetone [6]	0.0040 U	0.0044 UJ	0.0043 U	0.0043 U	0.0047 U	**0.0091**	0.0041 U	0.0043 U	0.0049 U	0.0048 U	0.0044 U	0.0051 U	0.0079 U	0.0053 U	0.0036 U	0.0049 U	0.0051 U	0.0051 U
Carbon Disulfide [6]	0.00081 U	0.00088 UJ	0.00085 U	0.00085 U	0.00094 U	0.0016 U	0.00081 U	0.00087 U	0.00097 U	0.00095 U	0.00088 U	0.0010 U	0.0016 U	0.0011 U	**0.0038**	0.00098 U	0.0010 U	0.0010 U
Trichlorofluoromethane (CFC-11) [6]	0.00081 U	0.00088 UJ	0.00085 U	0.00085 U	0.00094 U	0.0016 U	0.00081 U	0.00087 U	0.00097 U	0.00095 U	0.00088 U	0.0010 U	0.0016 U	0.0011 U	0.00072 U	0.00098 U	0.0010 U	0.0010 U
PAHs [7] (mg/kg)																		
1-Methylnaphthalene	0.0073 U	--	0.0076 U	0.0074 U	0.0074 U	0.0072 U	0.0073 U	--	**0.045**	0.0073 U	0.0074 U	**0.013**	**0.012**	0.0081 U	0.0074 U	0.0081 U	0.0082 U	0.0083 U
2-Methylnaphthalene	0.0073 U	--	0.0076 U	0.0074 U	0.0074 U	0.0072 U	0.0073 U	--	**0.062**	0.0073 U	0.0074 U	**0.013**	**0.016**	0.0081 U	0.0074 U	0.0081 U	0.0082 U	0.0083 U
Acenaphthene	0.0073 U	--	0.0076 U	0.0074 U	0.0074 U	0.0072 U	0.0073 U	--	0.0072 U	0.0073 U	0.0074 U	**0.012**	0.0081 U	0.0081 U	0.0074 U	0.0081 U	0.0082 U	0.0083 U
Acenaphthylene	0.0073 U	--	0.0076 U	0.0074 U	0.0074 U	0.0072 U	0.0073 U	--	0.0072 U	0.0073 U	0.0074 U	0.0075 U	**0.010**	0.0081 U	0.0074 U	0.0081 U	0.0082 U	0.0083 U
Anthracene	0.0073 U	--	0.0076 U	0.0074 U	0.0074 U	0.0072 U	0.0073 U	--	0.0072 U	0.0073 U	0.0074 U	**0.038**	**0.016**	0.0081 U	0.0074 U	0.0081 U	0.0082 U	0.0083 U
Benzo[g,h,i]perylene	0.0073 U	--	0.0076 U	0.0074 U	0.0074 U	0.0072 U	0.0073 U	--	**0.014**	0.0073 U	**0.013**	**0.069**	**0.046**	0.0081 U	0.0074 U	0.0081 U	0.0082 U	0.0083 U
Fluoranthene	0.0073 U	--	0.0076 U	0.0074 U	0.0074 U	0.0072 U	0.0073 U	--	**0.035**	0.0073 U	**0.029**	**0.17**	**0.094**	0.0081 U	0.0074 U	0.0081 U	0.0082 U	0.0083 U
Fluorene	0.0073 U	--	0.0076 U	0.0074 U	0.0074 U	0.0072 U	0.0073 U	--	0.0072 U	0.0073 U	0.0074 U	**0.010**	0.0081 U	0.0081 U	0.0074 U	0.0081 U	0.0082 U	0.0083 U
Naphthalene	0.0073 U	--	0.0076 U	0.0074 U	0.0074 U	0.0072 U	0.0073 U	--	**0.042**	0.0073 U	0.0074 U	**0.018**	**0.023**	0.0081 U	0.0074 U	0.0081 U	0.0082 U	0.0083 U
Phenanthrene	0.0073 U	--	0.0076 U	0.0074 U	0.0074 U	0.0072 U	0.0073 U	--	**0.038**	0.0073 U	**0.018**	**0.14**	**0.049**	0.0081 U	0.0074 U	0.0081 U	0.0082 U	0.0083 U
Pyrene	0.0073 U	--	0.0076 U	0.0074 U	0.0074 U	0.0072 U	0.0073 U	--	**0.036**	0.0073 U	**0.031**	**0.22**	**0.093**	0.0081 U	0.0074 U	0.0081 U	0.0082 U	0.0083 U
cPAHs [7] (mg/kg)																		
Benzo (a) anthracene (TEF 0.1)	0.0073 U	--	0.0076 U	0.0074 U	0.0074 U	0.0072 U	0.0073 U	--	**0.020**	0.0073 U	**0.016**	**0.094**	**0.049**	0.0081 U	0.0074 U	0.0081 U	0.0082 U	0.0083 U
Benzo (a) pyrene (TEF 1)	0.0073 U	--	0.0076 U	0.0074 U	0.0074 U	0.0072 U	0.0073 U	--	**0.017**	0.0073 U	**0.016**	**0.093**	**0.055**	0.0081 U	0.0074 U	0.0081 U	0.0082 U	0.0083 U
Benzo (b) fluoranthene (TEF 0.1)	0.0073 U	--	0.0076 U	0.0074 U	0.0074 U	0.0072 U	0.0073 U	--	**0.026**	0.0073 U	**0.020**	**0.10**	**0.079**	0.0081 U	0.0074 U	0.0081 U	0.0082 U	0.0083 U
Benzo (J,k) fluoranthene (TEF 0.1)	0.0073 U	--	0.0076 U	0.0074 U	0.0074 U	0.0072 U	0.0073 U	--	0.0072 U	0.0073 U	0.0074 U	**0.033**	**0.022**	0.0081 U	0.0074 U	0.0081 U	0.0082 U	0.0083 U
Chrysene (TEF 0.01)	0.0073 U	--	0.0076 U	0.0074 U	0.0074 U	0.0072 U	0.0073 U	--	**0.022**	0.0073 U	**0.019**	**0.10**	**0.059**	0.0081 U	0.0074 U	0.0081 U	0.0082 U	0.0083 U
Dibenz (a,h) anthracene (TEF 0.1)	0.0073 U	--	0.0076 U	0.0074 U	0.0074 U	0.0072 U	0.0073 U	--	0.0072 U	0.0073 U	0.0074 U	**0.016**	**0.011**	0.0081 U	0.0074 U	0.0081 U	0.0082 U	0.0083 U
Indeno (1,2,3-cd) pyrene (TEF 0.1)	0.0073 U	--	0.0076 U	0.0074 U	0.0074 U	0.0072 U	0.0073 U	--	**0.012**	0.0073 U	**0.011**	**0.056**	**0.040**	0.0081 U	0.0074 U	0.0081 U	0.0082 U	0.0083 U
Total TTEC of cPAHs (detect only)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	--	**0.023**	N/A	**0.021**	**0.12**	**0.076**	N/A	N/A	N/A	N/A	N/A
Metals [8] (mg/kg)																		
Arsenic	11 U	--	11 U	11 U	11 U	11 U	11 U	--	11 U	11 U	11 U	11 U	12 U	12 U	11 U	12 U	12 U	12 U
Barium	**58**	--	**66**	**37**	**40**	**75**	**55**	--	**130**	**85**	**88**	**140**	**150**	**100**	**41**	**79**	**120**	**63**
Cadmium	0.55 U	--	0.57 U	0.55 U	0.56 U	0.54 U	0.54 U	--	0.54 U	0.54 U	0.56 U	0.57 U	0.61 U	0.60 U	0.56 U	0.61 U	0.61 U	0.62 U
Chromium	**57**	--	**56**	**38**	**28**	**64**	**48**	--	**33**	**49**	**40**	**52**	**41**	**39**	**20**	**41**	**60**	**34**
Lead	5.5 U	--	5.7 U	5.5 U	5.6 U	**5.8**	5.4 U	--	**37**	**8.6**	**25**	**250**	**220**	6.0 U	5.6 U	6.1 U	6.1 U	6.2 U
Mercury	0.27 U	--	0.28 U	0.28 U	0.28 U	0.27 U	0.27 U	--	0.27 U	0.27 U	**0.42**	0.28 U	0.30 U	0.30 U	0.28 U	0.31 U	0.31 U	0.31 U
Selenium	11 U	--	11 U	11 U	11 U	11 U	11 U	--	11 U	11 U	11 U	11 U	12 U	12 U	11 U	12 U	12 U	12 U
Silver	1.1 U	--	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	--	1.1 U	1.1 U	1.1 U	1.1 U	1.2 U	1.2 U	1.1 U	1.2 U	1.2 U	1.2 U

Boring/Test Pit	UG-MW31									UG-MW34				MTCA Method A ULU Cleanup Level	Reuse Criteria [12]
Sample Identification [2]	UG-MW31-0.5-1	UG-MW31-4-5	UG-MW31-11-12	UG-MW31-15-16	UG-MW31-16.5-17	UG-MW31-20-21	UG-MW31-22-23	UG-MW31-29.5-30	UG-MW31-32-33	UG-MW34-1-2	UG-MW34-5-6	UG-MW34-14-15	UG-MW34-15-16		
Sample Depth (feet bgs)	0.5 to 1	4 to 5	11 to 12	15 to 16	16.5 to 17	20 to 21	22 to 23	29.5 to 30	32 to 33	1 to 2	5 to 6	14 to 15	15 to 16		
Soil Type	Fill	Fill	Qvi	Qvi	Qvi	Silt	Outwash	Outwash	Outwash	Qvi	Qvi	Qvi	Qvi		
NWTPH-HCID [3] (mg/kg)															
Gasoline-Range	21 U	22 U	--	--	--	--	--	--	--	21 U	21 U	--	--	30/100[9]	30
Diesel-Range	53 U	54 U	--	--	--	--	--	--	--	54 U	53 U	--	--	2,000	200
Lube Oil-Range	110 U	110 U	--	--	--	--	--	--	--	110 U	110 U	--	--	2,000	200
NWTPH-Dx [4] (mg/kg)															
Diesel-Range Petroleum Hydrocarbons	--	--	--	--	--	--	--	--	--	--	--	--	--	2,000	200
Lube Oil-Range Petroleum Hydrocarbons	--	--	--	--	--	--	--	--	--	--	--	--	--	2,000	200
VOCs [5] (mg/kg)															
Tetrachloroethene (PCE)	0.00082 U	0.00087 U	0.00085 U	0.00075 U	**0.00091**	0.00082 U	0.00089 U	0.00092 U	0.00072 U	0.0010 U	0.00037 U	0.00081 U	0.00084 U	0.05	DET
Trichloroethene (TCE)	0.00082 U	0.00087 U	**0.002**	**0.0077**	**0.026**	**0.0046**	**0.006**	**0.0024**	**0.0088**	0.0010 U	0.00037 U	0.00081 U	0.00084 U	0.03	DET
(cis) 1,2-Dichloroethene	0.00082 U	0.00087 U	0.00085 U	0.00075 U	0.00089 U	0.00082 U	0.00089 U	0.00092 U	0.00072 U	0.0010 U	0.00037 U	0.00081 U	0.00084 U	160[10]	DET
(trans) 1,2-Dichloroethene	0.00082 U	0.00087 U	0.00085 U	0.00075 U	0.00089 U	0.00082 U	0.00089 U	0.00092 U	0.00072 U	0.0010 U	0.00037 U	0.00081 U	0.00084 U	1,600[10]	DET
Vinyl Chloride	0.00082 U	0.00087 U	0.00085 U	0.00075 U	0.00089 U	0.00082 U	0.00089 U	0.00092 U	0.00072 U	0.0010 U	0.00037 U	0.00081 U	0.00084 U	0.67[10]	DET
1,2,4-Trimethylbenzene	0.00082 U	**0.0011**	0.00085 U	0.00075 U	0.00089 U	0.00082 U	0.00089 U	0.00092 U	0.00072 U	0.0010 U	0.00037 U	0.00081 U	0.00084 U	8,000[10]	NE
Acetone [6]	0.0041 U	0.0044 U	**0.011**	0.0037 U	0.0045 U	**0.0057**	0.0045 U	0.0046 U	0.0036 U	0.0051 U	**0.0045**	0.0041 U	0.0042 U	72,000[10]	NE
Carbon Disulfide [6]	0.00082 U	0.00087 U	**0.0012**	0.00075 U	0.00089 U	0.00082 U	0.00089 U	0.00092 U	0.00072 U	0.0010 U	0.00037 U	0.00081 U	0.00084 U	8,000[10]	NE
Trichlorofluoromethane (CFC-11) [6]	0.00082 U	0.00087 U	0.00085 U	0.00075 U	0.00089 U	0.00082 U	0.00089 U	0.00092 U	0.00072 U	0.0010 U	0.00037 U	**0.0023**	**0.0041**	24,000[10]	NE
PAHs [7] (mg/kg)															
1-Methylnaphthalene	0.0071 U	0.0072 U	--	--	--	--	--	--	--	0.0071 U	0.0070 U	--	--	35[10]	NE
2-Methylnaphthalene	0.0071 U	0.0072 U	--	--	--	--	--	--	--	0.0071 U	0.0070 U	--	--	320[10]	NE
Acenaphthene	0.0071 U	0.0072 U	--	--	--	--	--	--	--	0.0071 U	0.0070 U	--	--	4,800[10]	NE
Acenaphthylene	0.0071 U	0.0072 U	--	--	--	--	--	--	--	0.0071 U	0.0070 U	--	--	NE	NE
Anthracene	0.0071 U	0.0072 U	--	--	--	--	--	--	--	0.0071 U	0.0070 U	--	--	24,000[10]	NE
Benzo[g,h,i]perylene	0.0071 U	0.0072 U	--	--	--	--	--	--	--	0.0071 U	0.0070 U	--	--	NE	NE
Fluoranthene	0.0071 U	0.0072 U	--	--	--	--	--	--	--	0.0071 U	0.0070 U	--	--	3,200[10]	NE
Fluorene	0.0071 U	0.0072 U	--	--	--	--	--	--	--	0.0071 U	0.0070 U	--	--	3,200[10]	NE
Naphthalene	0.0071 U	0.0072 U	--	--	--	--	--	--	--	0.0071 U	0.0070 U	--	--	5	NE
Phenanthrene	0.0071 U	0.0072 U	--	--	--	--	--	--	--	0.0071 U	0.0070 U	--	--	NE	NE
Pyrene	0.0071 U	0.0072 U	--	--	--	--	--	--	--	0.0071 U	0.0070 U	--	--	2,400[10]	NE
cPAHs (mg/kg)															
Benzo (a) anthracene (TEF 0.1)	0.0071 U	0.0072 U	--	--	--	--	--	--	--	0.0071 U	0.0070 U	--	--	MTCA ULU cleanup level for the sum of all cPAHs is 0.1 mg/kg	Reuse Criteria for the sum of all cPAHs is 0.1 mg/kg
Benzo (a) pyrene (TEF 1)	0.0071 U	0.0072 U	--	--	--	--	--	--	--	0.0071 U	0.0070 U	--	--		
Benzo (b) fluoranthene (TEF 0.1)	0.0071 U	0.0072 U	--	--	--	--	--	--	--	0.0071 U	0.0070 U	--	--		
Benzo (J,k) fluoranthene (TEF 0.1)	0.0071 U	0.0072 U	--	--	--	--	--	--	--	0.0071 U	0.0070 U	--	--		
Chrysene (TEF 0.01)	0.0071 U	0.0072 U	--	--	--	--	--	--	--	0.0071 U	0.0070 U	--	--		
Dibenz (a,h) anthracene (TEF 0.1)	0.0071 U	0.0072 U	--	--	--	--	--	--	--	0.0071 U	0.0070 U	--	--		
Indeno (1,2,3-cd) pyrene (TEF 0.1)	0.0071 U	0.0072 U	--	--	--	--	--	--	--	0.0071 U	0.0070 U	--	--		
Total TTEC of cPAHs (detect only)	N/A	N/A	--	--	--	--	--	--	--	N/A	N/A	--	--	0.1	0.1
Metals [8] (mg/kg)															
Arsenic	11 U	11 U	--	--	--	--	--	--	--	11 U	11 U	--	--	20	7
Barium	**40**	**39**	--	--	--	--	--	--	--	**71**	**49**	--	--	16,000[10]	NE
Cadmium	0.53 U	0.54 U	--	--	--	--	--	--	--	0.54 U	0.53 U	--	--	2.0	1.0
Chromium	**32**	**34**	--	--	--	--	--	--	--	**64**	**33**	--	--	2,000 [11]	48[13]
Lead	5.3 U	5.4 U	--	--	--	--	--	--	--	5.4 U	**6.8**	--	--	250	50
Mercury	0.27 U	0.27 U	--	--	--	--	--	--	--	0.27 U	0.26 U	--	--	2.0	0.07 or DET
Selenium	11 U	11 U	--	--	--	--	--	--	--	11 U	11 U	--	--	400[10]	NE
Silver	1.1 U	1.1 U	--	--	--	--	--	--	--	1.1 U	1.1 U	--	--	400[10]	NE

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc., of Redmond, Washington.

[2] Sample ID = Area number - boring/test pit number - starting depth of sample [feet bgs] -end depth [feet bgs], Area 1G Boring 1 collected 2-3 feet bgs = 1G-B1-2-3.

[3] Washington State Department of Ecology (Ecology)-approved method NWTPH-HCID.

[4] Ecology-approved method NWTPH-Dx.

[5] VOCs were analyzed by U.S. Environmental Protection Agency (EPA) method 8260B. Other VOCs were analyzed but not detected.

[6] This compound is a common laboratory contaminant.

[7] Polycyclic aromatic hydrocarbons (PAHs) and carcinogenic PAHs (cPAHs) were analyzed by EPA method 8270D/SIM.

[8] Resource Conservation Recovery Act (RCRA) metals analyzed by EPA 6000/7000 series method.

[9] MTCA Method A cleanup level for gasoline is 30 mg/kg if benzene is detected or if the sum of toluene, ethylbenzene and xylenes are equal to or greater than 1% of the total gasoline detection.

[10] MTCA Method B criteria represented because MTCA Method A cleanup level has not been established.

[11] MTCA Method A cleanup level for Trivalent Chromium.

[12] Guidance for Remediation of Petroleum Contaminated Sites (Publication 10-09-057) Ecology, October 2011; Summary Natural Background Soil Metals Concentrations in Washington State (Publication 94-115) dated October 1994; and Hazardous Waste Regulations 40 CFR Part 260.

[13] Chromium was not compared to the Reuse Criteria listed above for soils based on historic soil analytical results indicating chromium is not a prevalent chemical of concern on the UWT campus.

mg/kg = milligram per kilogram

-- = sample not analyzed

N/A = not applicable

DET = Detected greater than laboratory reporting limits

MTCA = Model Toxics Control Act

bgs = below ground surface

Qvi = Ice-contact deposit

Outwash = Advance Outwash

U = Analyte was not detected at or greater than the listed reporting limit of the analytical laboratory

UJ = Analyte was not detected at or greater than the listed reporting limit and the result is estimated.

TEF = Toxicity Equivalency Factor as defined in WAC 173-340-900 Table 708-2

Total Toxic Equivalent Concentration (TTEC) is the sum of each individual cPAH concentration multiplied by its corresponding TEF.

Bold font type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Bold font type and gray shading indicates that the detected concentration is greater than the respective MTCA cleanup level.

Dashed outline indicates the value is greater than the Reuse Criteria.

Table 2

Summary of Chemical Analytical Results[1] - Groundwater

Area 1G - Laborers/Lot T39 and T40

University of Washington Tacoma Priority Development Areas

Tacoma, Washington

Boring Identification	UG-MW9	UG-MW14	UG-MW27	UG-MW28	UG-MW31	UG-MW34	BA-MW2	MTCA Method A Groundwater Cleanup Level	MTCA Method B Air Screening Levels [13]
Sample ID[2]	UG-MW9-130617	UG-MW14-130617	UG-MW27-130702	UG-MW28-130702	UG-MW31-130904	UG-MW34-130923	BA-MW2-130617		
Sample Date	6/17/2013	6/17/2013	7/2/2013	7/2/2013	9/4/2013	9/23/2013	6/17/2013		
Approximate Depth to Groundwater (feet btoc)[3]	30.06	21.41	23.16	19.81	5.20	16.71	28.44		
Approximate Elevation of Groundwater (feet)[4]	93.74	112.34	125.52	131.33	137.72	125.32	95.84		
Top of Well Screen Elevation (feet)[4]	79.6	111.97	108.68	143	135.35	133.23	79.6		
Bottom of Well Screen Elevation (feet)[4]	64.6	96.97	93.68	128	125.35	123.23	64.6		
Lithology At Well Screen	Outwash	Outwash	Outwash	Qvi	Qvi	Qvi	Outwash		
Chemical									
NWTPH-Gx[5] (µg/L)									
Gasoline-Range	--	--	100 U	100 U	100 U	100 U	--	800/1,000[10]	NE
NWTPH-Dx[6] (mg/L)									
Diesel-Range	--	--	0.26 U	0.25 U	0.26 U	0.26 U	--	0.5	NE
Lube Oil-Range	--	--	0.41 U	0.41 U	0.42 U	0.42 U	--	0.5	NE
VOCs[7] (µg/L)									
Trichloroethene (TCE)	0.20 U	110	0.20 U	0.21	120	0.20 U	0.20 U	5	1.5
Tetrachloroethene (PCE)	0.20 U	1.2	0.20 U	0.20 U	1.0 U	0.20 U	0.20 U	5	24
(cis) 1,2-Dichloroethene	0.20 U	1.0 U	0.20 U	0.20 U	1.4	0.20 U	0.20 U	16[11]	160
(trans) 1,2-Dichloroethene	0.20 U	1.0 U	0.20 U	0.20 U	1.0 U	0.20 U	0.20 U	160[11]	110
Vinyl Chloride	0.10 U	0.50 U	0.10 U	0.10 U	1.0 U	0.20 U	0.10 U	0.2	0.35
cPAHs[8] (µg/L)									
Benzo (a) anthracene (TEF 0.1)	--	--	0.010 U	0.010 U	0.0094 U	0.015 U	--	MTCA ULU cleanup level for the sum of all cPAHs is 0.1 µg/L	NE
Benzo (a) pyrene (TEF 1)	--	--	0.010 U	0.010 U	0.0094 U	0.015 U	--		NE
Benzo (b) fluoranthene (TEF 0.1)	--	--	0.010 U	0.010 U	0.0094 U	0.015 U	--		NE
Benzo (j,k) fluoranthene (TEF 0.1)	--	--	0.010 U	0.010 U	0.0094 U	0.015 U	--		NE
Chrysene (TEF 0.01)	--	--	0.010 U	0.010 U	0.0094 U	0.015 U	--		NE
Dibenz (a,h) anthracene (TEF 0.1)	--	--	0.010 U	0.010 U	0.0094 U	0.015 U	--		NE
Indeno (1,2,3-cd) pyrene (TEF 0.1)	--	--	0.010 U	0.010 U	0.0094 U	0.015 U	--		NE
Total TTEC of cPAHs (detect only)	--	--	N/A	NA	N/A	N/A	--	0.1	NE
Total Metals[9] (µg/L)									
Arsenic	--	--	3.3 U	3.3 U	3.3 U	3.0 U	--	5	NE
Barium	--	--	28 U	33	28 U	89	--	3,200[11]	NE
Cadmium	--	--	4.4 U	4.4 U	4.4 U	4.0 U	--	5	NE
Chromium	--	--	11 U	11 U	11 U	10 U	--	50[12]	NE
Lead	--	--	1.1 U	1.1 U	1.1 U	2.6	--	15	NE
Mercury	--	--	0.50 U	0.50 U	0.50 U	0.50 U	--	2	NE
Selenium	--	--	5.6 U	5.6 U	5.6 U	5.0 U	--	80[11]	NE
Silver	--	--	11 U	11 U	11 U	10 U	--	80[11]	NE

Boring Identification	UG-MW9	UG-MW14	UG-MW27	UG-MW28	UG-MW31	UG-MW34	BA-MW2	MTCA Method A Groundwater Cleanup Level	MTCA Method B Air Screening Levels [13]
Sample ID[2]	UG-MW9-130617	UG-MW14-130617	UG-MW27-130702	UG-MW28-130702	UG-MW31-130904	UG-MW34-130923	BA-MW2-130617		
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Bottom of Well Screen Elevation (feet)[4]	64.6	96.97	93.68	128	125.35	123.23	64.6		
Lithology At Well Screen	Outwash	Outwash	Outwash	Qvi	Qvi	Qvi	Outwash		
Chemical									

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc. in Redmond, Washington.

[2] Sample ID = Area number - Boring number - Date (i.e., a water sample collected from UG-MW31 on September 4, 2013 = UG-MW31-130904).

[3] Groundwater level was measured below the top of casing.

[4] Based on survey completed by AHBL November 6, 2013. Horizontal datum - NAD 83/91 Washington State Plane - South Zone (City of Tacoma Horizontal control Holding City Monument Numbers 411 and 414). Vertical datum NGVD 29 (brass monument at South 19th and Fawcett Avenue, elevation 165.15).

[5] Washington State Department of Ecology (Ecology)-approved method NWTPH-Gx.

[6] Ecology-approved method NWTPH-Dx.

[7] Volatile organic compounds (VOCs) were analyzed by U.S. Environmental Protection Agency (EPA) method 8260C. Other VOCs were analyzed but not detected.

[8] Polycyclic Aromatic Hydrocarbons (PAHs) and carcinogenic PAHs (cPAHs) analyzed by EPA method 8270D/SIM.

[9] Metals analyzed by EPA 200.8 or 7470A method.

[10] MTCA Method A cleanup level for gasoline-range petroleum hydrocarbons is 800 µg/L if benzene is present and 1,000 µg/L if benzene is not present.

[11] MTCA Method B criteria represented because MTCA Method A cleanup level has not been established.

[12] MTCA Method A cleanup level for total chromium shown. Cleanup level for hexavalent chromium is 48 µg/L.

[13] MTCA Method B Indoor Air Screening Level from Washington State Deportment of Ecology Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action. Values updated as appropriate to incorporate recent toxicity data.

MTCA = Model Toxics Control Act

-- = Analyte or sample not analyzed

Qvi = Ice-contact deposit

N/A = Not applicable

µg/L = Microgram per liter

Outwash = Advance Outwash

mg/L = Milligram per liter

DET = Detected greater than laboratory reporting limits

U = Analyte was not detected at or greater than the listed reporting limit

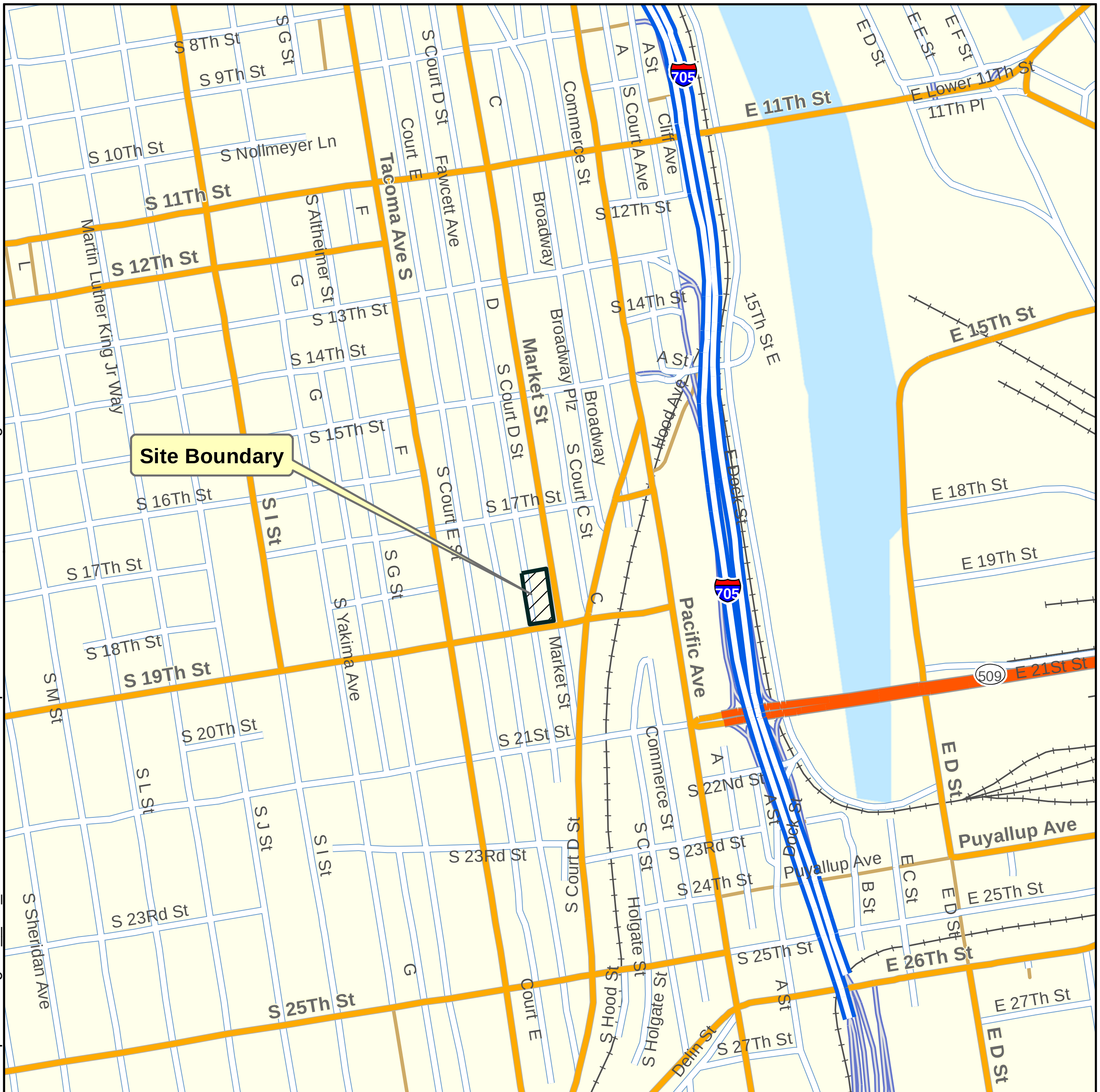
TEF = Toxicity Equivalency Factor as defined in WAC 173-340-900 Table 708-2

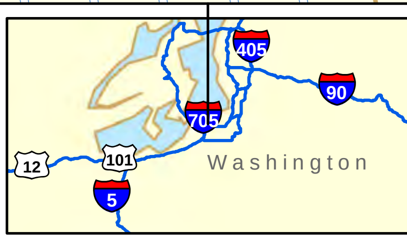
Total Toxic Equivalent Concentration (TTEC) is the sum of each individual cPAH concentration multiplied by its corresponding TEF.

Bold font type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Bold type and gray shading indicates analyte was detected at a concentration greater than the MTCA Method groundwater cleanup/criteria level.

Dashed outline indicates analyte was detected at a concentration greater than the MTCA Method B Indoor Air Screening Level.





N
W E
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1,000 0 1,000

Feet

Notes:
CPO = University of Washington Capital Project Office
UWT = University of Washington Tacoma
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Data Sources: ESRI Data & Maps

Projection: NAD 1983 UTM Zone 10N

Vicinity Map

UWT Environmental Investigation
Priority Development Areas - CPO Project No. 204277
Tacoma, Washington

GeoEngineers

Figure 1

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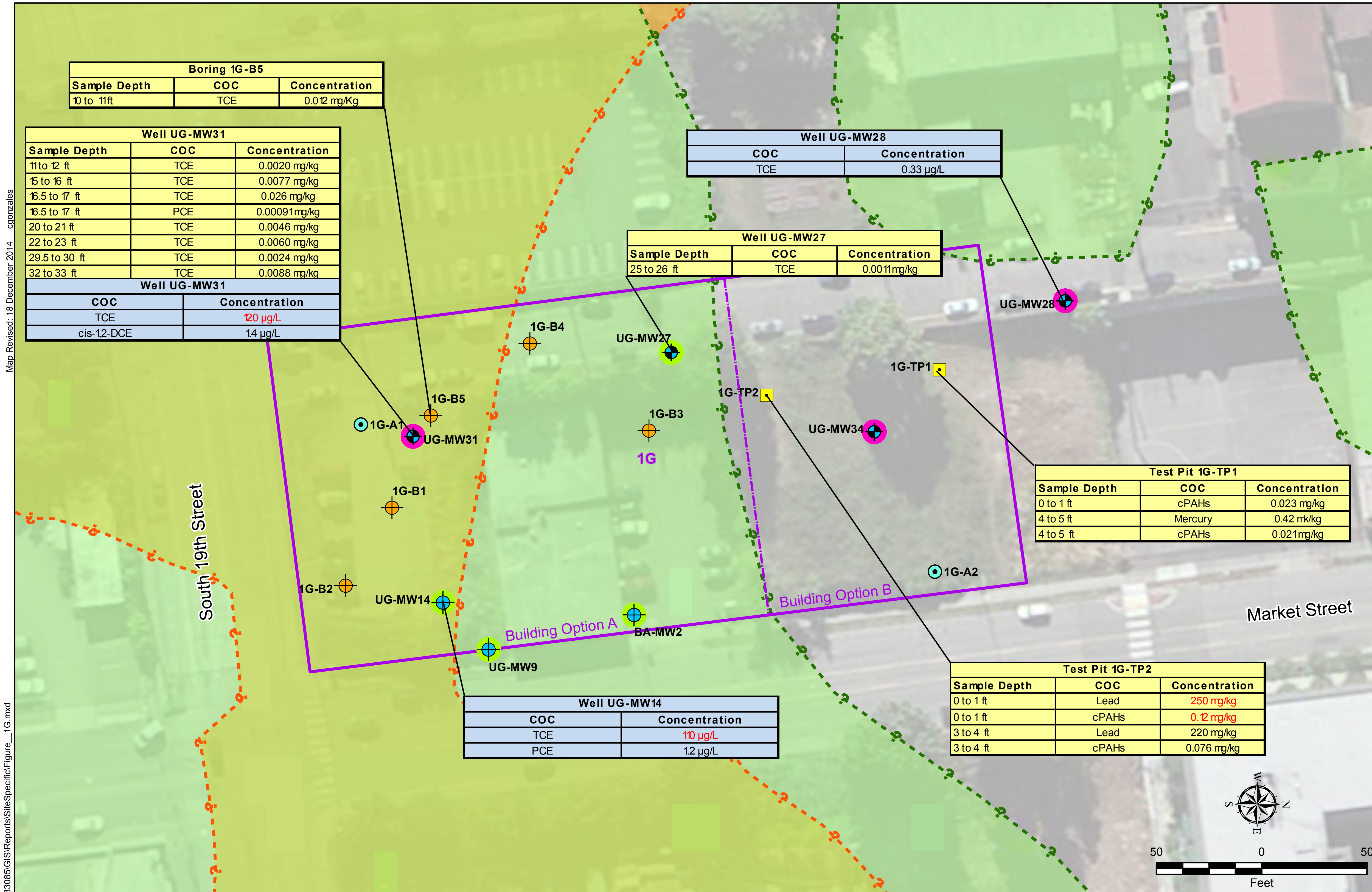

Boring 1G-B5		
Sample Depth	COC	Concentration
10 to 11ft	TCE	0.012 mg/Kg

Well UG-MW31		
Sample Depth	COC	Concentration
11 to 12 ft	TCE	0.0020 mg/kg
15 to 16 ft	TCE	0.0077 mg/kg
16.5 to 17 ft	TCE	0.026 mg/kg
16.5 to 17 ft	PCE	0.00091mg/kg
20 to 21 ft	TCE	0.0046 mg/kg
22 to 23 ft	TCE	0.0060 mg/kg
29.5 to 30 ft	TCE	0.0024 mg/kg
32 to 33 ft	TCE	0.0088 mg/kg

Well UG-MW31	
COC	Concentration
TCE	120 µg/L
cis-1,2-DCE	14 µg/L

Well UG-MW28	
COC	Concentration
TCE	0.33 µg/L

Well UG-MW27		
Sample Depth	COC	Concentration
25 to 26 ft	TCE	0.0011mg/kg

Test Pit 1G-TP1		
Sample Depth	COC	Concentration
0 to 1 ft	cPAHs	0.023 mg/kg
4 to 5 ft	Mercury	0.42 mk/kg
4 to 5 ft	cPAHs	0.021mg/kg

Test Pit 1G-TP2		
Sample Depth	COC	Concentration
0 to 1 ft	Lead	250 mg/kg
0 to 1 ft	cPAHs	0.12 mg/kg
3 to 4 ft	Lead	220 mg/kg
3 to 4 ft	cPAHs	0.076 mg/kg

Well UG-MW14	
COC	Concentration
TCE	110 µg/L
PCE	1.2 µg/L

Soil Results*

Boring 2A-B7		
Sample Depth	COC	Concentration
2.5 to 3.5 feet bgs	Lead	200 mg/kg
2.5 to 3.5 feet bgs	cPAHs	0.64 mg/kg

Groundwater Results*

Well UG-MW13	
COC	Concentration
TCE	110 µg/L
PCE	1.4 µg/L

*Chemicals shown in red were detected at concentrations greater than the respective MTCA Method A cleanup levels.

Only analytical results of the chemicals of concern are shown if detected. Other chemicals that were analyzed and detected are not shown unless detected at concentrations greater than the respective MTCA cleanup levels.

Legend

Approximate Location of Priority Development Area 1G

Approximate Subsurface Location and Identification

Existing Monitoring Well

Direct Push Boring

Sonic Core Boring - Permanent New Monitoring Well

Test Pit

Magnetic Anomaly Where Test Pit Was Not Completed (Potential UST)

Lithology of Well Screen Interval

Ice-Contact Deposit (Shallow Aquifer)

Advance Outwash (Deep Aquifer)

Approximate Lateral Extent of TCE-Contaminated Groundwater Plume in Shallow Aquifer

Approximate Lateral Extent of TCE-Contaminated Groundwater Plume in Deep Aquifer

Approximate Lateral Extent of TCE-Contaminated Groundwater Plume in Shallow and Deep Aquifers

Notes:
cPAHs concentrations shown as TTEC.
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet
COC = Chemical of Concern
UWT = University of Washington Tacoma
PDA = Priority Development Area
PCE = tetrachloroethene
TCE = trichloroethene
cPAH = Carcinogenic Polycyclic Aromatic Hydrocarbons
mg/kg = milligram per kilogram
µg/L = microgram per Liter
bgs = Below Ground Surface
TTEC = Total Toxicity Equivalency Concentration
UST = Underground Storage Tank
ULU = Unrestricted Land Use
MTCA = Model Toxics Control Act
DCE = dichloroethene

Soil MTCA Cleanup/Criteria Levels:
PCE = 0.05 mg/kg (Method A ULU)
TCE = 0.03 mg/kg (Method A ULU)
Benzene = 0.03 mg/kg (Method A ULU)
Vinyl Chloride = 0.67 mg/kg (Method B)
Lube Oil-Range Petroleum Hydrocarbons = 2,000 mg/kg (Method A ULU)
Diesel-Range Petroleum Hydrocarbons = 2,000 mg/kg (Method A ULU)
Gasoline-Range Petroleum Hydrocarbons = 100 mg/kg (Method A ULU)
cPAHs (TTEC) = 0.1 mg/kg (Method A ULU)
Lead = 250 mg/kg (Method A ULU)
Arsenic = 20 mg/kg (Method A ULU)
Cadmium = 2 mg/kg (Method A ULU)
Mercury = 2 mg/kg (Method A ULU)

Groundwater MTCA Cleanup/Criteria Levels:
PCE = 5 µg/L (Method A); 24 µg/L (Indoor Air)
TCE = 5 µg/L (Method A); 1.5 µg/L (Indoor Air)
cis-1,2-DCE= 16 µg/L (Method B); 160 µg/L (Indoor Air)
Vinyl Chloride = 0.2 µg/L (Method A); 0.35 µg/L (Indoor Air)
Benzene = 5 µg/L (Method A); 2.4 µg/L (Indoor Air)
Lube Oil-Range Petroleum Hydrocarbons = 0.5 mg/L (Method A)
Arsenic = 5 µg/L (Method A)
cPAHs= 0.1 µg/L (Method A)

Site Plan – PDA 1G/Laborers/Lot T39 and T40

UWT Environmental Investigation
Priority Development Areas - CPO Project No. 204277
Tacoma, Washington

GEOENGINEERS

Figure 2

Map Revised: 18 December 2014 cgonzales

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APPENDIX A

Report Limitations and Guidelines for Use

APPENDIX A
REPORT LIMITATIONS AND GUIDELINES FOR USE[1]

This appendix provides information to help you manage your risks with respect to the use of this report.

Environmental Services are Performed for Specific Purposes, Persons and Projects

This report has been prepared for use by University of Washington. This report is not intended for use by others, and the information contained herein is not applicable to other sites.

GeoEngineers structures our services to meet the specific needs of our clients. For example, an environmental site assessment study conducted for a property owner may not fulfill the needs of a prospective purchaser of the same property. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and project site. No one except University of Washington should rely on this environmental report without first conferring with GeoEngineers. This report should not be applied for any purpose or project except the one originally contemplated.

This Environmental Report is Based on a Unique Set of Project-Specific Factors

This report has been prepared for the Priority Development Areas (PDAs) Environmental Assessment Project at the UW – Tacoma (UWT) campus located in Tacoma, Washington. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, do not rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

If important changes are made after the date of this report, GeoEngineers should be given the opportunity to review our interpretations and recommendations and provide written modifications or confirmation, as appropriate.

Reliance Conditions for Third Parties

If a lending agency or other parties intend to place legal reliance on the product of our services, we require that those parties indicate in writing their acknowledgement that the scope of services provided, and the general conditions under which the services were rendered including the limitation of professional liability, are understood and accepted by them. This is to provide our firm with reasonable

[1] Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions.

Environmental Regulations are Always Evolving

Some substances may be present in the site vicinity in quantities or under conditions that may have led, or may lead, to contamination of the subject site, but are not included in current local, state or federal regulatory definitions of hazardous substances or do not otherwise present current potential liability. GeoEngineers cannot be responsible if the standards for appropriate inquiry, or regulatory definitions of hazardous substance, change or if more stringent environmental standards are developed in the future.

Subsurface Conditions can Change

This environmental report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by manmade events such as construction on or adjacent to the site, by new releases of hazardous substances, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Always contact GeoEngineers before applying this report to determine if it is still applicable.

Topsoil

For the purposes of this report, we consider topsoil to consist of generally fine-grained soil with an appreciable amount of organic matter based on visual examination, and to be unsuitable for direct support of the proposed improvements. However, the organic content and other mineralogical and gradational characteristics used to evaluate the suitability of soil for use in landscaping and agricultural purposes was not determined, nor considered in our analyses. Therefore, the information and recommendations in this report, and our logs and descriptions should not be used as a basis for estimating the volume of topsoil available for such purposes.

Most Environmental Findings are Professional Opinions

Our interpretations of subsurface conditions are based on field observations and chemical analytical data from widely spaced sampling locations at the site. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ – sometimes significantly – from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

Do Not Redraw the Exploration Logs

Environmental scientists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in an environmental report should never be redrawn for inclusion in other design drawings. Only photographic or electronic reproduction is acceptable, but recognize that separating logs from the report can elevate risk.

Read These Provisions Closely

Some clients, design professionals and contractors may not recognize that the geoscience practices (geotechnical engineering, geology and environmental science) are far less exact than other engineering

and natural science disciplines. This lack of understanding can create unrealistic expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory “limitations” provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you are unclear how these “Report Limitations and Guidelines for Use” apply to your project or site.

Geotechnical, Geologic and Geoenvironmental Reports Should Not Be Interchanged

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually relate any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding a specific project.

Biological Pollutants

GeoEngineers’ Scope of Work specifically excludes the investigation, detection, prevention, or assessment of the presence of Biological Pollutants in or around any structure. Accordingly, this report includes no interpretations, recommendations, findings, or conclusions for the purpose of detecting, preventing, assessing, or abating Biological Pollutants. The term “Biological Pollutants” includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts.

PDA 1H – Proposed YMCA Building

Proposed YMCA Building – Area 1H
Environmental Subsurface Investigation

UWT Environmental Investigation Project
UW Capital Project Office Project No. 204277
1710 and 1726 Market Street
Tacoma, Washington

for
University of Washington

August 30, 2013

GeoEngineers

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Tacoma, Washington 98402
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Proposed YMCA Building
UWT Environmental Investigation Project
UW Capital Project Office
Project No. 204277
1710 and 1726 Market Street
Tacoma, Washington

File No. 0183-085-00

August 30, 2013

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Table of Contents

1.0 INTRODUCTION 1

2.0 HISTORICAL USE AND PREVIOUS INVESTIGATIONS 1

3.0 CURRENT SITE FEATURES 1

4.0 PROPOSED DEVELOPMENT PLANS 2

5.0 ENVIRONMENTAL SUBSURFACE EXPLORATIONS 2

5.1. General 2
5.2. Soil Conditions 3
5.3. Groundwater Conditions 3
5.4. Monitoring Well Installation 4

6.0 CHEMICAL ANALYTICAL PROGRAM 4

6.1. General 4
6.2. Soil 4
6.2.1. Petroleum-Range Hydrocarbons 5
6.2.2. VOCs 5
6.2.3. PAHs 5
6.2.4. RCRA Metals 6
6.3. Groundwater 6
6.3.1. Petroleum-Range Hydrocarbons 6
6.3.2. VOCs 6
6.3.3. PAHs 7
6.3.4. Total RCRA Metals 7

7.0 CONCLUSIONS 7

8.0 POTENTIAL IMPACTS AND MITIGATION MEASURES 8

8.1. Potential Immediate Impacts 8
8.2. Potential Impacts and Mitigation Measures to Design and Construction 9
8.2.1. Vapor Intrusion 9
Vapor Intrusion 9
8.2.2. Cross Contamination Between Water-Bearing Units 10
8.2.3. Management of Soil and Water During Construction 10
8.2.4. Management of Groundwater Following Construction 11
8.3 Potential Long Term Impacts 11

9.0 LIMITATIONS 11

10.0 REFERENCES 12

LIST OF TABLES

Table 1. Summary of Chemical Analytical Results – Soil
Table 2. Summary of Chemical Analytical Results – Groundwater
Table 3. Air and Groundwater Residential Risk-Based Concentrations

LIST OF FIGURES

Figure 1. Vicinity Map
Figure 2. Subsurface Investigation Results Area 1H
Figure 3. Preliminary Conceptual Site Model

APPENDICES

Appendix A. Field Exploration Program
    Figure A-1. Key to Exploration Logs
    Figures A-2 through A-4. Log of Monitoring Wells
    Figures A-5 through A-7. Log of Borings
    Figure A-8. Log of Test Pit
Appendix B. Chemical Analytical Reports (To Be Included in Final)
Appendix C. MTCA Method B Groundwater Screening Level Protective of Indoor Air Calculation
Appendix D. Report Limitations and Guidelines for Use

1.0 INTRODUCTION

This report presents the results of our environmental subsurface investigation completed for the proposed YMCA building at the University of Washington, Tacoma (UWT) YMCA Center to be located at 1710 and 1726 Market Street in Tacoma, Washington. The subsurface investigation was completed under the larger UWT Environmental Investigation Project, UW project number 204277. The YMCA project was identified as Area 1H in the larger Environmental Investigation project.

The property is located in the downtown business district area on the UWT campus in Tacoma, Washington. The property is bound by South Court D Street to the west, South 17th Street to the north, Market Street to the east and a vacant grass-covered sloped lot and the Student Health Services single-story building to the south (formerly the Laborers Hall building). The property is herein referred to as the “site”. A Vicinity Map of the project area is included as Figure 1. See Figure 2 for the layout of the site in relation to adjacent properties.

2.0 HISTORICAL USE AND PREVIOUS INVESTIGATIONS

The historical use and previous site investigations are further described in the Sampling and Analysis Plan dated June 14, 2013 for the Environmental Investigation Project. The site was developed in the early 1900s with multiple single-family houses with sheds and an apartment building (Lam Property, 1726 Market Street) that was heated by a boiler according to City of Tacoma records. A store was present on the northeast portion of the site in 1912.

These structures were demolished by the 1950s with the exception of the apartment building (Lam Property) on the southern portion of the site. The apartment building continued operating through the 2000s. The existing Longshoremen’s Building was built in 1952 and recently renovated in 2007. The Longshoremen’s Building consists of a two-story concrete block structure. An underground storage tank (UST) was removed in the southwest portion of the Longshoremen’s Building. Petroleum-contaminated soil was reportedly not encountered during the UST removal and excavation in the area southwest of the existing building.

A subsurface investigation was completed in the area of the former apartment building in 2013. The investigation consisted of performing a ground penetrating radar (GPR) survey and associated test pits. USTs were not observed during the investigation.

3.0 CURRENT SITE FEATURES

The site comprises the Longshoremen’s Building (1710 Market Street), the parking lot located north of the Longshoremen’s building, the courtyard located south of the Longshoremen’s building and a portion of the vacant lot that is approximately 50 feet wide and 120 feet deep (Lam property at 1726 Market Street) located south of the courtyard.

Topography from Market Street to the South Court D Street varies as much as 25 feet in elevation. The parking lot, Longshoremen’s building entrance and courtyard are near the same elevation as Market Street. Grade separation from the alley and Market Street includes a number of features including a steep slope in the west portion of the parking lot, the west wall of the Longshoremen's building, a retaining wall in the west portion of the courtyard and a sloped area and retaining wall in the west portion of the vacant lot. Water was observed to be seeping from the steep slope in the western portion of the parking lot.

4.0 PROPOSED DEVELOPMENT PLANS

UWT has selected the Mortenson Construction-McGranahan Architect team to provide design-build services for the design and construction of a new 55,000- to 70,000-gross square foot recreation and student life facility to be owned by the UWT and operated by the YMCA of Pierce and Kitsap Counties. Primary goals of the project are to maximize the building and program square footage and meet the level of quality of recent YMCA facilities constructed in Gig Harbor and Silverdale. Program elements will include a gymnasium, cardio and weight training facilities, indoor walking/jogging track, multipurpose exercise rooms, meeting rooms, locker rooms, student government and club space, site development, utilities and landscaping. The proposed three-story structure is anticipated to remain at or near the existing grade of Market Street.

5.0 ENVIRONMENTAL SUBSURFACE EXPLORATIONS

5.1. General

Three direct-push borings (1H-B1, 1H-B2 and 1H-B3), and one test pit (1H-TP1) were completed at the site on June 10 and June 25, 2013. The direct-push borings and test pit ranged in depth between 6 and 11 feet below ground surface (bgs) and were completed when practical refusal was encountered. Three rotosonic core borings (UG-MW28, UG-MW29S and UG-MW29D) were advanced adjacent to the west and upgradient of the site between June 24 and 26, 2013. The rotosonic core borings were completed as monitoring wells to depths ranging between 21 and 45 feet bgs.

Soil and groundwater conditions were evaluated during the subsurface investigation to identify potential environmental impacts to the design and construction phases of the project. Soil samples were collected during the environmental subsurface investigation activities for chemical analysis. The groundwater monitoring wells were developed on June 28, 2013. Groundwater samples were collected on July 1 and 2, 2013 from monitoring wells UG-MW28, UG-MW29S and UG-MW29D.

A soil vapor sample was scheduled to be collected during subsurface investigation activities. Several attempts to collect the soil vapor sample were performed on June 14, 2013. No soil vapor sample was collected due to either low permeability soil or to shallow groundwater (3 to 7 feet bgs) being drawn into the vapor sampling equipment when pressure was applied to the soil matrix.

The subsurface explorations were monitored by a representative of GeoEngineers who visually classified the soil samples obtained during advancement of the borings and test pit and performed field screening tests on soil samples collected from the borings and test pit for evidence of petroleum hydrocarbons and photoionizable vapors.

The field exploration program, boring and test pit logs and monitoring well installation details and development procedures are included in Appendix A. The direct-push borings were abandoned in accordance with Washington State Department of Ecology (Ecology) regulations and monitoring wells were installed in the rotosonic core borings. The boring and test pit locations are shown on Figure 2.

5.2. Soil Conditions

The surface conditions encountered during the subsurface exploration activities were either asphalt road or parking lot at all locations with the exception of boring 1H-TP1 where field grass was encountered at the surface.

Subsurface conditions consisted of sand and gravel fill (fine to coarse sand and/or gravel with silt), when encountered, from below the surface to depths ranging from 0.5 to 3 feet bgs.

Native soil conditions underlying the fill consisted of glacially consolidated units (glacial drift) comprised of silty sand to sand with gravel and silt were observed at all subsurface explorations. A semi-confining to confining silt unit was observed in the rotosonic core borings installed on site. The depth of the silt unit ranges between 24 to 27.5 feet bgs on the southern portion of the site and 19 to 24 feet bgs on the northern portion of the site. The thickness of the silt unit ranged from between 2 to 4.5 feet thick in UG-MW28 and UG-MW29D. Boring UG-MW29S was advanced 2 feet into the silt unit and the boring was terminated.

Glacial advance outwash consisting of sand with gravel with various amounts of silt to silty gravel with sand was encountered underlying the semi-confining to confining silt unit at UG-MW28 and UG-MW29D to full depth explored (45 feet bgs). The silt semi-confining to confining silt and the advance outwash were observed to be interbedded for approximately 4 and 6 feet in UG-MW28 and UG-MW29D.

5.3. Groundwater Conditions

Two water-bearing units were observed at and adjacent to (upgradient of) the site consisting of groundwater within the glacial drift and groundwater within the advance outwash. Groundwater within the glacial drift appears to be present in sand and gravel seams within the drift. The continuity and connectedness of the sand seams within the drift is unknown. Groundwater was observed to be seeping from the steep slope on the west side of the site at the interval of the glacial drift.

Groundwater within the advance outwash appears to be continuous with interbeds of moist to wet silt. The approximate groundwater intervals are described Table I.

TABLE I. GROUNDWATER SUMMARY

Boring/ Test Pit	Groundwater Bearing Unit Monitoring Well Was Screened In	Groundwater Level Feet Below Top of Casing in Monitoring Well	Groundwater/Wet Soils Observed			
			Glacial Drift (feet bgs)		Advance Outwash (feet bgs)	
UG-MW28	Glacial Drift	19.14	22 to 24		34 to 46.5	
UG-MW29S	Glacial Drift	11.45	6 to 6.25	17 to 19	N/A	
UG-MW29D	Advance Outwash	19.80	7 to 7.5	17 to 22	32 to 38	39.5 to 44
1H-B1	N/A	N/A	Not Observed		N/A	
1H-B2	N/A	N/A	7.5 to 10 (base of boring)		N/A	
1H-B3	N/A	N/A	7.5 to 10 (base of boring)		N/A	
1H-TP1	N/A	N/A	Not Observed		N/A	

5.4. Monitoring Well Installation

The rotosonic borings were telescoped between the glacial drift and advance outwash to prevent cross contamination between the two groundwater bearing units. The depth of the rotosonic borings ranged between 21 and 46.5 feet bgs. Two wells (UG-MW28 and UG-MW29S) were set within the glacial drift and one well (UG-MW29D) was set within the advance outwash. Telescoping and monitoring well installation procedures are described in Appendix A.

6.0 CHEMICAL ANALYTICAL PROGRAM

6.1. General

Soil and groundwater samples were submitted to OnSite Laboratories Inc., in Redmond, Washington. The chemical analytical data are summarized in Tables 1 and 2. Chemicals that were not detected at or greater than the laboratory reporting limits in the analyzed samples are typically not included on the tables. A copy of the laboratory report is presented in Appendix B.

6.2. Soil

A total of 18 soil samples were submitted for chemical analysis. The soil samples collected from the subsurface explorations were identified using the following identification system: A#-B/TP#-start depth-end depth, where A# is the area designation number, B/TP# is the boring or test pit number and start depth-end depth is the depth interval in feet below the ground of specific sample (e.g., 1H-B1-4-5 was collected in Area 1H from boring B1 from 4 to 5 feet bgs).

Soil samples were submitted for chemical analysis based on the following:

- Where field screening indicated the soil is impacted.
- Directly below potentially impacted soil to delineate the vertical extent.
- Where wet sand seams were encountered in the glacial drift.

- At the soil/groundwater interface if groundwater was encountered.
- At the top of confining units if encountered.

Follow-up analysis was completed to further delineate the vertical extent of contaminated soil. Soil samples were not collected or submitted for chemical analysis from boring UG-MW29S due to the proximity to UG-MW29D. The soil samples were submitted for chemical analysis of petroleum hydrocarbon identification by Ecology-approved method NWPTH-HCID or gasoline-range petroleum hydrocarbons by Ecology-approved method NWTPH-Gx, diesel- and lube oil-range petroleum hydrocarbons by Ecology-approved method NWTPH-Dx with silica gel/acid cleanup, volatile organic compounds (VOCs) by Environmental Protection Agency (EPA) method 8260C, polycyclic aromatic hydrocarbons (PAHs) by EPA method 8270DSIM, and Resource Conservation and Recovery Act (RCRA) metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver) by EPA method 6000/7000 series.

The chemical analytical data for soil are described below and summarized in Table 1. The chemical analytical data are described relative to Model Toxics Control Act (MTCA) Method A Unrestricted Land Use (ULU) cleanup levels for soil. Method B ULU criteria were used for comparison of specific metals, VOCs and PAHs because Method A cleanup levels have not been established for these compounds.

6.2.1. Petroleum-Range Hydrocarbons

Gasoline-, diesel- and lube oil-range petroleum hydrocarbons were not detected in the analyzed soil samples.

6.2.2. VOCs

WITHIN GLACIAL DRIFT

TCE was detected at concentrations less than the MTCA Method A ULU cleanup level (0.03 milligrams per kilogram [mg/kg]) in the following soil samples with the concentrations detected identified in parenthesis.

- 1H-B3-7-8 (0.0072 mg/kg)
- UG-MW29D-7-7.25 (0.0014 mg/kg)
- UG-MW29D-17-18 (0.0066 mg/kg)
- UG-MW29D-20-20.5 (0.0073 mg/kg)

Other VOCs were not detected in the analyzed soil samples as shown in Table 1.

WITHIN ADVANCE OUTWASH

VOCs were not detected in the analyzed soil samples.

6.2.3. PAHs

PAHs and carcinogenic PAHs (cPAHs) were not detected in the analyzed soil samples.

6.2.4. RCRA Metals

RCRA metals were either not detected or were detected at concentrations less than the respective MTCA Method A cleanup levels or the Method B ULU criteria in the analyzed soil samples.

6.3. Groundwater

Three permanent monitoring wells were installed along the South Court D Street west of the proposed YMCA building. The monitoring wells were developed to stabilize the sand pack and formation materials surrounding the well screens and establish the hydraulic connection between the well screens and the surrounding soil as described in Appendix A and in accordance with the project SAP, dated June 14, 2013.

Groundwater samples collected from the three wells were submitted for chemical analysis of gasoline-range petroleum hydrocarbons by Ecology-approved method NWTPH-Gx, and diesel- and lube oil-range petroleum hydrocarbons by Ecology-approved method NWTPH-Dx with silica gel/acid cleanup, VOCs by EPA method 8260C, and PAHs by EPA method 8270DSIM and total RCRA metals EPA method 200.8 or 7470A.

The chemical analytical data for groundwater are described below and summarized in Table 2. The chemical analytical data are described relative to MTCA Method A cleanup levels for groundwater. Method B criteria were used for comparison of specific compounds if Method A groundwater cleanup levels have not been established for those compounds. The groundwater analytical data are also compared to the updated MTCA Method B groundwater screening level protective of indoor air as shown in Table 3. This updated TCE screening level was calculated using Equation 1 from Ecology's review draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action" dated October 2009 (Ecology, 2009) and EPA's TCE and PCE toxicity factors updated in 2011 and available on EPA's on-line Integrated Risk Information System (IRIS). The calculation to update screening level is included in Appendix C.

6.3.1. Petroleum-Range Hydrocarbons

Gasoline-, diesel- and lube oil-range petroleum hydrocarbons were not detected in the analyzed groundwater samples.

6.3.2. VOCs

WITHIN GLACIAL DRIFT

Two monitoring wells (UG-MW28 and UW-MW29S) were set in the glacial drift. TCE was detected at a concentration (42 micrograms per liter [μg/L]) greater than the MTCA Method A groundwater cleanup level (5 μg/L) and the updated MTCA Method B groundwater screening level protective of indoor air (1.5 μg/L) in the groundwater sample collected from UG-MW29S.

PCE was detected at a concentration (0.29 μg/L) less than the MTCA Method A groundwater cleanup level (5 μg/L) and the updated MTCA Method B groundwater screening levels protective of indoor air (24 μg/L) in the groundwater sample collected from UG-MW29S.

TCE was detected at a concentration (0.21 μg/L) less than the MTCA Method A groundwater cleanup level and updated MTCA Method B groundwater screening levels protective of indoor air (1.5 μg/L) in the groundwater sample collected from monitoring well UG-MW28.

Other VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A groundwater cleanup level or MTCA Method B criteria in the analyzed groundwater samples.

WITHIN ADVANCE OUTWASH

VOCS were not detected in the analyzed groundwater sample from UG-MW29D.

6.3.3. PAHs

PAHs and cPAHs were not detected in the analyzed groundwater samples.

6.3.4. Total RCRA Metals

Total RCRA metals were either not detected or were detected at concentrations less than the MTCA Method A cleanup levels or the Method B criteria in the analyzed groundwater samples.

7.0 CONCLUSIONS

In general, soil and groundwater do not appear to be impacted with petroleum hydrocarbons, metals, PAHs and VOCs at concentrations greater than the applicable MTCA Method A and B criteria with the exception of TCE in the groundwater sample collected from UG-MW29S. TCE was detected in groundwater sample UG-MW29S at a concentration greater than the MTCA Method A groundwater cleanup level and the MTCA Method B groundwater screening level protective of indoor air. This groundwater sample was collected in a water-bearing unit within the shallow glacial drift on the northwest portion of the project area. The depth to groundwater within the glacial drift is approximately 11.33 feet below the existing alley or 12 feet above the elevation of Market Street.

TCE-impacted soil is present approximately 7 to 8 feet bgs in the northeast portion of the proposed building, indicating the TCE-impacted groundwater may be present in the area based on our experience in the area. Therefore, TCE-contaminated groundwater is likely present on the northwest side and beneath the northern portion of the proposed building footprint. GeoEngineers attempted to collect a soil vapor sample within the building footprint but was unsuccessful due to the shallow groundwater.

MTCA Method B groundwater screening level protective of indoor air provides a screening level for concentrations of chemicals of concern in groundwater that may cause potential vapor intrusion issues. The typical next steps involves implementation of the Ecology Vapor Intrusion Model and soil vapor sampling (attempted but not successful at this site) or mitigation for vapor intrusion in the building design. Impacts and mitigation measures for vapor intrusion are further discussed in Section 8.

TCE was not detected in the groundwater in the next underlying water-bearing unit (advance outwash). The TCE-contaminated groundwater within the drift and the non-TCE impacted groundwater within the advance outwash appear to be separated by a semi-confining to confining silt unit observed at approximately 24 to 27.5 feet bgs on the southern portion of the site and 19 to 24 feet bgs on the northern portion of the site. There may be a potential for cross-contamination of TCE between the two water-bearing units during and following construction as discussed further in Section 8.

8.0 POTENTIAL IMPACTS AND MITIGATION MEASURES

We recommend UW develop and implement appropriate administrative institutional controls to limit or prohibit activities that may result in exposure to hazardous substances remaining at the project site. A preliminary conceptual site model (CSM) was developed based on the current understanding of the lithology and groundwater monitoring data and is shown on Figure 3. The preliminary CSM will be refined as additional data and understanding of current site conditions and characteristics become available during design and construction of the project.

Potential immediate impacts include:

- Exposure to the public from the groundwater seeping from the slope onto the existing parking lot.

Potential impacts to the design and construction of the YMCA Building are the following:

- Potential for vapor intrusion into the building and associated mitigation.
- Potential for cross contamination between groundwater within the drift and advance outwash water-bearing units.
- Management and disposal of water and soil removed during construction.
- Management and disposal of water collected from underground drainage beneath the building footprint, if applicable.

Potential long-term impacts include:

- Exposure of public and UWT personnel to residual site contamination.
- Long-term disposal of water collected from an underground drainage beneath the building footprint, if applicable.

8.1. Potential Immediate Impacts

TCE was detected at a concentration greater than the MTCA Method A groundwater cleanup level in the groundwater sample collected from monitoring well UG-MW29S. The depth to groundwater within the glacial drift is approximately 11.33 feet bgs in the existing alley or approximately 12 feet above the general elevation of Market Street. Water was observed to be seeping from the hillside and onto the adjacent parking lot in the area approximately 20 feet east of monitoring well UG-MW29S. The seep water appears to collect and evaporate on the parking lot surface. A sample of the seep was not collected during this investigation; however, the water may be impacted with TCE.

Potential mitigation measures include installing a fence in the area of the seep and the respective impacted parking stalls during the course of this project as necessary. The seep may also be sampled to evaluate the presence of TCE and the potential impacts to the public.

8.2. Potential Impacts and Mitigation Measures to Design and Construction

The following sections described potential impacts and mitigation measures to design and construction.

8.2.1. Vapor Intrusion

Vapor Intrusion

Vapor intrusion occurs when VOCs migrate upwards from contaminated soil or groundwater into overlying buildings through openings in the foundation. The route VOCs take from a subsurface source to the air inside a building is referred to as the vapor intrusion pathway. The most common sources of soil vapor are VOCs including TCE and PCE, which may pose short-term (TCE only) and long-term (chronic) risks through inhalation of contaminated indoor air.

The calculated MTCA Method B groundwater screening levels protective of indoor air for TCE and PCE are 1.5 µg/L and 24 µg/L respectively, as described in Table 3. The TCE concentration in groundwater (42 ug/L) collected from monitoring well UG-MW29S exceeds the TCE vapor intrusion screening level. PCE was not detected in groundwater at a concentration greater than its MTCA Method B groundwater SL.

Additional on-site characterization may be completed at the vertical and lateral limits of the TCE-contaminated groundwater and impacted soil to reduce the extent of a vapor intrusion mitigation system. A vapor intrusion mitigation system will likely be needed regardless and the cost of the investigation could off-set any gains obtained by reducing extent of the mitigation system. An additional line of evidence for vapor intrusion, is the use of the Ecology approved Johnson and Ettinger Vapor Intrusion (J&S VI) Model. The J&E VE model was designed for single-family residences with VOC sources below the home, not buildings with groundwater adjacent to a sidewall of the building as will be present at the site. The model will also accept soil vapor samples. A soil vapor sample was scheduled to be collected during the subsurface investigation activities. However, no soil vapor sample was collected due to either low permeable soil or to shallow groundwater (3 to 7 feet bgs) being drawn into the vapor sampling equipment during sample collection.

We recommend the design team plan on designing a vapor intrusion mitigation system for this project without performing additional groundwater or vapor sampling based on the estimated cost difference between designing and constructing the mitigation system versus performing the additional groundwater and soil vapor sampling. We further recommend the design team coordinate the investigation and potential mitigation options with UW EH&S and Ecology during the design process. Potential mitigation options to prevent vapor intrusion into the building include:

- A passive vapor barrier beneath and on the west side of the building. Passive vapor barriers are typically used in combination with another mitigation option (venting or building pressurization).
- Passive or active venting system beneath and on the west side of the building. The venting system may need to be combined with an underslab and perimeter drain to reduce the potential for shallow groundwater to enter the venting system.

- Building pressurization consisting of a positive pressure on the inside of the building. The building pressurization is typically completed with a large heating, ventilation and air conditioning (HVAC) system. However, vapors may enter the building if the HVAC system is turned off.
- Capturing the TCE-contaminated groundwater upgradient of the proposed building to reduce the potential of vapor intrusion.

8.2.2. Cross Contamination Between Water-Bearing Units

TCE-contaminated groundwater is present in the glacial drift water-bearing unit between the ground surface and approximately 19 to 22 feet bgs. The underlying advance outwash groundwater bearing unit does not appear to be impacted with TCE adjacent and upgradient of the site. A semi-confining to confining silt unit is present between the two water-bearing units. The silt layer appears to be present between 24 to 27.5 feet bgs on the southern portion of the site and 19 to 24 feet bgs on the northern portion of the site. The continuity of the silt unit across the site is unknown at this time. We recommend the design team complete additional investigation to evaluate the potential for cross contamination between the two units. We further recommend the project design and construction team coordinate with UW EH&S and Ecology to provide mitigation measures that will prevent cross-contamination between the two water-bearing units.

8.2.3. Management of Soil and Water During Construction

TCE-contaminated water and TCE-impacted soil will likely be generated during construction activities. We recommend UW implement the following actions.

- UW requires its earthwork contractor and other personnel who could potentially contact contaminated materials to comply with training requirements for handling soil and potentially groundwater on the site. Our recommendation is consistent with the Washington Administrative Code (WAC) 296-843-100, *Hazardous Waste Operations*, which indicates that on-site personnel are required to have current health and safety training in accordance with Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response requirements in 29 CFR 1910.120.

  UW requires its earthwork contractor and other personnel who could potentially contact contaminated materials to develop and implement a written safety and health program for their employees involved in hazardous waste operations under 29 CFR 1910.120. The program shall be designed to identify, evaluate, and control safety and health hazards, and provide for emergency response for hazardous waste operations prior to construction.

  Additionally, the Washington State Department of Labor and Industries has indicated that all on-site workers working within a contaminated zone are required to be in compliance with OSHA 29 CFR 1910.120 if contaminants are detected in soil at concentrations greater than the MTCA Method A ULU cleanup levels.
- The source of the TCE has not been identified to date, therefore, the TCE-impacted soil will need to be managed as a solid waste based on the EPA Policy. If the source of the TCE impacting the site is identified as an F-listed facility in accordance with the applicable Code of Federal Regulations during the course of this project, soil generated at the site may be characterized as a hazardous waste (i.e., spent solvent - F002) based on the concentration of TCE. Disposal of soil characterized as a hazardous waste will substantially increase the project

costs. Stockpiling and subsequent sampling be performed on soil that is generated during construction in areas of TCE-contaminated groundwater or TCE-impacted soil. Soil disposal should be coordinated with UW EH&S at a UW-approved disposal facility.

- Water generated during construction shall be stored in tanks, sampled and analyzed. Water disposal should be coordinated with UW EH&S at a UW-approved disposal facility.
- Work should be stopped and notification sent to UW Capital Projects Office (CPO) and EH&S if soil conditions change from those described above, or if petroleum-contaminated soil or USTs are encountered during construction activities. It may be necessary to complete a remedial excavation of contaminated soil and/or remove underground storage tanks encountered during construction.

8.2.4. Management of Groundwater Following Construction

The design of the building will likely include perimeter drainage and may include underslab drains beneath the proposed building footprint. The shallow water-bearing unit may be contaminated with TCE beneath the site. We recommend the project team coordinate with UW EH&S, Ecology and the City of Tacoma regarding the preferred disposal option for the collected groundwater.

8.3 Potential Long Term Impacts

The following long term impacts may be present following construction of the building:

- TCE-contaminated groundwater and TCE-impacted soil will likely remain adjacent and beneath the building following construction activities. UW will develop and implement appropriate institutional controls to help prevent exposure to residual contamination.
- Continued permitting, sampling, disposal and maintenance of TCE-impacted water generated in the groundwater drainage system.
- Continued maintenance of vapor intrusion mitigation system.
- Potential periodic indoor air sampling to confirm the vapor intrusion mitigation system may be necessary to evaluate the system is operating properly.

9.0 LIMITATIONS

This report has been prepared for use by the University of Washington for the proposed YMCA building located in Tacoma, Washington at the University of Washington Tacoma campus.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

Please refer to Appendix C titled “Report Limitations and Guidelines for Use” for additional information pertaining to use of this report.

10.0 REFERENCES

Ecology, 2009. Review Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action. Publication No. 09-09-047. October 2009.

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GeoEngineers, Inc. Priority Development Areas Environmental Assessment Project Sampling and Analysis Plan and Quality Assurance Project Plan. CPO Project 204277, South 17th Street to South 21st Street and South Tacoma Avenue to Pacific Avenue. June 14, 2013.

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TABLE 1

SUMMARY OF CHEMICAL ANALYTICAL RESULTS[1] - SOIL

PROPOSED YMCA BUILDING

PRIORITY DEVELOPMENT AREAS - UNIVERSITY OF WASHINGTON TACOMA

TACOMA, WASHINGTON

Boring/Test Pit	1H-B1		1H-B2		1H-B3		1H-TP1		UG-MW28			UG-MW29D							MTCA Method A ULU Cleanup Level
Sample Identification [2]	1H-B1-4-5	1H-B1-9-9.5	1H-B2-7-7.5	1H-B2-9-10	1H-B3-4-5	1H-B3-7-8	1H-TP1-0-1	1H-TP1-5-6	UG-MW28-23-24	UG-MW28-27-28	UG-MW28-39-40	UG-MW29D-7-7.25	UG-MW29D-9-9.5	UG-MW29D-17-18	UG-MW29D-20-20.5	UG-MW29D-22-23	UG-MW29D-34.5-35	UG-MW29D-37.5-38	
Sample Depth (feet bgs)	4 to 5	9 to 9.5	7 to 7.5	9 to 10	4 to 5	7 to 8	0 to 1	5 to 6	23 to 24	27 to 28	39 to 40	7 to 7.25	9 to 9.5	17 to 18	20 to 20.5	22 to 23	34.5 to 35	37.5 to 38	
Moisture	Moist	Moist	Wet	Wet	Moist	Wet	Moist	Moist	Wet	Moist	Wet	Wet	Moist	Wet	Wet	Moist	Wet	Wet	
Soil Type	Glacial Drift	Glacial Drift	Glacial Drift	Glacial Drift	Glacial Drift	Glacial Drift	Glacial Drift	Glacial Drift	Glacial Drift	Silt	Advance Outwash	Glacial Drift	Glacial Drift	Glacial Drift	Glacial Drift	Silt	Advance Outwash	Advance Outwash	
NWTPH-HCID [3] (mg/kg)																			
Gasoline-Range	22 U	22 U	25 U	--	22 U	22 U	22 U	21 U	--	--	--	--	--	--	--	--	--	--	30/100[10]
Diesel-Range	54 U	55 U	64 U	--	54 U	56 U	55 U	53 U	--	--	--	--	--	--	--	--	--	--	2,000
Lube Oil-Range	110 U	110 U	130 U	--	110 U	110 U	110 U	110 U	--	--	--	--	--	--	--	--	--	--	2,000
NWTPH-Gx [4] (mg/kg)																			
Gasoline-Range Petroleum Hydrocarbons	--	--	--	--	--	--	--	--	4.1 U	5.8 U	5.8 U	4.8 U	5.5 U	4.8 U	5.2 U	5.9 U	6.7 U	6.0 U	30/100[10]
NWTPH-Dx [5] (mg/kg)																			
Diesel-Range Petroleum Hydrocarbons	--	--	--	--	--	--	--	--	29 U	31 U	31 U	28 U	27 U	29 U	28 U	30 U	33 U	32 U	2,000
Lube Oil-Range Petroleum Hydrocarbons	--	--	--	--	--	--	--	--	57 U	62 U	62 U	56 U	55 U	59 U	55 U	61 U	65 U	64 U	2,000
VOCs [6] (mg/kg)																			
Tetrachloroethene (PCE)	0.00074 U	0.00087 U	0.00091 U	0.00096 U	0.00086 U	0.00074 U	0.00088 U	0.00079 U	0.00081 U	0.00090 U	0.00096 U	0.00086 U	0.00096 U	0.00077 U	0.00082 U	0.00092 U	0.00098 U	0.0011 U	0.05
Trichloroethene (TCE)	0.00074 U	0.00087 U	0.00091 U	0.00096 U	0.00086 U	0.0072	0.00088 U	0.00079 U	0.00081 U	0.00090 U	0.00096 U	0.0014	0.00096 U	0.0066	0.0073	0.00092 U	0.00098 U	0.0011 U	0.03
Benzene	0.00074 U	0.00087 U	0.00091 U	0.00096 U	0.00086 U	0.00074 U	0.00088 U	0.00079 U	0.00081 U	0.00090 U	0.00096 U	0.00086 U	0.00096 U	0.00077 U	0.00082 U	0.00092 U	0.00098 U	0.0011 U	0.03
Ethylbenzene	0.00074 U	0.00087 U	0.00091 U	0.00096 U	0.00086 U	0.00074 U	0.00088 U	0.00079 U	0.00081 U	0.00090 U	0.00096 U	0.00086 U	0.00096 U	0.00077 U	0.00082 U	0.00092 U	0.00098 U	0.0011 U	6
Toluene	0.0074 U	0.0087U	0.0091 U	0.0096 U	0.0086 U	0.0074 U	0.0088 U	0.0079 U	0.0081 U	0.0090U	0.0096 U	0.0086 U	0.0096 U	0.0077 U	0.0082 U	0.0092 U	0.0098 U	0.011 U	7
Xylene [7]	0.0015 U	0.0017 U	0.0018 U	0.0019 U	0.0017 U	0.0015 U	0.0018 U	0.0016 U	0.0016 U	0.0018 U	0.0019 U	0.0017 U	0.0019 U	0.0015 U	0.0016 U	0.0018 U	0.0020 U	0.0023 U	9
Carcinogenic PAHs [8] (mg/kg)																			
Benzo (a) anthracene (TEF 0.1)	0.0072 U	0.0073 U	0.0085 U	--	0.0072 U	0.0074 U	0.0073 U	0.0071 U	0.0076 U	0.0083 U	0.0083 U	0.0075 U	0.0073 U	0.0078 U	0.0074 U	0.0081 U	0.0087 U	0.0086 U	MTCA ULU cleanup level for the sum of all cPAHs is 0.1 mg/kg
Benzo (a) pyrene (TEF 1)	0.0072 U	0.0073 U	0.0085 U	--	0.0072 U	0.0074 U	0.0073 U	0.0071 U	0.0076 U	0.0083 U	0.0083 U	0.0075 U	0.0073 U	0.0078 U	0.0074 U	0.0081 U	0.0087 U	0.0086 U	
Benzo (b) fluoranthene (TEF 0.1)	0.0072 U	0.0073 U	0.0085 U	--	0.0072 U	0.0074 U	0.0073 U	0.0071 U	0.0076 U	0.0083 U	0.0083 U	0.0075 U	0.0073 U	0.0078 U	0.0074 U	0.0081 U	0.0087 U	0.0086 U	
Benzo (J,k) fluoranthene (TEF 0.1)	0.0072 U	0.0073 U	0.0085 U	--	0.0072 U	0.0074 U	0.0073 U	0.0071 U	0.0076 U	0.0083 U	0.0083 U	0.0075 U	0.0073 U	0.0078 U	0.0074 U	0.0081 U	0.0087 U	0.0086 U	
Chrysene (TEF 0.01)	0.0072 U	0.0073 U	0.0085 U	--	0.0072 U	0.0074 U	0.0073 U	0.0071 U	0.0076 U	0.0083 U	0.0083 U	0.0075 U	0.0073 U	0.0078 U	0.0074 U	0.0081 U	0.0087 U	0.0086 U	
Dibenz (a,h) anthracene (TEF 0.1)	0.0072 U	0.0073 U	0.0085 U	--	0.0072 U	0.0074 U	0.0073 U	0.0071 U	0.0076 U	0.0083 U	0.0083 U	0.0075 U	0.0073 U	0.0078 U	0.0074 U	0.0081 U	0.0087 U	0.0086 U	
Indeno (1,2,3-cd) pyrene (TEF 0.1)	0.0072 U	0.0073 U	0.0085 U	--	0.0072 U	0.0074 U	0.0073 U	0.0071 U	0.0076 U	0.0083 U	0.0083 U	0.0075 U	0.0073 U	0.0078 U	0.0074 U	0.0081 U	0.0087 U	0.0086 U	
Total TTEC of cPAHs (detect only)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.1
Metals [9] (mg/kg)																			
Arsenic	11 U	11 U	13 U	--	11 U	11 U	11 U	11 U	11 U	12 U	12 U	11 U	11 U	12 U	11 U	12 U	13 U	13 U	20
Barium	37	39	89	--	29	29	38	36	50	120	90	40	54	38	52	140	42	91	16,000[11]
Cadmium	0.54 U	0.55 U	0.64 U	--	0.54 U	0.56 U	0.55 U	0.53 U	0.57 U	0.62 U	0.62 U	0.56 U	0.55 U	0.59 U	0.55 U	0.61 U	0.65 U	0.64 U	2.0
Chromium	49	21	52	--	16	20	25	17	20	60	49	53	42	26	28	87	32	56	2,000 [12]
Lead	5.4 U	5.5 U	6.4 U	--	5.4 U	5.6 U	5.5 U	5.3 U	5.7 U	6.2 U	6.2 U	5.6 U	5.5 U	5.9 U	5.5 U	6.7	6.5 U	6.4 U	250
Mercury	0.27 U	0.27 U	0.32 U	--	0.27 U	0.28 U	0.27 U	0.27 U	0.29 U	0.31 U	0.31 U	0.28 U	0.27 U	0.29 U	0.28 U	0.30 U	0.33 U	0.32 U	2.0
Selenium	11 U	11 U	13 U	--	11 U	11 U	11 U	11 U	11 U	12 U	12 U	11 U	11 U	12 U	11 U	12 U	13 U	13 U	400[11]
Silver	1.1 U	1.1 U	1.3 U	--	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.2 U	1.2 U	1.1 U	1.1 U	1.2 U	1.1 U	1.2 U	1.3 U	1.3 U	400[11]

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc., of Redmond, Washington.

[2] Sample ID = Area number - boring/test pit number - starting depth of sample [feet bgs] -end depth [feet bgs], Area 1H Boring 1 collected 4-5 feet bgs = 1H-B1-4-5.

[3] Washington State Department of Ecology (Ecology)-approved method NWTPH-HCID.

[4] Washington Department of Ecology-approved method NWTPH-Gx.

[5] Washington Department of Ecology-approved method NWTPH-Dx.

[6] VOCs were analyzed by U.S. Environmental Protection Agency (EPA) method 8260B. Other VOCs were analyzed but not detected.

[7] Total xylenes consists of m,p- and o- xylenes. The higher detection limit is shown.

[8] Polycyclic aromatic hydrocarbons (PAHs) were analyzed by U.S. Environmental Protection Agency (EPA) method 8270D/SIM. Other PAHs were analyzed but not detected.

[9] Resource Conservation Recovery Act (RCRA) metals analyzed by EPA 6000/7000 series method.

[10] MTCA Method A cleanup level for gasoline is 30 mg/kg if benzene is detected or if the sum of toluene, ethylbenzene and xylenes are equal to or greater than 1% of the total gasoline detection.

[11] MTCA Method B ULU Criteria represented because MTCA Method A cleanup level has not been established.

[12] MTCA Method A cleanup level for Trivalent Chromium.

-- = sample not analyzed

mg/kg = milligram per kilogram

MTCA = Model Toxics Control Act

ULU = unrestricted land use

NA = Not Applicable

bgs = below ground surface

U = Analyte was not detected at or greater than the listed reporting limit.

TEF = Toxicity Equivalency Factor as defined in Washington State Administrative Code (WAC) 173-340-900 Table 708-2.

TTEC = Total Toxic Equivalent Concentration is the sum of each individual cPAH concentration multiplied by its corresponding TEF.

Bold type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Bold type and gray shading indicates that the detected concentration is greater than the respective MTCA cleanup level.

TABLE 2

SUMMARY OF CHEMICAL ANALYTICAL RESULTS[1] - GROUNDWATER

PROPOSED YMCA BUILDING

PRIORITY DEVELOPMENT AREAS - UNIVERSITY OF WASHINGTON TACOMA

TACOMA, WASHINGTON

	Permanent Monitoring Wells				
Sample Identification [2]	UG-MW28-130702	UG-MW29S-130701	UG-MW29D-130701	MTCA Method A Groundwater Cleanup Level	MTCA Method B Groundwater Criteria
Lithology At Well Screen	Glacial Drift	Glacial Drift	Advance Outwash		
Approximate Depth to Groundwater (feet btoc) [3]	19.1	11.5	19.8		
NWTPH-Gx [4] (µg/L)					
Gasoline-Range	100 U	100 U	100 U	800/1,000 [10]	NE
NWTPH-Dx [5] (mg/L)					
Diesel-Range	0.25 U	0.25 U	0.25 U	0.5	NE
Lube Oil-Range	0.41 U	0.41 U	0.40 U	0.5	NE
VOCs [6] (µg/L)					
Benzene	0.20 U	0.20 U	0.20 U	5	0.8
Toluene	1.0 U	1.0 U	1.0 U	1,000	640
Ethylbenzene	0.20 U	0.20 U	0.20 U	700	800
Total Xylenes[7]	0.40 U	0.40 U	0.40 U	1,000	1,600
Trichloroethene (TCE)	**0.21**	**42**	0.20 U	5	0.54
Tetrachloroethene (PCE)	0.20 U	**0.29**	0.20 U	5	21
Chloroform	0.20 U	**0.56**	0.20 U	NE	80
CPAHs[8] (µg/L)					
Benzo (a) anthracene (TEF 0.1)	0.010 U	0.0097 U	0.0094 U	MTCA ULU cleanup level for the sum of all cPAHs is 0.1 µg/L	MTCA ULU B criteria level for the sum of all cPAHs is 0.012 µg/L
Benzo (a) pyrene (TEF 1)	0.010 U	0.0097 U	0.0094 U		
Benzo (b) fluoranthene (TEF 0.1)	0.010 U	0.0097 U	0.0094 U		
Benzo (j,k) fluoranthene (TEF 0.1)	0.010 U	0.0097 U	0.0094 U		
Chrysene (TEF 0.01)	0.010 U	0.0097 U	0.0094 U		
Dibenz (a,h) anthracene (TEF 0.1)	0.010 U	0.0097 U	0.0094 U		
Indeno (1,2,3-cd) pyrene (TEF 0.1)	0.010 U	0.0097 U	0.0094 U		
Total TTEC of cPAHs (detect only)	NA	NA	NA	0.1	0.012
Metals [9] (µg/L)					
Arsenic	3.3 U	3.3 U	3.3 U	5	0.058
Barium	**33**	28 U	**51**	NE	3,200
Cadmium	4.4 U	4.4 U	4.4 U	5	16
Total Chromium	11 U	11 U	11 U	50[11]	NE
Lead	1.1 U	1.1 U	1.1 U	15	NE
Mercury	0.50 U	0.50 U	0.50 U	2	NE
Selenium	5.6 U	5.6 U	5.6 U	NE	80
Silver	11 U	11 U	11 U	NE	80

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc. in Redmond, Washington.

[2] Sample ID = area designator - monitoring well number - date collected (yymmdd), groundwater sample collected from UG-MW28 on July 2, 2013 = UG-MW28-130702.

[3] Groundwater level was measured below the top of the casing in the monitoring wells.

[4] Washington State Department of Ecology (Ecology)-approved method NWTPH-Gx.

[5] Ecology-approved method NWTPH-Dx.

[6] Volatile organic compounds (VOCs) were analyzed by U.S. Environmental Protection Agency (EPA) method 8260C. Other VOCs were analyzed but not detected.

[7] Total xylenes consists of m,p- and o- xylenes. The higher detection limit is shown.

[8] Polycyclic Aromatic Hydrocarbons (PAHs) analyzed by EPA method 8270D/SIM. Other PAHs were analyzed but not detected.

[9] Metals analyzed by U.S. Environmental Protection Agency (EPA) 200.8 or 7470A method.

[10] MTCA Method A cleanup level for gasoline-range petroleum hydrocarbons is 800 µg/L if benzene is present and 1,000 µg/L if benzene is not present.

[11] MTCA Method A cleanup level for total chromium shown. Cleanup level for hexavalent chromium is 48 µg/L.

MTCA = Model Toxics Control Act

µg/L = microgram per liter

NA = Not Applicable

-- = sample not analyzed.

mg/L = milligram per liter

btoc = below top of casing

TEF = Toxicity Equivalency Factor as defined in Washington State Administrative Code (WAC) 173-340-900 Table 708-2.

TTEC = Total Toxic Equivalent Concentration is the sum of each individual cPAH concentration multiplied by its corresponding TEF.

Bold type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Bold type and Gray Shading indicates analyte is detected at a concentration greater than the MTCA Method groundwater cleanup/criteria level.

TABLE 3

AIR AND GROUNDWATER RESIDENTIAL RISK-BASED CONCENTRATIONS

PROPOSED YMCA BUILDING

PRIORITY DEVELOPMENT AREAS - UNIVERSITY OF WASHINGTON TACOMA

TACOMA, WASHINGTON

Analyte	MTCA Method B Air CUL (µg/m ^{3})			MTCA Method B Groundwater VI SL (µg/L)		
	Non-Cancer	Cancer	Method B	Non-Cancer	Cancer	Method B
Trichloroethene (TCE)	0.9	0.37	0.37	3.8	1.5	1.5
Tetrachloroethene (PCE)	18	9.6	9.6	45	24	24

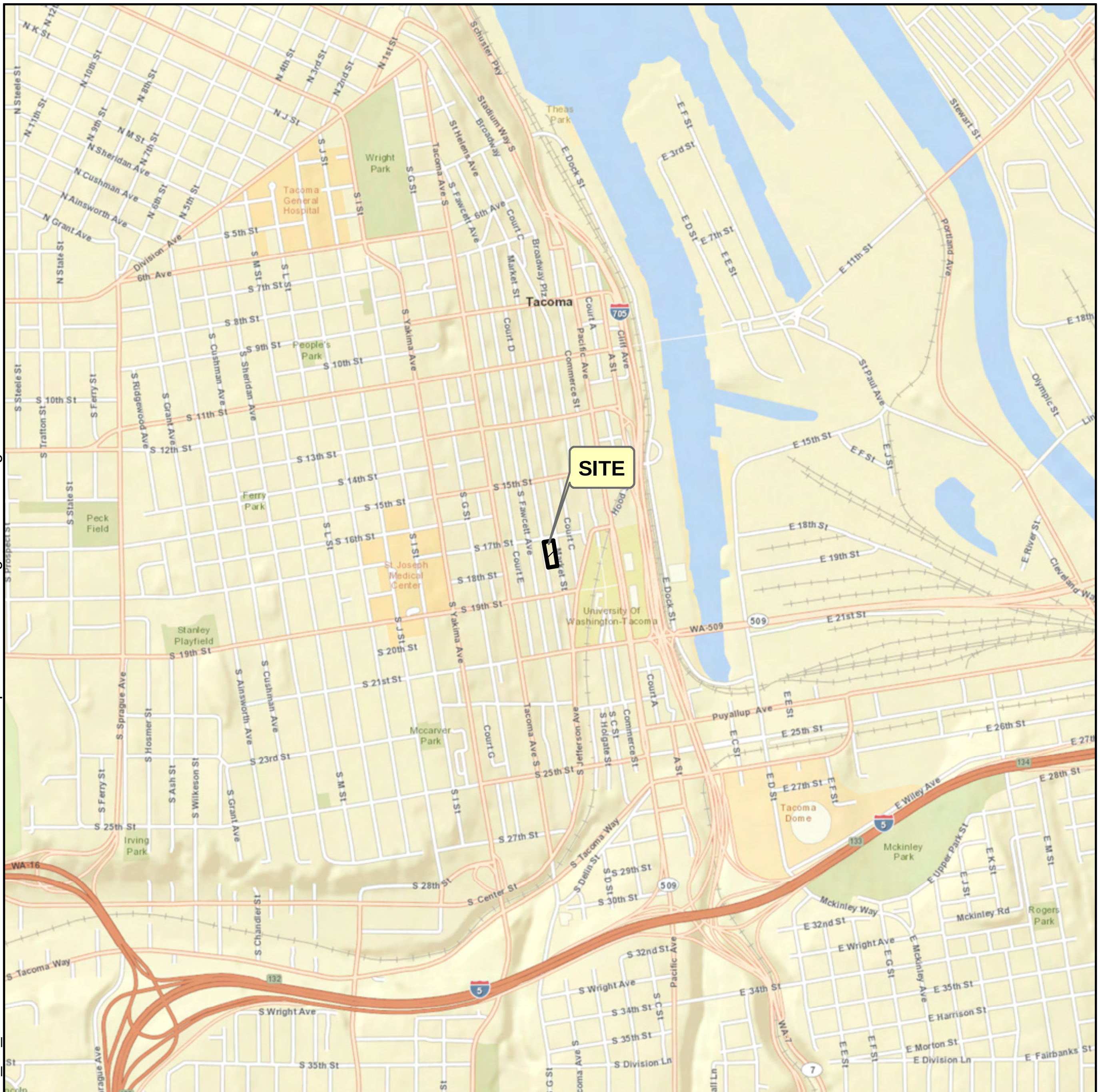
Notes:

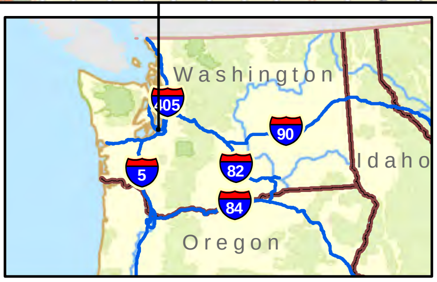
CUL = Cleanup Level

VI SL = Vapor Intrusion Screening Level (based on MTCA Method B Air CUL)

µg/m^3 = microgram per cubic meter

µg/L = microgram per liter





N
W E
S

2,000 0 2,000
Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Data Sources: ESRI Data & Maps

Projection: NAD 1983 UTM Zone 10N

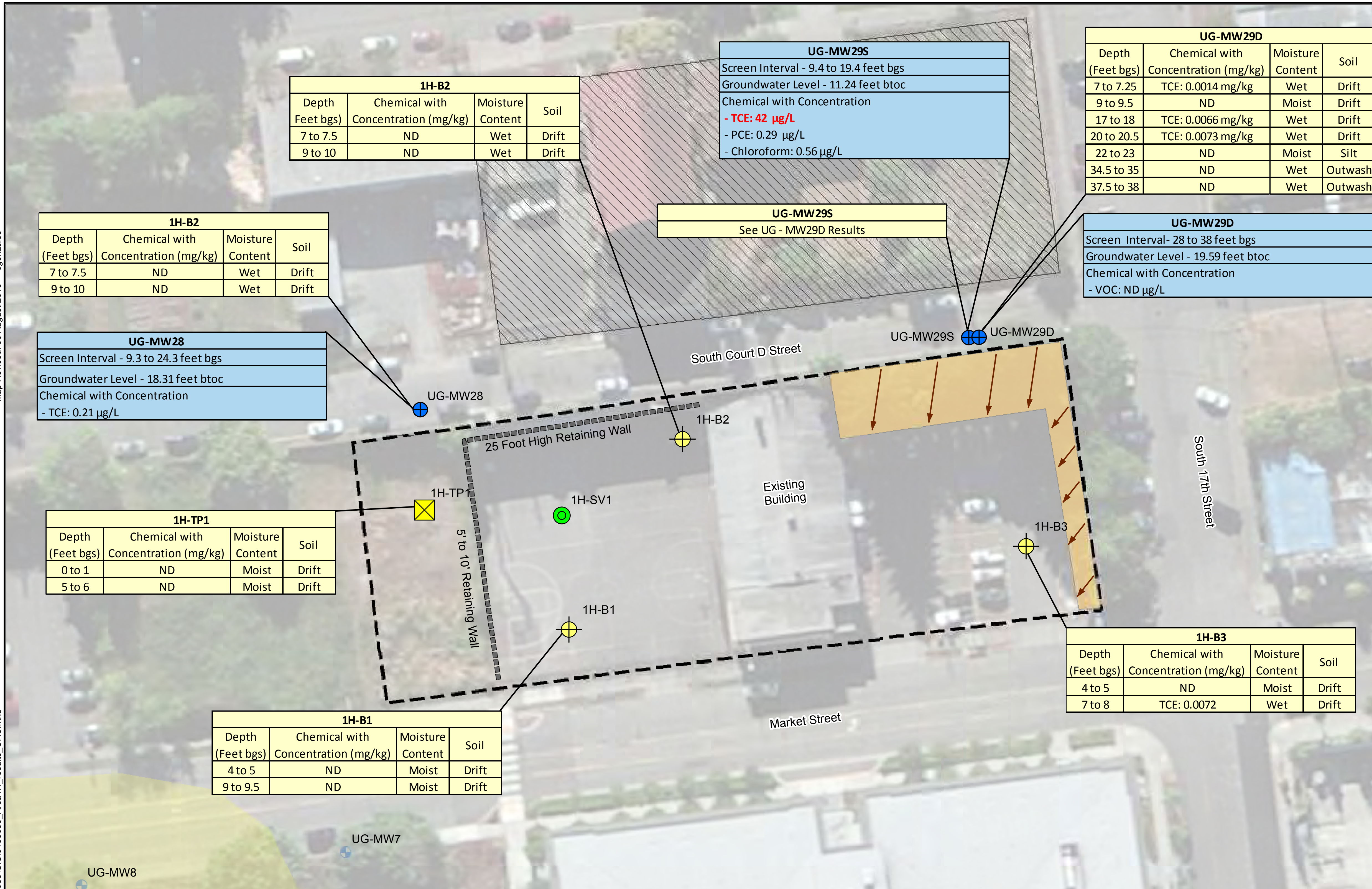
Vicinity Map

Proposed YMCA Building
UWT - Environmental Investigation Project
Tacoma, Washington

GeoEngineers

Figure 1

Office: TACO Path: \\TACO\projects\0\0183085\GIS\0183085_F1_VM.mxd Map Revised: 30 August 2013 cgonzales



1H-B2

Depth Feet bgs)	Chemical with Concentration (mg/kg)	Moisture Content	Soil
7 to 7.5	ND	Wet	Drift
9 to 10	ND	Wet	Drift

UG-MW29S

Screen Interval - 9.4 to 19.4 feet bgs
Groundwater Level - 11.24 feet btoc
Chemical with Concentration - TCE: 42 µg/L - PCE: 0.29 µg/L - Chloroform: 0.56 µg/L

UG-MW29D

Depth (Feet bgs)	Chemical with Concentration (mg/kg)	Moisture Content	Soil
7 to 7.25	TCE: 0.0014 mg/kg	Wet	Drift
9 to 9.5	ND	Moist	Drift
17 to 18	TCE: 0.0066 mg/kg	Wet	Drift
20 to 20.5	TCE: 0.0073 mg/kg	Wet	Drift
22 to 23	ND	Moist	Silt
34.5 to 35	ND	Wet	Outwash
37.5 to 38	ND	Wet	Outwash

1H-B2

Depth (Feet bgs)	Chemical with Concentration (mg/kg)	Moisture Content	Soil
7 to 7.5	ND	Wet	Drift
9 to 10	ND	Wet	Drift

UG-MW29S

See UG - MW29D Results

UG-MW29D

Screen Interval- 28 to 38 feet bgs
Groundwater Level - 19.59 feet btoc
Chemical with Concentration - VOC: ND µg/L

UG-MW28

Screen Interval - 9.3 to 24.3 feet bgs
Groundwater Level - 18.31 feet btoc
Chemical with Concentration - TCE: 0.21 µg/L

1H-TP1

Depth (Feet bgs)	Chemical with Concentration (mg/kg)	Moisture Content	Soil
0 to 1	ND	Moist	Drift
5 to 6	ND	Moist	Drift

1H-B3

Depth (Feet bgs)	Chemical with Concentration (mg/kg)	Moisture Content	Soil
4 to 5	ND	Moist	Drift
7 to 8	TCE: 0.0072	Wet	Drift

1H-B1

Depth (Feet bgs)	Chemical with Concentration (mg/kg)	Moisture Content	Soil
4 to 5	ND	Moist	Drift
9 to 9.5	ND	Moist	Drift

Soil and groundwater chemical analytical results:

Soil Results

Sample Name		
Depth (Feet bgs)	Chemical with Concentration (mg/kg)	Moisture Content

Groundwater Results

Sample Name
Screen Interval - feet bgs
Groundwater Level - feet btoc
Chemical with Concentration

*Chemicals shown in red were detected at concentrations greater than the respective MTCA Method A cleanup levels

Notes:
Btoc = below top of casing
Bgs = below ground surface
Drift = glacial drift
Mg/kg = milligram per kilogram
µg/L = microgram/liter
MTCA = Model Toxic Control Act
Outwash = advance outwash
TCE = tetrachloroethene
UWT = University of Washington Tacoma

W N E S

50 0 50

Feet

Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Notes:
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Legend

- Property Not Owned by UW
- Approximate Location of Westerly Plume (TCE)
- Retaining Wall
- Proposed Building Location
- Direct Push Boring
- Test Pit
- Soil Gas Boring With Temporary Well
- Sonic Core Monitoring Well
- Historic Monitoring Wells (URS 2002)
- Topographic Slope and Direction

Subsurface Investigation Results Area 1H

Proposed YMCA Building
UWT - Environmental Investigation Project
Tacoma, Washington

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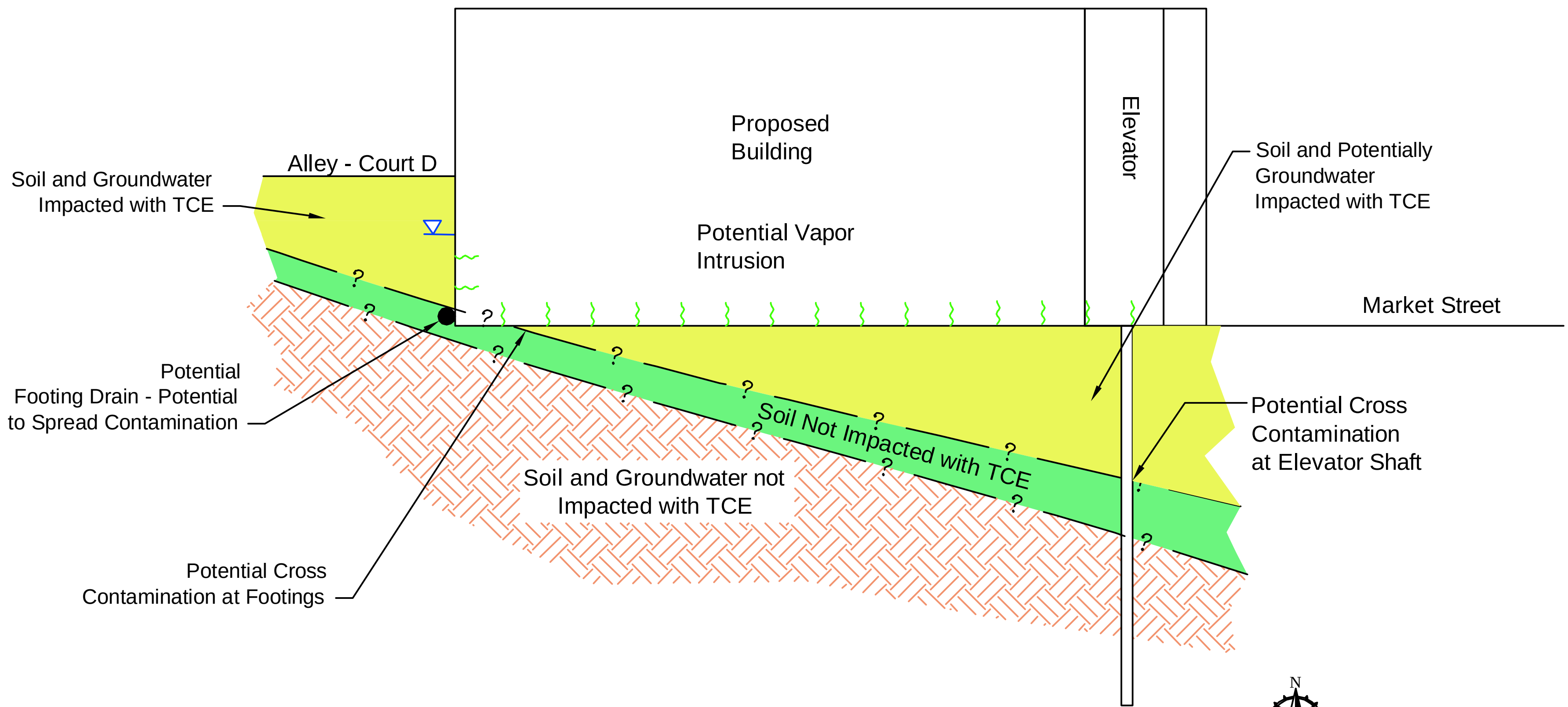
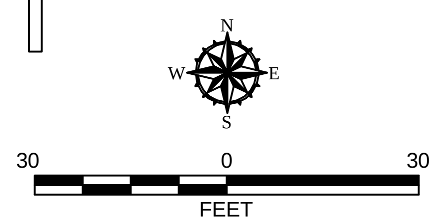
Figure 2

Office: TAC Path: \\TAC\projects\0\0183085\GIS\0183085_Area1H_results_CRC.mxd Map Revised: 30 August 2013 cgonzales





Legend

- Glacial Drift
- Silt (Semi-Confining to Confining)
- Advance Outwash
- Potential Vapor Intrusion
- Groundwater Level in Glacial Drift
- TCE Trichloroethene

Notes

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Reference: Sketch provided by GeoEngineers staff dated 7/15/2013.

Preliminary
Conceptual Site Model

Proposed YMCA Building
UWT - Environmental Investigation Project
Tacoma, Washington

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Figure 3

APPENDIX A
Field Exploration Program

APPENDIX A
FIELD EXPLORATION PROGRAM

General

Subsurface conditions were explored by completing soil borings, groundwater monitoring and a test pit at the site to evaluate the potential presence of petroleum hydrocarbons, VOCs, metals and PAHs in soil and groundwater at the site between June 10 and July 2, 2013.

A representative of GeoEngineers selected the locations for subsurface explorations, observed and classified the soils encountered and prepared a detailed log of each subsurface exploration. The soils were classified according to the system described in Figure A-1. The test pit and boring logs are presented in Figures A-2 through A-8.

Field Screening Methods

Soil samples obtained from the test pit and boring locations were field screened for indications of petroleum hydrocarbons and VOCs. Field screening results were recorded on the test pit and boring logs. Field screening results were used as a general guideline to delineate areas of possible contamination and potential samples to be submitted to the lab. The following screening methods were used: 1) visual screening, 2) water sheen screening and 3) headspace vapor screening. Visual screening and water sheen screening are qualitative methods; therefore, precision, accuracy and detection limits are not quantified for these methods. Headspace vapor screening is a semi-quantitative method; however, precision and accuracy will not be quantified for this method. Instrument accuracy and detection limits are described below. Field screening results are property and location specific. The results vary with temperature, moisture content, soil type and type of contaminant. Field screening consisted of the following:

- Visual Screening. The soil was observed for indications of petroleum impacts, including unusual color, stains and/or odor indicative of possible contamination.
- Water Sheen Screening. A portion of the soil sample was placed in a pan containing distilled water. The water surface was observed for signs of sheen. The following sheen classifications were used for this project:

No Sheen (NS)	No visible sheen on the water surface.
Slight Sheen (SS)	Light, colorless, dull sheen; spread is irregular, not rapid; sheen dissipates rapidly.
Moderate Sheen (MS)	Light to heavy sheen; may have some color/iridescence; spread is irregular to flowing, may be rapid; few remaining areas of no sheen on the water surface.
Heavy Sheen (HS)	Heavy sheen with color/iridescence; spread is rapid; entire water surface may be covered with sheen.

- Headspace Vapor Screening. A portion of the soil sample was placed in a plastic bag. Ambient air was captured in the bag. The bag was sealed and then shaken gently to expose the soil to the air trapped in the bag. The bag remained closed for approximately 5 minutes at ambient temperature before the headspace vapors were measured. Vapors present within the sample bag's headspace were measured by inserting the probe of a photoionization detector (PID) in a small opening in the bag. The maximum measured value and the ambient air temperature were recorded on the field log for each sample.

  The monitoring instrument was calibrated, as described in the following section. The PID measures the concentration of organic vapors ionizable by a 10.6 electron volt (eV) lamp in parts per million (ppm). The PID was calibrated to 100 ppm isobutylene. The PID quantifies organic vapor concentrations in the range between 0.1 ppm and 2,000 ppm (isobutylene equivalent) with an accuracy of 1 ppm between 0 ppm and 100 ppm.

Soil Sampling

Test Pit

A rubber-tired backhoe was used to complete the test pit. Soil samples were obtained from the stockpile of soil generated during excavation. During excavation, a representative of GeoEngineers examined the soil and performed field screening tests. The test pit was backfilled with the material removed during excavation and tamped with the backhoe bucket.

Selected soil samples were obtained in glass jars (supplied by the analytical laboratory), labeled and stored in a cooler with ice pending delivery to the laboratory. VOC and gasoline-range petroleum hydrocarbons samples were collected first, directly from the stockpile using the 5035A sampling method. Following the VOC sample collection, the remaining soil was placed the remaining sample containers provided by the analytical laboratory. All sampling equipment was decontaminated between samples using an Alconox soap wash and distilled water rinse.

Direct-Push Borings

Soil samples were obtained continuously using direct-push drilling equipment. Soil samples were obtained using a 5-foot-long core sampler with acetate liner. The sampler was driven into the soil using a pneumatic hammer. Upon retrieval, the sampler was opened, and a GeoEngineers representative examined the soil and performed field screening tests.

Selected soil samples were obtained in glass jars (supplied by the analytical laboratory), labeled and stored in a cooler with ice pending delivery to the laboratory. VOC and gasoline-range petroleum hydrocarbons samples will be collected first, directly from the sample sleeve using the 5035A sampling method. Following the VOC sample collection, the remaining soil was placed in the remaining sample containers provided by the analytical laboratory. All sampling equipment was decontaminated between samples using an Alconox soap wash and distilled water rinse.

Rotosonic Core Borings

Soil samples were collected continuously using sonic drilling equipment with a 4-inch diameter, 10-foot-long core barrel sampler. The sampler was advanced into the soil using a rotary and vibratory drilling head. Upon retrieval, the sampler extruded the recovered soil into sample bags. Soil core temperatures will be monitored using an infrared thermometer and noted on the lithologic log immediately after the sample is extruded to quantify the potential for volatilization of VOCs during drilling. If the soil temperature exceeded 25 degrees Celsius the rate of drilling was decreased. After the temperature is recorded, the sample bags were cut open to allow access to the recovered soil for collecting samples for chemical analyses and lithologic logging.

Selected soil samples were obtained in glass jars (supplied by the analytical laboratory), labeled and stored in a cooler with ice pending delivery to the laboratory. VOC and gasoline-range petroleum hydrocarbons samples were collected first, directly from the sample bag using the 5035A sampling method. Following the VOC sample collection, the remaining soil was placed in the remaining sample containers provided by the analytical laboratory.

Groundwater Monitoring Well Installation

Drilling and construction of the monitoring wells was conducted by a Washington State licensed driller in accordance with the Minimum Standards for Construction and Maintenance of Wells (Chapter 173-160 Washington Administrative Code [WAC]; Ecology, 2006). Installation of the monitoring wells was observed by a GeoEngineers representative who maintained a detailed log of the materials and depths of the wells.

- To minimize potential cross contamination between the glacial drift and advance outwash units during rotosonic core drilling the following methodology was implemented.
- An 8-inch steel casing was driven through the glacial drift unit just into the semi-confining to confining silt unit at the base of the glacial drift at UG-MW28 and UG-MW29D. Groundwater was observed to be present within the glacial drift unit so the 8-inch casing was terminated at the confining silt unit to seal the 8-inch casing and allow for telescoping further down using a smaller diameter steel casing into the glacial advance outwash unit. The 8-inch casing was lifted approximately 1 foot and the boreholes were filled with at least 3 feet of bentonite. The bentonite was hydrated with potable water and let sit for at least 1-hour. Water within the casing was removed via a bailer or pump. The 6-inch casing was placed inside the 8-inch casing to seal off the groundwater within the glacial drift water-bearing unit. The inner 6-inch casing continued to be driven until the desired water-bearing unit was located.
- A single 8-inch steel casing was used at UG-MW29S as the boring was terminated in the semi-confining to confining silt unit below the glacial drift.

The wells were constructed using 2-inch-diameter, flush-threaded Schedule 40 polyvinyl chloride (PVC) casing with machine-slotted PVC screen (0.010 inch). Following placement of the well screen and casing in the borehole, a sand pack was installed around the well screen. Sand pack material consisted of commercially prepared 10-20 silica sand.

A minimum of a 1-foot-thick bentonite seal was placed above the sand pack. A mix of neat cement and bentonite was used from the 2 feet bgs to 10-feet bgs per City of Tacoma requirements. The surface of each well was completed with a concrete seal and surface pad extending from the top of neat cement/bentonite mix to slightly above the ground surface. Steel flush-mount monuments were cemented in place.

Monitoring Well Development

The monitoring wells were developed to stabilize the filter pack and formation materials surrounding the well screens and to establish the hydraulic connection between the well screens and the surrounding soil. The wells were developed using an inertial pump with a check valve and surge block. The wells were gently surged and purged with the surge block starting at the bottom of the well screen interval. Surging continued to the top of the well screen interval. After the well screen intervals were surged, the surge block was removed. The wells continued to be purged until a minimum of five casing volumes of water was removed and turbidity of the discharged water was relatively low. The goal of well development is to reduce the turbidity content of the water to less than 25 nephelometric turbidity units (NTU). The removal rate and volume of groundwater removed was recorded during well development procedures. Water that was removed from the well during well development activities was stored at the UW laydown yard facility on Court E in a temporary storage tank, pending off-site disposal. Depths to water in the monitoring wells were measured prior to development.

Low-Flow Sampling

Groundwater samples were obtained using low-flow/low-turbidity sampling techniques to minimize the suspension of particulates in the samples. Groundwater samples were obtained from monitoring wells using a decontaminated bladder pump with dedicated bladder and flexible, dedicated vinyl tubing. Groundwater samples collected form the temporary monitoring wells installed in the direct-push borings were collected using a peristaltic pump with new, disposal tubing. Groundwater was pumped at approximately 0.5 liters per minute from the approximate midpoint of the screened interval. A water quality measuring system with a flow-through-cell was used to monitor the following water quality parameters during purging: electrical conductivity, dissolved oxygen, pH, salinity, total dissolved solids, turbidity, oxidation-reduction potential and temperature. Ambient groundwater conditions were assumed to have been reached once these parameters varied by less than 10 percent on three consecutive measurements. All field measurements were documented on the field logs.

After well purging, the flow-through-cell was disconnected and the groundwater sample was collected in laboratory-prepared containers. The groundwater sample was placed into a cooler with ice and logged on the chain-of-custody record using the procedures described in the project SAP. Purge water was stored at the UW laydown yard facility on Court E in a temporary storage tank, pending off-site disposal.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS: GRAPH	SYMBOLS: LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% RETAINED ON NO. 200 SIEVE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS
				SP	POORLY-GRADED SANDS, GRAVELLY SAND
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS: GRAPH	SYMBOLS: LETTER	TYPICAL DESCRIPTIONS
	AC	Asphalt Concrete
	CC	Cement Concrete
	CR	Crushed Rock/ Quarry Spalls
	TS	Topsoil/ Forest Duff/Sod

Groundwater Contact

Measured groundwater level in exploration, well, or piezometer

Measured free product in well or piezometer

Graphic Log Contact

Distinct contact between soil strata or geologic units

Approximate location of soil strata change within a geologic soil unit

Material Description Contact

Distinct contact between soil strata or geologic units

Approximate location of soil strata change within a geologic soil unit

Sampler Symbol Descriptions

2.4-inch I.D. split barrel

Standard Penetration Test (SPT)

Shelby tube

Piston

Direct-Push

Bulk or grab

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

A "P" indicates sampler pushed using the weight of the drill rig.

Laboratory / Field Tests

%F	Percent fines
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
OC	Organic content
PM	Permeability or hydraulic conductivity
PI	Plasticity index
PP	Pocket penetrometer
PPM	Parts per million
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
VS	Vane shear

Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen
NT	Not Tested

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

KEY TO EXPLORATION LOGS

GeoEngineers

FIGURE A-1

Drilled	Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
	6/24/2013	6/25/2013	46.5	BEL/AMW	CAJ	Holt Drilling	Sonic

Hammer Data	Auto 140 (lbs) / 30 (in) Drop	Drilling Equipment	Terrasonic 150 CC Track Rig
Surface Elevation (ft)	152	Top of Casing Elevation (ft)	
Vertical Datum	NGVD 1929		
Easting (X)		Horizontal Datum	
Northing (Y)			

DOE Well I.D.: BIJ 671
A 2 (in) well was installed on 6/26/2013 to a depth of 46.5 (ft).

Groundwater

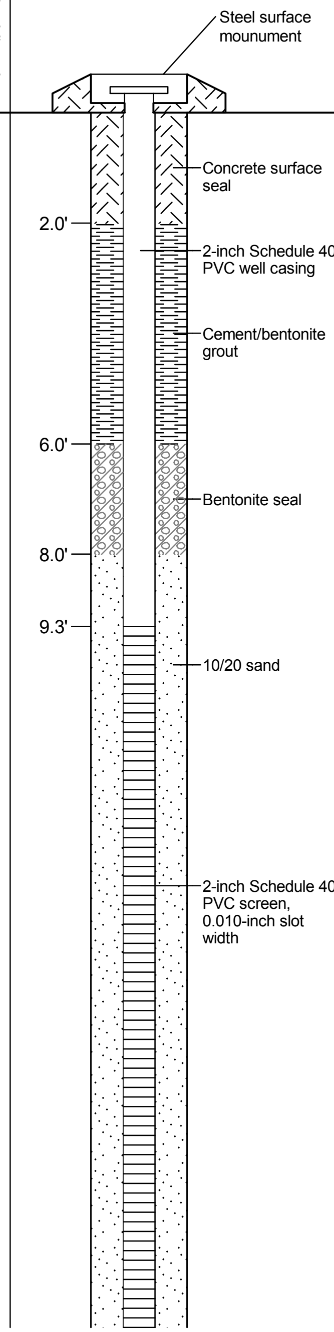
Date Measured	Depth to Water (ft)	Elevation (ft)
7/17/2013	18.8	133.2

Notes: Elevation based on topographic survey completed by Sitts and Hill for the YMCA project

FIELD DATA

Elevation (feet)	Depth (feet)	Recovered (in)	Blows/foot	Collected Sample	Sample Name	Water Level	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0	60					AC	2 inches asphalt		
			27.2				GM	Brown silty fine to coarse gravel with sand, occasional brick (medium dense, moist) (fill)	NS	
							ML	Orange brown silt with sand, occasional gravel (medium dense, moist) (fill)		
150			32.4							
							SM	Gray/brown silty fine to coarse sand with gravel (very dense, moist) (Glacial Drift)		
			35.9						NS	3.9
	5	60	53							
			29.7						NS	
145										
			28.3					Grades to occasional cobbles	NS	<1
	10	60	50/3"							
			30.1						NS	
140			28.2							
							GP-GM	Brown/gray fine to coarse gravel with silt and sand, occasional cobbles (very dense, moist) (Glacial Drift)	NS	
									NS	
	15	60	50/3"				GM	Gray silty fine to coarse gravel with sand, occasional cobbles (very dense, moist) (Glacial Drift)		
			61.3						NS	
135										
			58.5						NS	
			53.0							1.5
						▼			NS	
	20	60	37					Grades to dense		
			42.9						NS	1.3
130										

WELL LOG



Notes: See Figure A-1 for explanation of symbols.

Log of Monitoring Well UG-MW28

GEOENGINEERS

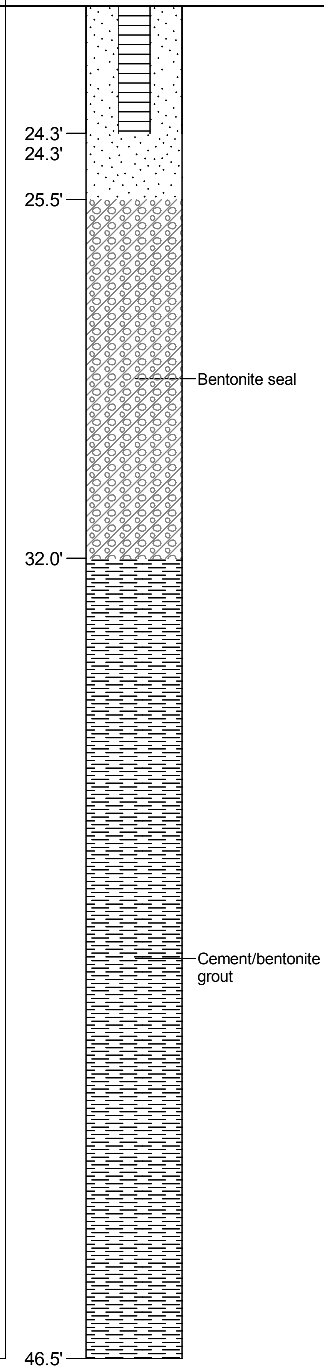
Project: UWT - Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure A-2
Sheet 1 of 2

Elevation (feet)	Depth (feet)	Recovered (in)	Blows/foot	Sample Name	Water Level	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
						SM	Gray silty fine to coarse sand with gravel (dense, wet) (Glacial Drift)		
				UG-MW28 23-24					
			27.9					NS	1.7
						ML	Brown/gray silt, occasional sand (hard, moist)		
	25	60	33						
								NS	
125									
				UG-MW28 27-28				NS	
						SP-SM	Gray fine to medium sand with silt (dense, moist)		
			27.3					NS	2.1
	30	60	48			ML	Gray sandy silt (hard, moist)		
			19.0					NS	2.0
120									
			18.7						
							Grades to with sand	NS	
			18.8						
						SM	Gray silty fine to medium sand (dense, wet)		
	35	60	34						
			18.1					NS	1.8
115									
			19.0					NS	
				UG-MW28 39-40				NS	
	40	60	39						
			15.9					NS	
110									
			15.9					NS	1.8
			16.8						
			17.8					NS	
	45	18	42						

Well was telescoped with 8-inch conductor casing to 26 feet bgs. Two feet of bentonite was placed and hydrated from 24 to 26 feet bgs. The well was then drilled to 45 feet bgs with 6-inch casing through the 8-inch casing.

WELL LOG



Notes: See Figure A-1 for explanation of symbols.

Log of Monitoring Well UG-MW28 (continued)

GeoEngineers

Project: UWT - Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure A-2
Sheet 2 of 2

Drilled	Start: 6/26/2013	End: 6/26/2013	Total Depth (ft)	46.5	Logged By: BEL/AMW; Checked By: CAJ	Driller	Holt Drilling	Drilling Method	Sonic

Hammer Data	Auto 140 (lbs) / 30 (in) Drop	Drilling Equipment	Terrasonic 150 CC Track Rig
Surface Elevation (ft) / Vertical Datum	149 / NGVD 1929	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)		Horizontal Datum	

A 2 (in) well was installed on 6/26/2013 to a depth of 46.5 (ft).

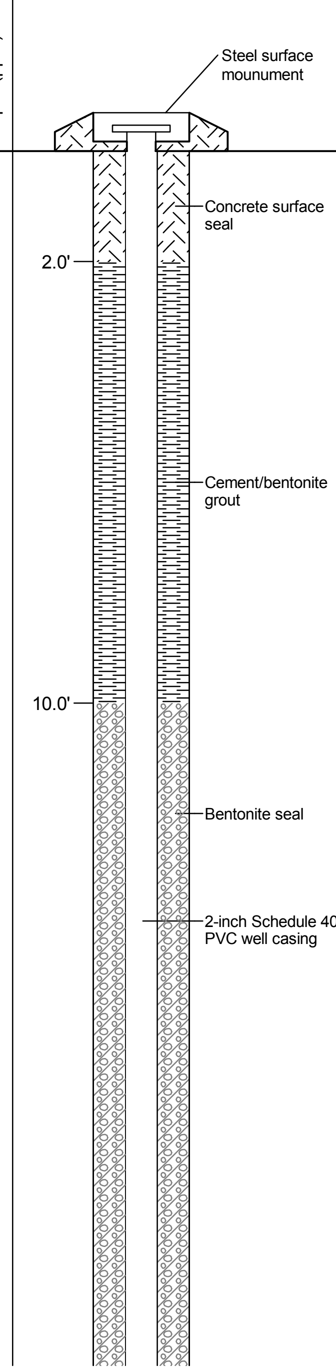
Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
7/17/2013	19.6	129.4

Notes: Elevation based on topographic survey completed by Sitts and Hill for the YMCA project

FIELD DATA

Elevation (feet)	Depth (feet)	Recovered (in)	Blows/foot	Collected Sample / Sample Name	Water Level	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0	60				AC	4 inches asphalt		
						SP-SM	Brown fine to coarse sand with silt and gravel (medium dense, moist) (Fill)		
						SM	Brown/gray silty fine to coarse sand with gravel (very dense, moist) (Glacial Drift)		
			37.2					NS	
145			32.1					NS	6.1
	5	60	50/6"						
								NS	4.4
				UG-MW29D 7-7.5		SP-SM	Brown/gray fine to coarse sand with silt and gravel (very dense, wet) (Glacial Drift)		
						SM	Brown/gray silty fine to coarse sand with gravel (very dense, moist) (Glacial Drift)	NS	
			23.7						
140								NS	
			37.2	UG-MW29D 9-9.5				NS	4.8
								NS	
	10	60	50/5"			GM	Brown/gray silty fine to coarse gravel with sand (very dense, moist) (Glacial Drift)		
									7.7
			30.7					NS	
			40.0						
			41.0						
135									8.3
								NS	
	15	60	50/4"						
								NS	
			34.2						
				UG-MW29D 17-18		SM	Brown silty fine to coarse sand with gravel (very dense, wet) (Glacial Drift)		
			30.1			GM	Gray silty fine to coarse gravel with sand, occasional cobble (very dense, wet) (Glacial Drift)		
130			29.2		▼			NS	
	20	12	24	UG-MW29D 20-20.5		SM	Brown silty fine sand (medium dense, wet) (Glacial Drift)		
		12	28.9					NS	<1

WELL LOG



Notes: See Figure A-1 for explanation of symbols.

Tacoma: Date:8/30/13 Path:P:\0\0183085\00\GINT\018308800COMBINED WITH 085.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Log of Monitoring Well UG-MW29D

GEOENGINEERS

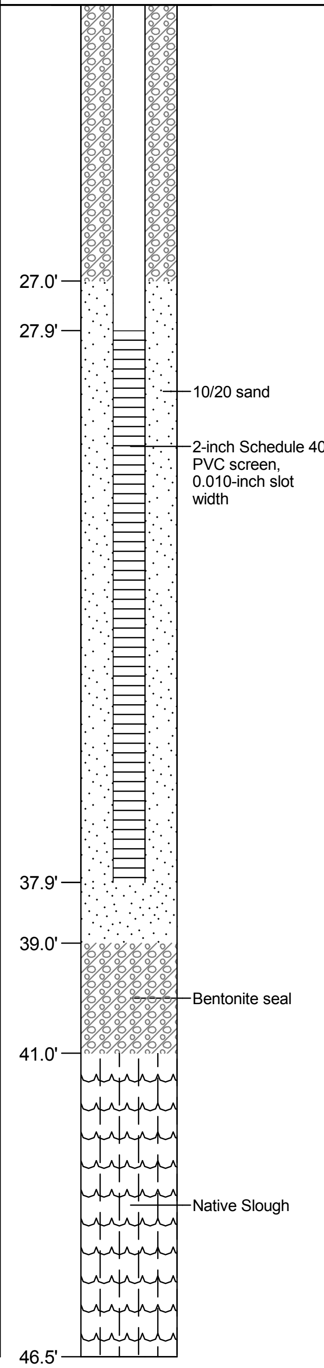
Project: UWT - Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure A-3
Sheet 1 of 2

Elevation (feet)	Depth (feet)	Recovered (in)	Blows/foot	Sample Name	Water Level	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
		96	21.3	UG-MW29D 22-23		ML	Gray silt, occasional sand (very stiff, moist)	NS	
125						SM	Dark gray silty fine to medium sand, trace organics (organic matter) (medium dense, moist)		
	25		23.2			SP	Brown fine to medium sand with trace silt (medium dense, moist)		
			22.8						
						ML	Gray silt, occasional sand (very stiff, moist)	NS	
120			23.7			SP-SM	Gray fine to medium sand with silt (dense, moist)		<1
	30	60	38						
			19.4					NS	
							Grades to wet		<1
115				UG-MW29D 34.5-35				NS	
	35	60	29				Grades to medium dense		
								NS	
			18.0						
			20.9	UG-MW29D 37.5-38				NS	
110			19.2			ML	Gray silt, occasional sand (very stiff, moist)	NS	
	40	60	14			SP-SM	Gray fine to medium sand with silt (medium dense, moist)		
								NS	
105			20.1					NS	<1
						ML/SM	Interbedded gray silt, occasional sand and gray silty fine sand (hard, moist)	NS	
	45	18	54						

Well was telescoped with 8-inch conductor casing to 22 feet bgs. Placed 2 feet of bentonite chips from 20 to 22 feet bgs and hydrated for an hour. Then drilled to 45 feet bgs with 6-inch casing through the 8-inch casing.

WELL LOG



Notes: See Figure A-1 for explanation of symbols.

Log of Monitoring Well UG-MW29D (continued)

GeoEngineers

Project: UWT - Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure A-3
Sheet 2 of 2

Drilled	Start 6/26/2013	End 6/26/2013	Total Depth (ft) 21	Logged By AMW / Checked By TSD	Driller Holt Drilling	Drilling Method Sonic

Hammer Data	N/A	Drilling Equipment	Terrasonic 150 CC Truck Rig
Surface Elevation (ft) / Vertical Datum	149 / NGVD 1929	Top of Casing Elevation (ft)	
Easting (X) / Northing (Y)		Horizontal Datum	

DOE Well I.D.: BIJ 673
A 2 (in) well was installed on 6/26/2013 to a depth of 21 (ft).

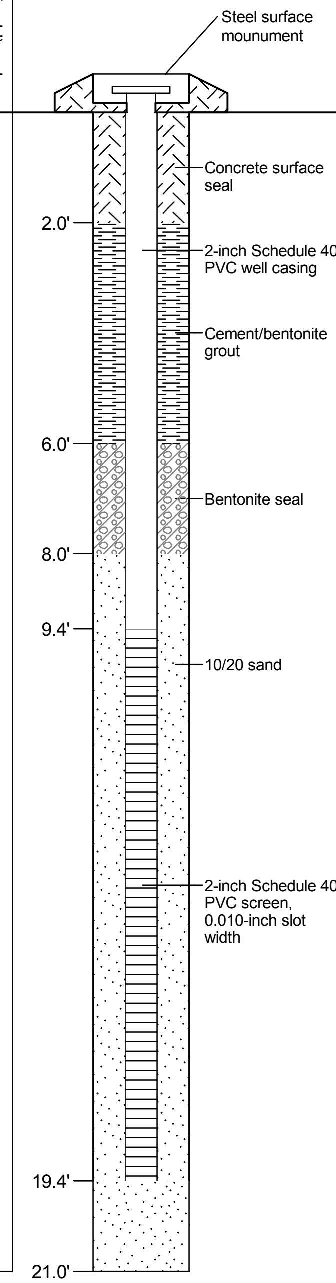
Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
6/27/2013	11.5	137.6

Notes: Elevation based on topographic survey completed by Sitts and Hill for the YMCA project

FIELD DATA

Elevation (feet)	Depth (feet)	Recovered (in)	Blows/foot	Water Level	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0	60			AC	Asphalt		
			24.0		SP	Light brown fine to medium sand with gravel, trace silt (moist) (Fill)	NS	
			28.7					<1
					SM	Light brown silty fine to coarse sand with gravel (moist) (Glacial Drift)	NS	
145			29.8				NS	<1
	5	60	30.1				NS	
			36.8		SP	Light brown fine to coarse sand with gravel, trace silt (wet) (Glacial Drift)		<1
					SM	Gray silty fine to medium sand with occasional gravel (moist) (Glacial Drift)		
			32.8				NS	
			34.1				NS	<1
140			42.9		GM	Brown silty fine to coarse gravel with sand (moist) (Glacial Drift)	NS	
	10	60	72.4		GP	Brown fine to coarse gravel with sand, trace silt, occasional cobbles (moist) (Glacial Drift)	NS	
			32.4	▼			NS	<1
			39.4		GM	Gray to brown silty fine to coarse gravel with sand and occasional cobbles (moist) (Glacial Drift)	NS	
135			47.4				NS	<1
	15	72	57.3				NS	
			50.4					4.7
			53.8		SM	Light brown silty fine to coarse sand with gravel and occasional cobbles (wet) (Glacial Drift)	NS	
							NS	<1
130			55.9		ML	Light brown with orange mottling fine sandy silt, moderately laminated (moist)	NS	
	20					Becomes gray	NS	<1
			68.2					

WELL LOG



Notes: See Figure A-1 for explanation of symbols.

Log of Monitoring Well UG-MW29S

GeoEngineers

Project: UWT - Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure A-4
Sheet 1 of 1

Drilled	Start 6/10/2013	End 6/10/2013	Total Depth (ft)	11	Logged By JCD	Checked By TSD	Driller Holt Drilling	Drilling Method Direct Push

Surface Elevation (ft) / Vertical Datum	126 / NGVD 1929	Hammer Data	Pneumatic
Drilling Equipment	Geoprobe 7822 DT		
Easting (X) / Northing (Y)		System Datum	

Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)

Notes: Elevation based on topographic survey completed by Sitts and Hill for the YMCA project

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
126	0		54						SM	Brown to gray silty fine to coarse sand with gravel (moist) (Glacial Drift)	NS	<1	
125													
	4					1H-B1-4-5 / CA							
	5		54										Difficult drilling at 5 feet
120													
	6.5								GP-GM	Brown to gray gravel with silt and fine to coarse sand (moist) (Glacial Drift)	NS	<1	
	9					1H-B1-9-9.5 / CA			SM	Brown to gray silty fine to coarse sand with gravel (moist) (Glacial Drift)	NS	<1	
	10		18										
115	11									Practical refusal at 11 feet			

Notes: See Figure A-1 for explanation of symbols.

Tacoma: Date:8/30/13 Path:P:\0\0183085\00\GINT\018308800COMBINED WITH 085.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_STANDARD

Log of Boring 1H-B1

GeoEngineers

Project: UWT - Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure A-5
Sheet 1 of 1

Drilled	Start 6/10/2013	End 6/10/2013	Total Depth (ft)	10	Logged By JCD / Checked By TSD	Driller	Holt Drilling	Drilling Method	Direct Push

Surface Elevation (ft) / Vertical Datum	127 / NGVD 1929	Hammer Data	Pneumatic	Drilling Equipment	Geoprobe 7822 DT
Easting (X) / Northing (Y)		System Datum		Groundwater	

Notes: Elevation based on topographic survey completed by Sitts and Hill for the YMCA project

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
6/10/2013	7.5	119.5

FIELD DATA

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		25						SP-SM	Dark brown sand with silt and gravel (moist) (Fill)			
									SM	Brown to gray silty fine to coarse sand with gravel (moist) (Glacial Drift)	NS	<1	
125													
										Gray silty fine to medium sand (moist)			
	5		60										
120													
						1H-B2-7-7.5 / CA							Difficult drilling at approximately 7 feet
							▼			Wet at 7.5 feet			
						1H-B2-9-10 / CA				Grades to fine sand			
													After sampler pulled, water came up to 2 feet
	10									Practical refusal at 10 feet			

Notes: See Figure A-1 for explanation of symbols.

Log of Boring 1H-B2

GEOENGINEERS

Project: UWT - Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled	Start 6/10/2013	End 6/10/2013	Total Depth (ft) 10	Logged By JCD Checked By TSD	Driller Holt Drilling	Drilling Method Direct Push

Surface Elevation (ft) 128.4 Vertical Datum NGVD 1929	Hammer Data Pneumatic	Drilling Equipment Geoprobe 7822 DT	
Easting (X) Northing (Y)	System Datum	Groundwater	

Notes: Elevation based on topographic survey completed by Sitts and Hill for the YMCA project

Date Measured	Depth to Water (ft)	Elevation (ft)
6/10/2013	7.0	121.4

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		50						GP	Gravel with fine to coarse sand and silt (moist) (Fill)	NS	<1	
									SM	Brown to gray silty fine to coarse sand with gravel (moist) (Glacial Drift)			
125						1H-B3-4-5 CA							Difficult drilling at 4 feet
	5		58								NS	<1	
						1H-B3-7-8 CA	▼		SP-SM	Brown to gray fine to medium sand with silt (wet) (Glacial Drift)			
120													
	10									Practical refusal at 10 feet			

Notes: See Figure A-1 for explanation of symbols.

Log of Boring 1H-B3

GEOENGINEERS

Project: UWT - Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure A-7
Sheet 1 of 1

Date Excavated: 6/25/2013

Equipment: Case 580 Backhoe

Logged By: JWW

Total Depth (ft) 6.0

Elevation (feet)	Depth (feet)	SAMPLE Testing Sample	SAMPLE Sample Name Testing	Graphic Log	Group Classification	Encountered Water	MATERIAL DESCRIPTION	Sheen	Headspace Vapor	Notes
	0	X	1H-TP1-0-1		Sod		Sod	NS	<1	No HC odor
					SM		Brown/gray silty fine to coarse sand with gravel, occasional cobbles (dense, moist) (Glacial Drift)			
	3				GP-GM		Brown/gray fine to coarse gravel with silt and sand (dense, moist) (Glacial Drift)			
	5	X	1H-TP1-5-6					NS	<1	No HC odor
	6									

Test pit completed at 6 feet
No groundwater seepage observed
No caving observed

Notes: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.

Tacoma: Date:8/30/13 Path:P:\0\0183085\00\GINT\018308800COMBINED WITH 085.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_TESTPIT_1P_ENV

Log of Test Pit 1H-TP1

GeoEngineers

Project: UWT - Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure A-8
Sheet 1 of 1

APPENDIX B
Chemical Analytical Reports

OnSite
Environmental Inc.

14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

July 1, 2013

Tricia DeOme
GeoEngineers, Inc.
1101 Fawcett Avenue South, Suite 200
Tacoma, WA 98402

Re: Analytical Data for Project 0183-085-00
Laboratory Reference No. 1306-086

Dear Tricia:

Enclosed are the analytical results and associated quality control data for samples submitted on June 11, 2013.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

Case Narrative

Samples were collected on June 10, 2013 and received by the laboratory on June 11, 2013. They were maintained at the laboratory at a temperature of $2^{o}C$ to $6^{o}C$.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

Volatiles EPA 8260C (soil) Analysis

Per EPA Method 5035A, samples were received by the laboratory in pre-weighed 40 mL VOA vials within 48 hours of sample collection. They were stored in a freezer at between $-7^{o}C$ and $-20^{o}C$ until extraction or analysis.

The holding times for samples 1H-B2-9-10 and 1G-B1-7-8 were exceeded by approximately 6 hours and 2 hours, respectively.

Any other QA/QC issues associated with this extraction and analysis will be indicated with a footnote reference and discussed in detail on the Data Qualifier page.

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

ANALYTICAL REPORT FOR SAMPLES

Client ID	Laboratory ID	Matrix	Date Sampled	Date Received	Notes
1H-B1-4-5	06-086-01	Soil	6-10-13	6-11-13	
1H-B1-9-9.5	06-086-02	Soil	6-10-13	6-11-13	
1H-B2-7-7.5	06-086-03	Soil	6-10-13	6-11-13	
1H-B2-9-10	06-086-04	Soil	6-10-13	6-11-13	
1H-B3-4-5	06-086-05	Soil	6-10-13	6-11-13	
1H-B3-7-8	06-086-06	Soil	6-10-13	6-11-13	
~~1G-B3-2-3~~	~~06-086-07~~	~~Soil~~	~~6-10-13~~	~~6-11-13~~	
~~1G-B2-2-3~~	~~06-086-08~~	~~Soil~~	~~6-10-13~~	~~6-11-13~~	
~~1G-B2-9-10~~	~~06-086-09~~	~~Soil~~	~~6-10-13~~	~~6-11-13~~	
~~1G-B1-2-3~~	~~06-086-10~~	~~Soil~~	~~6-10-13~~	~~6-11-13~~	
~~1G-B1-7-8~~	~~06-086-11~~	~~Soil~~	~~6-10-13~~	~~6-11-13~~	
TRIP-130610-1	06-086-12	Water	6-10-13	6-11-13	

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

NWTPH-HCID

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**1H-B1-4-5**					
Laboratory ID:	06-086-01					
Gasoline Range Organics	**ND**	22	NWTPH-HCID	6-13-13	6-13-13	
Diesel Range Organics	**ND**	54	NWTPH-HCID	6-13-13	6-13-13	
Lube Oil Range Organics	**ND**	110	NWTPH-HCID	6-13-13	6-13-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*100*	*50-150*				
Client ID:	**1H-B1-9-9.5**					
Laboratory ID:	06-086-02					
Gasoline Range Organics	**ND**	22	NWTPH-HCID	6-13-13	6-13-13	
Diesel Range Organics	**ND**	55	NWTPH-HCID	6-13-13	6-13-13	
Lube Oil Range Organics	**ND**	110	NWTPH-HCID	6-13-13	6-13-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*97*	*50-150*				
Client ID:	**1H-B2-7-7.5**					
Laboratory ID:	06-086-03					
Gasoline Range Organics	**ND**	25	NWTPH-HCID	6-13-13	6-13-13	
Diesel Range Organics	**ND**	64	NWTPH-HCID	6-13-13	6-13-13	
Lube Oil Range Organics	**ND**	130	NWTPH-HCID	6-13-13	6-13-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*86*	*50-150*				
Client ID:	**1H-B3-4-5**					
Laboratory ID:	06-086-05					
Gasoline Range Organics	**ND**	22	NWTPH-HCID	6-13-13	6-13-13	
Diesel Range Organics	**ND**	54	NWTPH-HCID	6-13-13	6-13-13	
Lube Oil Range Organics	**ND**	110	NWTPH-HCID	6-13-13	6-13-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*97*	*50-150*				
Client ID:	**1H-B3-7-8**					
Laboratory ID:	06-086-06					
Gasoline Range Organics	**ND**	22	NWTPH-HCID	6-13-13	6-13-13	
Diesel Range Organics	**ND**	56	NWTPH-HCID	6-13-13	6-13-13	
Lube Oil Range Organics	**ND**	110	NWTPH-HCID	6-13-13	6-13-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*92*	*50-150*				

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

NWTPH-HCID

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**1G-B3-2-3**					
Laboratory ID:	06-086-07					
Gasoline Range Organics	**ND**	22	NWTPH-HCID	6-13-13	6-13-13	
Diesel Range Organics	**ND**	56	NWTPH-HCID	6-13-13	6-13-13	
Lube Oil Range Organics	**ND**	110	NWTPH-HCID	6-13-13	6-13-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*95*	*50-150*				
Client ID:	**1G-B2-2-3**					
Laboratory ID:	06-086-08					
Gasoline Range Organics	**ND**	23	NWTPH-HCID	6-13-13	6-13-13	
Diesel Range Organics	**ND**	57	NWTPH-HCID	6-13-13	6-13-13	
Lube Oil Range Organics	**ND**	110	NWTPH-HCID	6-13-13	6-13-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*90*	*50-150*				
Client ID:	**1G-B2-9-10**					
Laboratory ID:	06-086-09					
Gasoline Range Organics	**ND**	22	NWTPH-HCID	6-13-13	6-13-13	
Diesel Range Organics	**ND**	55	NWTPH-HCID	6-13-13	6-13-13	
Lube Oil Range Organics	**ND**	110	NWTPH-HCID	6-13-13	6-13-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*100*	*50-150*				
Client ID:	**1G-B1-2-3**					
Laboratory ID:	06-086-10					
Gasoline Range Organics	**ND**	22	NWTPH-HCID	6-13-13	6-13-13	
Diesel Range Organics	**ND**	55	NWTPH-HCID	6-13-13	6-13-13	
Lube Oil Range Organics	**ND**	110	NWTPH-HCID	6-13-13	6-13-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*99*	*50-150*				

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 1 of 2

Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**1H-B1-4-5**					
Laboratory ID:	06-086-01					
Dichlorodifluoromethane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Chloromethane	ND	0.0037	EPA 8260C	6-12-13	6-12-13	
Vinyl Chloride	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Bromomethane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Chloroethane	ND	0.0037	EPA 8260C	6-12-13	6-12-13	
Trichlorofluoromethane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
1,1-Dichloroethene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Acetone	ND	0.0037	EPA 8260C	6-12-13	6-12-13	
Iodomethane	ND	0.0037	EPA 8260C	6-12-13	6-12-13	
Carbon Disulfide	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Methylene Chloride	ND	0.0037	EPA 8260C	6-12-13	6-12-13	
(trans) 1,2-Dichloroethene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Methyl t-Butyl Ether	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
1,1-Dichloroethane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Vinyl Acetate	ND	0.0037	EPA 8260C	6-12-13	6-12-13	
2,2-Dichloropropane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
(cis) 1,2-Dichloroethene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
2-Butanone	ND	0.0037	EPA 8260C	6-12-13	6-12-13	
Bromochloromethane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Chloroform	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
1,1,1-Trichloroethane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Carbon Tetrachloride	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
1,1-Dichloropropene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Benzene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
1,2-Dichloroethane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Trichloroethene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
1,2-Dichloropropane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Dibromomethane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Bromodichloromethane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
2-Chloroethyl Vinyl Ether	ND	0.0037	EPA 8260C	6-12-13	6-12-13	
(cis) 1,3-Dichloropropene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Methyl Isobutyl Ketone	ND	0.0037	EPA 8260C	6-12-13	6-12-13	
Toluene	ND	0.0074	EPA 8260C	6-12-13	6-12-13	
(trans) 1,3-Dichloropropene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**1H-B1-4-5**					
Laboratory ID:	06-086-01					
1,1,2-Trichloroethane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Tetrachloroethene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
1,3-Dichloropropane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
2-Hexanone	ND	0.0037	EPA 8260C	6-12-13	6-12-13	
Dibromochloromethane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
1,2-Dibromoethane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Chlorobenzene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
1,1,1,2-Tetrachloroethane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Ethylbenzene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
m,p-Xylene	ND	0.0015	EPA 8260C	6-12-13	6-12-13	
o-Xylene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Styrene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Bromoform	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Isopropylbenzene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Bromobenzene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
1,1,2,2-Tetrachloroethane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
1,2,3-Trichloropropane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
n-Propylbenzene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
2-Chlorotoluene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
4-Chlorotoluene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
1,3,5-Trimethylbenzene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
tert-Butylbenzene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
1,2,4-Trimethylbenzene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
sec-Butylbenzene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
1,3-Dichlorobenzene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
p-Isopropyltoluene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
1,4-Dichlorobenzene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
1,2-Dichlorobenzene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
n-Butylbenzene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
1,2-Dibromo-3-chloropropane	ND	0.0037	EPA 8260C	6-12-13	6-12-13	
1,2,4-Trichlorobenzene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Hexachlorobutadiene	ND	0.0037	EPA 8260C	6-12-13	6-12-13	
Naphthalene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
1,2,3-Trichlorobenzene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*114*	*63-127*				
Toluene-d8	*112*	*65-129*				
4-Bromofluorobenzene	*111*	*52-125*				

Date of Report: July 1, 2013
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Laboratory Reference: 1306-086
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 1 of 2

Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**1H-B1-9-9.5**					
Laboratory ID:	06-086-02					
Dichlorodifluoromethane	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
Chloromethane	ND	0.0043	EPA 8260C	6-12-13	6-12-13	
Vinyl Chloride	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
Bromomethane	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
Chloroethane	ND	0.0043	EPA 8260C	6-12-13	6-12-13	
Trichlorofluoromethane	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
1,1-Dichloroethene	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
Acetone	ND	0.0043	EPA 8260C	6-12-13	6-12-13	
Iodomethane	ND	0.0043	EPA 8260C	6-12-13	6-12-13	
Carbon Disulfide	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
Methylene Chloride	ND	0.0043	EPA 8260C	6-12-13	6-12-13	
(trans) 1,2-Dichloroethene	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
Methyl t-Butyl Ether	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
1,1-Dichloroethane	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
Vinyl Acetate	ND	0.0043	EPA 8260C	6-12-13	6-12-13	
2,2-Dichloropropane	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
(cis) 1,2-Dichloroethene	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
2-Butanone	ND	0.0043	EPA 8260C	6-12-13	6-12-13	
Bromochloromethane	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
Chloroform	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
1,1,1-Trichloroethane	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
Carbon Tetrachloride	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
1,1-Dichloropropene	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
Benzene	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
1,2-Dichloroethane	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
Trichloroethene	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
1,2-Dichloropropane	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
Dibromomethane	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
Bromodichloromethane	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
2-Chloroethyl Vinyl Ether	ND	0.0043	EPA 8260C	6-12-13	6-12-13	
(cis) 1,3-Dichloropropene	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
Methyl Isobutyl Ketone	ND	0.0043	EPA 8260C	6-12-13	6-12-13	
Toluene	ND	0.0087	EPA 8260C	6-12-13	6-12-13	
(trans) 1,3-Dichloropropene	ND	0.00087	EPA 8260C	6-12-13	6-12-13	

Date of Report: July 1, 2013
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Laboratory Reference: 1306-086
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**1H-B1-9-9.5**					
Laboratory ID:	06-086-02					
1,1,2-Trichloroethane	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
Tetrachloroethene	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
1,3-Dichloropropane	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
2-Hexanone	ND	0.0043	EPA 8260C	6-12-13	6-12-13	
Dibromochloromethane	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
1,2-Dibromoethane	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
Chlorobenzene	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
1,1,1,2-Tetrachloroethane	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
Ethylbenzene	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
m,p-Xylene	ND	0.0017	EPA 8260C	6-12-13	6-12-13	
o-Xylene	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
Styrene	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
Bromoform	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
Isopropylbenzene	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
Bromobenzene	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
1,1,2,2-Tetrachloroethane	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
1,2,3-Trichloropropane	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
n-Propylbenzene	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
2-Chlorotoluene	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
4-Chlorotoluene	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
1,3,5-Trimethylbenzene	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
tert-Butylbenzene	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
1,2,4-Trimethylbenzene	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
sec-Butylbenzene	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
1,3-Dichlorobenzene	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
p-Isopropyltoluene	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
1,4-Dichlorobenzene	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
1,2-Dichlorobenzene	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
n-Butylbenzene	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
1,2-Dibromo-3-chloropropane	ND	0.0043	EPA 8260C	6-12-13	6-12-13	
1,2,4-Trichlorobenzene	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
Hexachlorobutadiene	ND	0.0043	EPA 8260C	6-12-13	6-12-13	
Naphthalene	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
1,2,3-Trichlorobenzene	ND	0.00087	EPA 8260C	6-12-13	6-12-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*121*	*63-127*				
Toluene-d8	*120*	*65-129*				
4-Bromofluorobenzene	*116*	*52-125*				

Date of Report: July 1, 2013
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Laboratory Reference: 1306-086
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VOLATILES by EPA 8260C
Page 1 of 2

Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**1H-B2-7-7.5**					
Laboratory ID:	06-086-03					
Dichlorodifluoromethane	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
Chloromethane	ND	0.0046	EPA 8260C	6-12-13	6-12-13	
Vinyl Chloride	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
Bromomethane	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
Chloroethane	ND	0.0046	EPA 8260C	6-12-13	6-12-13	
Trichlorofluoromethane	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
1,1-Dichloroethene	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
Acetone	ND	0.0046	EPA 8260C	6-12-13	6-12-13	
Iodomethane	ND	0.0046	EPA 8260C	6-12-13	6-12-13	
Carbon Disulfide	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
Methylene Chloride	ND	0.0046	EPA 8260C	6-12-13	6-12-13	
(trans) 1,2-Dichloroethene	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
Methyl t-Butyl Ether	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
1,1-Dichloroethane	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
Vinyl Acetate	ND	0.0046	EPA 8260C	6-12-13	6-12-13	
2,2-Dichloropropane	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
(cis) 1,2-Dichloroethene	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
2-Butanone	ND	0.0046	EPA 8260C	6-12-13	6-12-13	
Bromochloromethane	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
Chloroform	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
1,1,1-Trichloroethane	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
Carbon Tetrachloride	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
1,1-Dichloropropene	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
Benzene	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
1,2-Dichloroethane	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
Trichloroethene	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
1,2-Dichloropropane	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
Dibromomethane	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
Bromodichloromethane	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
2-Chloroethyl Vinyl Ether	ND	0.0046	EPA 8260C	6-12-13	6-12-13	
(cis) 1,3-Dichloropropene	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
Methyl Isobutyl Ketone	ND	0.0046	EPA 8260C	6-12-13	6-12-13	
Toluene	ND	0.0091	EPA 8260C	6-12-13	6-12-13	
(trans) 1,3-Dichloropropene	ND	0.00091	EPA 8260C	6-12-13	6-12-13	

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**1H-B2-7-7.5**					
Laboratory ID:	06-086-03					
1,1,2-Trichloroethane	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
Tetrachloroethene	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
1,3-Dichloropropane	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
2-Hexanone	ND	0.0046	EPA 8260C	6-12-13	6-12-13	
Dibromochloromethane	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
1,2-Dibromoethane	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
Chlorobenzene	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
1,1,1,2-Tetrachloroethane	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
Ethylbenzene	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
m,p-Xylene	ND	0.0018	EPA 8260C	6-12-13	6-12-13	
o-Xylene	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
Styrene	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
Bromoform	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
Isopropylbenzene	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
Bromobenzene	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
1,1,2,2-Tetrachloroethane	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
1,2,3-Trichloropropane	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
n-Propylbenzene	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
2-Chlorotoluene	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
4-Chlorotoluene	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
1,3,5-Trimethylbenzene	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
tert-Butylbenzene	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
1,2,4-Trimethylbenzene	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
sec-Butylbenzene	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
1,3-Dichlorobenzene	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
p-Isopropyltoluene	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
1,4-Dichlorobenzene	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
1,2-Dichlorobenzene	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
n-Butylbenzene	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
1,2-Dibromo-3-chloropropane	ND	0.0046	EPA 8260C	6-12-13	6-12-13	
1,2,4-Trichlorobenzene	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
Hexachlorobutadiene	ND	0.0046	EPA 8260C	6-12-13	6-12-13	
Naphthalene	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
1,2,3-Trichlorobenzene	ND	0.00091	EPA 8260C	6-12-13	6-12-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*107*	*63-127*				
Toluene-d8	*110*	*65-129*				
4-Bromofluorobenzene	*106*	*52-125*				

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 1 of 2

Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**1H-B3-4-5**					
Laboratory ID:	06-086-05					
Dichlorodifluoromethane	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
Chloromethane	ND	0.0043	EPA 8260C	6-12-13	6-12-13	
Vinyl Chloride	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
Bromomethane	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
Chloroethane	ND	0.0043	EPA 8260C	6-12-13	6-12-13	
Trichlorofluoromethane	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
1,1-Dichloroethene	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
Acetone	ND	0.0043	EPA 8260C	6-12-13	6-12-13	
Iodomethane	ND	0.0043	EPA 8260C	6-12-13	6-12-13	
Carbon Disulfide	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
Methylene Chloride	ND	0.0043	EPA 8260C	6-12-13	6-12-13	
(trans) 1,2-Dichloroethene	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
Methyl t-Butyl Ether	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
1,1-Dichloroethane	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
Vinyl Acetate	ND	0.0043	EPA 8260C	6-12-13	6-12-13	
2,2-Dichloropropane	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
(cis) 1,2-Dichloroethene	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
2-Butanone	ND	0.0043	EPA 8260C	6-12-13	6-12-13	
Bromochloromethane	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
Chloroform	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
1,1,1-Trichloroethane	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
Carbon Tetrachloride	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
1,1-Dichloropropene	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
Benzene	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
1,2-Dichloroethane	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
Trichloroethene	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
1,2-Dichloropropane	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
Dibromomethane	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
Bromodichloromethane	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
2-Chloroethyl Vinyl Ether	ND	0.0043	EPA 8260C	6-12-13	6-12-13	
(cis) 1,3-Dichloropropene	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
Methyl Isobutyl Ketone	ND	0.0043	EPA 8260C	6-12-13	6-12-13	
Toluene	ND	0.0086	EPA 8260C	6-12-13	6-12-13	
(trans) 1,3-Dichloropropene	ND	0.00086	EPA 8260C	6-12-13	6-12-13	

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**1H-B3-4-5**					
Laboratory ID:	06-086-05					
1,1,2-Trichloroethane	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
Tetrachloroethene	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
1,3-Dichloropropane	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
2-Hexanone	ND	0.0043	EPA 8260C	6-12-13	6-12-13	
Dibromochloromethane	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
1,2-Dibromoethane	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
Chlorobenzene	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
1,1,1,2-Tetrachloroethane	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
Ethylbenzene	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
m,p-Xylene	ND	0.0017	EPA 8260C	6-12-13	6-12-13	
o-Xylene	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
Styrene	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
Bromoform	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
Isopropylbenzene	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
Bromobenzene	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
1,1,2,2-Tetrachloroethane	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
1,2,3-Trichloropropane	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
n-Propylbenzene	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
2-Chlorotoluene	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
4-Chlorotoluene	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
1,3,5-Trimethylbenzene	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
tert-Butylbenzene	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
1,2,4-Trimethylbenzene	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
sec-Butylbenzene	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
1,3-Dichlorobenzene	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
p-Isopropyltoluene	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
1,4-Dichlorobenzene	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
1,2-Dichlorobenzene	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
n-Butylbenzene	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
1,2-Dibromo-3-chloropropane	ND	0.0043	EPA 8260C	6-12-13	6-12-13	
1,2,4-Trichlorobenzene	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
Hexachlorobutadiene	ND	0.0043	EPA 8260C	6-12-13	6-12-13	
Naphthalene	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
1,2,3-Trichlorobenzene	ND	0.00086	EPA 8260C	6-12-13	6-12-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*103*	*63-127*				
Toluene-d8	*103*	*65-129*				
4-Bromofluorobenzene	*102*	*52-125*				

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 1 of 2

Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**1H-B3-7-8**					
Laboratory ID:	06-086-06					
Dichlorodifluoromethane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Chloromethane	ND	0.0037	EPA 8260C	6-12-13	6-12-13	
Vinyl Chloride	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Bromomethane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Chloroethane	ND	0.0037	EPA 8260C	6-12-13	6-12-13	
Trichlorofluoromethane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
1,1-Dichloroethene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Acetone	ND	0.0037	EPA 8260C	6-12-13	6-12-13	
Iodomethane	ND	0.0037	EPA 8260C	6-12-13	6-12-13	
Carbon Disulfide	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Methylene Chloride	ND	0.0037	EPA 8260C	6-12-13	6-12-13	
(trans) 1,2-Dichloroethene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Methyl t-Butyl Ether	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
1,1-Dichloroethane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Vinyl Acetate	ND	0.0037	EPA 8260C	6-12-13	6-12-13	
2,2-Dichloropropane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
(cis) 1,2-Dichloroethene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
2-Butanone	ND	0.0037	EPA 8260C	6-12-13	6-12-13	
Bromochloromethane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Chloroform	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
1,1,1-Trichloroethane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Carbon Tetrachloride	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
1,1-Dichloropropene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Benzene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
1,2-Dichloroethane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Trichloroethene	0.0072	0.00074	EPA 8260C	6-12-13	6-12-13	
1,2-Dichloropropane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Dibromomethane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Bromodichloromethane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
2-Chloroethyl Vinyl Ether	ND	0.0037	EPA 8260C	6-12-13	6-12-13	
(cis) 1,3-Dichloropropene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Methyl Isobutyl Ketone	ND	0.0037	EPA 8260C	6-12-13	6-12-13	
Toluene	ND	0.0074	EPA 8260C	6-12-13	6-12-13	
(trans) 1,3-Dichloropropene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**1H-B3-7-8**					
Laboratory ID:	06-086-06					
1,1,2-Trichloroethane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Tetrachloroethene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
1,3-Dichloropropane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
2-Hexanone	ND	0.0037	EPA 8260C	6-12-13	6-12-13	
Dibromochloromethane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
1,2-Dibromoethane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Chlorobenzene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
1,1,1,2-Tetrachloroethane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Ethylbenzene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
m,p-Xylene	ND	0.0015	EPA 8260C	6-12-13	6-12-13	
o-Xylene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Styrene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Bromoform	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Isopropylbenzene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Bromobenzene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
1,1,2,2-Tetrachloroethane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
1,2,3-Trichloropropane	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
n-Propylbenzene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
2-Chlorotoluene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
4-Chlorotoluene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
1,3,5-Trimethylbenzene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
tert-Butylbenzene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
1,2,4-Trimethylbenzene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
sec-Butylbenzene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
1,3-Dichlorobenzene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
p-Isopropyltoluene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
1,4-Dichlorobenzene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
1,2-Dichlorobenzene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
n-Butylbenzene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
1,2-Dibromo-3-chloropropane	ND	0.0037	EPA 8260C	6-12-13	6-12-13	
1,2,4-Trichlorobenzene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Hexachlorobutadiene	ND	0.0037	EPA 8260C	6-12-13	6-12-13	
Naphthalene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
1,2,3-Trichlorobenzene	ND	0.00074	EPA 8260C	6-12-13	6-12-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*107*	*63-127*				
Toluene-d8	*107*	*65-129*				
4-Bromofluorobenzene	*105*	*52-125*				

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 1 of 2

~~Matrix: Soil~~
~~Units: mg/kg~~

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~Client ID:~~	~~1G-B3-2-3~~					
~~Laboratory ID:~~	~~06-086-07~~					
~~Dichlorodifluoromethane~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Chloromethane~~	~~ND~~	~~0.0047~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Vinyl Chloride~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Bromomethane~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Chloroethane~~	~~ND~~	~~0.0047~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Trichlorofluoromethane~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,1-Dichloroethene~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Acetone~~	~~ND~~	~~0.0047~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Iodomethane~~	~~ND~~	~~0.0047~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Carbon Disulfide~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Methylene Chloride~~	~~ND~~	~~0.0047~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~(trans) 1,2-Dichloroethene~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Methyl t-Butyl Ether~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,1-Dichloroethane~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Vinyl Acetate~~	~~ND~~	~~0.0047~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~2,2-Dichloropropane~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~(cis) 1,2-Dichloroethene~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~2-Butanone~~	~~ND~~	~~0.0047~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Bromochloromethane~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Chloroform~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,1,1-Trichloroethane~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Carbon Tetrachloride~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,1-Dichloropropene~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Benzene~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2-Dichloroethane~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Trichloroethene~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2-Dichloropropane~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Dibromomethane~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Bromodichloromethane~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~2-Chloroethyl Vinyl Ether~~	~~ND~~	~~0.0047~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~(cis) 1,3-Dichloropropene~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Methyl Isobutyl Ketone~~	~~ND~~	~~0.0047~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Toluene~~	~~ND~~	~~0.0094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~(trans) 1,3-Dichloropropene~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 2 of 2

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	Date ~~Prepared~~	Date ~~Analyzed~~	~~Flags~~
~~Client ID:~~	**~~1G-B3-2-3~~**					
~~Laboratory ID:~~	~~06-086-07~~					
~~1,1,2-Trichloroethane~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Tetrachloroethene~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,3-Dichloropropane~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~2-Hexanone~~	~~ND~~	~~0.0047~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Dibromochloromethane~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2-Dibromoethane~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Chlorobenzene~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,1,1,2-Tetrachloroethane~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Ethylbenzene~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~m,p-Xylene~~	~~ND~~	~~0.0019~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~o-Xylene~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Styrene~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Bromoform~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Isopropylbenzene~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Bromobenzene~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,1,2,2-Tetrachloroethane~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2,3-Trichloropropane~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~n-Propylbenzene~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~2-Chlorotoluene~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~4-Chlorotoluene~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,3,5-Trimethylbenzene~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~tert-Butylbenzene~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2,4-Trimethylbenzene~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~sec-Butylbenzene~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,3-Dichlorobenzene~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~p-Isopropyltoluene~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,4-Dichlorobenzene~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2-Dichlorobenzene~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~n-Butylbenzene~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2-Dibromo-3-chloropropane~~	~~ND~~	~~0.0047~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2,4-Trichlorobenzene~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Hexachlorobutadiene~~	~~ND~~	~~0.0047~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Naphthalene~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2,3-Trichlorobenzene~~	~~ND~~	~~0.00094~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Surrogate:~~	*~~Percent Recovery~~*	*~~Control Limits~~*				
~~Dibromofluoromethane~~	*~~107~~*	*~~63-127~~*				
~~Toluene-d8~~	*~~106~~*	*~~65-129~~*				
~~4-Bromofluorobenzene~~	*~~104~~*	*~~52-125~~*				

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 1 of 2

~~Matrix: Soil~~
~~Units: mg/kg~~

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~Client ID:~~	~~1G-B2-2-3~~					
~~Laboratory ID:~~	~~06-086-08~~					
~~Dichlorodifluoromethane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Chloromethane~~	~~ND~~	~~0.0043~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Vinyl Chloride~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Bromomethane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Chloroethane~~	~~ND~~	~~0.0043~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Trichlorofluoromethane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,1-Dichloroethene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Acetone~~	~~ND~~	~~0.0043~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Iodomethane~~	~~ND~~	~~0.0043~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Carbon Disulfide~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Methylene Chloride~~	~~ND~~	~~0.0043~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~(trans) 1,2-Dichloroethene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Methyl t-Butyl Ether~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,1-Dichloroethane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Vinyl Acetate~~	~~ND~~	~~0.0043~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~2,2-Dichloropropane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~(cis) 1,2-Dichloroethene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~2-Butanone~~	~~ND~~	~~0.0043~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Bromochloromethane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Chloroform~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,1,1-Trichloroethane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Carbon Tetrachloride~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,1-Dichloropropene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Benzene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2-Dichloroethane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Trichloroethene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2-Dichloropropane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Dibromomethane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Bromodichloromethane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~2-Chloroethyl Vinyl Ether~~	~~ND~~	~~0.0043~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~(cis) 1,3-Dichloropropene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Methyl Isobutyl Ketone~~	~~ND~~	~~0.0043~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Toluene~~	~~ND~~	~~0.0085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~(trans) 1,3-Dichloropropene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 2 of 2

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	Date ~~Prepared~~	Date ~~Analyzed~~	~~Flags~~
~~**Client ID:**~~	~~**1G-B2-2-3**~~					
~~Laboratory ID:~~	~~06-086-08~~					
~~1,1,2-Trichloroethane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Tetrachloroethene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,3-Dichloropropane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~2-Hexanone~~	~~ND~~	~~0.0043~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Dibromochloromethane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2-Dibromoethane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Chlorobenzene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,1,1,2-Tetrachloroethane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Ethylbenzene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~m,p-Xylene~~	~~ND~~	~~0.0017~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~o-Xylene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Styrene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Bromoform~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Isopropylbenzene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Bromobenzene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,1,2,2-Tetrachloroethane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2,3-Trichloropropane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~n-Propylbenzene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~2-Chlorotoluene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~4-Chlorotoluene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,3,5-Trimethylbenzene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~tert-Butylbenzene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2,4-Trimethylbenzene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~sec-Butylbenzene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,3-Dichlorobenzene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~p-Isopropyltoluene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,4-Dichlorobenzene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2-Dichlorobenzene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~n-Butylbenzene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2-Dibromo-3-chloropropane~~	~~ND~~	~~0.0043~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2,4-Trichlorobenzene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Hexachlorobutadiene~~	~~ND~~	~~0.0043~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Naphthalene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2,3-Trichlorobenzene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~*Surrogate:*~~	~~*Percent Recovery*~~	~~*Control Limits*~~				
~~*Dibromofluoromethane*~~	~~*111*~~	~~*63-127*~~				
~~*Toluene-d8*~~	~~*109*~~	~~*65-129*~~				
~~*4-Bromofluorobenzene*~~	~~*110*~~	~~*52-125*~~				

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 1 of 2

~~Matrix: Soil~~
~~Units: mg/kg~~

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~Client ID:~~	**~~1G-B2-9-10~~**					
~~Laboratory ID:~~	~~06-086-09~~					
~~Dichlorodifluoromethane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Chloromethane~~	~~ND~~	~~0.0043~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Vinyl Chloride~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Bromomethane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Chloroethane~~	~~ND~~	~~0.0043~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Trichlorofluoromethane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,1-Dichloroethene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Acetone~~	~~ND~~	~~0.0043~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Iodomethane~~	~~ND~~	~~0.0043~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Carbon Disulfide~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Methylene Chloride~~	~~ND~~	~~0.0043~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~(trans) 1,2-Dichloroethene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Methyl t-Butyl Ether~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,1-Dichloroethane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Vinyl Acetate~~	~~ND~~	~~0.0043~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~2,2-Dichloropropane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~(cis) 1,2-Dichloroethene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~2-Butanone~~	~~ND~~	~~0.0043~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Bromochloromethane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Chloroform~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,1,1-Trichloroethane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Carbon Tetrachloride~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,1-Dichloropropene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Benzene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2-Dichloroethane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Trichloroethene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2-Dichloropropane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Dibromomethane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Bromodichloromethane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~2-Chloroethyl Vinyl Ether~~	~~ND~~	~~0.0043~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~(cis) 1,3-Dichloropropene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Methyl Isobutyl Ketone~~	~~ND~~	~~0.0043~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Toluene~~	~~ND~~	~~0.0085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~(trans) 1,3-Dichloropropene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 2 of 2

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	Date ~~Prepared~~	Date ~~Analyzed~~	~~Flags~~
~~**Client ID:**~~	~~**1G-B2-9-10**~~					
~~Laboratory ID:~~	~~06-086-09~~					
~~1,1,2-Trichloroethane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Tetrachloroethene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,3-Dichloropropane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~2-Hexanone~~	~~ND~~	~~0.0043~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Dibromochloromethane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2-Dibromoethane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Chlorobenzene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,1,1,2-Tetrachloroethane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Ethylbenzene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~m,p-Xylene~~	~~ND~~	~~0.0017~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~o-Xylene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Styrene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Bromoform~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Isopropylbenzene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Bromobenzene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,1,2,2-Tetrachloroethane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2,3-Trichloropropane~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~n-Propylbenzene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~2-Chlorotoluene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~4-Chlorotoluene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,3,5-Trimethylbenzene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~tert-Butylbenzene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2,4-Trimethylbenzene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~sec-Butylbenzene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,3-Dichlorobenzene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~p-Isopropyltoluene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,4-Dichlorobenzene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2-Dichlorobenzene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~n-Butylbenzene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2-Dibromo-3-chloropropane~~	~~ND~~	~~0.0043~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2,4-Trichlorobenzene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Hexachlorobutadiene~~	~~ND~~	~~0.0043~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Naphthalene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2,3-Trichlorobenzene~~	~~ND~~	~~0.00085~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~*Surrogate:*~~	~~*Percent Recovery*~~	~~*Control Limits*~~				
~~*Dibromofluoromethane*~~	~~*108*~~	~~*63-127*~~				
~~*Toluene-d8*~~	~~*107*~~	~~*65-129*~~				
~~*4-Bromofluorobenzene*~~	~~*102*~~	~~*52-125*~~				

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 1 of 2

~~Matrix: Soil~~
~~Units: mg/kg~~

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~Client ID:~~	~~1G-B1-2-3~~					
~~Laboratory ID:~~	~~06-086-10~~					
~~Dichlorodifluoromethane~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Chloromethane~~	~~ND~~	~~0.0040~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Vinyl Chloride~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Bromomethane~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Chloroethane~~	~~ND~~	~~0.0040~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Trichlorofluoromethane~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,1-Dichloroethene~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Acetone~~	~~ND~~	~~0.0040~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Iodomethane~~	~~ND~~	~~0.0040~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Carbon Disulfide~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Methylene Chloride~~	~~ND~~	~~0.0040~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~(trans) 1,2-Dichloroethene~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Methyl t-Butyl Ether~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,1-Dichloroethane~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Vinyl Acetate~~	~~ND~~	~~0.0040~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~2,2-Dichloropropane~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~(cis) 1,2-Dichloroethene~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~2-Butanone~~	~~ND~~	~~0.0040~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Bromochloromethane~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Chloroform~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,1,1-Trichloroethane~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Carbon Tetrachloride~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,1-Dichloropropene~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Benzene~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2-Dichloroethane~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Trichloroethene~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2-Dichloropropane~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Dibromomethane~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Bromodichloromethane~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~2-Chloroethyl Vinyl Ether~~	~~ND~~	~~0.0040~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~(cis) 1,3-Dichloropropene~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Methyl Isobutyl Ketone~~	~~ND~~	~~0.0040~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Toluene~~	~~ND~~	~~0.0081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~(trans) 1,3-Dichloropropene~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 2 of 2

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	Date ~~Prepared~~	Date ~~Analyzed~~	~~Flags~~
~~Client ID:~~	~~1G-B1-2-3~~					
~~Laboratory ID:~~	~~06-086-10~~					
~~1,1,2-Trichloroethane~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Tetrachloroethene~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,3-Dichloropropane~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~2-Hexanone~~	~~ND~~	~~0.0040~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Dibromochloromethane~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2-Dibromoethane~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Chlorobenzene~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,1,1,2-Tetrachloroethane~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Ethylbenzene~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~m,p-Xylene~~	~~ND~~	~~0.0016~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~o-Xylene~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Styrene~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Bromoform~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Isopropylbenzene~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Bromobenzene~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,1,2,2-Tetrachloroethane~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2,3-Trichloropropane~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~n-Propylbenzene~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~2-Chlorotoluene~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~4-Chlorotoluene~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,3,5-Trimethylbenzene~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~tert-Butylbenzene~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2,4-Trimethylbenzene~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~sec-Butylbenzene~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,3-Dichlorobenzene~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~p-Isopropyltoluene~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,4-Dichlorobenzene~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2-Dichlorobenzene~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~n-Butylbenzene~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2-Dibromo-3-chloropropane~~	~~ND~~	~~0.0040~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2,4-Trichlorobenzene~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Hexachlorobutadiene~~	~~ND~~	~~0.0040~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Naphthalene~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~1,2,3-Trichlorobenzene~~	~~ND~~	~~0.00081~~	~~EPA 8260C~~	~~6-12-13~~	~~6-12-13~~	
~~Surrogate:~~	*~~Percent Recovery~~*	*~~Control Limits~~*				
Dibromofluoromethane	*107*	*63-127*				
Toluene-d8	*106*	*65-129*				
4-Bromofluorobenzene	*105*	*52-125*				

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 1 of 2

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TRIP 130610-1**					
Laboratory ID:	06-086-12					
Dichlorodifluoromethane	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Chloromethane	ND	1.0	EPA 8260C	6-21-13	6-21-13	
Vinyl Chloride	ND	0.10	EPA 8260C	6-21-13	6-21-13	
Bromomethane	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Chloroethane	ND	1.0	EPA 8260C	6-21-13	6-21-13	
Trichlorofluoromethane	ND	0.26	EPA 8260C	6-21-13	6-21-13	
1,1-Dichloroethene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Acetone	ND	7.6	EPA 8260C	6-21-13	6-21-13	
Iodomethane	ND	1.0	EPA 8260C	6-21-13	6-21-13	
Carbon Disulfide	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Methylene Chloride	ND	1.0	EPA 8260C	6-21-13	6-21-13	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Methyl t-Butyl Ether	ND	0.27	EPA 8260C	6-21-13	6-21-13	
1,1-Dichloroethane	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Vinyl Acetate	ND	1.0	EPA 8260C	6-21-13	6-21-13	
2,2-Dichloropropane	ND	0.20	EPA 8260C	6-21-13	6-21-13	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
2-Butanone	ND	6.8	EPA 8260C	6-21-13	6-21-13	
Bromochloromethane	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Chloroform	ND	0.20	EPA 8260C	6-21-13	6-21-13	
1,1,1-Trichloroethane	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Carbon Tetrachloride	ND	0.20	EPA 8260C	6-21-13	6-21-13	
1,1-Dichloropropene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Benzene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
1,2-Dichloroethane	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Trichloroethene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
1,2-Dichloropropane	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Dibromomethane	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Bromodichloromethane	ND	0.20	EPA 8260C	6-21-13	6-21-13	
2-Chloroethyl Vinyl Ether	ND	1.0	EPA 8260C	6-21-13	6-21-13	
(cis) 1,3-Dichloropropene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Methyl Isobutyl Ketone	ND	2.6	EPA 8260C	6-21-13	6-21-13	
Toluene	ND	1.0	EPA 8260C	6-21-13	6-21-13	
(trans) 1,3-Dichloropropene	ND	0.20	EPA 8260C	6-21-13	6-21-13	

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TRIP 130610-1**					
Laboratory ID:	06-086-12					
1,1,2-Trichloroethane	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Tetrachloroethene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
1,3-Dichloropropane	ND	0.20	EPA 8260C	6-21-13	6-21-13	
2-Hexanone	ND	2.6	EPA 8260C	6-21-13	6-21-13	
Dibromochloromethane	ND	0.20	EPA 8260C	6-21-13	6-21-13	
1,2-Dibromoethane	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Chlorobenzene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
1,1,1,2-Tetrachloroethane	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Ethylbenzene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
m,p-Xylene	ND	0.40	EPA 8260C	6-21-13	6-21-13	
o-Xylene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Styrene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Bromoform	ND	1.0	EPA 8260C	6-21-13	6-21-13	
Isopropylbenzene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Bromobenzene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
1,1,2,2-Tetrachloroethane	ND	0.20	EPA 8260C	6-21-13	6-21-13	
1,2,3-Trichloropropane	ND	0.26	EPA 8260C	6-21-13	6-21-13	
n-Propylbenzene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
2-Chlorotoluene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
4-Chlorotoluene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
1,3,5-Trimethylbenzene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
tert-Butylbenzene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
1,2,4-Trimethylbenzene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
sec-Butylbenzene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
1,3-Dichlorobenzene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
p-Isopropyltoluene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
1,4-Dichlorobenzene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
1,2-Dichlorobenzene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
n-Butylbenzene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
1,2-Dibromo-3-chloropropane	ND	1.3	EPA 8260C	6-21-13	6-21-13	
1,2,4-Trichlorobenzene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Hexachlorobutadiene	ND	0.25	EPA 8260C	6-21-13	6-21-13	
Naphthalene	ND	1.5	EPA 8260C	6-21-13	6-21-13	
1,2,3-Trichlorobenzene	ND	0.29	EPA 8260C	6-21-13	6-21-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*84*	*62-122*				
Toluene-d8	*94*	*70-120*				
4-Bromofluorobenzene	*91*	*71-120*				

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

VOLATILES by EPA 8260C
page 1 of 2

Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**1H-B2-9-10**					
Laboratory ID:	06-086-04					
Dichlorodifluoromethane	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
Chloromethane	ND	0.0048	EPA 8260C	6-24-13	6-24-13	
Vinyl Chloride	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
Bromomethane	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
Chloroethane	ND	0.0048	EPA 8260C	6-24-13	6-24-13	
Trichlorofluoromethane	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
1,1-Dichloroethene	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
Acetone	ND	0.0048	EPA 8260C	6-24-13	6-24-13	
Iodomethane	ND	0.0048	EPA 8260C	6-24-13	6-24-13	
Carbon Disulfide	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
Methylene Chloride	ND	0.0048	EPA 8260C	6-24-13	6-24-13	
(trans) 1,2-Dichloroethene	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
Methyl t-Butyl Ether	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
1,1-Dichloroethane	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
Vinyl Acetate	ND	0.0048	EPA 8260C	6-24-13	6-24-13	
2,2-Dichloropropane	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
(cis) 1,2-Dichloroethene	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
2-Butanone	ND	0.0048	EPA 8260C	6-24-13	6-24-13	
Bromochloromethane	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
Chloroform	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
1,1,1-Trichloroethane	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
Carbon Tetrachloride	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
1,1-Dichloropropene	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
Benzene	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
1,2-Dichloroethane	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
Trichloroethene	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
1,2-Dichloropropane	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
Dibromomethane	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
Bromodichloromethane	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
2-Chloroethyl Vinyl Ether	ND	0.0048	EPA 8260C	6-24-13	6-24-13	
(cis) 1,3-Dichloropropene	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
Methyl Isobutyl Ketone	ND	0.0048	EPA 8260C	6-24-13	6-24-13	
Toluene	ND	0.0096	EPA 8260C	6-24-13	6-24-13	
(trans) 1,3-Dichloropropene	ND	0.00096	EPA 8260C	6-24-13	6-24-13	

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

VOLATILES by EPA 8260C
page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**1H-B2-9-10**					
Laboratory ID:	06-086-04					
1,1,2-Trichloroethane	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
Tetrachloroethene	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
1,3-Dichloropropane	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
2-Hexanone	ND	0.0048	EPA 8260C	6-24-13	6-24-13	
Dibromochloromethane	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
1,2-Dibromoethane	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
Chlorobenzene	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
1,1,1,2-Tetrachloroethane	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
Ethylbenzene	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
m,p-Xylene	ND	0.0019	EPA 8260C	6-24-13	6-24-13	
o-Xylene	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
Styrene	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
Bromoform	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
Isopropylbenzene	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
Bromobenzene	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
1,1,2,2-Tetrachloroethane	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
1,2,3-Trichloropropane	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
n-Propylbenzene	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
2-Chlorotoluene	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
4-Chlorotoluene	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
1,3,5-Trimethylbenzene	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
tert-Butylbenzene	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
1,2,4-Trimethylbenzene	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
sec-Butylbenzene	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
1,3-Dichlorobenzene	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
p-Isopropyltoluene	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
1,4-Dichlorobenzene	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
1,2-Dichlorobenzene	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
n-Butylbenzene	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
1,2-Dibromo-3-chloropropane	ND	0.0048	EPA 8260C	6-24-13	6-24-13	
1,2,4-Trichlorobenzene	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
Hexachlorobutadiene	ND	0.0048	EPA 8260C	6-24-13	6-24-13	
Naphthalene	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
1,2,3-Trichlorobenzene	ND	0.00096	EPA 8260C	6-24-13	6-24-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*103*	*65-129*				
Toluene-d8	*102*	*77-122*				
4-Bromofluorobenzene	*95*	*73-124*				

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

VOLATILES by EPA 8260C
page 1 of 2

Matrix: Soil
Units: mg/kg

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	Date ~~Prepared~~	Date ~~Analyzed~~	~~Flags~~
~~**Client ID:**~~	~~**1G-B1-7-8**~~					
~~Laboratory ID:~~	~~06-086-11~~					
~~Dichlorodifluoromethane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~Chloromethane~~	~~ND~~	~~0.0044~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~Vinyl Chloride~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~Bromomethane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~Chloroethane~~	~~ND~~	~~0.0044~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~Trichlorofluoromethane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~1,1-Dichloroethene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~Acetone~~	~~ND~~	~~0.0044~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~Iodomethane~~	~~ND~~	~~0.0044~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~Carbon Disulfide~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~Methylene Chloride~~	~~ND~~	~~0.0044~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~(trans) 1,2-Dichloroethene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~Methyl t-Butyl Ether~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~1,1-Dichloroethane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~Vinyl Acetate~~	~~ND~~	~~0.0044~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~2,2-Dichloropropane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~(cis) 1,2-Dichloroethene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~2-Butanone~~	~~ND~~	~~0.0044~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~Bromochloromethane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~Chloroform~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~1,1,1-Trichloroethane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~Carbon Tetrachloride~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~1,1-Dichloropropene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~Benzene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~1,2-Dichloroethane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~Trichloroethene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~1,2-Dichloropropane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~Dibromomethane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~Bromodichloromethane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~2-Chloroethyl Vinyl Ether~~	~~ND~~	~~0.0044~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~(cis) 1,3-Dichloropropene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~Methyl Isobutyl Ketone~~	~~ND~~	~~0.0044~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~Toluene~~	~~ND~~	~~0.0088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~(trans) 1,3-Dichloropropene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

VOLATILES by EPA 8260C
page 2 of 2

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	Date ~~Prepared~~	Date ~~Analyzed~~	~~Flags~~
~~Client ID:~~	~~1G-B1-7-8~~					
~~Laboratory ID:~~	~~06-086-11~~					
~~1,1,2-Trichloroethane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~Tetrachloroethene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~1,3-Dichloropropane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~2-Hexanone~~	~~ND~~	~~0.0044~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~Dibromochloromethane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~1,2-Dibromoethane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~Chlorobenzene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~1,1,1,2-Tetrachloroethane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~Ethylbenzene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~m,p-Xylene~~	~~ND~~	~~0.0018~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~o-Xylene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~Styrene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~Bromoform~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~Isopropylbenzene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~Bromobenzene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~1,1,2,2-Tetrachloroethane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~1,2,3-Trichloropropane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~n-Propylbenzene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~2-Chlorotoluene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~4-Chlorotoluene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~1,3,5-Trimethylbenzene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~tert-Butylbenzene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~1,2,4-Trimethylbenzene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~sec-Butylbenzene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~1,3-Dichlorobenzene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~p-Isopropyltoluene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~1,4-Dichlorobenzene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~1,2-Dichlorobenzene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~n-Butylbenzene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~1,2-Dibromo-3-chloropropane~~	~~ND~~	~~0.0044~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~1,2,4-Trichlorobenzene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~Hexachlorobutadiene~~	~~ND~~	~~0.0044~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~Naphthalene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~1,2,3-Trichlorobenzene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-24-13~~	~~6-24-13~~	
~~Surrogate:~~	*~~Percent Recovery~~*	*~~Control Limits~~*				
~~Dibromofluoromethane~~	*~~114~~*	*~~65-129~~*				
~~Toluene-d8~~	*~~112~~*	*~~77-122~~*				
~~4-Bromofluorobenzene~~	*~~113~~*	*~~73-124~~*				

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

PAHs by EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**1H-B1-4-5**					
Laboratory ID:	06-086-01					
Naphthalene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
2-Methylnaphthalene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
1-Methylnaphthalene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
Acenaphthylene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
Acenaphthene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
Fluorene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
Phenanthrene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
Anthracene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
Fluoranthene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
Pyrene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
Benzo[a]anthracene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
Chrysene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
Benzo[b]fluoranthene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
Benzo(j,k)fluoranthene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
Benzo[a]pyrene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
Dibenz[a,h]anthracene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
Benzo[g,h,i]perylene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*63*	*43 - 116*				
Pyrene-d10	*64*	*33 - 124*				
Terphenyl-d14	*63*	*38 - 125*				

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

PAHs by EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**1H-B1-9-9.5**					
Laboratory ID:	06-086-02					
Naphthalene	**ND**	0.0073	EPA 8270D/SIM	6-14-13	6-17-13	
2-Methylnaphthalene	**ND**	0.0073	EPA 8270D/SIM	6-14-13	6-17-13	
1-Methylnaphthalene	**ND**	0.0073	EPA 8270D/SIM	6-14-13	6-17-13	
Acenaphthylene	**ND**	0.0073	EPA 8270D/SIM	6-14-13	6-17-13	
Acenaphthene	**ND**	0.0073	EPA 8270D/SIM	6-14-13	6-17-13	
Fluorene	**ND**	0.0073	EPA 8270D/SIM	6-14-13	6-17-13	
Phenanthrene	**ND**	0.0073	EPA 8270D/SIM	6-14-13	6-17-13	
Anthracene	**ND**	0.0073	EPA 8270D/SIM	6-14-13	6-17-13	
Fluoranthene	**ND**	0.0073	EPA 8270D/SIM	6-14-13	6-17-13	
Pyrene	**ND**	0.0073	EPA 8270D/SIM	6-14-13	6-17-13	
Benzo[a]anthracene	**ND**	0.0073	EPA 8270D/SIM	6-14-13	6-17-13	
Chrysene	**ND**	0.0073	EPA 8270D/SIM	6-14-13	6-17-13	
Benzo[b]fluoranthene	**ND**	0.0073	EPA 8270D/SIM	6-14-13	6-17-13	
Benzo(j,k)fluoranthene	**ND**	0.0073	EPA 8270D/SIM	6-14-13	6-17-13	
Benzo[a]pyrene	**ND**	0.0073	EPA 8270D/SIM	6-14-13	6-17-13	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0073	EPA 8270D/SIM	6-14-13	6-17-13	
Dibenz[a,h]anthracene	**ND**	0.0073	EPA 8270D/SIM	6-14-13	6-17-13	
Benzo[g,h,i]perylene	**ND**	0.0073	EPA 8270D/SIM	6-14-13	6-17-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*57*	*43 - 116*				
Pyrene-d10	*60*	*33 - 124*				
Terphenyl-d14	*58*	*38 - 125*				

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

PAHs by EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**1H-B2-7-7.5**					
Laboratory ID:	06-086-03					
Naphthalene	**ND**	0.0085	EPA 8270D/SIM	6-14-13	6-17-13	
2-Methylnaphthalene	**ND**	0.0085	EPA 8270D/SIM	6-14-13	6-17-13	
1-Methylnaphthalene	**ND**	0.0085	EPA 8270D/SIM	6-14-13	6-17-13	
Acenaphthylene	**ND**	0.0085	EPA 8270D/SIM	6-14-13	6-17-13	
Acenaphthene	**ND**	0.0085	EPA 8270D/SIM	6-14-13	6-17-13	
Fluorene	**ND**	0.0085	EPA 8270D/SIM	6-14-13	6-17-13	
Phenanthrene	**ND**	0.0085	EPA 8270D/SIM	6-14-13	6-17-13	
Anthracene	**ND**	0.0085	EPA 8270D/SIM	6-14-13	6-17-13	
Fluoranthene	**ND**	0.0085	EPA 8270D/SIM	6-14-13	6-17-13	
Pyrene	**ND**	0.0085	EPA 8270D/SIM	6-14-13	6-17-13	
Benzo[a]anthracene	**ND**	0.0085	EPA 8270D/SIM	6-14-13	6-17-13	
Chrysene	**ND**	0.0085	EPA 8270D/SIM	6-14-13	6-17-13	
Benzo[b]fluoranthene	**ND**	0.0085	EPA 8270D/SIM	6-14-13	6-17-13	
Benzo(j,k)fluoranthene	**ND**	0.0085	EPA 8270D/SIM	6-14-13	6-17-13	
Benzo[a]pyrene	**ND**	0.0085	EPA 8270D/SIM	6-14-13	6-17-13	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0085	EPA 8270D/SIM	6-14-13	6-17-13	
Dibenz[a,h]anthracene	**ND**	0.0085	EPA 8270D/SIM	6-14-13	6-17-13	
Benzo[g,h,i]perylene	**ND**	0.0085	EPA 8270D/SIM	6-14-13	6-17-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*55*	*43 - 116*				
Pyrene-d10	*53*	*33 - 124*				
Terphenyl-d14	*53*	*38 - 125*				

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

PAHs by EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**1H-B3-4-5**					
Laboratory ID:	06-086-05					
Naphthalene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
2-Methylnaphthalene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
1-Methylnaphthalene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
Acenaphthylene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
Acenaphthene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
Fluorene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
Phenanthrene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
Anthracene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
Fluoranthene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
Pyrene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
Benzo[a]anthracene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
Chrysene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
Benzo[b]fluoranthene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
Benzo(j,k)fluoranthene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
Benzo[a]pyrene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
Dibenz[a,h]anthracene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
Benzo[g,h,i]perylene	**ND**	0.0072	EPA 8270D/SIM	6-14-13	6-17-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*68*	*43 - 116*				
Pyrene-d10	*71*	*33 - 124*				
Terphenyl-d14	*70*	*38 - 125*				

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

PAHs by EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**1H-B3-7-8**					
Laboratory ID:	06-086-06					
Naphthalene	**ND**	0.0074	EPA 8270D/SIM	6-14-13	6-17-13	
2-Methylnaphthalene	**ND**	0.0074	EPA 8270D/SIM	6-14-13	6-17-13	
1-Methylnaphthalene	**ND**	0.0074	EPA 8270D/SIM	6-14-13	6-17-13	
Acenaphthylene	**ND**	0.0074	EPA 8270D/SIM	6-14-13	6-17-13	
Acenaphthene	**ND**	0.0074	EPA 8270D/SIM	6-14-13	6-17-13	
Fluorene	**ND**	0.0074	EPA 8270D/SIM	6-14-13	6-17-13	
Phenanthrene	**ND**	0.0074	EPA 8270D/SIM	6-14-13	6-17-13	
Anthracene	**ND**	0.0074	EPA 8270D/SIM	6-14-13	6-17-13	
Fluoranthene	**ND**	0.0074	EPA 8270D/SIM	6-14-13	6-17-13	
Pyrene	**ND**	0.0074	EPA 8270D/SIM	6-14-13	6-17-13	
Benzo[a]anthracene	**ND**	0.0074	EPA 8270D/SIM	6-14-13	6-17-13	
Chrysene	**ND**	0.0074	EPA 8270D/SIM	6-14-13	6-17-13	
Benzo[b]fluoranthene	**ND**	0.0074	EPA 8270D/SIM	6-14-13	6-17-13	
Benzo(j,k)fluoranthene	**ND**	0.0074	EPA 8270D/SIM	6-14-13	6-17-13	
Benzo[a]pyrene	**ND**	0.0074	EPA 8270D/SIM	6-14-13	6-17-13	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0074	EPA 8270D/SIM	6-14-13	6-17-13	
Dibenz[a,h]anthracene	**ND**	0.0074	EPA 8270D/SIM	6-14-13	6-17-13	
Benzo[g,h,i]perylene	**ND**	0.0074	EPA 8270D/SIM	6-14-13	6-17-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*59*	*43 - 116*				
Pyrene-d10	*63*	*33 - 124*				
Terphenyl-d14	*61*	*38 - 125*				

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

PAHs by EPA 8270D/SIM

Matrix: Soil
~~Units: mg/Kg~~

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~Client ID:~~	**~~1G-B3-2-3~~**					
~~Laboratory ID:~~	~~06-086-07~~					
~~Naphthalene~~	**~~ND~~**	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~2-Methylnaphthalene~~	**~~ND~~**	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~1-Methylnaphthalene~~	**~~ND~~**	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Acenaphthylene~~	**~~ND~~**	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Acenaphthene~~	**~~ND~~**	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Fluorene~~	**~~ND~~**	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Phenanthrene~~	**~~ND~~**	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Anthracene~~	**~~ND~~**	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Fluoranthene~~	**~~ND~~**	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Pyrene~~	**~~ND~~**	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Benzo[a]anthracene~~	**~~ND~~**	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Chrysene~~	**~~ND~~**	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Benzo[b]fluoranthene~~	**~~ND~~**	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Benzo(j,k)fluoranthene~~	**~~ND~~**	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Benzo[a]pyrene~~	**~~ND~~**	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Indeno(1,2,3-c,d)pyrene~~	**~~ND~~**	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Dibenz[a,h]anthracene~~	**~~ND~~**	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Benzo[g,h,i]perylene~~	**~~ND~~**	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Surrogate:~~	*~~Percent Recovery~~*	*~~Control Limits~~*				
~~2-Fluorobiphenyl~~	*~~65~~*	*~~43 - 116~~*				
~~Pyrene-d10~~	*~~66~~*	*~~33 - 124~~*				
~~Terphenyl-d14~~	*~~64~~*	*~~38 - 125~~*				

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

PAHs by EPA 8270D/SIM

~~Matrix: Soil~~
~~Units: mg/Kg~~

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~Client ID:~~	~~1G-B2-2-3~~					
~~Laboratory ID:~~	~~06-086-08~~					
~~Naphthalene~~	~~ND~~	~~0.0076~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~2-Methylnaphthalene~~	~~ND~~	~~0.0076~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~1-Methylnaphthalene~~	~~ND~~	~~0.0076~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Acenaphthylene~~	~~ND~~	~~0.0076~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Acenaphthene~~	~~ND~~	~~0.0076~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Fluorene~~	~~ND~~	~~0.0076~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Phenanthrene~~	~~ND~~	~~0.0076~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Anthracene~~	~~ND~~	~~0.0076~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Fluoranthene~~	~~ND~~	~~0.0076~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Pyrene~~	~~ND~~	~~0.0076~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Benzo[a]anthracene~~	~~ND~~	~~0.0076~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Chrysene~~	~~ND~~	~~0.0076~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Benzo[b]fluoranthene~~	~~ND~~	~~0.0076~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Benzo(j,k)fluoranthene~~	~~ND~~	~~0.0076~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Benzo[a]pyrene~~	~~ND~~	~~0.0076~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Indeno(1,2,3-c,d)pyrene~~	~~ND~~	~~0.0076~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Dibenz[a,h]anthracene~~	~~ND~~	~~0.0076~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Benzo[g,h,i]perylene~~	~~ND~~	~~0.0076~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~*Surrogate:*~~	~~*Percent Recovery*~~	~~*Control Limits*~~				
~~*2-Fluorobiphenyl*~~	~~*63*~~	~~*43 - 116*~~				
~~*Pyrene-d10*~~	~~*66*~~	~~*33 - 124*~~				
~~*Terphenyl-d14*~~	~~*65*~~	~~*38 - 125*~~				

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

PAHs by EPA 8270D/SIM

~~Matrix: Soil~~
~~Units: mg/Kg~~

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~Client ID:~~	~~1G-B2-9-10~~					
~~Laboratory ID:~~	~~06-086-09~~					
~~Naphthalene~~	~~ND~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~2-Methylnaphthalene~~	~~ND~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~1-Methylnaphthalene~~	~~ND~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Acenaphthylene~~	~~ND~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Acenaphthene~~	~~ND~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Fluorene~~	~~ND~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Phenanthrene~~	~~ND~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Anthracene~~	~~ND~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Fluoranthene~~	~~ND~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Pyrene~~	~~ND~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Benzo[a]anthracene~~	~~ND~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Chrysene~~	~~ND~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Benzo[b]fluoranthene~~	~~ND~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Benzo(j,k)fluoranthene~~	~~ND~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Benzo[a]pyrene~~	~~ND~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Indeno(1,2,3-c,d)pyrene~~	~~ND~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Dibenz[a,h]anthracene~~	~~ND~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Benzo[g,h,i]perylene~~	~~ND~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-17-13~~	
~~Surrogate:~~	*~~Percent Recovery~~*	*~~Control Limits~~*				
~~2-Fluorobiphenyl~~	*~~60~~*	*~~43 - 116~~*				
~~Pyrene-d10~~	*~~64~~*	*~~33 - 124~~*				
~~Terphenyl-d14~~	*~~62~~*	*~~38 - 125~~*				

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

PAHs by EPA 8270D/SIM

~~Matrix: Soil~~
~~Units: mg/Kg~~

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~Client ID:~~	~~1G-B1-2-3~~					
~~Laboratory ID:~~	~~06-086-10~~					
~~Naphthalene~~	~~ND~~	~~0.0073~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-18-13~~	
~~2-Methylnaphthalene~~	~~ND~~	~~0.0073~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-18-13~~	
~~1-Methylnaphthalene~~	~~ND~~	~~0.0073~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-18-13~~	
~~Acenaphthylene~~	~~ND~~	~~0.0073~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-18-13~~	
~~Acenaphthene~~	~~ND~~	~~0.0073~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-18-13~~	
~~Fluorene~~	~~ND~~	~~0.0073~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-18-13~~	
~~Phenanthrene~~	~~ND~~	~~0.0073~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-18-13~~	
~~Anthracene~~	~~ND~~	~~0.0073~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-18-13~~	
~~Fluoranthene~~	~~ND~~	~~0.0073~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-18-13~~	
~~Pyrene~~	~~ND~~	~~0.0073~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-18-13~~	
~~Benzo[a]anthracene~~	~~ND~~	~~0.0073~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-18-13~~	
~~Chrysene~~	~~ND~~	~~0.0073~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-18-13~~	
~~Benzo[b]fluoranthene~~	~~ND~~	~~0.0073~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-18-13~~	
~~Benzo(j,k)fluoranthene~~	~~ND~~	~~0.0073~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-18-13~~	
~~Benzo[a]pyrene~~	~~ND~~	~~0.0073~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-18-13~~	
~~Indeno(1,2,3-c,d)pyrene~~	~~ND~~	~~0.0073~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-18-13~~	
~~Dibenz[a,h]anthracene~~	~~ND~~	~~0.0073~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-18-13~~	
~~Benzo[g,h,i]perylene~~	~~ND~~	~~0.0073~~	~~EPA 8270D/SIM~~	~~6-14-13~~	~~6-18-13~~	
~~Surrogate:~~	*~~Percent Recovery~~*	*~~Control Limits~~*				
~~2-Fluorobiphenyl~~	*~~62~~*	*~~43 - 116~~*				
~~Pyrene-d10~~	*~~66~~*	*~~33 - 124~~*				
~~Terphenyl-d14~~	*~~66~~*	*~~38 - 125~~*				

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

TOTAL METALS
EPA 6010C/7471B

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	06-086-01					
Client ID:	**1H-B1-4-5**					
Arsenic	**ND**	11	6010C	6-12-13	6-13-13	
Barium	**37**	2.7	6010C	6-12-13	6-13-13	
Cadmium	**ND**	0.54	6010C	6-12-13	6-13-13	
Chromium	**49**	0.54	6010C	6-12-13	6-13-13	
Lead	**ND**	5.4	6010C	6-12-13	6-13-13	
Mercury	**ND**	0.27	7471B	6-13-13	6-13-13	
Selenium	**ND**	11	6010C	6-12-13	6-13-13	
Silver	**ND**	1.1	6010C	6-12-13	6-13-13	
Lab ID:	06-086-02					
Client ID:	**1H-B1-9-9.5**					
Arsenic	**ND**	11	6010C	6-12-13	6-13-13	
Barium	**39**	2.7	6010C	6-12-13	6-13-13	
Cadmium	**ND**	0.55	6010C	6-12-13	6-13-13	
Chromium	**21**	0.55	6010C	6-12-13	6-13-13	
Lead	**ND**	5.5	6010C	6-12-13	6-13-13	
Mercury	**ND**	0.27	7471B	6-13-13	6-13-13	
Selenium	**ND**	11	6010C	6-12-13	6-13-13	
Silver	**ND**	1.1	6010C	6-12-13	6-13-13	

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

TOTAL METALS
EPA 6010C/7471B

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	06-086-03					
Client ID:	**1H-B2-7-7.5**					
Arsenic	**ND**	13	6010C	6-12-13	6-13-13	
Barium	**89**	3.2	6010C	6-12-13	6-13-13	
Cadmium	**ND**	0.64	6010C	6-12-13	6-13-13	
Chromium	**52**	0.64	6010C	6-12-13	6-13-13	
Lead	**ND**	6.4	6010C	6-12-13	6-13-13	
Mercury	**ND**	0.32	7471B	6-13-13	6-13-13	
Selenium	**ND**	13	6010C	6-12-13	6-13-13	
Silver	**ND**	1.3	6010C	6-12-13	6-13-13	

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	06-086-05					
Client ID:	**1H-B3-4-5**					
Arsenic	**ND**	11	6010C	6-12-13	6-13-13	
Barium	**29**	2.7	6010C	6-12-13	6-13-13	
Cadmium	**ND**	0.54	6010C	6-12-13	6-13-13	
Chromium	**16**	0.54	6010C	6-12-13	6-13-13	
Lead	**ND**	5.4	6010C	6-12-13	6-13-13	
Mercury	**ND**	0.27	7471B	6-13-13	6-13-13	
Selenium	**ND**	11	6010C	6-12-13	6-13-13	
Silver	**ND**	1.1	6010C	6-12-13	6-13-13	

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

TOTAL METALS
EPA 6010C/7471B

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	06-086-06					
Client ID:	**1H-B3-7-8**					
Arsenic	**ND**	11	6010C	6-12-13	6-13-13	
Barium	**29**	2.8	6010C	6-12-13	6-13-13	
Cadmium	**ND**	0.56	6010C	6-12-13	6-13-13	
Chromium	**20**	0.56	6010C	6-12-13	6-13-13	
Lead	**ND**	5.6	6010C	6-12-13	6-13-13	
Mercury	**ND**	0.28	7471B	6-13-13	6-13-13	
Selenium	**ND**	11	6010C	6-12-13	6-13-13	
Silver	**ND**	1.1	6010C	6-12-13	6-13-13	

~~Lab ID:~~	~~06-086-07~~					
~~**Client ID:**~~	~~**1G-B3-2-3**~~					
~~Arsenic~~	~~**ND**~~	~~11~~	~~6010C~~	~~6-12-13~~	~~6-13-13~~	
~~Barium~~	~~**40**~~	~~2.8~~	~~6010C~~	~~6-12-13~~	~~6-13-13~~	
~~Cadmium~~	~~**ND**~~	~~0.56~~	~~6010C~~	~~6-12-13~~	~~6-13-13~~	
~~Chromium~~	~~**28**~~	~~0.56~~	~~6010C~~	~~6-12-13~~	~~6-13-13~~	
~~Lead~~	~~**ND**~~	~~5.6~~	~~6010C~~	~~6-12-13~~	~~6-13-13~~	
~~Mercury~~	~~**ND**~~	~~0.28~~	~~7471B~~	~~6-13-13~~	~~6-13-13~~	
~~Selenium~~	~~**ND**~~	~~11~~	~~6010C~~	~~6-12-13~~	~~6-13-13~~	
~~Silver~~	~~**ND**~~	~~1.1~~	~~6010C~~	~~6-12-13~~	~~6-13-13~~	

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

TOTAL METALS
EPA 6010C/7471B

~~Matrix:~~ ~~Soil~~
~~Units:~~ ~~mg/kg (ppm)~~

~~Analyte~~	~~Result~~	~~PQL~~	~~EPA Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~Lab ID:~~	~~06-086-08~~					
~~**Client ID:**~~	~~**1G-B2-2-3**~~					
~~Arsenic~~	~~**ND**~~	~~11~~	~~6010C~~	~~6-12-13~~	~~6-13-13~~	
~~Barium~~	~~**66**~~	~~2.8~~	~~6010C~~	~~6-12-13~~	~~6-13-13~~	
~~Cadmium~~	~~**ND**~~	~~0.57~~	~~6010C~~	~~6-12-13~~	~~6-13-13~~	
~~Chromium~~	~~**56**~~	~~0.57~~	~~6010C~~	~~6-12-13~~	~~6-13-13~~	
~~Lead~~	~~**ND**~~	~~5.7~~	~~6010C~~	~~6-12-13~~	~~6-13-13~~	
~~Mercury~~	~~**ND**~~	~~0.28~~	~~7471B~~	~~6-13-13~~	~~6-13-13~~	
~~Selenium~~	~~**ND**~~	~~11~~	~~6010C~~	~~6-12-13~~	~~6-13-13~~	
~~Silver~~	~~**ND**~~	~~1.1~~	~~6010C~~	~~6-12-13~~	~~6-13-13~~	

~~Lab ID:~~	~~06-086-09~~					
~~**Client ID:**~~	~~**1G-B2-9-10**~~					
~~Arsenic~~	~~**ND**~~	~~11~~	~~6010C~~	~~6-12-13~~	~~6-13-13~~	
~~Barium~~	~~**37**~~	~~2.8~~	~~6010C~~	~~6-12-13~~	~~6-13-13~~	
~~Cadmium~~	~~**ND**~~	~~0.55~~	~~6010C~~	~~6-12-13~~	~~6-13-13~~	
~~Chromium~~	~~**38**~~	~~0.55~~	~~6010C~~	~~6-12-13~~	~~6-13-13~~	
~~Lead~~	~~**ND**~~	~~5.5~~	~~6010C~~	~~6-12-13~~	~~6-13-13~~	
~~Mercury~~	~~**ND**~~	~~0.28~~	~~7471B~~	~~6-13-13~~	~~6-13-13~~	
~~Selenium~~	~~**ND**~~	~~11~~	~~6010C~~	~~6-12-13~~	~~6-13-13~~	
~~Silver~~	~~**ND**~~	~~1.1~~	~~6010C~~	~~6-12-13~~	~~6-13-13~~	

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

TOTAL METALS
EPA 6010C/7471B

~~Matrix:~~ ~~Soil~~
~~Units:~~ ~~mg/kg (ppm)~~

~~Analyte~~	~~Result~~	~~PQL~~	~~EPA Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~Lab ID:~~	~~06-086-10~~					
~~Client ID:~~	**~~1G-B1-2-3~~**					
~~Arsenic~~	**~~ND~~**	~~11~~	~~6010C~~	~~6-12-13~~	~~6-13-13~~	
~~Barium~~	**~~58~~**	~~2.7~~	~~6010C~~	~~6-12-13~~	~~6-13-13~~	
~~Cadmium~~	**~~ND~~**	~~0.55~~	~~6010C~~	~~6-12-13~~	~~6-13-13~~	
~~Chromium~~	**~~57~~**	~~0.55~~	~~6010C~~	~~6-12-13~~	~~6-13-13~~	
~~Lead~~	**~~ND~~**	~~5.5~~	~~6010C~~	~~6-12-13~~	~~6-13-13~~	
~~Mercury~~	**~~ND~~**	~~0.27~~	~~7471B~~	~~6-13-13~~	~~6-13-13~~	
~~Selenium~~	**~~ND~~**	~~11~~	~~6010C~~	~~6-12-13~~	~~6-13-13~~	
~~Silver~~	**~~ND~~**	~~1.1~~	~~6010C~~	~~6-12-13~~	~~6-13-13~~	

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

NWTPH-HCID
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0613S1					
Gasoline Range Organics	**ND**	20	NWTPH-HCID	6-13-13	6-13-13	
Diesel Range Organics	**ND**	50	NWTPH-HCID	6-13-13	6-13-13	
Lube Oil Range Organics	**ND**	100	NWTPH-HCID	6-13-13	6-13-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*104*	*50-150*				

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

VOLATILES by EPA 8260C
METHOD BLANK QUALITY CONTROL
Page 1 of 2

Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0612S1					
Dichlorodifluoromethane	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
Chloromethane	ND	0.0050	EPA 8260C	6-12-13	6-12-13	
Vinyl Chloride	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
Bromomethane	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
Chloroethane	ND	0.0050	EPA 8260C	6-12-13	6-12-13	
Trichlorofluoromethane	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
1,1-Dichloroethene	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
Acetone	ND	0.0050	EPA 8260C	6-12-13	6-12-13	
Iodomethane	ND	0.0050	EPA 8260C	6-12-13	6-12-13	
Carbon Disulfide	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
Methylene Chloride	ND	0.0050	EPA 8260C	6-12-13	6-12-13	
(trans) 1,2-Dichloroethene	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
Methyl t-Butyl Ether	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
1,1-Dichloroethane	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
Vinyl Acetate	ND	0.0050	EPA 8260C	6-12-13	6-12-13	
2,2-Dichloropropane	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
(cis) 1,2-Dichloroethene	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
2-Butanone	ND	0.0050	EPA 8260C	6-12-13	6-12-13	
Bromochloromethane	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
Chloroform	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
1,1,1-Trichloroethane	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
Carbon Tetrachloride	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
1,1-Dichloropropene	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
Benzene	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
1,2-Dichloroethane	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
Trichloroethene	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
1,2-Dichloropropane	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
Dibromomethane	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
Bromodichloromethane	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
2-Chloroethyl Vinyl Ether	ND	0.0050	EPA 8260C	6-12-13	6-12-13	
(cis) 1,3-Dichloropropene	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
Methyl Isobutyl Ketone	ND	0.0050	EPA 8260C	6-12-13	6-12-13	
Toluene	ND	0.010	EPA 8260C	6-12-13	6-12-13	
(trans) 1,3-Dichloropropene	ND	0.0010	EPA 8260C	6-12-13	6-12-13	

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

VOLATILES by EPA 8260C
METHOD BLANK QUALITY CONTROL
Page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0612S1					
1,1,2-Trichloroethane	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
Tetrachloroethene	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
1,3-Dichloropropane	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
2-Hexanone	ND	0.0050	EPA 8260C	6-12-13	6-12-13	
Dibromochloromethane	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
1,2-Dibromoethane	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
Chlorobenzene	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
1,1,1,2-Tetrachloroethane	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
Ethylbenzene	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
m,p-Xylene	ND	0.0020	EPA 8260C	6-12-13	6-12-13	
o-Xylene	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
Styrene	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
Bromoform	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
Isopropylbenzene	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
Bromobenzene	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
1,1,2,2-Tetrachloroethane	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
1,2,3-Trichloropropane	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
n-Propylbenzene	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
2-Chlorotoluene	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
4-Chlorotoluene	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
1,3,5-Trimethylbenzene	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
tert-Butylbenzene	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
1,2,4-Trimethylbenzene	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
sec-Butylbenzene	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
1,3-Dichlorobenzene	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
p-Isopropyltoluene	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
1,4-Dichlorobenzene	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
1,2-Dichlorobenzene	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
n-Butylbenzene	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
1,2-Dibromo-3-chloropropane	ND	0.0050	EPA 8260C	6-12-13	6-12-13	
1,2,4-Trichlorobenzene	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
Hexachlorobutadiene	ND	0.0050	EPA 8260C	6-12-13	6-12-13	
Naphthalene	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
1,2,3-Trichlorobenzene	ND	0.0010	EPA 8260C	6-12-13	6-12-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*113*	*63-127*				
Toluene-d8	*114*	*65-129*				
4-Bromofluorobenzene	*111*	*52-125*				

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

VOLATILES by EPA 8260C
SB/SBD QUALITY CONTROL

Matrix: Soil
Units: mg/kg

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS										
Laboratory ID:	SB0612S1									
	SB	SBD	SB	SBD	SB	SBD				
1,1-Dichloroethene	**0.0529**	**0.0542**	0.0500	0.0500	106	108	65-141	2	15	
Benzene	**0.0501**	**0.0519**	0.0500	0.0500	100	104	69-121	4	15	
Trichloroethene	**0.0498**	**0.0513**	0.0500	0.0500	100	103	75-120	3	15	
Toluene	**0.0507**	**0.0508**	0.0500	0.0500	101	102	75-120	0	15	
Chlorobenzene	**0.0516**	**0.0536**	0.0500	0.0500	103	107	75-120	4	15	
Surrogate:										
Dibromofluoromethane					*107*	*103*	*63-127*			
Toluene-d8					*107*	*102*	*65-129*			
4-Bromofluorobenzene					*103*	*101*	*52-125*			

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

VOLATILES by EPA 8260C
METHOD BLANK QUALITY CONTROL
Page 1 of 2

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0621W1					
Dichlorodifluoromethane	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Chloromethane	ND	1.0	EPA 8260C	6-21-13	6-21-13	
Vinyl Chloride	ND	0.10	EPA 8260C	6-21-13	6-21-13	
Bromomethane	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Chloroethane	ND	1.0	EPA 8260C	6-21-13	6-21-13	
Trichlorofluoromethane	ND	0.26	EPA 8260C	6-21-13	6-21-13	
1,1-Dichloroethene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Acetone	ND	7.6	EPA 8260C	6-21-13	6-21-13	
Iodomethane	ND	1.0	EPA 8260C	6-21-13	6-21-13	
Carbon Disulfide	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Methylene Chloride	ND	1.0	EPA 8260C	6-21-13	6-21-13	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Methyl t-Butyl Ether	ND	0.27	EPA 8260C	6-21-13	6-21-13	
1,1-Dichloroethane	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Vinyl Acetate	ND	1.0	EPA 8260C	6-21-13	6-21-13	
2,2-Dichloropropane	ND	0.20	EPA 8260C	6-21-13	6-21-13	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
2-Butanone	ND	6.8	EPA 8260C	6-21-13	6-21-13	
Bromochloromethane	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Chloroform	ND	0.20	EPA 8260C	6-21-13	6-21-13	
1,1,1-Trichloroethane	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Carbon Tetrachloride	ND	0.20	EPA 8260C	6-21-13	6-21-13	
1,1-Dichloropropene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Benzene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
1,2-Dichloroethane	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Trichloroethene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
1,2-Dichloropropane	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Dibromomethane	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Bromodichloromethane	ND	0.20	EPA 8260C	6-21-13	6-21-13	
2-Chloroethyl Vinyl Ether	ND	1.0	EPA 8260C	6-21-13	6-21-13	
(cis) 1,3-Dichloropropene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Methyl Isobutyl Ketone	ND	2.6	EPA 8260C	6-21-13	6-21-13	
Toluene	ND	1.0	EPA 8260C	6-21-13	6-21-13	
(trans) 1,3-Dichloropropene	ND	0.20	EPA 8260C	6-21-13	6-21-13	

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

VOLATILES by EPA 8260C
METHOD BLANK QUALITY CONTROL
Page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0621W1					
1,1,2-Trichloroethane	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Tetrachloroethene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
1,3-Dichloropropane	ND	0.20	EPA 8260C	6-21-13	6-21-13	
2-Hexanone	ND	2.6	EPA 8260C	6-21-13	6-21-13	
Dibromochloromethane	ND	0.20	EPA 8260C	6-21-13	6-21-13	
1,2-Dibromoethane	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Chlorobenzene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
1,1,1,2-Tetrachloroethane	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Ethylbenzene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
m,p-Xylene	ND	0.40	EPA 8260C	6-21-13	6-21-13	
o-Xylene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Styrene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Bromoform	ND	1.0	EPA 8260C	6-21-13	6-21-13	
Isopropylbenzene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Bromobenzene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
1,1,2,2-Tetrachloroethane	ND	0.20	EPA 8260C	6-21-13	6-21-13	
1,2,3-Trichloropropane	ND	0.26	EPA 8260C	6-21-13	6-21-13	
n-Propylbenzene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
2-Chlorotoluene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
4-Chlorotoluene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
1,3,5-Trimethylbenzene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
tert-Butylbenzene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
1,2,4-Trimethylbenzene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
sec-Butylbenzene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
1,3-Dichlorobenzene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
p-Isopropyltoluene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
1,4-Dichlorobenzene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
1,2-Dichlorobenzene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
n-Butylbenzene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
1,2-Dibromo-3-chloropropane	ND	1.3	EPA 8260C	6-21-13	6-21-13	
1,2,4-Trichlorobenzene	ND	0.20	EPA 8260C	6-21-13	6-21-13	
Hexachlorobutadiene	ND	0.25	EPA 8260C	6-21-13	6-21-13	
Naphthalene	ND	1.5	EPA 8260C	6-21-13	6-21-13	
1,2,3-Trichlorobenzene	ND	0.29	EPA 8260C	6-21-13	6-21-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*87*	*62-122*				
Toluene-d8	*96*	*70-120*				
4-Bromofluorobenzene	*93*	*71-120*				

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

VOLATILES by EPA 8260C
SB/SBD QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS										
Laboratory ID:	SB0621W1									
	SB	SBD	SB	SBD	SB	SBD				
1,1-Dichloroethene	**9.20**	**8.19**	10.0	10.0	92	82	63-142	12	17	
Benzene	**9.55**	**8.72**	10.0	10.0	96	87	78-125	9	15	
Trichloroethene	**9.12**	**8.18**	10.0	10.0	91	82	80-125	11	15	
Toluene	**10.0**	**9.04**	10.0	10.0	100	90	80-125	10	15	
Chlorobenzene	**11.2**	**10.3**	10.0	10.0	112	103	80-140	8	15	
Surrogate:										
Dibromofluoromethane					*85*	*85*	*62-122*			
Toluene-d8					*94*	*95*	*70-120*			
4-Bromofluorobenzene					*89*	*94*	*71-120*			

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

VOLATILES by EPA 8260C
METHOD BLANK QUALITY CONTROL
page 1 of 2

Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0624S1					
Dichlorodifluoromethane	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
Chloromethane	ND	0.0050	EPA 8260C	6-24-13	6-24-13	
Vinyl Chloride	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
Bromomethane	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
Chloroethane	ND	0.0050	EPA 8260C	6-24-13	6-24-13	
Trichlorofluoromethane	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
1,1-Dichloroethene	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
Acetone	ND	0.0050	EPA 8260C	6-24-13	6-24-13	
Iodomethane	ND	0.0050	EPA 8260C	6-24-13	6-24-13	
Carbon Disulfide	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
Methylene Chloride	ND	0.0050	EPA 8260C	6-24-13	6-24-13	
(trans) 1,2-Dichloroethene	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
Methyl t-Butyl Ether	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
1,1-Dichloroethane	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
Vinyl Acetate	ND	0.0050	EPA 8260C	6-24-13	6-24-13	
2,2-Dichloropropane	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
(cis) 1,2-Dichloroethene	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
2-Butanone	ND	0.0050	EPA 8260C	6-24-13	6-24-13	
Bromochloromethane	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
Chloroform	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
1,1,1-Trichloroethane	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
Carbon Tetrachloride	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
1,1-Dichloropropene	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
Benzene	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
1,2-Dichloroethane	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
Trichloroethene	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
1,2-Dichloropropane	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
Dibromomethane	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
Bromodichloromethane	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
2-Chloroethyl Vinyl Ether	ND	0.0050	EPA 8260C	6-24-13	6-24-13	
(cis) 1,3-Dichloropropene	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
Methyl Isobutyl Ketone	ND	0.0050	EPA 8260C	6-24-13	6-24-13	
Toluene	ND	0.010	EPA 8260C	6-24-13	6-24-13	
(trans) 1,3-Dichloropropene	ND	0.0010	EPA 8260C	6-24-13	6-24-13	

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

VOLATILES by EPA 8260C
METHOD BLANK QUALITY CONTROL
page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0624S1					
1,1,2-Trichloroethane	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
Tetrachloroethene	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
1,3-Dichloropropane	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
2-Hexanone	ND	0.0050	EPA 8260C	6-24-13	6-24-13	
Dibromochloromethane	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
1,2-Dibromoethane	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
Chlorobenzene	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
1,1,1,2-Tetrachloroethane	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
Ethylbenzene	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
m,p-Xylene	ND	0.0020	EPA 8260C	6-24-13	6-24-13	
o-Xylene	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
Styrene	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
Bromoform	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
Isopropylbenzene	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
Bromobenzene	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
1,1,2,2-Tetrachloroethane	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
1,2,3-Trichloropropane	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
n-Propylbenzene	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
2-Chlorotoluene	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
4-Chlorotoluene	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
1,3,5-Trimethylbenzene	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
tert-Butylbenzene	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
1,2,4-Trimethylbenzene	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
sec-Butylbenzene	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
1,3-Dichlorobenzene	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
p-Isopropyltoluene	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
1,4-Dichlorobenzene	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
1,2-Dichlorobenzene	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
n-Butylbenzene	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
1,2-Dibromo-3-chloropropane	ND	0.0050	EPA 8260C	6-24-13	6-24-13	
1,2,4-Trichlorobenzene	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
Hexachlorobutadiene	ND	0.0050	EPA 8260C	6-24-13	6-24-13	
Naphthalene	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
1,2,3-Trichlorobenzene	ND	0.0010	EPA 8260C	6-24-13	6-24-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*102*	*65-129*				
Toluene-d8	*104*	*77-122*				
4-Bromofluorobenzene	*100*	*73-124*				

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

VOLATILES by EPA 8260C
SB/SBD QUALITY CONTROL

Matrix: Soil
Units: mg/kg

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS										
Laboratory ID:	SB0624S1									
	SB	SBD	SB	SBD	SB	SBD				
1,1-Dichloroethene	**0.0513**	**0.0478**	0.0500	0.0500	103	96	56-141	7	15	
Benzene	**0.0544**	**0.0513**	0.0500	0.0500	109	103	70-121	6	15	
Trichloroethene	**0.0539**	**0.0496**	0.0500	0.0500	108	99	74-118	8	15	
Toluene	**0.0542**	**0.0498**	0.0500	0.0500	108	100	75-120	8	15	
Chlorobenzene	**0.0540**	**0.0498**	0.0500	0.0500	108	100	75-120	8	15	
Surrogate:										
Dibromofluoromethane					*104*	*94*	*65-129*			
Toluene-d8					*104*	*95*	*77-122*			
4-Bromofluorobenzene					*105*	*96*	*73-124*			

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

PAHs by EPA 8270D/SIM
METHOD BLANK QUALITY CONTROL

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0614S1					
Naphthalene	**ND**	0.0067	EPA 8270D/SIM	6-14-13	6-17-13	
2-Methylnaphthalene	**ND**	0.0067	EPA 8270D/SIM	6-14-13	6-17-13	
1-Methylnaphthalene	**ND**	0.0067	EPA 8270D/SIM	6-14-13	6-17-13	
Acenaphthylene	**ND**	0.0067	EPA 8270D/SIM	6-14-13	6-17-13	
Acenaphthene	**ND**	0.0067	EPA 8270D/SIM	6-14-13	6-17-13	
Fluorene	**ND**	0.0067	EPA 8270D/SIM	6-14-13	6-17-13	
Phenanthrene	**ND**	0.0067	EPA 8270D/SIM	6-14-13	6-17-13	
Anthracene	**ND**	0.0067	EPA 8270D/SIM	6-14-13	6-17-13	
Fluoranthene	**ND**	0.0067	EPA 8270D/SIM	6-14-13	6-17-13	
Pyrene	**ND**	0.0067	EPA 8270D/SIM	6-14-13	6-17-13	
Benzo[a]anthracene	**ND**	0.0067	EPA 8270D/SIM	6-14-13	6-17-13	
Chrysene	**ND**	0.0067	EPA 8270D/SIM	6-14-13	6-17-13	
Benzo[b]fluoranthene	**ND**	0.0067	EPA 8270D/SIM	6-14-13	6-17-13	
Benzo(j,k)fluoranthene	**ND**	0.0067	EPA 8270D/SIM	6-14-13	6-17-13	
Benzo[a]pyrene	**ND**	0.0067	EPA 8270D/SIM	6-14-13	6-17-13	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0067	EPA 8270D/SIM	6-14-13	6-17-13	
Dibenz[a,h]anthracene	**ND**	0.0067	EPA 8270D/SIM	6-14-13	6-17-13	
Benzo[g,h,i]perylene	**ND**	0.0067	EPA 8270D/SIM	6-14-13	6-17-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*74*	*43 - 116*				
Pyrene-d10	*79*	*33 - 124*				
Terphenyl-d14	*77*	*38 - 125*				

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

PAHs by EPA 8270D/SIM
SB/SBD QUALITY CONTROL

Matrix: Soil
Units: mg/Kg

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS										
Laboratory ID:	SB0614S1									
	SB	SBD	SB	SBD	SB	SBD				
Naphthalene	**0.0631**	**0.0667**	0.0833	0.0833	76	80	45 - 109	6	29	
Acenaphthylene	**0.0648**	**0.0669**	0.0833	0.0833	78	80	54 - 118	3	18	
Acenaphthene	**0.0638**	**0.0661**	0.0833	0.0833	77	79	60 - 108	4	14	
Fluorene	**0.0667**	**0.0681**	0.0833	0.0833	80	82	61 - 113	2	13	
Phenanthrene	**0.0655**	**0.0661**	0.0833	0.0833	79	79	63 - 106	1	13	
Anthracene	**0.0671**	**0.0684**	0.0833	0.0833	81	82	55 - 117	2	13	
Fluoranthene	**0.0694**	**0.0707**	0.0833	0.0833	83	85	66 - 118	2	13	
Pyrene	**0.0696**	**0.0705**	0.0833	0.0833	84	85	69 - 112	1	12	
Benzo[a]anthracene	**0.0628**	**0.0640**	0.0833	0.0833	75	77	58 - 115	2	13	
Chrysene	**0.0669**	**0.0681**	0.0833	0.0833	80	82	64 - 114	2	11	
Benzo[b]fluoranthene	**0.0693**	**0.0696**	0.0833	0.0833	83	84	52 - 125	0	19	
Benzo(j,k)fluoranthene	**0.0692**	**0.0720**	0.0833	0.0833	83	86	50 - 126	4	22	
Benzo[a]pyrene	**0.0713**	**0.0719**	0.0833	0.0833	86	86	43 - 123	1	16	
Indeno(1,2,3-c,d)pyrene	**0.0687**	**0.0699**	0.0833	0.0833	82	84	55 - 118	2	16	
Dibenz[a,h]anthracene	**0.0695**	**0.0698**	0.0833	0.0833	83	84	57 - 120	0	15	
Benzo[g,h,i]perylene	**0.0677**	**0.0677**	0.0833	0.0833	81	81	58 - 113	0	18	
Surrogate:										
2-Fluorobiphenyl					*75*	*78*	*43 - 116*			
Pyrene-d10					*78*	*79*	*33 - 124*			
Terphenyl-d14					*76*	*78*	*38 - 125*			

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

TOTAL METALS
EPA 6010C/7471B
METHOD BLANK QUALITY CONTROL

Date Extracted: 6-12&13-13
Date Analyzed: 6-13-13

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: MB0612SM2&MB0613S1

Analyte	Method	Result	PQL
Arsenic	6010C	**ND**	10
Barium	6010C	**ND**	2.5
Cadmium	6010C	**ND**	0.50
Chromium	6010C	**ND**	0.50
Lead	6010C	**ND**	5.0
Mercury	7471B	**ND**	0.25
Selenium	6010C	**ND**	10
Silver	6010C	**ND**	1.0

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

TOTAL METALS
EPA 6010C/7471B
DUPLICATE QUALITY CONTROL

Date Extracted: 6-12&13-13
Date Analyzed: 6-13-13

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: 06-086-10

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Arsenic	**ND**	**ND**	NA	10	
Barium	**53.4**	**55.9**	5	2.5	
Cadmium	**ND**	**ND**	NA	0.50	
Chromium	**51.8**	**49.6**	4	0.50	
Lead	**ND**	**ND**	NA	5.0	
Mercury	**ND**	**ND**	NA	0.25	
Selenium	**ND**	**ND**	NA	10	
Silver	**ND**	**ND**	NA	1.0	

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

TOTAL METALS
EPA 6010C/7471B
MS/MSD QUALITY CONTROL

Date Extracted: 6-12&13-13
Date Analyzed: 6-13-13

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: 06-086-10

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Arsenic	100	**88.6**	89	**90.6**	91	2	
Barium	100	**144**	91	**143**	90	1	
Cadmium	50.0	**46.5**	93	**46.3**	93	0	
Chromium	100	**129**	77	**128**	76	1	
Lead	250	**218**	87	**221**	88	1	
Mercury	0.500	**0.446**	89	**0.433**	87	3	
Selenium	100	**89.2**	89	**89.9**	90	1	
Silver	25.0	**21.4**	86	**21.6**	86	1	

Date of Report: July 1, 2013
Samples Submitted: June 11, 2013
Laboratory Reference: 1306-086
Project: 0183-085-00

% MOISTURE

Date Analyzed: 6-12&24-13

Client ID	Lab ID	% Moisture
1H-B1-4-5	06-086-01	7
1H-B1-9-9.5	06-086-02	8
1H-B2-7-7.5	06-086-03	21
1H-B2-9-10	06-086-04	19
1H-B3-4-5	06-086-05	7
1H-B3-7-8	06-086-06	10
1G-B3-2-3	06-086-07	10
1G-B2-2-3	06-086-08	12
1G-B2-9-10	06-086-09	9
1G-B1-2-3	06-086-10	8
1G-B1-7-8	06-086-11	14

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-napthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical ____________.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1- Sample extract treated with a Sulfuric acid/Silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in method 8260C, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

OnSite Environmental Inc.
Analytical Laboratory Testing Services
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Phone: (425) 883-3881 • www.onsite-env.com

Chain of Custody

Page 1 of 2

Company: GeoEngineers
Project Number: 0183-085-00
Project Name: UWT-Priority Development
Project Manager: T DeOme
Sampled by: J Deeds

Turnaround Request (in working days)
(Check One)
- [ ] Same Day
- [ ] 1 Day
- [ ] 2 Days
- [ ] 3 Days
- [x] Standard (7 Days) (TPH analysis 5 Days)
- [ ] ______ (other)

Laboratory Number: 06-086

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	No. of Cont.	NWTPH-HCID ①	NWTPH-Gx/BTEX	NWTPH-Gx	~~NWTPH-Dx~~ Volatiles SIM 8260B	Volatiles 8260B	Halogenated Volatiles 8260B	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082	Organochlorine Pesticides 8081A	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664	Hold				% Moisture
1	1H-B1-4-5	6/10/13	1125	S	5	X			X				X					X								X
2	1H-B1-9-9.5		1135			X			X				X					X								
3	1H-B2-7-7.5		1205			X			X				X					X								
4	~~1H~~ B2-9-10		1215						O													~~X~~ NO				O
5	1H-B3-4-5		1340			X			X				X					X								X
6	1H-B3-7-8		1400			X			X				X					X								
7	~~1H~~ 1G-B3-2-3		1415			X			X				X					X								
8	1G-B2-2-3		1535			X			X				X					X								
9	1G-B2-9-10		1555			X			X				X					X								
10	1G-B1-2-3		1615			X			X				X					X								

	Signature	Company	Date	Time
Relinquished	[signature]	GeoEngineers	6/11/13	11:15
Received	[signature]	Speedy	6-11-13	11:15
Relinquished	[signature]	Speedy	6-11-13	1257
Received	[signature]	OSE	6/11/13	1257
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions:
① Followup analyses of NWTPH-Dx and NWTPH-Gx if [illegible] detected
O - Added 6/24/13. DB (STA)

Chromatograms with final report [ ]

Data Package: Level III [ ] Level IV [ ] Electronic Data Deliverables (EDDs) [ ] ______

OnSite Environmental Inc.

Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Chain of Custody

Laboratory Number: 06-086

Company: GeoEngineers
Project Number: 0183-085-00
Project Name: GW - Priority Development
Project Manager: Tricia DeOme
Sampled by: JD

Turnaround Request (in working days) (Check One)
- [ ] Same Day
- [ ] 1 Day
- [ ] 2 Days
- [ ] 3 Days
- [x] Standard (7 Days) (TPH analysis 5 Days)
- [ ] ______ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID ①	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Volatiles 8260C	Halogenated Volatiles 8260C	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals/ MTCA Metals (circle one)	TCLP Metals	HEM (oil and grease) 1664A	Hold						% Moisture
11	IG-B1-7-8	6/6/13	1625	S	5	X				OK 4°C			X					X			~~X~~ NO						O
12	TRIP-130610-1	6/6/13	—	W	1					(X)																	

	Signature	Company	Date	Time
Relinquished	[signature]	GeoEngineers	6/11/13	11:15
Received	Tracy Harr	Speedy	6-11-13	1111
Relinquished	Tracy Harr	Speedy	6-11-13	1257
Received	[signature]	OSE	6/11/13	1257
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions

① with follow up Gx/Dx if detected

Analyze Trip if VOCs detected in soil

(X) Added 6/20/13 STA

① added 6/24/13. DB (STA)

Chromatograms with final report ☐

Data Package: Level III ☐ Level IV ☐ Electronic Data Deliverables (EDDs) ☐ ______

OnSite Environmental Inc.

14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

July 2, 2013

Tricia DeOme
GeoEngineers, Inc.
1101 Fawcett Avenue South, Suite 200
Tacoma, WA 98402

Re: Analytical Data for Project 0183-085-00
Laboratory Reference No. 1306-227

Dear Tricia:

Enclosed are the analytical results and associated quality control data for samples submitted on June 25, 2013.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

Case Narrative

Samples were collected on June 24 and 25, 2013 and received by the laboratory on June 25, 2013. They were maintained at the laboratory at a temperature of 2^oC to 6^oC.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

NWTPH Gx and Volatiles EPA 8260C Analysis

Per EPA Method 5035A, samples were received by the laboratory in pre-weighed 40 mL VOA vials within 48 hours of sample collection. They were stored in a freezer at between -7^oC and -20^oC until extraction or analysis.

Any other QA/QC issues associated with this extraction and analysis will be indicated with a footnote reference and discussed in detail on the Data Qualifier page.

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

ANALYTICAL REPORT FOR SAMPLES

Client ID	Laboratory ID	Matrix	Date Sampled	Date Received	Notes
UG-MW28-23-24	06-227-01	Soil	6-24-13	6-25-13	
UG-MW28-27-28	06-227-02	Soil	6-24-13	6-25-13	
UG-MW28-39-40	06-227-03	Soil	6-24-13	6-25-13	
UG-MW29D-7-7.25	06-227-04	Soil	6-25-13	6-25-13	
UG-MW29D-9-9.5	06-227-05	Soil	6-25-13	6-25-13	
UG-MW29D-17-18	06-227-06	Soil	6-25-13	6-25-13	
UG-MW29D-20-20.5	06-227-07	Soil	6-25-13	6-25-13	
UG-MW29D-34.5-35	06-227-08	Soil	6-25-13	6-25-13	
UG-MW29D-22-23	06-227-09	Soil	6-25-13	6-25-13	
UG-MW29D-37.5-38	06-227-10	Soil	6-25-13	6-25-13	

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

NWTPH-Gx

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW28-23-24**					
Laboratory ID:	06-227-01					
Gasoline	**ND**	4.1	NWTPH-Gx	6-27-13	6-27-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*101*	*71-121*				
Client ID:	**UG-MW28-27-28**					
Laboratory ID:	06-227-02					
Gasoline	**ND**	5.8	NWTPH-Gx	6-27-13	6-27-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*99*	*71-121*				
Client ID:	**UG-MW28-39-40**					
Laboratory ID:	06-227-03					
Gasoline	**ND**	5.8	NWTPH-Gx	6-27-13	6-27-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*95*	*71-121*				
Client ID:	**UG-MW29D-7-7.25**					
Laboratory ID:	06-227-04					
Gasoline	**ND**	4.8	NWTPH-Gx	6-27-13	6-27-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*95*	*71-121*				
Client ID:	**UG-MW29D-9-9.5**					
Laboratory ID:	06-227-05					
Gasoline	**ND**	5.5	NWTPH-Gx	6-27-13	6-27-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*93*	*71-121*				
Client ID:	**UG-MW29D-17-18**					
Laboratory ID:	06-227-06					
Gasoline	**ND**	4.8	NWTPH-Gx	6-27-13	6-27-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*101*	*71-121*				

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

NWTPH-Gx

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW29D-20-20.5**					
Laboratory ID:	06-227-07					
Gasoline	**ND**	5.2	NWTPH-Gx	6-27-13	6-27-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*96*	*71-121*				
Client ID:	**UG-MW29D-34.5-35**					
Laboratory ID:	06-227-08					
Gasoline	**ND**	6.7	NWTPH-Gx	6-27-13	6-27-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*96*	*71-121*				
Client ID:	**UG-MW29D-22-23**					
Laboratory ID:	06-227-09					
Gasoline	**ND**	5.9	NWTPH-Gx	6-27-13	6-28-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*95*	*71-121*				
Client ID:	**UG-MW29D-37.5-38**					
Laboratory ID:	06-227-10					
Gasoline	**ND**	6.0	NWTPH-Gx	6-27-13	6-28-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*104*	*71-121*				

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

NWTPH-Dx

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW28-23-24**					
Laboratory ID:	06-227-01					
Diesel Range Organics	**ND**	29	NWTPH-Dx	6-27-13	6-27-13	
Lube Oil Range Organics	**ND**	57	NWTPH-Dx	6-27-13	6-27-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*89*	*50-150*				
Client ID:	**UG-MW28-27-28**					
Laboratory ID:	06-227-02					
Diesel Range Organics	**ND**	31	NWTPH-Dx	6-27-13	6-27-13	
Lube Oil Range Organics	**ND**	62	NWTPH-Dx	6-27-13	6-27-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*72*	*50-150*				
Client ID:	**UG-MW28-39-40**					
Laboratory ID:	06-227-03					
Diesel Range Organics	**ND**	31	NWTPH-Dx	6-27-13	6-27-13	
Lube Oil Range Organics	**ND**	62	NWTPH-Dx	6-27-13	6-27-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*82*	*50-150*				
Client ID:	**UG-MW29D-7-7.25**					
Laboratory ID:	06-227-04					
Diesel Range Organics	**ND**	28	NWTPH-Dx	6-27-13	6-27-13	
Lube Oil Range Organics	**ND**	56	NWTPH-Dx	6-27-13	6-27-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*85*	*50-150*				
Client ID:	**UG-MW29D-9-9.5**					
Laboratory ID:	06-227-05					
Diesel Range Organics	**ND**	27	NWTPH-Dx	6-27-13	6-27-13	
Lube Oil Range Organics	**ND**	55	NWTPH-Dx	6-27-13	6-27-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*88*	*50-150*				
Client ID:	**UG-MW29D-17-18**					
Laboratory ID:	06-227-06					
Diesel Range Organics	**ND**	29	NWTPH-Dx	6-27-13	6-27-13	
Lube Oil Range Organics	**ND**	59	NWTPH-Dx	6-27-13	6-27-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*88*	*50-150*				

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

NWTPH-Dx

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW29D-20-20.5**					
Laboratory ID:	06-227-07					
Diesel Range Organics	**ND**	28	NWTPH-Dx	6-27-13	6-27-13	
Lube Oil Range Organics	**ND**	55	NWTPH-Dx	6-27-13	6-27-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*83*	*50-150*				
Client ID:	**UG-MW29D-34.5-35**					
Laboratory ID:	06-227-08					
Diesel Range Organics	**ND**	33	NWTPH-Dx	6-27-13	6-27-13	
Lube Oil Range Organics	**ND**	65	NWTPH-Dx	6-27-13	6-27-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*86*	*50-150*				
Client ID:	**UG-MW29D-22-23**					
Laboratory ID:	06-227-09					
Diesel Range Organics	**ND**	30	NWTPH-Dx	6-27-13	6-27-13	
Lube Oil Range Organics	**ND**	61	NWTPH-Dx	6-27-13	6-27-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*82*	*50-150*				
Client ID:	**UG-MW29D-37.5-38**					
Laboratory ID:	06-227-10					
Diesel Range Organics	**ND**	32	NWTPH-Dx	6-27-13	6-27-13	
Lube Oil Range Organics	**ND**	64	NWTPH-Dx	6-27-13	6-27-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*89*	*50-150*				

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

VOLATILES by EPA 8260C
page 1 of 2

Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW28-23-24**					
Laboratory ID:	06-227-01					
Dichlorodifluoromethane	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
Chloromethane	ND	0.0040	EPA 8260C	6-26-13	6-26-13	
Vinyl Chloride	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
Bromomethane	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
Chloroethane	ND	0.0040	EPA 8260C	6-26-13	6-26-13	
Trichlorofluoromethane	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
1,1-Dichloroethene	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
Acetone	ND	0.0040	EPA 8260C	6-26-13	6-26-13	
Iodomethane	ND	0.0040	EPA 8260C	6-26-13	6-26-13	
Carbon Disulfide	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
Methylene Chloride	ND	0.0052	EPA 8260C	6-26-13	6-26-13	
(trans) 1,2-Dichloroethene	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
Methyl t-Butyl Ether	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
1,1-Dichloroethane	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
Vinyl Acetate	ND	0.0040	EPA 8260C	6-26-13	6-26-13	
2,2-Dichloropropane	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
(cis) 1,2-Dichloroethene	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
2-Butanone	ND	0.0040	EPA 8260C	6-26-13	6-26-13	
Bromochloromethane	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
Chloroform	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
1,1,1-Trichloroethane	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
Carbon Tetrachloride	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
1,1-Dichloropropene	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
Benzene	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
1,2-Dichloroethane	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
Trichloroethene	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
1,2-Dichloropropane	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
Dibromomethane	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
Bromodichloromethane	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
2-Chloroethyl Vinyl Ether	ND	0.0040	EPA 8260C	6-26-13	6-26-13	
(cis) 1,3-Dichloropropene	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
Methyl Isobutyl Ketone	ND	0.0040	EPA 8260C	6-26-13	6-26-13	
Toluene	ND	0.0081	EPA 8260C	6-26-13	6-26-13	
(trans) 1,3-Dichloropropene	ND	0.00081	EPA 8260C	6-26-13	6-26-13	

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

VOLATILES by EPA 8260C
page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW28-23-24**					
Laboratory ID:	06-227-01					
1,1,2-Trichloroethane	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
Tetrachloroethene	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
1,3-Dichloropropane	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
2-Hexanone	ND	0.0040	EPA 8260C	6-26-13	6-26-13	
Dibromochloromethane	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
1,2-Dibromoethane	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
Chlorobenzene	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
1,1,1,2-Tetrachloroethane	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
Ethylbenzene	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
m,p-Xylene	ND	0.0016	EPA 8260C	6-26-13	6-26-13	
o-Xylene	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
Styrene	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
Bromoform	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
Isopropylbenzene	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
Bromobenzene	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
1,1,2,2-Tetrachloroethane	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
1,2,3-Trichloropropane	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
n-Propylbenzene	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
2-Chlorotoluene	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
4-Chlorotoluene	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
1,3,5-Trimethylbenzene	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
tert-Butylbenzene	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
1,2,4-Trimethylbenzene	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
sec-Butylbenzene	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
1,3-Dichlorobenzene	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
p-Isopropyltoluene	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
1,4-Dichlorobenzene	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
1,2-Dichlorobenzene	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
n-Butylbenzene	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
1,2-Dibromo-3-chloropropane	ND	0.0040	EPA 8260C	6-26-13	6-26-13	
1,2,4-Trichlorobenzene	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
Hexachlorobutadiene	ND	0.0040	EPA 8260C	6-26-13	6-26-13	
Naphthalene	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
1,2,3-Trichlorobenzene	ND	0.00081	EPA 8260C	6-26-13	6-26-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*109*	*65-129*				
Toluene-d8	*110*	*77-122*				
4-Bromofluorobenzene	*113*	*73-124*				

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

VOLATILES by EPA 8260C
page 1 of 2

Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW28-27-28**					
Laboratory ID:	06-227-02					
Dichlorodifluoromethane	ND	0.0013	EPA 8260C	6-26-13	6-26-13	
Chloromethane	ND	0.0045	EPA 8260C	6-26-13	6-26-13	
Vinyl Chloride	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
Bromomethane	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
Chloroethane	ND	0.0045	EPA 8260C	6-26-13	6-26-13	
Trichlorofluoromethane	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
1,1-Dichloroethene	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
Acetone	ND	0.0045	EPA 8260C	6-26-13	6-26-13	
Iodomethane	ND	0.0045	EPA 8260C	6-26-13	6-26-13	
Carbon Disulfide	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
Methylene Chloride	ND	0.0058	EPA 8260C	6-26-13	6-26-13	
(trans) 1,2-Dichloroethene	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
Methyl t-Butyl Ether	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
1,1-Dichloroethane	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
Vinyl Acetate	ND	0.0045	EPA 8260C	6-26-13	6-26-13	
2,2-Dichloropropane	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
(cis) 1,2-Dichloroethene	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
2-Butanone	ND	0.0045	EPA 8260C	6-26-13	6-26-13	
Bromochloromethane	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
Chloroform	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
1,1,1-Trichloroethane	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
Carbon Tetrachloride	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
1,1-Dichloropropene	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
Benzene	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
1,2-Dichloroethane	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
Trichloroethene	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
1,2-Dichloropropane	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
Dibromomethane	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
Bromodichloromethane	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
2-Chloroethyl Vinyl Ether	ND	0.0045	EPA 8260C	6-26-13	6-26-13	
(cis) 1,3-Dichloropropene	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
Methyl Isobutyl Ketone	ND	0.0045	EPA 8260C	6-26-13	6-26-13	
Toluene	ND	0.0090	EPA 8260C	6-26-13	6-26-13	
(trans) 1,3-Dichloropropene	ND	0.00090	EPA 8260C	6-26-13	6-26-13	

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

VOLATILES by EPA 8260C
page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW28-27-28**					
Laboratory ID:	06-227-02					
1,1,2-Trichloroethane	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
Tetrachloroethene	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
1,3-Dichloropropane	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
2-Hexanone	ND	0.0045	EPA 8260C	6-26-13	6-26-13	
Dibromochloromethane	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
1,2-Dibromoethane	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
Chlorobenzene	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
1,1,1,2-Tetrachloroethane	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
Ethylbenzene	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
m,p-Xylene	ND	0.0018	EPA 8260C	6-26-13	6-26-13	
o-Xylene	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
Styrene	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
Bromoform	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
Isopropylbenzene	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
Bromobenzene	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
1,1,2,2-Tetrachloroethane	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
1,2,3-Trichloropropane	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
n-Propylbenzene	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
2-Chlorotoluene	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
4-Chlorotoluene	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
1,3,5-Trimethylbenzene	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
tert-Butylbenzene	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
1,2,4-Trimethylbenzene	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
sec-Butylbenzene	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
1,3-Dichlorobenzene	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
p-Isopropyltoluene	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
1,4-Dichlorobenzene	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
1,2-Dichlorobenzene	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
n-Butylbenzene	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
1,2-Dibromo-3-chloropropane	ND	0.0045	EPA 8260C	6-26-13	6-26-13	
1,2,4-Trichlorobenzene	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
Hexachlorobutadiene	ND	0.0045	EPA 8260C	6-26-13	6-26-13	
Naphthalene	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
1,2,3-Trichlorobenzene	ND	0.00090	EPA 8260C	6-26-13	6-26-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*91*	*65-129*				
Toluene-d8	*102*	*77-122*				
4-Bromofluorobenzene	*93*	*73-124*				

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

VOLATILES by EPA 8260C
page 1 of 2

Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW28-39-40**					
Laboratory ID:	06-227-03					
Dichlorodifluoromethane	ND	0.0013	EPA 8260C	6-26-13	6-26-13	
Chloromethane	ND	0.0048	EPA 8260C	6-26-13	6-26-13	
Vinyl Chloride	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Bromomethane	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Chloroethane	ND	0.0048	EPA 8260C	6-26-13	6-26-13	
Trichlorofluoromethane	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,1-Dichloroethene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Acetone	ND	0.0048	EPA 8260C	6-26-13	6-26-13	
Iodomethane	ND	0.0048	EPA 8260C	6-26-13	6-26-13	
Carbon Disulfide	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Methylene Chloride	ND	0.0061	EPA 8260C	6-26-13	6-26-13	
(trans) 1,2-Dichloroethene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Methyl t-Butyl Ether	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,1-Dichloroethane	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Vinyl Acetate	ND	0.0048	EPA 8260C	6-26-13	6-26-13	
2,2-Dichloropropane	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
(cis) 1,2-Dichloroethene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
2-Butanone	ND	0.0048	EPA 8260C	6-26-13	6-26-13	
Bromochloromethane	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Chloroform	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,1,1-Trichloroethane	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Carbon Tetrachloride	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,1-Dichloropropene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Benzene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,2-Dichloroethane	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Trichloroethene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,2-Dichloropropane	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Dibromomethane	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Bromodichloromethane	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
2-Chloroethyl Vinyl Ether	ND	0.0048	EPA 8260C	6-26-13	6-26-13	
(cis) 1,3-Dichloropropene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Methyl Isobutyl Ketone	ND	0.0048	EPA 8260C	6-26-13	6-26-13	
Toluene	ND	0.0096	EPA 8260C	6-26-13	6-26-13	
(trans) 1,3-Dichloropropene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

VOLATILES by EPA 8260C
page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW28-39-40**					
Laboratory ID:	06-227-03					
1,1,2-Trichloroethane	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Tetrachloroethene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,3-Dichloropropane	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
2-Hexanone	ND	0.0048	EPA 8260C	6-26-13	6-26-13	
Dibromochloromethane	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,2-Dibromoethane	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Chlorobenzene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,1,1,2-Tetrachloroethane	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Ethylbenzene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
m,p-Xylene	ND	0.0019	EPA 8260C	6-26-13	6-26-13	
o-Xylene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Styrene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Bromoform	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Isopropylbenzene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Bromobenzene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,1,2,2-Tetrachloroethane	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,2,3-Trichloropropane	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
n-Propylbenzene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
2-Chlorotoluene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
4-Chlorotoluene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,3,5-Trimethylbenzene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
tert-Butylbenzene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,2,4-Trimethylbenzene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
sec-Butylbenzene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,3-Dichlorobenzene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
p-Isopropyltoluene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,4-Dichlorobenzene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,2-Dichlorobenzene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
n-Butylbenzene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,2-Dibromo-3-chloropropane	ND	0.0048	EPA 8260C	6-26-13	6-26-13	
1,2,4-Trichlorobenzene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Hexachlorobutadiene	ND	0.0048	EPA 8260C	6-26-13	6-26-13	
Naphthalene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,2,3-Trichlorobenzene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*106*	*65-129*				
Toluene-d8	*108*	*77-122*				
4-Bromofluorobenzene	*99*	*73-124*				

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

VOLATILES by EPA 8260C
page 1 of 2

Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW29D-7-7.25**					
Laboratory ID:	06-227-04					
Dichlorodifluoromethane	ND	0.0012	EPA 8260C	6-26-13	6-26-13	
Chloromethane	ND	0.0043	EPA 8260C	6-26-13	6-26-13	
Vinyl Chloride	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
Bromomethane	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
Chloroethane	ND	0.0043	EPA 8260C	6-26-13	6-26-13	
Trichlorofluoromethane	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
1,1-Dichloroethene	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
Acetone	ND	0.0043	EPA 8260C	6-26-13	6-26-13	
Iodomethane	ND	0.0043	EPA 8260C	6-26-13	6-26-13	
Carbon Disulfide	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
Methylene Chloride	ND	0.0055	EPA 8260C	6-26-13	6-26-13	
(trans) 1,2-Dichloroethene	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
Methyl t-Butyl Ether	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
1,1-Dichloroethane	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
Vinyl Acetate	ND	0.0043	EPA 8260C	6-26-13	6-26-13	
2,2-Dichloropropane	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
(cis) 1,2-Dichloroethene	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
2-Butanone	ND	0.0043	EPA 8260C	6-26-13	6-26-13	
Bromochloromethane	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
Chloroform	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
1,1,1-Trichloroethane	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
Carbon Tetrachloride	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
1,1-Dichloropropene	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
Benzene	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
1,2-Dichloroethane	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
Trichloroethene	0.0014	0.00086	EPA 8260C	6-26-13	6-26-13	
1,2-Dichloropropane	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
Dibromomethane	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
Bromodichloromethane	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
2-Chloroethyl Vinyl Ether	ND	0.0043	EPA 8260C	6-26-13	6-26-13	
(cis) 1,3-Dichloropropene	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
Methyl Isobutyl Ketone	ND	0.0043	EPA 8260C	6-26-13	6-26-13	
Toluene	ND	0.0086	EPA 8260C	6-26-13	6-26-13	
(trans) 1,3-Dichloropropene	ND	0.00086	EPA 8260C	6-26-13	6-26-13	

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

VOLATILES by EPA 8260C
page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW29D-7-7.25**					
Laboratory ID:	06-227-04					
1,1,2-Trichloroethane	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
Tetrachloroethene	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
1,3-Dichloropropane	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
2-Hexanone	ND	0.0043	EPA 8260C	6-26-13	6-26-13	
Dibromochloromethane	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
1,2-Dibromoethane	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
Chlorobenzene	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
1,1,1,2-Tetrachloroethane	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
Ethylbenzene	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
m,p-Xylene	ND	0.0017	EPA 8260C	6-26-13	6-26-13	
o-Xylene	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
Styrene	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
Bromoform	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
Isopropylbenzene	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
Bromobenzene	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
1,1,2,2-Tetrachloroethane	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
1,2,3-Trichloropropane	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
n-Propylbenzene	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
2-Chlorotoluene	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
4-Chlorotoluene	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
1,3,5-Trimethylbenzene	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
tert-Butylbenzene	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
1,2,4-Trimethylbenzene	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
sec-Butylbenzene	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
1,3-Dichlorobenzene	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
p-Isopropyltoluene	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
1,4-Dichlorobenzene	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
1,2-Dichlorobenzene	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
n-Butylbenzene	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
1,2-Dibromo-3-chloropropane	ND	0.0043	EPA 8260C	6-26-13	6-26-13	
1,2,4-Trichlorobenzene	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
Hexachlorobutadiene	ND	0.0043	EPA 8260C	6-26-13	6-26-13	
Naphthalene	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
1,2,3-Trichlorobenzene	ND	0.00086	EPA 8260C	6-26-13	6-26-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*97*	*65-129*				
Toluene-d8	*100*	*77-122*				
4-Bromofluorobenzene	*100*	*73-124*				

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

VOLATILES by EPA 8260C
page 1 of 2

Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW29D-9-9.5**					
Laboratory ID:	06-227-05					
Dichlorodifluoromethane	ND	0.0013	EPA 8260C	6-26-13	6-26-13	
Chloromethane	ND	0.0048	EPA 8260C	6-26-13	6-26-13	
Vinyl Chloride	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Bromomethane	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Chloroethane	ND	0.0048	EPA 8260C	6-26-13	6-26-13	
Trichlorofluoromethane	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,1-Dichloroethene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Acetone	ND	0.0048	EPA 8260C	6-26-13	6-26-13	
Iodomethane	ND	0.0048	EPA 8260C	6-26-13	6-26-13	
Carbon Disulfide	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Methylene Chloride	ND	0.0061	EPA 8260C	6-26-13	6-26-13	
(trans) 1,2-Dichloroethene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Methyl t-Butyl Ether	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,1-Dichloroethane	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Vinyl Acetate	ND	0.0048	EPA 8260C	6-26-13	6-26-13	
2,2-Dichloropropane	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
(cis) 1,2-Dichloroethene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
2-Butanone	ND	0.0048	EPA 8260C	6-26-13	6-26-13	
Bromochloromethane	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Chloroform	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,1,1-Trichloroethane	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Carbon Tetrachloride	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,1-Dichloropropene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Benzene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,2-Dichloroethane	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Trichloroethene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,2-Dichloropropane	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Dibromomethane	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Bromodichloromethane	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
2-Chloroethyl Vinyl Ether	ND	0.0048	EPA 8260C	6-26-13	6-26-13	
(cis) 1,3-Dichloropropene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Methyl Isobutyl Ketone	ND	0.0048	EPA 8260C	6-26-13	6-26-13	
Toluene	ND	0.0096	EPA 8260C	6-26-13	6-26-13	
(trans) 1,3-Dichloropropene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

VOLATILES by EPA 8260C
page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW29D-9-9.5**					
Laboratory ID:	06-227-05					
1,1,2-Trichloroethane	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Tetrachloroethene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,3-Dichloropropane	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
2-Hexanone	ND	0.0048	EPA 8260C	6-26-13	6-26-13	
Dibromochloromethane	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,2-Dibromoethane	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Chlorobenzene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,1,1,2-Tetrachloroethane	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Ethylbenzene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
m,p-Xylene	ND	0.0019	EPA 8260C	6-26-13	6-26-13	
o-Xylene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Styrene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Bromoform	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Isopropylbenzene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Bromobenzene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,1,2,2-Tetrachloroethane	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,2,3-Trichloropropane	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
n-Propylbenzene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
2-Chlorotoluene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
4-Chlorotoluene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,3,5-Trimethylbenzene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
tert-Butylbenzene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,2,4-Trimethylbenzene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
sec-Butylbenzene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,3-Dichlorobenzene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
p-Isopropyltoluene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,4-Dichlorobenzene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,2-Dichlorobenzene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
n-Butylbenzene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,2-Dibromo-3-chloropropane	ND	0.0048	EPA 8260C	6-26-13	6-26-13	
1,2,4-Trichlorobenzene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Hexachlorobutadiene	ND	0.0048	EPA 8260C	6-26-13	6-26-13	
Naphthalene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
1,2,3-Trichlorobenzene	ND	0.00096	EPA 8260C	6-26-13	6-26-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*103*	*65-129*				
Toluene-d8	*106*	*77-122*				
4-Bromofluorobenzene	*105*	*73-124*				

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

VOLATILES by EPA 8260C
page 1 of 2

Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW29D-17-18**					
Laboratory ID:	06-227-06					
Dichlorodifluoromethane	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
Chloromethane	ND	0.0038	EPA 8260C	6-26-13	6-26-13	
Vinyl Chloride	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
Bromomethane	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
Chloroethane	ND	0.0038	EPA 8260C	6-26-13	6-26-13	
Trichlorofluoromethane	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
1,1-Dichloroethene	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
Acetone	ND	0.0038	EPA 8260C	6-26-13	6-26-13	
Iodomethane	ND	0.0038	EPA 8260C	6-26-13	6-26-13	
Carbon Disulfide	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
Methylene Chloride	ND	0.0049	EPA 8260C	6-26-13	6-26-13	
(trans) 1,2-Dichloroethene	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
Methyl t-Butyl Ether	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
1,1-Dichloroethane	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
Vinyl Acetate	ND	0.0038	EPA 8260C	6-26-13	6-26-13	
2,2-Dichloropropane	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
(cis) 1,2-Dichloroethene	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
2-Butanone	ND	0.0038	EPA 8260C	6-26-13	6-26-13	
Bromochloromethane	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
Chloroform	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
1,1,1-Trichloroethane	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
Carbon Tetrachloride	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
1,1-Dichloropropene	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
Benzene	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
1,2-Dichloroethane	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
Trichloroethene	0.0066	0.00077	EPA 8260C	6-26-13	6-26-13	
1,2-Dichloropropane	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
Dibromomethane	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
Bromodichloromethane	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
2-Chloroethyl Vinyl Ether	ND	0.0038	EPA 8260C	6-26-13	6-26-13	
(cis) 1,3-Dichloropropene	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
Methyl Isobutyl Ketone	ND	0.0038	EPA 8260C	6-26-13	6-26-13	
Toluene	ND	0.0077	EPA 8260C	6-26-13	6-26-13	
(trans) 1,3-Dichloropropene	ND	0.00077	EPA 8260C	6-26-13	6-26-13	

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

VOLATILES by EPA 8260C
page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW29D-17-18**					
Laboratory ID:	06-227-06					
1,1,2-Trichloroethane	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
Tetrachloroethene	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
1,3-Dichloropropane	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
2-Hexanone	ND	0.0038	EPA 8260C	6-26-13	6-26-13	
Dibromochloromethane	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
1,2-Dibromoethane	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
Chlorobenzene	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
1,1,1,2-Tetrachloroethane	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
Ethylbenzene	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
m,p-Xylene	ND	0.0015	EPA 8260C	6-26-13	6-26-13	
o-Xylene	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
Styrene	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
Bromoform	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
Isopropylbenzene	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
Bromobenzene	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
1,1,2,2-Tetrachloroethane	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
1,2,3-Trichloropropane	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
n-Propylbenzene	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
2-Chlorotoluene	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
4-Chlorotoluene	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
1,3,5-Trimethylbenzene	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
tert-Butylbenzene	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
1,2,4-Trimethylbenzene	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
sec-Butylbenzene	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
1,3-Dichlorobenzene	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
p-Isopropyltoluene	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
1,4-Dichlorobenzene	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
1,2-Dichlorobenzene	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
n-Butylbenzene	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
1,2-Dibromo-3-chloropropane	ND	0.0038	EPA 8260C	6-26-13	6-26-13	
1,2,4-Trichlorobenzene	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
Hexachlorobutadiene	ND	0.0038	EPA 8260C	6-26-13	6-26-13	
Naphthalene	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
1,2,3-Trichlorobenzene	ND	0.00077	EPA 8260C	6-26-13	6-26-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*96*	*65-129*				
Toluene-d8	*99*	*77-122*				
4-Bromofluorobenzene	*101*	*73-124*				

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

VOLATILES by EPA 8260C
page 1 of 2

Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW29D-20-20.5**					
Laboratory ID:	06-227-07					
Dichlorodifluoromethane	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
Chloromethane	ND	0.0041	EPA 8260C	6-26-13	6-26-13	
Vinyl Chloride	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
Bromomethane	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
Chloroethane	ND	0.0041	EPA 8260C	6-26-13	6-26-13	
Trichlorofluoromethane	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
1,1-Dichloroethene	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
Acetone	ND	0.0041	EPA 8260C	6-26-13	6-26-13	
Iodomethane	ND	0.0041	EPA 8260C	6-26-13	6-26-13	
Carbon Disulfide	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
Methylene Chloride	ND	0.0052	EPA 8260C	6-26-13	6-26-13	
(trans) 1,2-Dichloroethene	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
Methyl t-Butyl Ether	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
1,1-Dichloroethane	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
Vinyl Acetate	ND	0.0041	EPA 8260C	6-26-13	6-26-13	
2,2-Dichloropropane	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
(cis) 1,2-Dichloroethene	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
2-Butanone	ND	0.0041	EPA 8260C	6-26-13	6-26-13	
Bromochloromethane	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
Chloroform	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
1,1,1-Trichloroethane	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
Carbon Tetrachloride	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
1,1-Dichloropropene	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
Benzene	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
1,2-Dichloroethane	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
Trichloroethene	0.0073	0.00082	EPA 8260C	6-26-13	6-26-13	
1,2-Dichloropropane	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
Dibromomethane	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
Bromodichloromethane	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
2-Chloroethyl Vinyl Ether	ND	0.0041	EPA 8260C	6-26-13	6-26-13	
(cis) 1,3-Dichloropropene	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
Methyl Isobutyl Ketone	ND	0.0041	EPA 8260C	6-26-13	6-26-13	
Toluene	ND	0.0082	EPA 8260C	6-26-13	6-26-13	
(trans) 1,3-Dichloropropene	ND	0.00082	EPA 8260C	6-26-13	6-26-13	

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

VOLATILES by EPA 8260C
page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW29D-20-20.5**					
Laboratory ID:	06-227-07					
1,1,2-Trichloroethane	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
Tetrachloroethene	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
1,3-Dichloropropane	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
2-Hexanone	ND	0.0041	EPA 8260C	6-26-13	6-26-13	
Dibromochloromethane	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
1,2-Dibromoethane	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
Chlorobenzene	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
1,1,1,2-Tetrachloroethane	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
Ethylbenzene	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
m,p-Xylene	ND	0.0016	EPA 8260C	6-26-13	6-26-13	
o-Xylene	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
Styrene	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
Bromoform	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
Isopropylbenzene	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
Bromobenzene	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
1,1,2,2-Tetrachloroethane	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
1,2,3-Trichloropropane	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
n-Propylbenzene	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
2-Chlorotoluene	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
4-Chlorotoluene	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
1,3,5-Trimethylbenzene	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
tert-Butylbenzene	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
1,2,4-Trimethylbenzene	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
sec-Butylbenzene	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
1,3-Dichlorobenzene	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
p-Isopropyltoluene	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
1,4-Dichlorobenzene	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
1,2-Dichlorobenzene	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
n-Butylbenzene	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
1,2-Dibromo-3-chloropropane	ND	0.0041	EPA 8260C	6-26-13	6-26-13	
1,2,4-Trichlorobenzene	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
Hexachlorobutadiene	ND	0.0041	EPA 8260C	6-26-13	6-26-13	
Naphthalene	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
1,2,3-Trichlorobenzene	ND	0.00082	EPA 8260C	6-26-13	6-26-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*105*	*65-129*				
Toluene-d8	*107*	*77-122*				
4-Bromofluorobenzene	*108*	*73-124*				

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

VOLATILES by EPA 8260C
page 1 of 2

Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW29D-34.5-35**					
Laboratory ID:	06-227-08					
Dichlorodifluoromethane	ND	0.0014	EPA 8260C	6-26-13	6-26-13	
Chloromethane	ND	0.0049	EPA 8260C	6-26-13	6-26-13	
Vinyl Chloride	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
Bromomethane	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
Chloroethane	ND	0.0049	EPA 8260C	6-26-13	6-26-13	
Trichlorofluoromethane	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
1,1-Dichloroethene	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
Acetone	ND	0.0049	EPA 8260C	6-26-13	6-26-13	
Iodomethane	ND	0.0049	EPA 8260C	6-26-13	6-26-13	
Carbon Disulfide	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
Methylene Chloride	ND	0.0062	EPA 8260C	6-26-13	6-26-13	
(trans) 1,2-Dichloroethene	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
Methyl t-Butyl Ether	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
1,1-Dichloroethane	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
Vinyl Acetate	ND	0.0049	EPA 8260C	6-26-13	6-26-13	
2,2-Dichloropropane	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
(cis) 1,2-Dichloroethene	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
2-Butanone	ND	0.0049	EPA 8260C	6-26-13	6-26-13	
Bromochloromethane	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
Chloroform	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
1,1,1-Trichloroethane	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
Carbon Tetrachloride	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
1,1-Dichloropropene	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
Benzene	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
1,2-Dichloroethane	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
Trichloroethene	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
1,2-Dichloropropane	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
Dibromomethane	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
Bromodichloromethane	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
2-Chloroethyl Vinyl Ether	ND	0.0049	EPA 8260C	6-26-13	6-26-13	
(cis) 1,3-Dichloropropene	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
Methyl Isobutyl Ketone	ND	0.0049	EPA 8260C	6-26-13	6-26-13	
Toluene	ND	0.0098	EPA 8260C	6-26-13	6-26-13	
(trans) 1,3-Dichloropropene	ND	0.00098	EPA 8260C	6-26-13	6-26-13	

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

VOLATILES by EPA 8260C
page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW29D-34.5-35**					
Laboratory ID:	06-227-08					
1,1,2-Trichloroethane	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
Tetrachloroethene	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
1,3-Dichloropropane	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
2-Hexanone	ND	0.0049	EPA 8260C	6-26-13	6-26-13	
Dibromochloromethane	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
1,2-Dibromoethane	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
Chlorobenzene	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
1,1,1,2-Tetrachloroethane	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
Ethylbenzene	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
m,p-Xylene	ND	0.0020	EPA 8260C	6-26-13	6-26-13	
o-Xylene	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
Styrene	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
Bromoform	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
Isopropylbenzene	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
Bromobenzene	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
1,1,2,2-Tetrachloroethane	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
1,2,3-Trichloropropane	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
n-Propylbenzene	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
2-Chlorotoluene	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
4-Chlorotoluene	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
1,3,5-Trimethylbenzene	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
tert-Butylbenzene	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
1,2,4-Trimethylbenzene	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
sec-Butylbenzene	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
1,3-Dichlorobenzene	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
p-Isopropyltoluene	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
1,4-Dichlorobenzene	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
1,2-Dichlorobenzene	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
n-Butylbenzene	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
1,2-Dibromo-3-chloropropane	ND	0.0049	EPA 8260C	6-26-13	6-26-13	
1,2,4-Trichlorobenzene	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
Hexachlorobutadiene	ND	0.0049	EPA 8260C	6-26-13	6-26-13	
Naphthalene	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
1,2,3-Trichlorobenzene	ND	0.00098	EPA 8260C	6-26-13	6-26-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*95*	*65-129*				
Toluene-d8	*98*	*77-122*				
4-Bromofluorobenzene	*100*	*73-124*				

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

VOLATILES by EPA 8260C
page 1 of 2

Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW29D-22-23**					
Laboratory ID:	06-227-09					
Dichlorodifluoromethane	ND	0.0013	EPA 8260C	6-26-13	6-26-13	
Chloromethane	ND	0.0046	EPA 8260C	6-26-13	6-26-13	
Vinyl Chloride	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
Bromomethane	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
Chloroethane	ND	0.0046	EPA 8260C	6-26-13	6-26-13	
Trichlorofluoromethane	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
1,1-Dichloroethene	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
Acetone	ND	0.0046	EPA 8260C	6-26-13	6-26-13	
Iodomethane	ND	0.0046	EPA 8260C	6-26-13	6-26-13	
Carbon Disulfide	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
Methylene Chloride	ND	0.0059	EPA 8260C	6-26-13	6-26-13	
(trans) 1,2-Dichloroethene	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
Methyl t-Butyl Ether	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
1,1-Dichloroethane	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
Vinyl Acetate	ND	0.0046	EPA 8260C	6-26-13	6-26-13	
2,2-Dichloropropane	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
(cis) 1,2-Dichloroethene	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
2-Butanone	ND	0.0046	EPA 8260C	6-26-13	6-26-13	
Bromochloromethane	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
Chloroform	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
1,1,1-Trichloroethane	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
Carbon Tetrachloride	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
1,1-Dichloropropene	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
Benzene	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
1,2-Dichloroethane	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
Trichloroethene	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
1,2-Dichloropropane	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
Dibromomethane	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
Bromodichloromethane	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
2-Chloroethyl Vinyl Ether	ND	0.0046	EPA 8260C	6-26-13	6-26-13	
(cis) 1,3-Dichloropropene	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
Methyl Isobutyl Ketone	ND	0.0046	EPA 8260C	6-26-13	6-26-13	
Toluene	ND	0.0092	EPA 8260C	6-26-13	6-26-13	
(trans) 1,3-Dichloropropene	ND	0.00092	EPA 8260C	6-26-13	6-26-13	

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

VOLATILES by EPA 8260C
page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW29D-22-23**					
Laboratory ID:	06-227-09					
1,1,2-Trichloroethane	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
Tetrachloroethene	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
1,3-Dichloropropane	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
2-Hexanone	ND	0.0046	EPA 8260C	6-26-13	6-26-13	
Dibromochloromethane	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
1,2-Dibromoethane	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
Chlorobenzene	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
1,1,1,2-Tetrachloroethane	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
Ethylbenzene	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
m,p-Xylene	ND	0.0018	EPA 8260C	6-26-13	6-26-13	
o-Xylene	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
Styrene	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
Bromoform	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
Isopropylbenzene	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
Bromobenzene	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
1,1,2,2-Tetrachloroethane	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
1,2,3-Trichloropropane	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
n-Propylbenzene	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
2-Chlorotoluene	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
4-Chlorotoluene	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
1,3,5-Trimethylbenzene	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
tert-Butylbenzene	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
1,2,4-Trimethylbenzene	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
sec-Butylbenzene	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
1,3-Dichlorobenzene	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
p-Isopropyltoluene	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
1,4-Dichlorobenzene	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
1,2-Dichlorobenzene	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
n-Butylbenzene	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
1,2-Dibromo-3-chloropropane	ND	0.0046	EPA 8260C	6-26-13	6-26-13	
1,2,4-Trichlorobenzene	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
Hexachlorobutadiene	ND	0.0046	EPA 8260C	6-26-13	6-26-13	
Naphthalene	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
1,2,3-Trichlorobenzene	ND	0.00092	EPA 8260C	6-26-13	6-26-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*109*	*65-129*				
Toluene-d8	*108*	*77-122*				
4-Bromofluorobenzene	*104*	*73-124*				

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

VOLATILES by EPA 8260C
page 1 of 2

Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW29D-37.5-38**					
Laboratory ID:	06-227-10					
Dichlorodifluoromethane	ND	0.0016	EPA 8260C	6-26-13	6-26-13	
Chloromethane	ND	0.0057	EPA 8260C	6-26-13	6-26-13	
Vinyl Chloride	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
Bromomethane	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
Chloroethane	ND	0.0057	EPA 8260C	6-26-13	6-26-13	
Trichlorofluoromethane	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
1,1-Dichloroethene	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
Acetone	ND	0.0057	EPA 8260C	6-26-13	6-26-13	
Iodomethane	ND	0.0057	EPA 8260C	6-26-13	6-26-13	
Carbon Disulfide	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
Methylene Chloride	ND	0.0073	EPA 8260C	6-26-13	6-26-13	
(trans) 1,2-Dichloroethene	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
Methyl t-Butyl Ether	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
1,1-Dichloroethane	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
Vinyl Acetate	ND	0.0057	EPA 8260C	6-26-13	6-26-13	
2,2-Dichloropropane	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
(cis) 1,2-Dichloroethene	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
2-Butanone	ND	0.0057	EPA 8260C	6-26-13	6-26-13	
Bromochloromethane	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
Chloroform	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
1,1,1-Trichloroethane	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
Carbon Tetrachloride	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
1,1-Dichloropropene	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
Benzene	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
1,2-Dichloroethane	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
Trichloroethene	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
1,2-Dichloropropane	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
Dibromomethane	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
Bromodichloromethane	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
2-Chloroethyl Vinyl Ether	ND	0.0057	EPA 8260C	6-26-13	6-26-13	
(cis) 1,3-Dichloropropene	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
Methyl Isobutyl Ketone	ND	0.0057	EPA 8260C	6-26-13	6-26-13	
Toluene	ND	0.011	EPA 8260C	6-26-13	6-26-13	
(trans) 1,3-Dichloropropene	ND	0.0011	EPA 8260C	6-26-13	6-26-13	

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

VOLATILES by EPA 8260C
page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW29D-37.5-38**					
Laboratory ID:	06-227-10					
1,1,2-Trichloroethane	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
Tetrachloroethene	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
1,3-Dichloropropane	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
2-Hexanone	ND	0.0057	EPA 8260C	6-26-13	6-26-13	
Dibromochloromethane	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
1,2-Dibromoethane	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
Chlorobenzene	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
1,1,1,2-Tetrachloroethane	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
Ethylbenzene	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
m,p-Xylene	ND	0.0023	EPA 8260C	6-26-13	6-26-13	
o-Xylene	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
Styrene	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
Bromoform	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
Isopropylbenzene	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
Bromobenzene	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
1,1,2,2-Tetrachloroethane	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
1,2,3-Trichloropropane	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
n-Propylbenzene	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
2-Chlorotoluene	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
4-Chlorotoluene	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
1,3,5-Trimethylbenzene	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
tert-Butylbenzene	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
1,2,4-Trimethylbenzene	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
sec-Butylbenzene	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
1,3-Dichlorobenzene	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
p-Isopropyltoluene	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
1,4-Dichlorobenzene	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
1,2-Dichlorobenzene	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
n-Butylbenzene	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
1,2-Dibromo-3-chloropropane	ND	0.0057	EPA 8260C	6-26-13	6-26-13	
1,2,4-Trichlorobenzene	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
Hexachlorobutadiene	ND	0.0057	EPA 8260C	6-26-13	6-26-13	
Naphthalene	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
1,2,3-Trichlorobenzene	ND	0.0011	EPA 8260C	6-26-13	6-26-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*100*	*65-129*				
Toluene-d8	*102*	*77-122*				
4-Bromofluorobenzene	*99*	*73-124*				

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

PAHs by EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW28-23-24**					
Laboratory ID:	06-227-01					
Naphthalene	**ND**	0.0076	EPA 8270D/SIM	6-27-13	7-1-13	
2-Methylnaphthalene	**ND**	0.0076	EPA 8270D/SIM	6-27-13	7-1-13	
1-Methylnaphthalene	**ND**	0.0076	EPA 8270D/SIM	6-27-13	7-1-13	
Acenaphthylene	**ND**	0.0076	EPA 8270D/SIM	6-27-13	7-1-13	
Acenaphthene	**ND**	0.0076	EPA 8270D/SIM	6-27-13	7-1-13	
Fluorene	**ND**	0.0076	EPA 8270D/SIM	6-27-13	7-1-13	
Phenanthrene	**ND**	0.0076	EPA 8270D/SIM	6-27-13	7-1-13	
Anthracene	**ND**	0.0076	EPA 8270D/SIM	6-27-13	7-1-13	
Fluoranthene	**ND**	0.0076	EPA 8270D/SIM	6-27-13	7-1-13	
Pyrene	**ND**	0.0076	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[a]anthracene	**ND**	0.0076	EPA 8270D/SIM	6-27-13	7-1-13	
Chrysene	**ND**	0.0076	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[b]fluoranthene	**ND**	0.0076	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo(j,k)fluoranthene	**ND**	0.0076	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[a]pyrene	**ND**	0.0076	EPA 8270D/SIM	6-27-13	7-1-13	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0076	EPA 8270D/SIM	6-27-13	7-1-13	
Dibenz[a,h]anthracene	**ND**	0.0076	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[g,h,i]perylene	**ND**	0.0076	EPA 8270D/SIM	6-27-13	7-1-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*81*	*43 - 116*				
Pyrene-d10	*87*	*33 - 124*				
Terphenyl-d14	*79*	*38 - 125*				

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

PAHs by EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW28-27-28**					
Laboratory ID:	06-227-02					
Naphthalene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
2-Methylnaphthalene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
1-Methylnaphthalene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
Acenaphthylene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
Acenaphthene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
Fluorene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
Phenanthrene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
Anthracene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
Fluoranthene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
Pyrene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[a]anthracene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
Chrysene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[b]fluoranthene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo(j,k)fluoranthene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[a]pyrene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
Dibenz[a,h]anthracene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[g,h,i]perylene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*69*	*43 - 116*				
Pyrene-d10	*74*	*33 - 124*				
Terphenyl-d14	*68*	*38 - 125*				

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

PAHs by EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW28-39-40**					
Laboratory ID:	06-227-03					
Naphthalene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
2-Methylnaphthalene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
1-Methylnaphthalene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
Acenaphthylene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
Acenaphthene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
Fluorene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
Phenanthrene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
Anthracene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
Fluoranthene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
Pyrene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[a]anthracene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
Chrysene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[b]fluoranthene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo(j,k)fluoranthene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[a]pyrene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
Dibenz[a,h]anthracene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[g,h,i]perylene	**ND**	0.0083	EPA 8270D/SIM	6-27-13	7-1-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*88*	*43 - 116*				
Pyrene-d10	*94*	*33 - 124*				
Terphenyl-d14	*89*	*38 - 125*				

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

PAHs by EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW29D-7-7.25**					
Laboratory ID:	06-227-04					
Naphthalene	**ND**	0.0075	EPA 8270D/SIM	6-27-13	7-1-13	
2-Methylnaphthalene	**ND**	0.0075	EPA 8270D/SIM	6-27-13	7-1-13	
1-Methylnaphthalene	**ND**	0.0075	EPA 8270D/SIM	6-27-13	7-1-13	
Acenaphthylene	**ND**	0.0075	EPA 8270D/SIM	6-27-13	7-1-13	
Acenaphthene	**ND**	0.0075	EPA 8270D/SIM	6-27-13	7-1-13	
Fluorene	**ND**	0.0075	EPA 8270D/SIM	6-27-13	7-1-13	
Phenanthrene	**ND**	0.0075	EPA 8270D/SIM	6-27-13	7-1-13	
Anthracene	**ND**	0.0075	EPA 8270D/SIM	6-27-13	7-1-13	
Fluoranthene	**ND**	0.0075	EPA 8270D/SIM	6-27-13	7-1-13	
Pyrene	**ND**	0.0075	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[a]anthracene	**ND**	0.0075	EPA 8270D/SIM	6-27-13	7-1-13	
Chrysene	**ND**	0.0075	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[b]fluoranthene	**ND**	0.0075	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo(j,k)fluoranthene	**ND**	0.0075	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[a]pyrene	**ND**	0.0075	EPA 8270D/SIM	6-27-13	7-1-13	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0075	EPA 8270D/SIM	6-27-13	7-1-13	
Dibenz[a,h]anthracene	**ND**	0.0075	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[g,h,i]perylene	**ND**	0.0075	EPA 8270D/SIM	6-27-13	7-1-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*88*	*43 - 116*				
Pyrene-d10	*94*	*33 - 124*				
Terphenyl-d14	*86*	*38 - 125*				

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

PAHs by EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW29D-9-9.5**					
Laboratory ID:	06-227-05					
Naphthalene	**ND**	0.0073	EPA 8270D/SIM	6-27-13	7-1-13	
2-Methylnaphthalene	**ND**	0.0073	EPA 8270D/SIM	6-27-13	7-1-13	
1-Methylnaphthalene	**ND**	0.0073	EPA 8270D/SIM	6-27-13	7-1-13	
Acenaphthylene	**ND**	0.0073	EPA 8270D/SIM	6-27-13	7-1-13	
Acenaphthene	**ND**	0.0073	EPA 8270D/SIM	6-27-13	7-1-13	
Fluorene	**ND**	0.0073	EPA 8270D/SIM	6-27-13	7-1-13	
Phenanthrene	**ND**	0.0073	EPA 8270D/SIM	6-27-13	7-1-13	
Anthracene	**ND**	0.0073	EPA 8270D/SIM	6-27-13	7-1-13	
Fluoranthene	**ND**	0.0073	EPA 8270D/SIM	6-27-13	7-1-13	
Pyrene	**ND**	0.0073	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[a]anthracene	**ND**	0.0073	EPA 8270D/SIM	6-27-13	7-1-13	
Chrysene	**ND**	0.0073	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[b]fluoranthene	**ND**	0.0073	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo(j,k)fluoranthene	**ND**	0.0073	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[a]pyrene	**ND**	0.0073	EPA 8270D/SIM	6-27-13	7-1-13	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0073	EPA 8270D/SIM	6-27-13	7-1-13	
Dibenz[a,h]anthracene	**ND**	0.0073	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[g,h,i]perylene	**ND**	0.0073	EPA 8270D/SIM	6-27-13	7-1-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*77*	*43 - 116*				
Pyrene-d10	*82*	*33 - 124*				
Terphenyl-d14	*74*	*38 - 125*				

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

PAHs by EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW29D-17-18**					
Laboratory ID:	06-227-06					
Naphthalene	**ND**	0.0078	EPA 8270D/SIM	6-27-13	7-1-13	
2-Methylnaphthalene	**ND**	0.0078	EPA 8270D/SIM	6-27-13	7-1-13	
1-Methylnaphthalene	**ND**	0.0078	EPA 8270D/SIM	6-27-13	7-1-13	
Acenaphthylene	**ND**	0.0078	EPA 8270D/SIM	6-27-13	7-1-13	
Acenaphthene	**ND**	0.0078	EPA 8270D/SIM	6-27-13	7-1-13	
Fluorene	**ND**	0.0078	EPA 8270D/SIM	6-27-13	7-1-13	
Phenanthrene	**ND**	0.0078	EPA 8270D/SIM	6-27-13	7-1-13	
Anthracene	**ND**	0.0078	EPA 8270D/SIM	6-27-13	7-1-13	
Fluoranthene	**ND**	0.0078	EPA 8270D/SIM	6-27-13	7-1-13	
Pyrene	**ND**	0.0078	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[a]anthracene	**ND**	0.0078	EPA 8270D/SIM	6-27-13	7-1-13	
Chrysene	**ND**	0.0078	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[b]fluoranthene	**ND**	0.0078	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo(j,k)fluoranthene	**ND**	0.0078	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[a]pyrene	**ND**	0.0078	EPA 8270D/SIM	6-27-13	7-1-13	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0078	EPA 8270D/SIM	6-27-13	7-1-13	
Dibenz[a,h]anthracene	**ND**	0.0078	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[g,h,i]perylene	**ND**	0.0078	EPA 8270D/SIM	6-27-13	7-1-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*71*	*43 - 116*				
Pyrene-d10	*77*	*33 - 124*				
Terphenyl-d14	*70*	*38 - 125*				

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

PAHs by EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW29D-20-20.5**					
Laboratory ID:	06-227-07					
Naphthalene	**ND**	0.0074	EPA 8270D/SIM	6-27-13	7-1-13	
2-Methylnaphthalene	**ND**	0.0074	EPA 8270D/SIM	6-27-13	7-1-13	
1-Methylnaphthalene	**ND**	0.0074	EPA 8270D/SIM	6-27-13	7-1-13	
Acenaphthylene	**ND**	0.0074	EPA 8270D/SIM	6-27-13	7-1-13	
Acenaphthene	**ND**	0.0074	EPA 8270D/SIM	6-27-13	7-1-13	
Fluorene	**ND**	0.0074	EPA 8270D/SIM	6-27-13	7-1-13	
Phenanthrene	**ND**	0.0074	EPA 8270D/SIM	6-27-13	7-1-13	
Anthracene	**ND**	0.0074	EPA 8270D/SIM	6-27-13	7-1-13	
Fluoranthene	**ND**	0.0074	EPA 8270D/SIM	6-27-13	7-1-13	
Pyrene	**ND**	0.0074	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[a]anthracene	**ND**	0.0074	EPA 8270D/SIM	6-27-13	7-1-13	
Chrysene	**ND**	0.0074	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[b]fluoranthene	**ND**	0.0074	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo(j,k)fluoranthene	**ND**	0.0074	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[a]pyrene	**ND**	0.0074	EPA 8270D/SIM	6-27-13	7-1-13	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0074	EPA 8270D/SIM	6-27-13	7-1-13	
Dibenz[a,h]anthracene	**ND**	0.0074	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[g,h,i]perylene	**ND**	0.0074	EPA 8270D/SIM	6-27-13	7-1-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*81*	*43 - 116*				
Pyrene-d10	*89*	*33 - 124*				
Terphenyl-d14	*81*	*38 - 125*				

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

PAHs by EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW29D-34.5-35**					
Laboratory ID:	06-227-08					
Naphthalene	**ND**	0.0087	EPA 8270D/SIM	6-27-13	7-1-13	
2-Methylnaphthalene	**ND**	0.0087	EPA 8270D/SIM	6-27-13	7-1-13	
1-Methylnaphthalene	**ND**	0.0087	EPA 8270D/SIM	6-27-13	7-1-13	
Acenaphthylene	**ND**	0.0087	EPA 8270D/SIM	6-27-13	7-1-13	
Acenaphthene	**ND**	0.0087	EPA 8270D/SIM	6-27-13	7-1-13	
Fluorene	**ND**	0.0087	EPA 8270D/SIM	6-27-13	7-1-13	
Phenanthrene	**ND**	0.0087	EPA 8270D/SIM	6-27-13	7-1-13	
Anthracene	**ND**	0.0087	EPA 8270D/SIM	6-27-13	7-1-13	
Fluoranthene	**ND**	0.0087	EPA 8270D/SIM	6-27-13	7-1-13	
Pyrene	**ND**	0.0087	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[a]anthracene	**ND**	0.0087	EPA 8270D/SIM	6-27-13	7-1-13	
Chrysene	**ND**	0.0087	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[b]fluoranthene	**ND**	0.0087	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo(j,k)fluoranthene	**ND**	0.0087	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[a]pyrene	**ND**	0.0087	EPA 8270D/SIM	6-27-13	7-1-13	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0087	EPA 8270D/SIM	6-27-13	7-1-13	
Dibenz[a,h]anthracene	**ND**	0.0087	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[g,h,i]perylene	**ND**	0.0087	EPA 8270D/SIM	6-27-13	7-1-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*79*	*43 - 116*				
Pyrene-d10	*80*	*33 - 124*				
Terphenyl-d14	*73*	*38 - 125*				

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

PAHs by EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW29D-22-23**					
Laboratory ID:	06-227-09					
Naphthalene	**ND**	0.0081	EPA 8270D/SIM	6-27-13	7-1-13	
2-Methylnaphthalene	**ND**	0.0081	EPA 8270D/SIM	6-27-13	7-1-13	
1-Methylnaphthalene	**ND**	0.0081	EPA 8270D/SIM	6-27-13	7-1-13	
Acenaphthylene	**ND**	0.0081	EPA 8270D/SIM	6-27-13	7-1-13	
Acenaphthene	**ND**	0.0081	EPA 8270D/SIM	6-27-13	7-1-13	
Fluorene	**ND**	0.0081	EPA 8270D/SIM	6-27-13	7-1-13	
Phenanthrene	**ND**	0.0081	EPA 8270D/SIM	6-27-13	7-1-13	
Anthracene	**ND**	0.0081	EPA 8270D/SIM	6-27-13	7-1-13	
Fluoranthene	**ND**	0.0081	EPA 8270D/SIM	6-27-13	7-1-13	
Pyrene	**ND**	0.0081	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[a]anthracene	**ND**	0.0081	EPA 8270D/SIM	6-27-13	7-1-13	
Chrysene	**ND**	0.0081	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[b]fluoranthene	**ND**	0.0081	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo(j,k)fluoranthene	**ND**	0.0081	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[a]pyrene	**ND**	0.0081	EPA 8270D/SIM	6-27-13	7-1-13	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0081	EPA 8270D/SIM	6-27-13	7-1-13	
Dibenz[a,h]anthracene	**ND**	0.0081	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[g,h,i]perylene	**ND**	0.0081	EPA 8270D/SIM	6-27-13	7-1-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*67*	*43 - 116*				
Pyrene-d10	*76*	*33 - 124*				
Terphenyl-d14	*68*	*38 - 125*				

Date of Report: July 2, 2013
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Project: 0183-085-00

PAHs by EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW29D-37.5-38**					
Laboratory ID:	06-227-10					
Naphthalene	**ND**	0.0086	EPA 8270D/SIM	6-27-13	7-1-13	
2-Methylnaphthalene	**ND**	0.0086	EPA 8270D/SIM	6-27-13	7-1-13	
1-Methylnaphthalene	**ND**	0.0086	EPA 8270D/SIM	6-27-13	7-1-13	
Acenaphthylene	**ND**	0.0086	EPA 8270D/SIM	6-27-13	7-1-13	
Acenaphthene	**ND**	0.0086	EPA 8270D/SIM	6-27-13	7-1-13	
Fluorene	**ND**	0.0086	EPA 8270D/SIM	6-27-13	7-1-13	
Phenanthrene	**ND**	0.0086	EPA 8270D/SIM	6-27-13	7-1-13	
Anthracene	**ND**	0.0086	EPA 8270D/SIM	6-27-13	7-1-13	
Fluoranthene	**ND**	0.0086	EPA 8270D/SIM	6-27-13	7-1-13	
Pyrene	**ND**	0.0086	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[a]anthracene	**ND**	0.0086	EPA 8270D/SIM	6-27-13	7-1-13	
Chrysene	**ND**	0.0086	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[b]fluoranthene	**ND**	0.0086	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo(j,k)fluoranthene	**ND**	0.0086	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[a]pyrene	**ND**	0.0086	EPA 8270D/SIM	6-27-13	7-1-13	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0086	EPA 8270D/SIM	6-27-13	7-1-13	
Dibenz[a,h]anthracene	**ND**	0.0086	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[g,h,i]perylene	**ND**	0.0086	EPA 8270D/SIM	6-27-13	7-1-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*80*	*43 - 116*				
Pyrene-d10	*84*	*33 - 124*				
Terphenyl-d14	*73*	*38 - 125*				

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

TOTAL METALS
EPA 6010C/7471B

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	06-227-01					
Client ID:	**UG-MW28-23-24**					
Arsenic	**ND**	11	6010C	6-28-13	6-28-13	
Barium	**50**	2.9	6010C	6-28-13	6-28-13	
Cadmium	**ND**	0.57	6010C	6-28-13	6-28-13	
Chromium	**20**	0.57	6010C	6-28-13	6-28-13	
Lead	**ND**	5.7	6010C	6-28-13	6-28-13	
Mercury	**ND**	0.29	7471B	6-26-13	6-26-13	
Selenium	**ND**	11	6010C	6-28-13	6-28-13	
Silver	**ND**	1.1	6010C	6-28-13	6-28-13	
Lab ID:	06-227-02					
Client ID:	**UG-MW28-27-28**					
Arsenic	**ND**	12	6010C	6-28-13	6-28-13	
Barium	**120**	3.1	6010C	6-28-13	6-28-13	
Cadmium	**ND**	0.62	6010C	6-28-13	6-28-13	
Chromium	**60**	0.62	6010C	6-28-13	6-28-13	
Lead	**ND**	6.2	6010C	6-28-13	6-28-13	
Mercury	**ND**	0.31	7471B	6-26-13	6-26-13	
Selenium	**ND**	12	6010C	6-28-13	6-28-13	
Silver	**ND**	1.2	6010C	6-28-13	6-28-13	

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

TOTAL METALS
EPA 6010C/7471B

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	06-227-03					
Client ID:	**UG-MW28-39-40**					
Arsenic	**ND**	12	6010C	6-28-13	6-28-13	
Barium	**90**	3.1	6010C	6-28-13	6-28-13	
Cadmium	**ND**	0.62	6010C	6-28-13	6-28-13	
Chromium	**49**	0.62	6010C	6-28-13	6-28-13	
Lead	**ND**	6.2	6010C	6-28-13	6-28-13	
Mercury	**ND**	0.31	7471B	6-26-13	6-26-13	
Selenium	**ND**	12	6010C	6-28-13	6-28-13	
Silver	**ND**	1.2	6010C	6-28-13	6-28-13	

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	06-227-04					
Client ID:	**UG-MW29D-7-7.25**					
Arsenic	**ND**	11	6010C	6-28-13	6-28-13	
Barium	**40**	2.8	6010C	6-28-13	6-28-13	
Cadmium	**ND**	0.56	6010C	6-28-13	6-28-13	
Chromium	**53**	0.56	6010C	6-28-13	6-28-13	
Lead	**ND**	5.6	6010C	6-28-13	6-28-13	
Mercury	**ND**	0.28	7471B	6-26-13	6-26-13	
Selenium	**ND**	11	6010C	6-28-13	6-28-13	
Silver	**ND**	1.1	6010C	6-28-13	6-28-13	

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

TOTAL METALS
EPA 6010C/7471B

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	06-227-05					
Client ID:	**UG-MW29D-9-9.5**					
Arsenic	**ND**	11	6010C	6-28-13	6-28-13	
Barium	**54**	2.7	6010C	6-28-13	6-28-13	
Cadmium	**ND**	0.55	6010C	6-28-13	6-28-13	
Chromium	**42**	0.55	6010C	6-28-13	6-28-13	
Lead	**ND**	5.5	6010C	6-28-13	6-28-13	
Mercury	**ND**	0.27	7471B	6-26-13	6-26-13	
Selenium	**ND**	11	6010C	6-28-13	6-28-13	
Silver	**ND**	1.1	6010C	6-28-13	6-28-13	

Lab ID:	06-227-06					
Client ID:	**UG-MW29D-17-18**					
Arsenic	**ND**	12	6010C	6-28-13	6-28-13	
Barium	**38**	2.9	6010C	6-28-13	6-28-13	
Cadmium	**ND**	0.59	6010C	6-28-13	6-28-13	
Chromium	**26**	0.59	6010C	6-28-13	6-28-13	
Lead	**ND**	5.9	6010C	6-28-13	6-28-13	
Mercury	**ND**	0.29	7471B	6-26-13	6-26-13	
Selenium	**ND**	12	6010C	6-28-13	6-28-13	
Silver	**ND**	1.2	6010C	6-28-13	6-28-13	

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

TOTAL METALS
EPA 6010C/7471B

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	06-227-07					
Client ID:	**UG-MW29D-20-20.5**					
Arsenic	**ND**	11	6010C	6-28-13	6-28-13	
Barium	**52**	2.8	6010C	6-28-13	6-28-13	
Cadmium	**ND**	0.55	6010C	6-28-13	6-28-13	
Chromium	**28**	0.55	6010C	6-28-13	6-28-13	
Lead	**ND**	5.5	6010C	6-28-13	6-28-13	
Mercury	**ND**	0.28	7471B	6-26-13	6-26-13	
Selenium	**ND**	11	6010C	6-28-13	6-28-13	
Silver	**ND**	1.1	6010C	6-28-13	6-28-13	

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	06-227-08					
Client ID:	**UG-MW29D-34.5-35**					
Arsenic	**ND**	13	6010C	6-28-13	6-28-13	
Barium	**42**	3.3	6010C	6-28-13	6-28-13	
Cadmium	**ND**	0.65	6010C	6-28-13	6-28-13	
Chromium	**32**	0.65	6010C	6-28-13	6-28-13	
Lead	**ND**	6.5	6010C	6-28-13	6-28-13	
Mercury	**ND**	0.33	7471B	6-26-13	6-26-13	
Selenium	**ND**	13	6010C	6-28-13	6-28-13	
Silver	**ND**	1.3	6010C	6-28-13	6-28-13	

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

TOTAL METALS
EPA 6010C/7471B

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	06-227-09					
Client ID:	**UG-MW29D-22-23**					
Arsenic	**ND**	12	6010C	6-28-13	6-28-13	
Barium	**140**	3.0	6010C	6-28-13	6-28-13	
Cadmium	**ND**	0.61	6010C	6-28-13	6-28-13	
Chromium	**87**	0.61	6010C	6-28-13	6-28-13	
Lead	**6.7**	6.1	6010C	6-28-13	6-28-13	
Mercury	**ND**	0.30	7471B	6-26-13	6-26-13	
Selenium	**ND**	12	6010C	6-28-13	6-28-13	
Silver	**ND**	1.2	6010C	6-28-13	6-28-13	

Lab ID:	06-227-10					
Client ID:	**UG-MW29D-37.5-38**					
Arsenic	**ND**	13	6010C	6-28-13	6-28-13	
Barium	**91**	3.2	6010C	6-28-13	6-28-13	
Cadmium	**ND**	0.64	6010C	6-28-13	6-28-13	
Chromium	**56**	0.64	6010C	6-28-13	6-28-13	
Lead	**ND**	6.4	6010C	6-28-13	6-28-13	
Mercury	**ND**	0.32	7471B	6-26-13	6-26-13	
Selenium	**ND**	13	6010C	6-28-13	6-28-13	
Silver	**ND**	1.3	6010C	6-28-13	6-28-13	

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

NWTPH-Gx
QUALITY CONTROL

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0627S2					
Gasoline	**ND**	5.0	NWTPH-Gx	6-27-13	6-27-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*97*	*71-121*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	06-227-02										
	ORIG	DUP									
Gasoline	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Surrogate:											
Fluorobenzene						*99*	*100*	*71-121*			

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

NWTPH-Dx
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0627S2					
Diesel Range Organics	**ND**	25	NWTPH-Dx	6-27-13	6-27-13	
Lube Oil Range Organics	**ND**	50	NWTPH-Dx	6-27-13	6-27-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*85*	*50-150*				

Analyte	Result		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE								
Laboratory ID:	06-227-04							
	ORIG	DUP						
Diesel Range Organics	**ND**	**ND**				NA	NA	
Lube Oil Range Organics	**ND**	**ND**				NA	NA	
Surrogate:								
o-Terphenyl			*85*	*90*	*50-150*			

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

VOLATILES by EPA 8260C
METHOD BLANK QUALITY CONTROL
page 1 of 2

Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0626S1					
Dichlorodifluoromethane	ND	0.0014	EPA 8260C	6-26-13	6-26-13	
Chloromethane	ND	0.0050	EPA 8260C	6-26-13	6-26-13	
Vinyl Chloride	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
Bromomethane	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
Chloroethane	ND	0.0050	EPA 8260C	6-26-13	6-26-13	
Trichlorofluoromethane	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
1,1-Dichloroethene	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
Acetone	ND	0.0050	EPA 8260C	6-26-13	6-26-13	
Iodomethane	ND	0.0050	EPA 8260C	6-26-13	6-26-13	
Carbon Disulfide	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
Methylene Chloride	ND	0.0064	EPA 8260C	6-26-13	6-26-13	
(trans) 1,2-Dichloroethene	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
Methyl t-Butyl Ether	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
1,1-Dichloroethane	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
Vinyl Acetate	ND	0.0050	EPA 8260C	6-26-13	6-26-13	
2,2-Dichloropropane	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
(cis) 1,2-Dichloroethene	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
2-Butanone	ND	0.0050	EPA 8260C	6-26-13	6-26-13	
Bromochloromethane	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
Chloroform	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
1,1,1-Trichloroethane	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
Carbon Tetrachloride	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
1,1-Dichloropropene	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
Benzene	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
1,2-Dichloroethane	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
Trichloroethene	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
1,2-Dichloropropane	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
Dibromomethane	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
Bromodichloromethane	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
2-Chloroethyl Vinyl Ether	ND	0.0050	EPA 8260C	6-26-13	6-26-13	
(cis) 1,3-Dichloropropene	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
Methyl Isobutyl Ketone	ND	0.0050	EPA 8260C	6-26-13	6-26-13	
Toluene	ND	0.0050	EPA 8260C	6-26-13	6-26-13	
(trans) 1,3-Dichloropropene	ND	0.0010	EPA 8260C	6-26-13	6-26-13	

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

VOLATILES by EPA 8260C
METHOD BLANK QUALITY CONTROL
page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0626S1					
1,1,2-Trichloroethane	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
Tetrachloroethene	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
1,3-Dichloropropane	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
2-Hexanone	ND	0.0050	EPA 8260C	6-26-13	6-26-13	
Dibromochloromethane	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
1,2-Dibromoethane	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
Chlorobenzene	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
1,1,1,2-Tetrachloroethane	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
Ethylbenzene	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
m,p-Xylene	ND	0.0020	EPA 8260C	6-26-13	6-26-13	
o-Xylene	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
Styrene	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
Bromoform	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
Isopropylbenzene	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
Bromobenzene	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
1,1,2,2-Tetrachloroethane	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
1,2,3-Trichloropropane	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
n-Propylbenzene	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
2-Chlorotoluene	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
4-Chlorotoluene	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
1,3,5-Trimethylbenzene	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
tert-Butylbenzene	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
1,2,4-Trimethylbenzene	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
sec-Butylbenzene	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
1,3-Dichlorobenzene	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
p-Isopropyltoluene	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
1,4-Dichlorobenzene	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
1,2-Dichlorobenzene	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
n-Butylbenzene	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
1,2-Dibromo-3-chloropropane	ND	0.0050	EPA 8260C	6-26-13	6-26-13	
1,2,4-Trichlorobenzene	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
Hexachlorobutadiene	ND	0.0050	EPA 8260C	6-26-13	6-26-13	
Naphthalene	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
1,2,3-Trichlorobenzene	ND	0.0010	EPA 8260C	6-26-13	6-26-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*110*	*65-129*				
Toluene-d8	*112*	*77-122*				
4-Bromofluorobenzene	*113*	*73-124*				

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

VOLATILES by EPA 8260C
SB/SBD QUALITY CONTROL

Matrix: Soil
Units: mg/kg

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS										
Laboratory ID:	SB0626S1									
	SB	SBD	SB	SBD	SB	SBD				
1,1-Dichloroethene	**0.0414**	**0.0401**	0.0500	0.0500	83	80	56-141	3	15	
Benzene	**0.0436**	**0.0434**	0.0500	0.0500	87	87	70-121	0	15	
Trichloroethene	**0.0462**	**0.0473**	0.0500	0.0500	92	95	74-118	2	15	
Toluene	**0.0464**	**0.0473**	0.0500	0.0500	93	95	75-120	2	15	
Chlorobenzene	**0.0556**	**0.0546**	0.0500	0.0500	111	109	75-120	2	15	
Surrogate:										
Dibromofluoromethane					*100*	*97*	*65-129*			
Toluene-d8					*99*	*101*	*77-122*			
4-Bromofluorobenzene					*102*	*100*	*73-124*			

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

PAHs by EPA 8270D/SIM
METHOD BLANK QUALITY CONTROL

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0627S2					
Naphthalene	**ND**	0.0067	EPA 8270D/SIM	6-27-13	7-1-13	
2-Methylnaphthalene	**ND**	0.0067	EPA 8270D/SIM	6-27-13	7-1-13	
1-Methylnaphthalene	**ND**	0.0067	EPA 8270D/SIM	6-27-13	7-1-13	
Acenaphthylene	**ND**	0.0067	EPA 8270D/SIM	6-27-13	7-1-13	
Acenaphthene	**ND**	0.0067	EPA 8270D/SIM	6-27-13	7-1-13	
Fluorene	**ND**	0.0067	EPA 8270D/SIM	6-27-13	7-1-13	
Phenanthrene	**ND**	0.0067	EPA 8270D/SIM	6-27-13	7-1-13	
Anthracene	**ND**	0.0067	EPA 8270D/SIM	6-27-13	7-1-13	
Fluoranthene	**ND**	0.0067	EPA 8270D/SIM	6-27-13	7-1-13	
Pyrene	**ND**	0.0067	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[a]anthracene	**ND**	0.0067	EPA 8270D/SIM	6-27-13	7-1-13	
Chrysene	**ND**	0.0067	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[b]fluoranthene	**ND**	0.0067	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo(j,k)fluoranthene	**ND**	0.0067	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[a]pyrene	**ND**	0.0067	EPA 8270D/SIM	6-27-13	7-1-13	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0067	EPA 8270D/SIM	6-27-13	7-1-13	
Dibenz[a,h]anthracene	**ND**	0.0067	EPA 8270D/SIM	6-27-13	7-1-13	
Benzo[g,h,i]perylene	**ND**	0.0067	EPA 8270D/SIM	6-27-13	7-1-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*87*	*43 - 116*				
Pyrene-d10	*91*	*33 - 124*				
Terphenyl-d14	*97*	*38 - 125*				

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

PAHs by EPA 8270D/SIM
MS/MSD QUALITY CONTROL

Matrix: Soil
Units: mg/Kg

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
MATRIX SPIKES											
Laboratory ID:	06-227-10										
	MS	MSD	MS	MSD		MS	MSD				
Naphthalene	**0.0603**	**0.0573**	0.0833	0.0833	ND	72	69	47 - 99	5	30	
Acenaphthylene	**0.0871**	**0.0836**	0.0833	0.0833	ND	105	100	41 - 118	4	26	
Acenaphthene	**0.0682**	**0.0651**	0.0833	0.0833	ND	82	78	43 - 112	5	28	
Fluorene	**0.0724**	**0.0706**	0.0833	0.0833	ND	87	85	41 - 119	3	25	
Phenanthrene	**0.0686**	**0.0664**	0.0833	0.0833	ND	82	80	40 - 115	3	24	
Anthracene	**0.0854**	**0.0865**	0.0833	0.0833	ND	103	104	41 - 117	1	25	
Fluoranthene	**0.0811**	**0.0802**	0.0833	0.0833	ND	97	96	36 -128	1	26	
Pyrene	**0.0779**	**0.0760**	0.0833	0.0833	ND	94	91	36 - 123	2	24	
Benzo[a]anthracene	**0.0874**	**0.0862**	0.0833	0.0833	ND	105	103	33 - 123	1	26	
Chrysene	**0.0684**	**0.0683**	0.0833	0.0833	ND	82	82	35 - 123	0	25	
Benzo[b]fluoranthene	**0.0871**	**0.0841**	0.0833	0.0833	ND	105	101	30 - 125	4	28	
Benzo(j,k)fluoranthene	**0.0748**	**0.0770**	0.0833	0.0833	ND	90	92	31 - 122	3	30	
Benzo[a]pyrene	**0.0742**	**0.0734**	0.0833	0.0833	ND	89	88	29 - 125	1	28	
Indeno(1,2,3-c,d)pyrene	**0.0835**	**0.0835**	0.0833	0.0833	ND	100	100	28 - 125	0	27	
Dibenz[a,h]anthracene	**0.0777**	**0.0786**	0.0833	0.0833	ND	93	94	32 - 124	1	27	
Benzo[g,h,i]perylene	**0.0716**	**0.0719**	0.0833	0.0833	ND	86	86	30 - 120	0	26	
Surrogate:											
2-Fluorobiphenyl						*83*	*81*	*43 - 116*			
Pyrene-d10						*86*	*86*	*33 - 124*			
Terphenyl-d14						*82*	*81*	*38 - 125*			

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

TOTAL METALS
EPA 6010C
METHOD BLANK QUALITY CONTROL

Date Extracted: 6-28-13
Date Analyzed: 6-28-13

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: MB0628SM1

Analyte	Method	Result	PQL
Arsenic	6010C	**ND**	10
Barium	6010C	**ND**	2.5
Cadmium	6010C	**ND**	0.50
Chromium	6010C	**ND**	0.50
Lead	6010C	**ND**	5.0
Selenium	6010C	**ND**	10
Silver	6010C	**ND**	1.0

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

TOTAL MERCURY
EPA 7471B
METHOD BLANK QUALITY CONTROL

Date Extracted:	6-26-13
Date Analyzed:	6-26-13
Matrix:	Soil
Units:	mg/kg (ppm)
Lab ID:	MB0626S1

Analyte	Method	Result	PQL
Mercury	7471B	**ND**	0.25

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

TOTAL METALS
EPA 6010C
DUPLICATE QUALITY CONTROL

Date Extracted: 6-28-13
Date Analyzed: 6-28-13

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: 06-227-05

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Arsenic	**ND**	**ND**	NA	10	
Barium	**49.9**	**46.4**	7	2.5	
Cadmium	**ND**	**ND**	NA	0.50	
Chromium	**38.1**	**34.0**	12	0.50	
Lead	**ND**	**ND**	NA	5.0	
Selenium	**ND**	**ND**	NA	10	
Silver	**ND**	**ND**	NA	1.0	

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

TOTAL MERCURY
EPA 7471B
DUPLICATE QUALITY CONTROL

Date Extracted: 6-26-13
Date Analyzed: 6-26-13

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: 06-198-06

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Mercury	**ND**	**ND**	NA	0.25	

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

TOTAL METALS
EPA 6010C
MS/MSD QUALITY CONTROL

Date Extracted: 6-28-13
Date Analyzed: 6-28-13

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: 06-227-05

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Arsenic	100	**92.5**	92	**91.3**	91	1	
Barium	100	**151**	102	**153**	103	1	
Cadmium	50.0	**47.7**	95	**47.9**	96	1	
Chromium	100	**129**	91	**131**	93	2	
Lead	250	**246**	98	**244**	98	1	
Selenium	100	**93.3**	93	**92.9**	93	0	
Silver	25.0	**19.8**	79	**19.6**	79	1	

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

TOTAL MERCURY
EPA 7471B
MS/MSD QUALITY CONTROL

Date Extracted: 6-26-13
Date Analyzed: 6-26-13

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: 06-198-06

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Mercury	0.500	**0.528**	106	**0.515**	103	3	

Date of Report: July 2, 2013
Samples Submitted: June 25, 2013
Laboratory Reference: 1306-227
Project: 0183-085-00

% MOISTURE

Date Analyzed: 6-26-13

Client ID	Lab ID	% Moisture
UG-MW28-23-24	06-227-01	13
UG-MW28-27-28	06-227-02	20
UG-MW28-39-40	06-227-03	20
UG-MW29D-7-7.25	06-227-04	11
UG-MW29D-9-9.5	06-227-05	8
UG-MW29D-17-18	06-227-06	15
UG-MW29D-20-20.5	06-227-07	10
UG-MW29D-34.5-35	06-227-08	23
UG-MW29D-22-23	06-227-09	18
UG-MW29D-37.5-38	06-227-10	22

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-napthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical ____________.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1- Sample extract treated with a Sulfuric acid/Silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in method 8260C, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

OnSite Environmental Inc.
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Chain of Custody

Laboratory Number: 06-227

Company: GeoEngineers
Project Number: 0183-085-00
Project Name: UWT PDA
Project Manager: Trizia DeOme
Sampled by: Aaron Waggoner

Turnaround Request (in working days)
(Check One)
☐ Same Day ☐ 1 Day
☐ 2 Days ☐ 3 Days
☒ Standard (7 Days) (TPH analysis 5 Days)
☐ ____ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Volatiles 8260C	Halogenated Volatiles 8260C	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals/MTCA Metals (circle one)	TCLP Metals	HEM (oil and grease) 1664A	Hold						% Moisture
1	UG-MW28-23-24	6/24/13	1215	Soil	5			X	X	X			X					X									X
2	UG-MW28-27-28	6/24/13	1615	Soil	5			X	X	X			X					X									X
3	UG-MW28-39-40	6/24/13	1725	Soil	5			X	X	X			X					X									X
4	UG-MW29D-7-7.25	6/25/13	0940	Soil	5			X	X	X			X					X									X
5	UG-MW29D-9-9.5	6/25/13	0945	Soil	5			X	X	X			X					X									X
6	UG-MW29D-17-18	6/25/13	1030	Soil	5			X	X	X			X					X									X
7	UG-MW29D-20-20.5	6/25/13	1110	Soil	5			X	X	X			X					X									X
8	UG-MW29D-34.5-35	6/25/13	1400	Soil	5			X	X	X			X					X									X
9	UG-MW29D-22-23	6/25/13	1430	Soil	5			X	X	X			X					X									X
10	UG MW29D 37.5-38	6/25/13	1445	soil	5			X	X	X			X					X									X

	Signature	Company	Date	Time
Relinquished	[signature]	GeoEngineers	6/25/13	~~1450~~ 1505
Received	[signature]	Speedy	6/25	1501
Relinquished	[signature]	Speedy	6/26	0914
Received	[signature]	OSE	6/25/13	1614
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions:

Chromatograms with final report ☐

Data Package: Level III ☐ Level IV ☐ Electronic Data Deliverables (EDDs) ☒ Equis 5

OnSite Environmental Inc.
14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

July 8, 2013

Tricia DeOme
GeoEngineers, Inc.
1101 Fawcett Avenue South, Suite 200
Tacoma, WA 98402

Re: Analytical Data for Project 0183-085-00
Laboratory Reference No. 1306-242

Dear Tricia:

Enclosed are the analytical results and associated quality control data for samples submitted on June 26, 2013.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

Case Narrative

Samples were collected on June 25, 2013 and received by the laboratory on June 26, 2013. They were maintained at the laboratory at a temperature of 2^oC to 6^oC.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

Volatiles EPA 8260C (soil) Analysis

Per EPA Method 5035A, samples were received by the laboratory in pre-weighed 40 mL VOA vials within 48 hours of sample collection. They were stored in a freezer at between -7^oC and -20^oC until extraction or analysis.

Internal Standard 1,4-Dichlorobenzene-d4 does not meet acceptance criteria for sample 1C-TP1-0-1 due to sample matrix effects. The sample was re-analyzed with similar results. All results, including Practical Quantitation Limits, from Bromobenzene onward should be considered estimates.

Any other QA/QC issues associated with this extraction and analysis will be indicated with a footnote reference and discussed in detail on the Data Qualifier page.

PAHs EPA 8270D/SIM Analysis

Samples 1C-TP1-0-1 and 1G-TP1-2-3 had one surrogate recovery out of control limits. This is within allowance of our standard operating procedure as long as the recovery is above 10%.

Any other QA/QC issues associated with this extraction and analysis will be indicated with a footnote reference and discussed in detail on the Data Qualifier page.

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

ANALYTICAL REPORT FOR SAMPLES

Client ID	Laboratory ID	Matrix	Date Sampled	Date Received	Notes
TRIP-130625	06-242-01	Water	---	6-26-13	
~~1D-TP2-0-1~~	~~06-242-02~~	~~Soil~~	~~6-25-13~~	~~6-26-13~~	
~~1D-TP2-3.5-4.5~~	~~06-242-03~~	~~Soil~~	~~6-25-13~~	~~6-26-13~~	
~~1C-TP1-0-1~~	~~06-242-05~~	~~Soil~~	~~6-25-13~~	~~6-26-13~~	
~~1C-TP1-2-3~~	~~06-242-06~~	~~Soil~~	~~6-25-13~~	~~6-26-13~~	
~~1C-TP2-0-1~~	~~06-242-08~~	~~Soil~~	~~6-25-13~~	~~6-26-13~~	
~~1C-TP2-3-4~~	~~06-242-09~~	~~Soil~~	~~6-25-13~~	~~6-26-13~~	
~~1C-TP2-6-7~~	~~06-242-10~~	~~Soil~~	~~6-25-13~~	~~6-26-13~~	
1H-TP1-0-1	06-242-11	Soil	6-25-13	6-26-13	
1H-TP1-5-6	06-242-12	Soil	6-25-13	6-26-13	
~~1G-TP1-0-1~~	~~06-242-13~~	~~Soil~~	~~6-25-13~~	~~6-26-13~~	
~~1G-TP1-2-3~~	~~06-242-14~~	~~Soil~~	~~6-25-13~~	~~6-26-13~~	
~~1G-TP1-4-5~~	~~06-242-15~~	~~Soil~~	~~6-25-13~~	~~6-26-13~~	
~~1G-TP2-0-1~~	~~06-242-16~~	~~Soil~~	~~6-25-13~~	~~6-26-13~~	
~~1G-TP2-3-4~~	~~06-242-17~~	~~Soil~~	~~6-25-13~~	~~6-26-13~~	
~~1G-TP2-6-7~~	~~06-242-18~~	~~Soil~~	~~6-25-13~~	~~6-26-13~~	

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

NWTPH-HCID

Matrix: Soil
Units: mg/Kg (ppm)

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	Date ~~Prepared~~	Date ~~Analyzed~~	~~Flags~~
~~**Client ID:**~~	~~**1D-TP2-0-1**~~					
~~Laboratory ID:~~	~~06-242-02~~					
~~Gasoline Range Organics~~	~~**ND**~~	~~25~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~Diesel Range Organics~~	~~**ND**~~	~~63~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~Lube Oil Range Organics~~	~~**ND**~~	~~130~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~*Surrogate:*~~	~~*Percent Recovery*~~	~~*Control Limits*~~				
~~*o-Terphenyl*~~	~~*96*~~	~~*50-150*~~				
~~**Client ID:**~~	~~**1D-TP2-3.5-4.5**~~					
~~Laboratory ID:~~	~~06-242-03~~					
~~Gasoline Range Organics~~	~~**ND**~~	~~25~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~Diesel Range Organics~~	~~**ND**~~	~~62~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~Lube Oil Range Organics~~	~~**ND**~~	~~120~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~*Surrogate:*~~	~~*Percent Recovery*~~	~~*Control Limits*~~				
~~*o-Terphenyl*~~	~~*92*~~	~~*50-150*~~				
~~**Client ID:**~~	~~**1C-TP1-0-1**~~					
~~Laboratory ID:~~	~~06-242-05~~					
~~Gasoline Range Organics~~	~~**ND**~~	~~27~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~Diesel Range Organics~~	~~**ND**~~	~~69~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~Lube Oil Range Organics~~	~~**ND**~~	~~140~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~*Surrogate:*~~	~~*Percent Recovery*~~	~~*Control Limits*~~				
~~*o-Terphenyl*~~	~~*96*~~	~~*50-150*~~				
~~**Client ID:**~~	~~**1C-TP1-2-3**~~					
~~Laboratory ID:~~	~~06-242-06~~					
~~Gasoline Range Organics~~	~~**ND**~~	~~23~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~Diesel Range Organics~~	~~**ND**~~	~~58~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~Lube Oil Range Organics~~	~~**ND**~~	~~120~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~*Surrogate:*~~	~~*Percent Recovery*~~	~~*Control Limits*~~				
~~*o-Terphenyl*~~	~~*93*~~	~~*50-150*~~				
~~**Client ID:**~~	~~**1C-TP2-0-1**~~					
~~Laboratory ID:~~	~~06-242-08~~					
~~Gasoline Range Organics~~	~~**ND**~~	~~21~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~Diesel Range Organics~~	~~**ND**~~	~~53~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~Lube Oil Range Organics~~	~~**ND**~~	~~110~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~*Surrogate:*~~	~~*Percent Recovery*~~	~~*Control Limits*~~				
~~*o-Terphenyl*~~	~~*101*~~	~~*50-150*~~				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

NWTPH-HCID

Matrix: Soil
Units: mg/Kg (ppm)

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	Date ~~Prepared~~	Date ~~Analyzed~~	~~Flags~~
~~**Client ID:**~~	~~**1C-TP2-3-4**~~					
~~Laboratory ID:~~	~~06-242-09~~					
~~Gasoline Range Organics~~	~~**ND**~~	~~25~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~Diesel Range Organics~~	~~**ND**~~	~~62~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~Lube Oil Range Organics~~	~~**ND**~~	~~120~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~*Surrogate:*~~	~~*Percent Recovery*~~	~~*Control Limits*~~				
~~*o-Terphenyl*~~	~~*95*~~	~~*50-150*~~				
~~**Client ID:**~~	~~**1C-TP2-6-7**~~					
~~Laboratory ID:~~	~~06-242-10~~					
~~Gasoline Range Organics~~	~~**ND**~~	~~25~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~Diesel Range Organics~~	~~**ND**~~	~~62~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~Lube Oil Range Organics~~	~~**ND**~~	~~130~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~*Surrogate:*~~	~~*Percent Recovery*~~	~~*Control Limits*~~				
~~*o-Terphenyl*~~	~~*91*~~	~~*50-150*~~				
Client ID:	**1H-TP1-0-1**					
Laboratory ID:	06-242-11					
Gasoline Range Organics	**ND**	22	NWTPH-HCID	6-27-13	6-27-13	
Diesel Range Organics	**ND**	55	NWTPH-HCID	6-27-13	6-27-13	
Lube Oil Range Organics	**ND**	110	NWTPH-HCID	6-27-13	6-27-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*93*	*50-150*				
Client ID:	**1H-TP1-5-6**					
Laboratory ID:	06-242-12					
Gasoline Range Organics	**ND**	21	NWTPH-HCID	6-27-13	6-27-13	
Diesel Range Organics	**ND**	53	NWTPH-HCID	6-27-13	6-27-13	
Lube Oil Range Organics	**ND**	110	NWTPH-HCID	6-27-13	6-27-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*95*	*50-150*				
~~**Client ID:**~~	~~**1G-TP1-0-1**~~					
~~Laboratory ID:~~	~~06-242-13~~					
~~Gasoline Range Organics~~	~~**ND**~~	~~22~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~Diesel Range Organics~~	~~**ND**~~	~~54~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~Lube Oil Range Organics~~	~~**ND**~~	~~110~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~*Surrogate:*~~	~~*Percent Recovery*~~	~~*Control Limits*~~				
~~*o-Terphenyl*~~	~~*99*~~	~~*50-150*~~				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

NWTPH-HCID

Matrix: Soil
Units: mg/Kg (ppm)

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	Date ~~Prepared~~	Date ~~Analyzed~~	~~Flags~~
~~Client ID:~~	**~~1G-TP1-2-3~~**					
~~Laboratory ID:~~	~~06-242-14~~					
~~Gasoline Range Organics~~	**~~ND~~**	~~22~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~Diesel Range Organics~~	**~~ND~~**	~~55~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~Lube Oil Range Organics~~	**~~ND~~**	~~110~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~Surrogate:~~	*~~Percent Recovery~~*	*~~Control Limits~~*				
~~o-Terphenyl~~	*~~95~~*	*~~50-150~~*				
~~Client ID:~~	**~~1G-TP1-4-5~~**					
~~Laboratory ID:~~	~~06-242-15~~					
~~Gasoline Range Organics~~	**~~ND~~**	~~22~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~Diesel Range Organics~~	**~~ND~~**	~~56~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~Lube Oil Range Organics~~	**~~ND~~**	~~110~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~Surrogate:~~	*~~Percent Recovery~~*	*~~Control Limits~~*				
~~o-Terphenyl~~	*~~100~~*	*~~50-150~~*				
~~Client ID:~~	**~~1G-TP2-0-1~~**					
~~Laboratory ID:~~	~~06-242-16~~					
~~Gasoline Range Organics~~	**~~ND~~**	~~23~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~Diesel Range Organics~~	**~~ND~~**	~~57~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~Lube Oil Range Organics~~	**~~ND~~**	~~110~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~Surrogate:~~	*~~Percent Recovery~~*	*~~Control Limits~~*				
~~o-Terphenyl~~	*~~103~~*	*~~50-150~~*				
~~Client ID:~~	**~~1G-TP2-3-4~~**					
~~Laboratory ID:~~	~~06-242-17~~					
~~Gasoline Range Organics~~	**~~ND~~**	~~24~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~Diesel Range Organics~~	**~~ND~~**	~~61~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~Lube Oil~~	**~~Detected~~**	~~120~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~Surrogate:~~	*~~Percent Recovery~~*	*~~Control Limits~~*				
~~o-Terphenyl~~	*~~101~~*	*~~50-150~~*				
~~Client ID:~~	**~~1G-TP2-6-7~~**					
~~Laboratory ID:~~	~~06-242-18~~					
~~Gasoline Range Organics~~	**~~ND~~**	~~24~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~Diesel Range Organics~~	**~~ND~~**	~~60~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~Lube Oil Range Organics~~	**~~ND~~**	~~120~~	~~NWTPH-HCID~~	~~6-27-13~~	~~6-27-13~~	
~~Surrogate:~~	*~~Percent Recovery~~*	*~~Control Limits~~*				
~~o-Terphenyl~~	*~~92~~*	*~~50-150~~*				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

NWTPH-Dx

Matrix: Soil
~~Units:~~ ~~mg/Kg (ppm)~~

~~**Analyte**~~	~~**Result**~~	~~**PQL**~~	~~**Method**~~	~~**Date Prepared**~~	~~**Date Analyzed**~~	~~**Flags**~~
~~**Client ID:**~~	~~**1G-TP2-3-4**~~					
~~Laboratory ID:~~	~~06-242-17~~					
~~Diesel Range Organics~~	~~**ND**~~	~~30~~	~~NWTPH-Dx~~	~~7-3-13~~	~~7-5-13~~	
~~Lube Oil~~	~~**99**~~	~~61~~	~~NWTPH-Dx~~	~~7-3-13~~	~~7-5-13~~	
~~*Surrogate:*~~	~~*Percent Recovery*~~	~~*Control Limits*~~				
o-Terphenyl	*78*	*50-150*				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

VOLATILES by EPA 8260C
page 1 of 2

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TRIP-130625**					
Laboratory ID:	06-242-01					
Dichlorodifluoromethane	ND	0.30	EPA 8260C	6-27-13	6-27-13	
Chloromethane	ND	1.0	EPA 8260C	6-27-13	6-27-13	
Vinyl Chloride	ND	0.10	EPA 8260C	6-27-13	6-27-13	
Bromomethane	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Chloroethane	ND	1.0	EPA 8260C	6-27-13	6-27-13	
Trichlorofluoromethane	ND	0.20	EPA 8260C	6-27-13	6-27-13	
1,1-Dichloroethene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Acetone	ND	5.0	EPA 8260C	6-27-13	6-27-13	
Iodomethane	ND	1.0	EPA 8260C	6-27-13	6-27-13	
Carbon Disulfide	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Methylene Chloride	ND	1.0	EPA 8260C	6-27-13	6-27-13	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Methyl t-Butyl Ether	ND	0.20	EPA 8260C	6-27-13	6-27-13	
1,1-Dichloroethane	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Vinyl Acetate	ND	1.0	EPA 8260C	6-27-13	6-27-13	
2,2-Dichloropropane	ND	0.20	EPA 8260C	6-27-13	6-27-13	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
2-Butanone	ND	5.0	EPA 8260C	6-27-13	6-27-13	
Bromochloromethane	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Chloroform	ND	0.20	EPA 8260C	6-27-13	6-27-13	
1,1,1-Trichloroethane	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Carbon Tetrachloride	ND	0.20	EPA 8260C	6-27-13	6-27-13	
1,1-Dichloropropene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Benzene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
1,2-Dichloroethane	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Trichloroethene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
1,2-Dichloropropane	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Dibromomethane	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Bromodichloromethane	ND	0.20	EPA 8260C	6-27-13	6-27-13	
2-Chloroethyl Vinyl Ether	ND	1.0	EPA 8260C	6-27-13	6-27-13	
(cis) 1,3-Dichloropropene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Methyl Isobutyl Ketone	ND	2.0	EPA 8260C	6-27-13	6-27-13	
Toluene	ND	1.0	EPA 8260C	6-27-13	6-27-13	
(trans) 1,3-Dichloropropene	ND	0.20	EPA 8260C	6-27-13	6-27-13	

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

VOLATILES by EPA 8260C
page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TRIP-130625**					
Laboratory ID:	06-242-01					
1,1,2-Trichloroethane	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Tetrachloroethene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
1,3-Dichloropropane	ND	0.20	EPA 8260C	6-27-13	6-27-13	
2-Hexanone	ND	2.0	EPA 8260C	6-27-13	6-27-13	
Dibromochloromethane	ND	0.20	EPA 8260C	6-27-13	6-27-13	
1,2-Dibromoethane	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Chlorobenzene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
1,1,1,2-Tetrachloroethane	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Ethylbenzene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
m,p-Xylene	ND	0.40	EPA 8260C	6-27-13	6-27-13	
o-Xylene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Styrene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Bromoform	ND	1.0	EPA 8260C	6-27-13	6-27-13	
Isopropylbenzene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Bromobenzene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
1,1,2,2-Tetrachloroethane	ND	0.20	EPA 8260C	6-27-13	6-27-13	
1,2,3-Trichloropropane	ND	0.20	EPA 8260C	6-27-13	6-27-13	
n-Propylbenzene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
2-Chlorotoluene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
4-Chlorotoluene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
1,3,5-Trimethylbenzene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
tert-Butylbenzene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
1,2,4-Trimethylbenzene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
sec-Butylbenzene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
1,3-Dichlorobenzene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
p-Isopropyltoluene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
1,4-Dichlorobenzene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
1,2-Dichlorobenzene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
n-Butylbenzene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
1,2-Dibromo-3-chloropropane	ND	1.0	EPA 8260C	6-27-13	6-27-13	
1,2,4-Trichlorobenzene	ND	0.26	EPA 8260C	6-27-13	6-27-13	
Hexachlorobutadiene	ND	0.25	EPA 8260C	6-27-13	6-27-13	
Naphthalene	ND	1.3	EPA 8260C	6-27-13	6-27-13	
1,2,3-Trichlorobenzene	ND	0.31	EPA 8260C	6-27-13	6-27-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*106*	*62-122*				
Toluene-d8	*102*	*70-120*				
4-Bromofluorobenzene	*100*	*71-120*				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

VOLATILES by EPA 8260C
page 1 of 2

Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
~~Client ID:~~	**~~1D-TP2-0-1~~**					
~~Laboratory ID:~~	~~06-242-02~~					
~~Dichlorodifluoromethane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chloromethane~~	~~ND~~	~~0.0068~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Vinyl Chloride~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromomethane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chloroethane~~	~~ND~~	~~0.0068~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Trichlorofluoromethane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1-Dichloroethene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Acetone~~	~~ND~~	~~0.0068~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Iodomethane~~	~~ND~~	~~0.0068~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Carbon Disulfide~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Methylene Chloride~~	~~ND~~	~~0.0068~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(trans) 1,2-Dichloroethene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Methyl t-Butyl Ether~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1-Dichloroethane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Vinyl Acetate~~	~~ND~~	~~0.0068~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2,2-Dichloropropane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(cis) 1,2-Dichloroethene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Butanone~~	~~ND~~	~~0.0068~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromochloromethane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chloroform~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1,1-Trichloroethane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Carbon Tetrachloride~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1-Dichloropropene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Benzene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dichloroethane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Trichloroethene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dichloropropane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Dibromomethane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromodichloromethane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Chloroethyl Vinyl Ether~~	~~ND~~	~~0.0068~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(cis) 1,3-Dichloropropene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Methyl Isobutyl Ketone~~	~~ND~~	~~0.0068~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Toluene~~	~~ND~~	~~0.014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(trans) 1,3-Dichloropropene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

VOLATILES by EPA 8260C
page 2 of 2

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	Date ~~Prepared~~	Date ~~Analyzed~~	~~Flags~~
~~Client ID:~~	**~~1D-TP2-0-1~~**					
~~Laboratory ID:~~	~~06-242-02~~					
~~1,1,2-Trichloroethane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Tetrachloroethene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3-Dichloropropane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Hexanone~~	~~ND~~	~~0.0068~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Dibromochloromethane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dibromoethane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chlorobenzene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1,1,2-Tetrachloroethane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Ethylbenzene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~m,p-Xylene~~	~~ND~~	~~0.0027~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~o-Xylene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Styrene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromoform~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Isopropylbenzene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromobenzene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1,2,2-Tetrachloroethane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,3-Trichloropropane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~n-Propylbenzene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Chlorotoluene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~4-Chlorotoluene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3,5-Trimethylbenzene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~tert-Butylbenzene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,4-Trimethylbenzene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~sec-Butylbenzene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3-Dichlorobenzene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~p-Isopropyltoluene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,4-Dichlorobenzene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dichlorobenzene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~n-Butylbenzene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dibromo-3-chloropropane~~	~~ND~~	~~0.0068~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,4-Trichlorobenzene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Hexachlorobutadiene~~	~~ND~~	~~0.0068~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Naphthalene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,3-Trichlorobenzene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Surrogate:~~	*~~Percent Recovery~~*	*~~Control Limits~~*				
~~Dibromofluoromethane~~	*~~109~~*	*~~65-129~~*				
~~Toluene-d8~~	*~~110~~*	*~~77-122~~*				
~~4-Bromofluorobenzene~~	*~~104~~*	*~~73-124~~*				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

VOLATILES by EPA 8260C
page 1 of 2

Matrix: Soil
Units: mg/kg

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	Date ~~Prepared~~	Date ~~Analyzed~~	~~Flags~~
~~**Client ID:**~~	~~**1D-TP2-3.5-4.5**~~					
~~Laboratory ID:~~	~~06-242-03~~					
~~Dichlorodifluoromethane~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chloromethane~~	~~ND~~	~~0.0048~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Vinyl Chloride~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromomethane~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chloroethane~~	~~ND~~	~~0.0048~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Trichlorofluoromethane~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1-Dichloroethene~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Acetone~~	~~ND~~	~~0.0048~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Iodomethane~~	~~ND~~	~~0.0048~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Carbon Disulfide~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Methylene Chloride~~	~~ND~~	~~0.0048~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(trans) 1,2-Dichloroethene~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Methyl t-Butyl Ether~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1-Dichloroethane~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Vinyl Acetate~~	~~ND~~	~~0.0048~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2,2-Dichloropropane~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(cis) 1,2-Dichloroethene~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Butanone~~	~~ND~~	~~0.0048~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromochloromethane~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chloroform~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1,1-Trichloroethane~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Carbon Tetrachloride~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1-Dichloropropene~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Benzene~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dichloroethane~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Trichloroethene~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dichloropropane~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Dibromomethane~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromodichloromethane~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Chloroethyl Vinyl Ether~~	~~ND~~	~~0.0048~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(cis) 1,3-Dichloropropene~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Methyl Isobutyl Ketone~~	~~ND~~	~~0.0048~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Toluene~~	~~ND~~	~~0.0096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(trans) 1,3-Dichloropropene~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

VOLATILES by EPA 8260C
page 2 of 2

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	Date ~~Prepared~~	Date ~~Analyzed~~	~~Flags~~
~~**Client ID:**~~	~~**1D-TP2-3.5-4.5**~~					
~~Laboratory ID:~~	~~06-242-03~~					
~~1,1,2-Trichloroethane~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Tetrachloroethene~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3-Dichloropropane~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Hexanone~~	~~ND~~	~~0.0048~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Dibromochloromethane~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dibromoethane~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chlorobenzene~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1,1,2-Tetrachloroethane~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Ethylbenzene~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~m,p-Xylene~~	~~ND~~	~~0.0019~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~o-Xylene~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Styrene~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromoform~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Isopropylbenzene~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromobenzene~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1,2,2-Tetrachloroethane~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,3-Trichloropropane~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~n-Propylbenzene~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Chlorotoluene~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~4-Chlorotoluene~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3,5-Trimethylbenzene~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~tert-Butylbenzene~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,4-Trimethylbenzene~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~sec-Butylbenzene~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3-Dichlorobenzene~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~p-Isopropyltoluene~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,4-Dichlorobenzene~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dichlorobenzene~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~n-Butylbenzene~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dibromo-3-chloropropane~~	~~ND~~	~~0.0048~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,4-Trichlorobenzene~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Hexachlorobutadiene~~	~~ND~~	~~0.0048~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Naphthalene~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,3-Trichlorobenzene~~	~~ND~~	~~0.00096~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~*Surrogate:*~~	~~*Percent Recovery*~~	~~*Control Limits*~~				
~~*Dibromofluoromethane*~~	~~*93*~~	~~*65-129*~~				
~~*Toluene-d8*~~	~~*98*~~	~~*77-122*~~				
~~*4-Bromofluorobenzene*~~	~~*99*~~	~~*73-124*~~				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

VOLATILES by EPA 8260C
page 1 of 2

~~Matrix: Soil~~
~~Units: mg/kg~~

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~**Client ID:**~~	~~**1C-TP1-0-1**~~					
~~Laboratory ID:~~	~~06-242-05~~					
~~Dichlorodifluoromethane~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chloromethane~~	~~ND~~	~~0.0074~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Vinyl Chloride~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromomethane~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chloroethane~~	~~ND~~	~~0.0074~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Trichlorofluoromethane~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1-Dichloroethene~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Acetone~~	~~ND~~	~~0.0074~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Iodomethane~~	~~ND~~	~~0.0074~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Carbon Disulfide~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Methylene Chloride~~	~~ND~~	~~0.0074~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(trans) 1,2-Dichloroethene~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Methyl t-Butyl Ether~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1-Dichloroethane~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Vinyl Acetate~~	~~ND~~	~~0.0074~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2,2-Dichloropropane~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(cis) 1,2-Dichloroethene~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Butanone~~	~~ND~~	~~0.0074~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromochloromethane~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chloroform~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1,1-Trichloroethane~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Carbon Tetrachloride~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1-Dichloropropene~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Benzene~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dichloroethane~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Trichloroethene~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dichloropropane~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Dibromomethane~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromodichloromethane~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Chloroethyl Vinyl Ether~~	~~ND~~	~~0.0074~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(cis) 1,3-Dichloropropene~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Methyl Isobutyl Ketone~~	~~ND~~	~~0.0074~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Toluene~~	~~ND~~	~~0.015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(trans) 1,3-Dichloropropene~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

VOLATILES by EPA 8260C
page 2 of 2

~~**Analyte**~~	~~**Result**~~	~~**PQL**~~	~~**Method**~~	**Date** ~~**Prepared**~~	**Date** ~~**Analyzed**~~	~~**Flags**~~
~~**Client ID:**~~	~~**1C-TP1-0-1**~~					
~~Laboratory ID:~~	~~06-242-05~~					
~~1,1,2-Trichloroethane~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Tetrachloroethene~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3-Dichloropropane~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Hexanone~~	~~ND~~	~~0.0074~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Dibromochloromethane~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dibromoethane~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chlorobenzene~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1,1,2-Tetrachloroethane~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Ethylbenzene~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~m,p-Xylene~~	~~ND~~	~~0.0030~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~o-Xylene~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Styrene~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromoform~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Isopropylbenzene~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromobenzene~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1,2,2-Tetrachloroethane~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,3-Trichloropropane~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~n-Propylbenzene~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Chlorotoluene~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~4-Chlorotoluene~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3,5-Trimethylbenzene~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~tert-Butylbenzene~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,4-Trimethylbenzene~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~sec-Butylbenzene~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3-Dichlorobenzene~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~p-Isopropyltoluene~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,4-Dichlorobenzene~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dichlorobenzene~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~n-Butylbenzene~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dibromo-3-chloropropane~~	~~ND~~	~~0.0074~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,4-Trichlorobenzene~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Hexachlorobutadiene~~	~~ND~~	~~0.0074~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Naphthalene~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,3-Trichlorobenzene~~	~~ND~~	~~0.0015~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~*Surrogate:*~~	~~*Percent Recovery*~~	~~*Control Limits*~~				
~~*Dibromofluoromethane*~~	~~*99*~~	~~*65-129*~~				
~~*Toluene-d8*~~	~~*99*~~	~~*77-122*~~				
~~*4-Bromofluorobenzene*~~	~~*86*~~	~~*73-124*~~				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

VOLATILES by EPA 8260C
page 1 of 2

~~Matrix: Soil~~
~~Units: mg/kg~~

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~Client ID:~~	~~1C-TP1-2-3~~					
~~Laboratory ID:~~	~~06-242-06~~					
~~Dichlorodifluoromethane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chloromethane~~	~~ND~~	~~0.0050~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Vinyl Chloride~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromomethane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chloroethane~~	~~ND~~	~~0.0050~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Trichlorofluoromethane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1-Dichloroethene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Acetone~~	~~ND~~	~~0.0050~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Iodomethane~~	~~ND~~	~~0.0050~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Carbon Disulfide~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Methylene Chloride~~	~~ND~~	~~0.0050~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(trans) 1,2-Dichloroethene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Methyl t-Butyl Ether~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1-Dichloroethane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Vinyl Acetate~~	~~ND~~	~~0.0050~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2,2-Dichloropropane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(cis) 1,2-Dichloroethene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Butanone~~	~~ND~~	~~0.0050~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromochloromethane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chloroform~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1,1-Trichloroethane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Carbon Tetrachloride~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1-Dichloropropene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Benzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dichloroethane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Trichloroethene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dichloropropane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Dibromomethane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromodichloromethane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Chloroethyl Vinyl Ether~~	~~ND~~	~~0.0050~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(cis) 1,3-Dichloropropene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Methyl Isobutyl Ketone~~	~~ND~~	~~0.0050~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Toluene~~	~~ND~~	~~0.010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(trans) 1,3-Dichloropropene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	

~~Date of Report: July 8, 2013~~
~~Samples Submitted: June 26, 2013~~
~~Laboratory Reference: 1306-242~~
~~Project: 0183-085-00~~

~~VOLATILES by EPA 8260C~~
~~page 2 of 2~~

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~Client ID:~~	**~~1C-TP1-2-3~~**					
~~Laboratory ID:~~	~~06-242-06~~					
~~1,1,2-Trichloroethane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Tetrachloroethene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3-Dichloropropane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Hexanone~~	~~ND~~	~~0.0050~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Dibromochloromethane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dibromoethane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chlorobenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1,1,2-Tetrachloroethane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Ethylbenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~m,p-Xylene~~	~~ND~~	~~0.0020~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~o-Xylene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Styrene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromoform~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Isopropylbenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromobenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1,2,2-Tetrachloroethane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,3-Trichloropropane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~n-Propylbenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Chlorotoluene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~4-Chlorotoluene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3,5-Trimethylbenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~tert-Butylbenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,4-Trimethylbenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~sec-Butylbenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3-Dichlorobenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~p-Isopropyltoluene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,4-Dichlorobenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dichlorobenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~n-Butylbenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dibromo-3-chloropropane~~	~~ND~~	~~0.0050~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,4-Trichlorobenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Hexachlorobutadiene~~	~~ND~~	~~0.0050~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Naphthalene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,3-Trichlorobenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Surrogate:~~	*~~Percent Recovery~~*	*~~Control Limits~~*				
~~Dibromofluoromethane~~	*~~99~~*	*~~65-129~~*				
~~Toluene-d8~~	*~~103~~*	*~~77-122~~*				
~~4-Bromofluorobenzene~~	*~~106~~*	*~~73-124~~*				

~~Date of Report: July 8, 2013~~
~~Samples Submitted: June 26, 2013~~
~~Laboratory Reference: 1306-242~~
~~Project: 0183-085-00~~

~~VOLATILES by EPA 8260C~~
~~page 1 of 2~~

~~Matrix: Soil~~
~~Units: mg/kg~~

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~Client ID:~~	**~~1C-TP2-0-1~~**					
~~Laboratory ID:~~	~~06-242-08~~					
~~Dichlorodifluoromethane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chloromethane~~	~~ND~~	~~0.0047~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Vinyl Chloride~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromomethane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chloroethane~~	~~ND~~	~~0.0047~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Trichlorofluoromethane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1-Dichloroethene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Acetone~~	~~ND~~	~~0.0047~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Iodomethane~~	~~ND~~	~~0.0047~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Carbon Disulfide~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Methylene Chloride~~	~~ND~~	~~0.0047~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(trans) 1,2-Dichloroethene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Methyl t-Butyl Ether~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1-Dichloroethane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Vinyl Acetate~~	~~ND~~	~~0.0047~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2,2-Dichloropropane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(cis) 1,2-Dichloroethene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Butanone~~	~~ND~~	~~0.0047~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromochloromethane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chloroform~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1,1-Trichloroethane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Carbon Tetrachloride~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1-Dichloropropene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Benzene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dichloroethane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Trichloroethene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dichloropropane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Dibromomethane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromodichloromethane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Chloroethyl Vinyl Ether~~	~~ND~~	~~0.0047~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(cis) 1,3-Dichloropropene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Methyl Isobutyl Ketone~~	~~ND~~	~~0.0047~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Toluene~~	~~ND~~	~~0.0095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(trans) 1,3-Dichloropropene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
~~Project: 0183-085-00~~

~~VOLATILES by EPA 8260C~~
~~page 2 of 2~~

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~Client ID:~~	**~~1C-TP2-0-1~~**					
~~Laboratory ID:~~	~~06-242-08~~					
~~1,1,2-Trichloroethane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Tetrachloroethene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3-Dichloropropane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Hexanone~~	~~ND~~	~~0.0047~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Dibromochloromethane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dibromoethane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chlorobenzene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1,1,2-Tetrachloroethane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Ethylbenzene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~m,p-Xylene~~	~~ND~~	~~0.0019~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~o-Xylene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Styrene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromoform~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Isopropylbenzene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromobenzene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1,2,2-Tetrachloroethane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,3-Trichloropropane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~n-Propylbenzene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Chlorotoluene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~4-Chlorotoluene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3,5-Trimethylbenzene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~tert-Butylbenzene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,4-Trimethylbenzene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~sec-Butylbenzene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3-Dichlorobenzene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~p-Isopropyltoluene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,4-Dichlorobenzene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dichlorobenzene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~n-Butylbenzene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dibromo-3-chloropropane~~	~~ND~~	~~0.0047~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,4-Trichlorobenzene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Hexachlorobutadiene~~	~~ND~~	~~0.0047~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Naphthalene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,3-Trichlorobenzene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Surrogate:~~	*~~Percent Recovery~~*	*~~Control Limits~~*				
~~Dibromofluoromethane~~	*~~98~~*	*~~65-129~~*				
~~Toluene-d8~~	*~~102~~*	*~~77-122~~*				
~~4-Bromofluorobenzene~~	*~~101~~*	*~~73-124~~*				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

VOLATILES by EPA 8260C
page 1 of 2

~~Matrix: Soil~~
~~Units: mg/kg~~

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~Client ID:~~	~~1C-TP2-3-4~~					
~~Laboratory ID:~~	~~06-242-09~~					
~~Dichlorodifluoromethane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chloromethane~~	~~ND~~	~~0.0051~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Vinyl Chloride~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromomethane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chloroethane~~	~~ND~~	~~0.0051~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Trichlorofluoromethane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1-Dichloroethene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Acetone~~	~~ND~~	~~0.0051~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Iodomethane~~	~~ND~~	~~0.0051~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Carbon Disulfide~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Methylene Chloride~~	~~ND~~	~~0.0051~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(trans) 1,2-Dichloroethene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Methyl t-Butyl Ether~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1-Dichloroethane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Vinyl Acetate~~	~~ND~~	~~0.0051~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2,2-Dichloropropane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(cis) 1,2-Dichloroethene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Butanone~~	~~ND~~	~~0.0051~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromochloromethane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chloroform~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1,1-Trichloroethane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Carbon Tetrachloride~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1-Dichloropropene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Benzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dichloroethane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Trichloroethene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dichloropropane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Dibromomethane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromodichloromethane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Chloroethyl Vinyl Ether~~	~~ND~~	~~0.0051~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(cis) 1,3-Dichloropropene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Methyl Isobutyl Ketone~~	~~ND~~	~~0.0051~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Toluene~~	~~ND~~	~~0.010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(trans) 1,3-Dichloropropene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

VOLATILES by EPA 8260C
page 2 of 2

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	Date ~~Prepared~~	Date ~~Analyzed~~	~~Flags~~
~~Client ID:~~	~~1C-TP2-3-4~~					
~~Laboratory ID:~~	~~06-242-09~~					
~~1,1,2-Trichloroethane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Tetrachloroethene~~	~~0.0021~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3-Dichloropropane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Hexanone~~	~~ND~~	~~0.0051~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Dibromochloromethane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dibromoethane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chlorobenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1,1,2-Tetrachloroethane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Ethylbenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~m,p-Xylene~~	~~ND~~	~~0.0020~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~o-Xylene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Styrene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromoform~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Isopropylbenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromobenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1,2,2-Tetrachloroethane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,3-Trichloropropane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~n-Propylbenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Chlorotoluene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~4-Chlorotoluene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3,5-Trimethylbenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~tert-Butylbenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,4-Trimethylbenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~sec-Butylbenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3-Dichlorobenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~p-Isopropyltoluene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,4-Dichlorobenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dichlorobenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~n-Butylbenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dibromo-3-chloropropane~~	~~ND~~	~~0.0051~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,4-Trichlorobenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Hexachlorobutadiene~~	~~ND~~	~~0.0051~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Naphthalene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,3-Trichlorobenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Surrogate:~~	*~~Percent Recovery~~*	*~~Control Limits~~*				
~~Dibromofluoromethane~~	*~~106~~*	*~~65-129~~*				
~~Toluene-d8~~	*~~110~~*	*~~77-122~~*				
~~4-Bromofluorobenzene~~	*~~102~~*	*~~73-124~~*				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

VOLATILES by EPA 8260C
page 1 of 2

Matrix: ~~Soil~~
~~Units: mg/kg~~

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~Client ID:~~	~~1C-TP2-6-7~~					
~~Laboratory ID:~~	~~06-242-10~~					
~~Dichlorodifluoromethane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chloromethane~~	~~ND~~	~~0.0069~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Vinyl Chloride~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromomethane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chloroethane~~	~~ND~~	~~0.0069~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Trichlorofluoromethane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1-Dichloroethene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Acetone~~	~~ND~~	~~0.0069~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Iodomethane~~	~~ND~~	~~0.0069~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Carbon Disulfide~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Methylene Chloride~~	~~ND~~	~~0.0069~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(trans) 1,2-Dichloroethene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Methyl t-Butyl Ether~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1-Dichloroethane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Vinyl Acetate~~	~~ND~~	~~0.0069~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2,2-Dichloropropane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(cis) 1,2-Dichloroethene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Butanone~~	~~ND~~	~~0.0069~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromochloromethane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chloroform~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1,1-Trichloroethane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Carbon Tetrachloride~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1-Dichloropropene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Benzene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dichloroethane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Trichloroethene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dichloropropane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Dibromomethane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromodichloromethane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Chloroethyl Vinyl Ether~~	~~ND~~	~~0.0069~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(cis) 1,3-Dichloropropene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Methyl Isobutyl Ketone~~	~~ND~~	~~0.0069~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Toluene~~	~~ND~~	~~0.014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(trans) 1,3-Dichloropropene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

VOLATILES by EPA 8260C
page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**1C-TP2-6-7**					
Laboratory ID:	~~06-242-10~~					
~~1,1,2-Trichloroethane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Tetrachloroethene~~	~~0.0074~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3-Dichloropropane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Hexanone~~	~~ND~~	~~0.0069~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Dibromochloromethane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dibromoethane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chlorobenzene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1,1,2-Tetrachloroethane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Ethylbenzene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~m,p-Xylene~~	~~ND~~	~~0.0028~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~o-Xylene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Styrene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromoform~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Isopropylbenzene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromobenzene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1,2,2-Tetrachloroethane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,3-Trichloropropane~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~n-Propylbenzene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Chlorotoluene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~4-Chlorotoluene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3,5-Trimethylbenzene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~tert-Butylbenzene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,4-Trimethylbenzene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~sec-Butylbenzene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3-Dichlorobenzene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~p-Isopropyltoluene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,4-Dichlorobenzene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dichlorobenzene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~n-Butylbenzene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dibromo-3-chloropropane~~	~~ND~~	~~0.0069~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,4-Trichlorobenzene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Hexachlorobutadiene~~	~~ND~~	~~0.0069~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Naphthalene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,3-Trichlorobenzene~~	~~ND~~	~~0.0014~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Surrogate:~~	*~~Percent Recovery~~*	*~~Control Limits~~*				
~~Dibromofluoromethane~~	*~~97~~*	*~~65-129~~*				
~~Toluene-d8~~	*~~103~~*	*~~77-122~~*				
~~4-Bromofluorobenzene~~	*~~106~~*	*~~73-124~~*				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

VOLATILES by EPA 8260C
page 1 of 2

Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**1H-TP1-0-1**					
Laboratory ID:	06-242-11					
Dichlorodifluoromethane	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
Chloromethane	ND	0.0044	EPA 8260C	6-28-13	6-28-13	
Vinyl Chloride	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
Bromomethane	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
Chloroethane	ND	0.0044	EPA 8260C	6-28-13	6-28-13	
Trichlorofluoromethane	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
1,1-Dichloroethene	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
Acetone	ND	0.0044	EPA 8260C	6-28-13	6-28-13	
Iodomethane	ND	0.0044	EPA 8260C	6-28-13	6-28-13	
Carbon Disulfide	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
Methylene Chloride	ND	0.0044	EPA 8260C	6-28-13	6-28-13	
(trans) 1,2-Dichloroethene	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
Methyl t-Butyl Ether	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
1,1-Dichloroethane	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
Vinyl Acetate	ND	0.0044	EPA 8260C	6-28-13	6-28-13	
2,2-Dichloropropane	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
(cis) 1,2-Dichloroethene	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
2-Butanone	ND	0.0044	EPA 8260C	6-28-13	6-28-13	
Bromochloromethane	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
Chloroform	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
1,1,1-Trichloroethane	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
Carbon Tetrachloride	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
1,1-Dichloropropene	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
Benzene	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
1,2-Dichloroethane	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
Trichloroethene	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
1,2-Dichloropropane	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
Dibromomethane	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
Bromodichloromethane	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
2-Chloroethyl Vinyl Ether	ND	0.0044	EPA 8260C	6-28-13	6-28-13	
(cis) 1,3-Dichloropropene	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
Methyl Isobutyl Ketone	ND	0.0044	EPA 8260C	6-28-13	6-28-13	
Toluene	ND	0.0088	EPA 8260C	6-28-13	6-28-13	
(trans) 1,3-Dichloropropene	ND	0.00088	EPA 8260C	6-28-13	6-28-13	

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

VOLATILES by EPA 8260C
page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**1H-TP1-0-1**					
Laboratory ID:	06-242-11					
1,1,2-Trichloroethane	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
Tetrachloroethene	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
1,3-Dichloropropane	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
2-Hexanone	ND	0.0044	EPA 8260C	6-28-13	6-28-13	
Dibromochloromethane	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
1,2-Dibromoethane	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
Chlorobenzene	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
1,1,1,2-Tetrachloroethane	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
Ethylbenzene	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
m,p-Xylene	ND	0.0018	EPA 8260C	6-28-13	6-28-13	
o-Xylene	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
Styrene	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
Bromoform	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
Isopropylbenzene	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
Bromobenzene	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
1,1,2,2-Tetrachloroethane	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
1,2,3-Trichloropropane	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
n-Propylbenzene	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
2-Chlorotoluene	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
4-Chlorotoluene	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
1,3,5-Trimethylbenzene	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
tert-Butylbenzene	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
1,2,4-Trimethylbenzene	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
sec-Butylbenzene	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
1,3-Dichlorobenzene	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
p-Isopropyltoluene	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
1,4-Dichlorobenzene	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
1,2-Dichlorobenzene	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
n-Butylbenzene	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
1,2-Dibromo-3-chloropropane	ND	0.0044	EPA 8260C	6-28-13	6-28-13	
1,2,4-Trichlorobenzene	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
Hexachlorobutadiene	ND	0.0044	EPA 8260C	6-28-13	6-28-13	
Naphthalene	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
1,2,3-Trichlorobenzene	ND	0.00088	EPA 8260C	6-28-13	6-28-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*107*	*65-129*				
Toluene-d8	*111*	*77-122*				
4-Bromofluorobenzene	*114*	*73-124*				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

VOLATILES by EPA 8260C
page 1 of 2

Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**1H-TP1-5-6**					
Laboratory ID:	06-242-12					
Dichlorodifluoromethane	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
Chloromethane	ND	0.0039	EPA 8260C	6-28-13	6-28-13	
Vinyl Chloride	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
Bromomethane	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
Chloroethane	ND	0.0039	EPA 8260C	6-28-13	6-28-13	
Trichlorofluoromethane	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
1,1-Dichloroethene	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
Acetone	ND	0.0039	EPA 8260C	6-28-13	6-28-13	
Iodomethane	ND	0.0039	EPA 8260C	6-28-13	6-28-13	
Carbon Disulfide	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
Methylene Chloride	ND	0.0039	EPA 8260C	6-28-13	6-28-13	
(trans) 1,2-Dichloroethene	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
Methyl t-Butyl Ether	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
1,1-Dichloroethane	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
Vinyl Acetate	ND	0.0039	EPA 8260C	6-28-13	6-28-13	
2,2-Dichloropropane	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
(cis) 1,2-Dichloroethene	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
2-Butanone	ND	0.0039	EPA 8260C	6-28-13	6-28-13	
Bromochloromethane	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
Chloroform	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
1,1,1-Trichloroethane	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
Carbon Tetrachloride	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
1,1-Dichloropropene	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
Benzene	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
1,2-Dichloroethane	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
Trichloroethene	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
1,2-Dichloropropane	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
Dibromomethane	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
Bromodichloromethane	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
2-Chloroethyl Vinyl Ether	ND	0.0039	EPA 8260C	6-28-13	6-28-13	
(cis) 1,3-Dichloropropene	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
Methyl Isobutyl Ketone	ND	0.0039	EPA 8260C	6-28-13	6-28-13	
Toluene	ND	0.0079	EPA 8260C	6-28-13	6-28-13	
(trans) 1,3-Dichloropropene	ND	0.00079	EPA 8260C	6-28-13	6-28-13	

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

VOLATILES by EPA 8260C
page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**1H-TP1-5-6**					
Laboratory ID:	06-242-12					
1,1,2-Trichloroethane	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
Tetrachloroethene	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
1,3-Dichloropropane	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
2-Hexanone	ND	0.0039	EPA 8260C	6-28-13	6-28-13	
Dibromochloromethane	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
1,2-Dibromoethane	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
Chlorobenzene	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
1,1,1,2-Tetrachloroethane	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
Ethylbenzene	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
m,p-Xylene	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
o-Xylene	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
Styrene	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
Bromoform	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
Isopropylbenzene	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
Bromobenzene	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
1,1,2,2-Tetrachloroethane	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
1,2,3-Trichloropropane	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
n-Propylbenzene	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
2-Chlorotoluene	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
4-Chlorotoluene	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
1,3,5-Trimethylbenzene	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
tert-Butylbenzene	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
1,2,4-Trimethylbenzene	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
sec-Butylbenzene	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
1,3-Dichlorobenzene	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
p-Isopropyltoluene	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
1,4-Dichlorobenzene	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
1,2-Dichlorobenzene	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
n-Butylbenzene	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
1,2-Dibromo-3-chloropropane	ND	0.0039	EPA 8260C	6-28-13	6-28-13	
1,2,4-Trichlorobenzene	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
Hexachlorobutadiene	ND	0.0039	EPA 8260C	6-28-13	6-28-13	
Naphthalene	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
1,2,3-Trichlorobenzene	ND	0.00079	EPA 8260C	6-28-13	6-28-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*98*	*65-129*				
Toluene-d8	*102*	*77-122*				
4-Bromofluorobenzene	*104*	*73-124*				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

VOLATILES by EPA 8260C
page 1 of 2

~~Matrix: Soil~~
~~Units: mg/kg~~

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~**Client ID:**~~	~~**1G-TP1-0-1**~~					
~~Laboratory ID:~~	~~06-242-13~~					
~~Dichlorodifluoromethane~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chloromethane~~	~~ND~~	~~0.0049~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Vinyl Chloride~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromomethane~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chloroethane~~	~~ND~~	~~0.0049~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Trichlorofluoromethane~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1-Dichloroethene~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Acetone~~	~~ND~~	~~0.0049~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Iodomethane~~	~~ND~~	~~0.0049~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Carbon Disulfide~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Methylene Chloride~~	~~ND~~	~~0.0049~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(trans) 1,2-Dichloroethene~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Methyl t-Butyl Ether~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1-Dichloroethane~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Vinyl Acetate~~	~~ND~~	~~0.0049~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2,2-Dichloropropane~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(cis) 1,2-Dichloroethene~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Butanone~~	~~ND~~	~~0.0049~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromochloromethane~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chloroform~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1,1-Trichloroethane~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Carbon Tetrachloride~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1-Dichloropropene~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Benzene~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dichloroethane~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Trichloroethene~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dichloropropane~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Dibromomethane~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromodichloromethane~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Chloroethyl Vinyl Ether~~	~~ND~~	~~0.0049~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(cis) 1,3-Dichloropropene~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Methyl Isobutyl Ketone~~	~~ND~~	~~0.0049~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Toluene~~	~~ND~~	~~0.0097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(trans) 1,3-Dichloropropene~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

VOLATILES by EPA 8260C
page 2 of 2

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	Date ~~Prepared~~	Date ~~Analyzed~~	~~Flags~~
~~Client ID:~~	~~1G-TP1-0-1~~					
~~Laboratory ID:~~	~~06-242-13~~					
~~1,1,2-Trichloroethane~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Tetrachloroethene~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3-Dichloropropane~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Hexanone~~	~~ND~~	~~0.0049~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Dibromochloromethane~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dibromoethane~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chlorobenzene~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1,1,2-Tetrachloroethane~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Ethylbenzene~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~m,p-Xylene~~	~~ND~~	~~0.0019~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~o-Xylene~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Styrene~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromoform~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Isopropylbenzene~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromobenzene~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1,2,2-Tetrachloroethane~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,3-Trichloropropane~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~n-Propylbenzene~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Chlorotoluene~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~4-Chlorotoluene~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3,5-Trimethylbenzene~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~tert-Butylbenzene~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,4-Trimethylbenzene~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~sec-Butylbenzene~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3-Dichlorobenzene~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~p-Isopropyltoluene~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,4-Dichlorobenzene~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dichlorobenzene~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~n-Butylbenzene~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dibromo-3-chloropropane~~	~~ND~~	~~0.0049~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,4-Trichlorobenzene~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Hexachlorobutadiene~~	~~ND~~	~~0.0049~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Naphthalene~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,3-Trichlorobenzene~~	~~ND~~	~~0.00097~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Surrogate:~~	*~~Percent Recovery~~*	*~~Control Limits~~*				
~~Dibromofluoromethane~~	*~~89~~*	*~~65-129~~*				
~~Toluene-d8~~	*~~93~~*	*~~77-122~~*				
~~4-Bromofluorobenzene~~	*~~89~~*	*~~73-124~~*				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

VOLATILES by EPA 8260C
page 1 of 2

~~Matrix: Soil~~
~~Units: mg/kg~~

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~Client ID:~~	**~~1G-TP1-2-3~~**					
~~Laboratory ID:~~	~~06-242-14~~					
~~Dichlorodifluoromethane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chloromethane~~	~~ND~~	~~0.0048~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Vinyl Chloride~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromomethane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chloroethane~~	~~ND~~	~~0.0048~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Trichlorofluoromethane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1-Dichloroethene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Acetone~~	~~ND~~	~~0.0048~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Iodomethane~~	~~ND~~	~~0.0048~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Carbon Disulfide~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Methylene Chloride~~	~~ND~~	~~0.0048~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(trans) 1,2-Dichloroethene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Methyl t-Butyl Ether~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1-Dichloroethane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Vinyl Acetate~~	~~ND~~	~~0.0048~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2,2-Dichloropropane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(cis) 1,2-Dichloroethene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Butanone~~	~~ND~~	~~0.0048~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromochloromethane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chloroform~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1,1-Trichloroethane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Carbon Tetrachloride~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1-Dichloropropene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Benzene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dichloroethane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Trichloroethene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dichloropropane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Dibromomethane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromodichloromethane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Chloroethyl Vinyl Ether~~	~~ND~~	~~0.0048~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(cis) 1,3-Dichloropropene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Methyl Isobutyl Ketone~~	~~ND~~	~~0.0048~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Toluene~~	~~ND~~	~~0.0095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(trans) 1,3-Dichloropropene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

VOLATILES by EPA 8260C
page 2 of 2

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	Date ~~Prepared~~	Date ~~Analyzed~~	~~Flags~~
~~**Client ID:**~~	~~**1G-TP1-2-3**~~					
~~Laboratory ID:~~	~~06-242-14~~					
~~1,1,2-Trichloroethane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Tetrachloroethene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3-Dichloropropane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Hexanone~~	~~ND~~	~~0.0048~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Dibromochloromethane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dibromoethane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chlorobenzene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1,1,2-Tetrachloroethane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Ethylbenzene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~m,p-Xylene~~	~~ND~~	~~0.0019~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~o-Xylene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Styrene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromoform~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Isopropylbenzene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromobenzene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1,2,2-Tetrachloroethane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,3-Trichloropropane~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~n-Propylbenzene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Chlorotoluene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~4-Chlorotoluene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3,5-Trimethylbenzene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~tert-Butylbenzene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,4-Trimethylbenzene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~sec-Butylbenzene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3-Dichlorobenzene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~p-Isopropyltoluene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,4-Dichlorobenzene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dichlorobenzene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~n-Butylbenzene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dibromo-3-chloropropane~~	~~ND~~	~~0.0048~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,4-Trichlorobenzene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Hexachlorobutadiene~~	~~ND~~	~~0.0048~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Naphthalene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,3-Trichlorobenzene~~	~~ND~~	~~0.00095~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Surrogate:~~	*~~Percent Recovery~~*	*~~Control Limits~~*				
~~Dibromofluoromethane~~	*~~99~~*	*~~65-129~~*				
~~Toluene-d8~~	*~~103~~*	*~~77-122~~*				
~~4-Bromofluorobenzene~~	*~~105~~*	*~~73-124~~*				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

VOLATILES by EPA 8260C
page 1 of 2

~~Matrix: Soil~~
~~Units: mg/kg~~

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~**Client ID:**~~	~~**1G-TP1-4-5**~~					
~~Laboratory ID:~~	~~06-242-15~~					
~~Dichlorodifluoromethane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chloromethane~~	~~ND~~	~~0.0044~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Vinyl Chloride~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromomethane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chloroethane~~	~~ND~~	~~0.0044~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Trichlorofluoromethane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1-Dichloroethene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Acetone~~	~~ND~~	~~0.0044~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Iodomethane~~	~~ND~~	~~0.0044~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Carbon Disulfide~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Methylene Chloride~~	~~ND~~	~~0.0044~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(trans) 1,2-Dichloroethene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Methyl t-Butyl Ether~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1-Dichloroethane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Vinyl Acetate~~	~~ND~~	~~0.0044~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2,2-Dichloropropane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(cis) 1,2-Dichloroethene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Butanone~~	~~ND~~	~~0.0044~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromochloromethane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chloroform~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1,1-Trichloroethane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Carbon Tetrachloride~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1-Dichloropropene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Benzene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dichloroethane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Trichloroethene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dichloropropane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Dibromomethane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromodichloromethane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Chloroethyl Vinyl Ether~~	~~ND~~	~~0.0044~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(cis) 1,3-Dichloropropene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Methyl Isobutyl Ketone~~	~~ND~~	~~0.0044~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Toluene~~	~~ND~~	~~0.0088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(trans) 1,3-Dichloropropene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

VOLATILES by EPA 8260C
page 2 of 2

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	Date ~~Prepared~~	Date ~~Analyzed~~	~~Flags~~
~~Client ID:~~	**~~1G-TP1-4-5~~**					
~~Laboratory ID:~~	~~06-242-15~~					
~~1,1,2-Trichloroethane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Tetrachloroethene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3-Dichloropropane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Hexanone~~	~~ND~~	~~0.0044~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Dibromochloromethane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dibromoethane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chlorobenzene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1,1,2-Tetrachloroethane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Ethylbenzene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~m,p-Xylene~~	~~ND~~	~~0.0018~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~o-Xylene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Styrene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromoform~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Isopropylbenzene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromobenzene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1,2,2-Tetrachloroethane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,3-Trichloropropane~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~n-Propylbenzene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Chlorotoluene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~4-Chlorotoluene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3,5-Trimethylbenzene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~tert-Butylbenzene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,4-Trimethylbenzene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~sec-Butylbenzene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3-Dichlorobenzene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~p-Isopropyltoluene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,4-Dichlorobenzene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dichlorobenzene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~n-Butylbenzene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dibromo-3-chloropropane~~	~~ND~~	~~0.0044~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,4-Trichlorobenzene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Hexachlorobutadiene~~	~~ND~~	~~0.0044~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Naphthalene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,3-Trichlorobenzene~~	~~ND~~	~~0.00088~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Surrogate:~~	*~~Percent Recovery~~*	*~~Control Limits~~*				
~~Dibromofluoromethane~~	*~~98~~*	*~~65-129~~*				
~~Toluene-d8~~	*~~104~~*	*~~77-122~~*				
~~4-Bromofluorobenzene~~	*~~103~~*	*~~73-124~~*				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

VOLATILES by EPA 8260C
page 1 of 2

Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**1G-TP2-0-1**					
Laboratory ID:	06-242-16					
Dichlorodifluoromethane	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Chloromethane	ND	0.0051	EPA 8260C	6-28-13	6-28-13	
Vinyl Chloride	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Bromomethane	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Chloroethane	ND	0.0051	EPA 8260C	6-28-13	6-28-13	
Trichlorofluoromethane	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
1,1-Dichloroethene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Acetone	ND	0.0051	EPA 8260C	6-28-13	6-28-13	
Iodomethane	ND	0.0051	EPA 8260C	6-28-13	6-28-13	
Carbon Disulfide	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Methylene Chloride	ND	0.0051	EPA 8260C	6-28-13	6-28-13	
(trans) 1,2-Dichloroethene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Methyl t-Butyl Ether	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
1,1-Dichloroethane	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Vinyl Acetate	ND	0.0051	EPA 8260C	6-28-13	6-28-13	
2,2-Dichloropropane	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
(cis) 1,2-Dichloroethene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
2-Butanone	ND	0.0051	EPA 8260C	6-28-13	6-28-13	
Bromochloromethane	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Chloroform	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
1,1,1-Trichloroethane	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Carbon Tetrachloride	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
1,1-Dichloropropene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Benzene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
1,2-Dichloroethane	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Trichloroethene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
1,2-Dichloropropane	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Dibromomethane	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Bromodichloromethane	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
2-Chloroethyl Vinyl Ether	ND	0.0051	EPA 8260C	6-28-13	6-28-13	
(cis) 1,3-Dichloropropene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Methyl Isobutyl Ketone	ND	0.0051	EPA 8260C	6-28-13	6-28-13	
Toluene	ND	0.010	EPA 8260C	6-28-13	6-28-13	
(trans) 1,3-Dichloropropene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

VOLATILES by EPA 8260C
page 2 of 2

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	Date ~~Prepared~~	Date ~~Analyzed~~	~~Flags~~
~~Client ID:~~	**~~1G-TP2-0-1~~**					
~~Laboratory ID:~~	~~06-242-16~~					
~~1,1,2-Trichloroethane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Tetrachloroethene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3-Dichloropropane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Hexanone~~	~~ND~~	~~0.0051~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Dibromochloromethane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dibromoethane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chlorobenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1,1,2-Tetrachloroethane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Ethylbenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~m,p-Xylene~~	~~ND~~	~~0.0020~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~o-Xylene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Styrene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromoform~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Isopropylbenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromobenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1,2,2-Tetrachloroethane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,3-Trichloropropane~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~n-Propylbenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Chlorotoluene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~4-Chlorotoluene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3,5-Trimethylbenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~tert-Butylbenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,4-Trimethylbenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~sec-Butylbenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3-Dichlorobenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~p-Isopropyltoluene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,4-Dichlorobenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dichlorobenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~n-Butylbenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dibromo-3-chloropropane~~	~~ND~~	~~0.0051~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,4-Trichlorobenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Hexachlorobutadiene~~	~~ND~~	~~0.0051~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Naphthalene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,3-Trichlorobenzene~~	~~ND~~	~~0.0010~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Surrogate:~~	*~~Percent Recovery~~*	*~~Control Limits~~*				
~~Dibromofluoromethane~~	*~~97~~*	*~~65-129~~*				
~~Toluene-d8~~	*~~101~~*	*~~77-122~~*				
4-Bromofluorobenzene	*99*	*73-124*				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

VOLATILES by EPA 8260C
page 1 of 2

~~Matrix: Soil~~
~~Units: mg/kg~~

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**1G-TP2-3-4**					
Laboratory ID:	06-242-17					
Dichlorodifluoromethane	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
Chloromethane	ND	0.0079	EPA 8260C	6-28-13	6-28-13	
Vinyl Chloride	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
Bromomethane	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
Chloroethane	ND	0.0079	EPA 8260C	6-28-13	6-28-13	
Trichlorofluoromethane	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
1,1-Dichloroethene	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
Acetone	ND	0.0079	EPA 8260C	6-28-13	6-28-13	
Iodomethane	ND	0.0079	EPA 8260C	6-28-13	6-28-13	
Carbon Disulfide	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
Methylene Chloride	ND	0.0079	EPA 8260C	6-28-13	6-28-13	
(trans) 1,2-Dichloroethene	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
Methyl t-Butyl Ether	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
1,1-Dichloroethane	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
Vinyl Acetate	ND	0.0079	EPA 8260C	6-28-13	6-28-13	
2,2-Dichloropropane	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
(cis) 1,2-Dichloroethene	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
2-Butanone	ND	0.0079	EPA 8260C	6-28-13	6-28-13	
Bromochloromethane	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
Chloroform	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
1,1,1-Trichloroethane	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
Carbon Tetrachloride	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
1,1-Dichloropropene	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
Benzene	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
1,2-Dichloroethane	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
Trichloroethene	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
1,2-Dichloropropane	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
Dibromomethane	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
Bromodichloromethane	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
2-Chloroethyl Vinyl Ether	ND	0.0079	EPA 8260C	6-28-13	6-28-13	
(cis) 1,3-Dichloropropene	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
Methyl Isobutyl Ketone	ND	0.0079	EPA 8260C	6-28-13	6-28-13	
Toluene	ND	0.016	EPA 8260C	6-28-13	6-28-13	
(trans) 1,3-Dichloropropene	ND	0.0016	EPA 8260C	6-28-13	6-28-13	

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

VOLATILES by EPA 8260C
page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**1G-TP2-3-4**					
Laboratory ID:	06-242-17					
1,1,2-Trichloroethane	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
Tetrachloroethene	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
1,3-Dichloropropane	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
2-Hexanone	ND	0.0079	EPA 8260C	6-28-13	6-28-13	
Dibromochloromethane	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
1,2-Dibromoethane	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
Chlorobenzene	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
1,1,1,2-Tetrachloroethane	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
Ethylbenzene	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
m,p-Xylene	ND	0.0032	EPA 8260C	6-28-13	6-28-13	
o-Xylene	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
Styrene	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
Bromoform	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
Isopropylbenzene	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
Bromobenzene	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
1,1,2,2-Tetrachloroethane	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
1,2,3-Trichloropropane	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
n-Propylbenzene	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
2-Chlorotoluene	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
4-Chlorotoluene	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
1,3,5-Trimethylbenzene	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
tert-Butylbenzene	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
1,2,4-Trimethylbenzene	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
sec-Butylbenzene	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
1,3-Dichlorobenzene	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
p-Isopropyltoluene	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
1,4-Dichlorobenzene	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
1,2-Dichlorobenzene	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
n-Butylbenzene	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
1,2-Dibromo-3-chloropropane	ND	0.0079	EPA 8260C	6-28-13	6-28-13	
1,2,4-Trichlorobenzene	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
Hexachlorobutadiene	ND	0.0079	EPA 8260C	6-28-13	6-28-13	
Naphthalene	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
1,2,3-Trichlorobenzene	ND	0.0016	EPA 8260C	6-28-13	6-28-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*93*	*65-129*				
Toluene-d8	*95*	*77-122*				
4-Bromofluorobenzene	*82*	*73-124*				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

VOLATILES by EPA 8260C
page 1 of 2

~~Matrix: Soil~~
~~Units: mg/kg~~

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~Client ID:~~	**~~1G-TP2-6-7~~**					
~~Laboratory ID:~~	~~06-242-18~~					
~~Dichlorodifluoromethane~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chloromethane~~	~~ND~~	~~0.0053~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Vinyl Chloride~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromomethane~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chloroethane~~	~~ND~~	~~0.0053~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Trichlorofluoromethane~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1-Dichloroethene~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Acetone~~	~~ND~~	~~0.0053~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Iodomethane~~	~~ND~~	~~0.0053~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Carbon Disulfide~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Methylene Chloride~~	~~ND~~	~~0.0053~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(trans) 1,2-Dichloroethene~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Methyl t-Butyl Ether~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1-Dichloroethane~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Vinyl Acetate~~	~~ND~~	~~0.0053~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2,2-Dichloropropane~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(cis) 1,2-Dichloroethene~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Butanone~~	~~ND~~	~~0.0053~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromochloromethane~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chloroform~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1,1-Trichloroethane~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Carbon Tetrachloride~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1-Dichloropropene~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Benzene~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dichloroethane~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Trichloroethene~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dichloropropane~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Dibromomethane~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromodichloromethane~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Chloroethyl Vinyl Ether~~	~~ND~~	~~0.0053~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(cis) 1,3-Dichloropropene~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Methyl Isobutyl Ketone~~	~~ND~~	~~0.0053~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Toluene~~	~~ND~~	~~0.011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~(trans) 1,3-Dichloropropene~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

VOLATILES by EPA 8260C
page 2 of 2

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	Date ~~Prepared~~	Date ~~Analyzed~~	~~Flags~~
~~**Client ID:**~~	~~**1G-TP2-6-7**~~					
~~Laboratory ID:~~	~~06-242-18~~					
~~1,1,2-Trichloroethane~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Tetrachloroethene~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3-Dichloropropane~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Hexanone~~	~~ND~~	~~0.0053~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Dibromochloromethane~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dibromoethane~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Chlorobenzene~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1,1,2-Tetrachloroethane~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Ethylbenzene~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~m,p-Xylene~~	~~ND~~	~~0.0021~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~o-Xylene~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Styrene~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromoform~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Isopropylbenzene~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Bromobenzene~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,1,2,2-Tetrachloroethane~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,3-Trichloropropane~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~n-Propylbenzene~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~2-Chlorotoluene~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~4-Chlorotoluene~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3,5-Trimethylbenzene~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~tert-Butylbenzene~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,4-Trimethylbenzene~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~sec-Butylbenzene~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,3-Dichlorobenzene~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~p-Isopropyltoluene~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,4-Dichlorobenzene~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dichlorobenzene~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~n-Butylbenzene~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2-Dibromo-3-chloropropane~~	~~ND~~	~~0.0053~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,4-Trichlorobenzene~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Hexachlorobutadiene~~	~~ND~~	~~0.0053~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Naphthalene~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~1,2,3-Trichlorobenzene~~	~~ND~~	~~0.0011~~	~~EPA 8260C~~	~~6-28-13~~	~~6-28-13~~	
~~Surrogate:~~	*~~Percent Recovery~~*	*~~Control Limits~~*				
~~Dibromofluoromethane~~	*~~94~~*	*~~65-129~~*				
~~Toluene-d8~~	*~~98~~*	*~~77-122~~*				
~~4-Bromofluorobenzene~~	*~~99~~*	*~~73-124~~*				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

PAHs by EPA 8270D/SIM

Matrix: Soil
~~Units: mg/Kg~~

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~**Client ID:**~~	~~**1D-TP2-0-1**~~					
~~Laboratory ID:~~	~~06-242-02~~					
~~Naphthalene~~	~~**0.022**~~	~~0.0084~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~2-Methylnaphthalene~~	~~**0.018**~~	~~0.0084~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~1-Methylnaphthalene~~	~~**0.016**~~	~~0.0084~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Acenaphthylene~~	~~**0.011**~~	~~0.0084~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Acenaphthene~~	~~**ND**~~	~~0.0084~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Fluorene~~	~~**ND**~~	~~0.0084~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Phenanthrene~~	~~**0.039**~~	~~0.0084~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Anthracene~~	~~**0.011**~~	~~0.0084~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Fluoranthene~~	~~**0.063**~~	~~0.0084~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Pyrene~~	~~**0.065**~~	~~0.0084~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Benzo[a]anthracene~~	~~**0.043**~~	~~0.0084~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Chrysene~~	~~**0.056**~~	~~0.0084~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Benzo[b]fluoranthene~~	~~**0.073**~~	~~0.0084~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Benzo(j,k)fluoranthene~~	~~**0.019**~~	~~0.0084~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Benzo[a]pyrene~~	~~**0.048**~~	~~0.0084~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Indeno(1,2,3-c,d)pyrene~~	~~**0.033**~~	~~0.0084~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Dibenz[a,h]anthracene~~	~~**0.012**~~	~~0.0084~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Benzo[g,h,i]perylene~~	~~**0.039**~~	~~0.0084~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~*Surrogate:*~~	~~*Percent Recovery*~~	~~*Control Limits*~~				
~~*2-Fluorobiphenyl*~~	~~*60*~~	~~*43 - 116*~~				
~~*Pyrene-d10*~~	~~*64*~~	~~*33 - 124*~~				
~~*Terphenyl-d14*~~	~~*65*~~	~~*38 - 125*~~				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

PAHs by EPA 8270D/SIM

~~Matrix: Soil~~
~~Units: mg/Kg~~

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~**Client ID:**~~	~~**1D-TP2-3.5-4.5**~~					
~~Laboratory ID:~~	~~06-242-03~~					
~~Naphthalene~~	~~**ND**~~	~~0.0082~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~2-Methylnaphthalene~~	~~**ND**~~	~~0.0082~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~1-Methylnaphthalene~~	~~**ND**~~	~~0.0082~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Acenaphthylene~~	~~**ND**~~	~~0.0082~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Acenaphthene~~	~~**ND**~~	~~0.0082~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Fluorene~~	~~**ND**~~	~~0.0082~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Phenanthrene~~	~~**ND**~~	~~0.0082~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Anthracene~~	~~**ND**~~	~~0.0082~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Fluoranthene~~	~~**ND**~~	~~0.0082~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Pyrene~~	~~**ND**~~	~~0.0082~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Benzo[a]anthracene~~	~~**ND**~~	~~0.0082~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Chrysene~~	~~**ND**~~	~~0.0082~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Benzo[b]fluoranthene~~	~~**ND**~~	~~0.0082~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Benzo(j,k)fluoranthene~~	~~**ND**~~	~~0.0082~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Benzo[a]pyrene~~	~~**ND**~~	~~0.0082~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Indeno(1,2,3-c,d)pyrene~~	~~**ND**~~	~~0.0082~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Dibenz[a,h]anthracene~~	~~**ND**~~	~~0.0082~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Benzo[g,h,i]perylene~~	~~**ND**~~	~~0.0082~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~*Surrogate:*~~	~~*Percent Recovery*~~	~~*Control Limits*~~				
~~*2-Fluorobiphenyl*~~	~~*66*~~	~~*43 - 116*~~				
~~*Pyrene-d10*~~	~~*71*~~	~~*33 - 124*~~				
~~*Terphenyl-d14*~~	~~*64*~~	~~*38 - 125*~~				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

PAHs by EPA 8270D/SIM

Matrix: Soil
~~Units: mg/Kg~~

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~**Client ID:**~~	~~**1C-TP1-0-1**~~					
~~Laboratory ID:~~	~~06-242-05~~					
~~Naphthalene~~	~~**0.072**~~	~~0.0091~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~2-Methylnaphthalene~~	~~**0.037**~~	~~0.0091~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~1-Methylnaphthalene~~	~~**0.036**~~	~~0.0091~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Acenaphthylene~~	~~**0.024**~~	~~0.0091~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Acenaphthene~~	~~**ND**~~	~~0.0091~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Fluorene~~	~~**0.012**~~	~~0.0091~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Phenanthrene~~	~~**0.13**~~	~~0.0091~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Anthracene~~	~~**0.029**~~	~~0.0091~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Fluoranthene~~	~~**0.17**~~	~~0.0091~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Pyrene~~	~~**0.16**~~	~~0.0091~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Benzo[a]anthracene~~	~~**0.10**~~	~~0.0091~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Chrysene~~	~~**0.11**~~	~~0.0091~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Benzo[b]fluoranthene~~	~~**0.14**~~	~~0.0091~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Benzo(j,k)fluoranthene~~	~~**0.043**~~	~~0.0091~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Benzo[a]pyrene~~	~~**0.090**~~	~~0.0091~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Indeno(1,2,3-c,d)pyrene~~	~~**0.065**~~	~~0.0091~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Dibenz[a,h]anthracene~~	~~**0.020**~~	~~0.0091~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Benzo[g,h,i]perylene~~	~~**0.069**~~	~~0.0091~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~*Surrogate:*~~	~~*Percent Recovery*~~	~~*Control Limits*~~				
~~*2-Fluorobiphenyl*~~	~~*41*~~	~~*43 - 116*~~				~~Q~~
~~*Pyrene-d10*~~	~~*50*~~	~~*33 - 124*~~				
~~*Terphenyl-d14*~~	~~*50*~~	~~*38 - 125*~~				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

PAHs by EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~Client ID:~~	~~1C-TP1-2-3~~					
~~Laboratory ID:~~	~~06-242-06~~					
~~Naphthalene~~	~~ND~~	~~0.0078~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~2-Methylnaphthalene~~	~~ND~~	~~0.0078~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~1-Methylnaphthalene~~	~~ND~~	~~0.0078~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Acenaphthylene~~	~~ND~~	~~0.0078~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Acenaphthene~~	~~ND~~	~~0.0078~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Fluorene~~	~~ND~~	~~0.0078~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Phenanthrene~~	~~ND~~	~~0.0078~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Anthracene~~	~~ND~~	~~0.0078~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Fluoranthene~~	~~ND~~	~~0.0078~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Pyrene~~	~~ND~~	~~0.0078~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Benzo[a]anthracene~~	~~ND~~	~~0.0078~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Chrysene~~	~~ND~~	~~0.0078~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Benzo[b]fluoranthene~~	~~ND~~	~~0.0078~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Benzo(j,k)fluoranthene~~	~~ND~~	~~0.0078~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Benzo[a]pyrene~~	~~ND~~	~~0.0078~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Indeno(1,2,3-c,d)pyrene~~	~~ND~~	~~0.0078~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Dibenz[a,h]anthracene~~	~~ND~~	~~0.0078~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Benzo[g,h,i]perylene~~	~~ND~~	~~0.0078~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-1-13~~	
~~Surrogate:~~	*~~Percent Recovery~~*	*~~Control Limits~~*				
~~2-Fluorobiphenyl~~	*~~55~~*	*~~43 - 116~~*				
~~Pyrene-d10~~	*~~60~~*	*~~33 - 124~~*				
~~Terphenyl-d14~~	*~~55~~*	*~~38 - 125~~*				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

PAHs by EPA 8270D/SIM

Matrix: Soil
Units: mg/~~Kg~~

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~**Client ID:**~~	~~**1C-TP2-0-1**~~					
~~Laboratory ID:~~	~~06-242-08~~					
~~Naphthalene~~	~~**ND**~~	~~0.0071~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~2-Methylnaphthalene~~	~~**ND**~~	~~0.0071~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~1-Methylnaphthalene~~	~~**ND**~~	~~0.0071~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Acenaphthylene~~	~~**ND**~~	~~0.0071~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Acenaphthene~~	~~**ND**~~	~~0.0071~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Fluorene~~	~~**ND**~~	~~0.0071~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Phenanthrene~~	~~**ND**~~	~~0.0071~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Anthracene~~	~~**ND**~~	~~0.0071~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Fluoranthene~~	~~**ND**~~	~~0.0071~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Pyrene~~	~~**ND**~~	~~0.0071~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Benzo[a]anthracene~~	~~**ND**~~	~~0.0071~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Chrysene~~	~~**ND**~~	~~0.0071~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Benzo[b]fluoranthene~~	~~**ND**~~	~~0.0071~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Benzo(j,k)fluoranthene~~	~~**ND**~~	~~0.0071~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Benzo[a]pyrene~~	~~**ND**~~	~~0.0071~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Indeno(1,2,3-c,d)pyrene~~	~~**ND**~~	~~0.0071~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Dibenz[a,h]anthracene~~	~~**ND**~~	~~0.0071~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Benzo[g,h,i]perylene~~	~~**ND**~~	~~0.0071~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~*Surrogate:*~~	~~*Percent Recovery*~~	~~*Control Limits*~~				
~~*2-Fluorobiphenyl*~~	~~*68*~~	~~*43 - 116*~~				
~~*Pyrene-d10*~~	~~*80*~~	~~*33 - 124*~~				
~~*Terphenyl-d14*~~	~~*74*~~	~~*38 - 125*~~				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

PAHs by EPA 8270D/SIM

Matrix: Soil
Units: mg/~~Kg~~

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**1C-TP2-3-4**					
Laboratory ID:	06-242-09					
Naphthalene	**0.019**	0.0082	EPA 8270D/SIM	7-1-13	7-2-13	
2-Methylnaphthalene	**0.011**	0.0082	EPA 8270D/SIM	7-1-13	7-2-13	
1-Methylnaphthalene	**0.011**	0.0082	EPA 8270D/SIM	7-1-13	7-2-13	
Acenaphthylene	**0.012**	0.0082	EPA 8270D/SIM	7-1-13	7-2-13	
Acenaphthene	**ND**	0.0082	EPA 8270D/SIM	7-1-13	7-2-13	
Fluorene	**0.013**	0.0082	EPA 8270D/SIM	7-1-13	7-2-13	
Phenanthrene	**0.093**	0.0082	EPA 8270D/SIM	7-1-13	7-2-13	
Anthracene	**0.031**	0.0082	EPA 8270D/SIM	7-1-13	7-2-13	
Fluoranthene	**0.11**	0.0082	EPA 8270D/SIM	7-1-13	7-2-13	
Pyrene	**0.11**	0.0082	EPA 8270D/SIM	7-1-13	7-2-13	
Benzo[a]anthracene	**0.053**	0.0082	EPA 8270D/SIM	7-1-13	7-2-13	
Chrysene	**0.053**	0.0082	EPA 8270D/SIM	7-1-13	7-2-13	
Benzo[b]fluoranthene	**0.064**	0.0082	EPA 8270D/SIM	7-1-13	7-2-13	
Benzo(j,k)fluoranthene	**0.022**	0.0082	EPA 8270D/SIM	7-1-13	7-2-13	
Benzo[a]pyrene	**0.054**	0.0082	EPA 8270D/SIM	7-1-13	7-2-13	
Indeno(1,2,3-c,d)pyrene	**0.033**	0.0082	EPA 8270D/SIM	7-1-13	7-2-13	
Dibenz[a,h]anthracene	**0.0095**	0.0082	EPA 8270D/SIM	7-1-13	7-2-13	
Benzo[g,h,i]perylene	**0.038**	0.0082	EPA 8270D/SIM	7-1-13	7-2-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*53*	*43 - 116*				
Pyrene-d10	*65*	*33 - 124*				
Terphenyl-d14	*55*	*38 - 125*				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

PAHs by EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	~~Result~~	~~PQL~~	~~Method~~	Date ~~Prepared~~	Date ~~Analyzed~~	~~Flags~~
~~Client ID:~~	~~1C-TP2-6-7~~					
~~Laboratory ID:~~	~~06-242-10~~					
~~Naphthalene~~	~~ND~~	~~0.0083~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~2-Methylnaphthalene~~	~~ND~~	~~0.0083~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~1-Methylnaphthalene~~	~~ND~~	~~0.0083~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Acenaphthylene~~	~~ND~~	~~0.0083~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Acenaphthene~~	~~ND~~	~~0.0083~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Fluorene~~	~~ND~~	~~0.0083~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Phenanthrene~~	~~ND~~	~~0.0083~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Anthracene~~	~~ND~~	~~0.0083~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Fluoranthene~~	~~ND~~	~~0.0083~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Pyrene~~	~~ND~~	~~0.0083~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Benzo[a]anthracene~~	~~ND~~	~~0.0083~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Chrysene~~	~~ND~~	~~0.0083~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Benzo[b]fluoranthene~~	~~ND~~	~~0.0083~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Benzo(j,k)fluoranthene~~	~~ND~~	~~0.0083~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Benzo[a]pyrene~~	~~ND~~	~~0.0083~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Indeno(1,2,3-c,d)pyrene~~	~~ND~~	~~0.0083~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Dibenz[a,h]anthracene~~	~~ND~~	~~0.0083~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Benzo[g,h,i]perylene~~	~~ND~~	~~0.0083~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Surrogate:~~	*~~Percent Recovery~~*	*~~Control Limits~~*				
~~2-Fluorobiphenyl~~	*~~59~~*	*~~43 - 116~~*				
~~Pyrene-d10~~	*~~65~~*	*~~33 - 124~~*				
~~Terphenyl-d14~~	*~~60~~*	*~~38 - 125~~*				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

PAHs by EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**1H-TP1-0-1**					
Laboratory ID:	06-242-11					
Naphthalene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
2-Methylnaphthalene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
1-Methylnaphthalene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
Acenaphthylene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
Acenaphthene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
Fluorene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
Phenanthrene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
Anthracene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
Fluoranthene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
Pyrene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
Benzo[a]anthracene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
Chrysene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
Benzo[b]fluoranthene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
Benzo(j,k)fluoranthene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
Benzo[a]pyrene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
Dibenz[a,h]anthracene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
Benzo[g,h,i]perylene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*65*	*43 - 116*				
Pyrene-d10	*78*	*33 - 124*				
Terphenyl-d14	*74*	*38 - 125*				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

PAHs by EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**1H-TP1-5-6**					
Laboratory ID:	06-242-12					
Naphthalene	**ND**	0.0071	EPA 8270D/SIM	7-1-13	7-2-13	
2-Methylnaphthalene	**ND**	0.0071	EPA 8270D/SIM	7-1-13	7-2-13	
1-Methylnaphthalene	**ND**	0.0071	EPA 8270D/SIM	7-1-13	7-2-13	
Acenaphthylene	**ND**	0.0071	EPA 8270D/SIM	7-1-13	7-2-13	
Acenaphthene	**ND**	0.0071	EPA 8270D/SIM	7-1-13	7-2-13	
Fluorene	**ND**	0.0071	EPA 8270D/SIM	7-1-13	7-2-13	
Phenanthrene	**ND**	0.0071	EPA 8270D/SIM	7-1-13	7-2-13	
Anthracene	**ND**	0.0071	EPA 8270D/SIM	7-1-13	7-2-13	
Fluoranthene	**ND**	0.0071	EPA 8270D/SIM	7-1-13	7-2-13	
Pyrene	**ND**	0.0071	EPA 8270D/SIM	7-1-13	7-2-13	
Benzo[a]anthracene	**ND**	0.0071	EPA 8270D/SIM	7-1-13	7-2-13	
Chrysene	**ND**	0.0071	EPA 8270D/SIM	7-1-13	7-2-13	
Benzo[b]fluoranthene	**ND**	0.0071	EPA 8270D/SIM	7-1-13	7-2-13	
Benzo(j,k)fluoranthene	**ND**	0.0071	EPA 8270D/SIM	7-1-13	7-2-13	
Benzo[a]pyrene	**ND**	0.0071	EPA 8270D/SIM	7-1-13	7-2-13	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0071	EPA 8270D/SIM	7-1-13	7-2-13	
Dibenz[a,h]anthracene	**ND**	0.0071	EPA 8270D/SIM	7-1-13	7-2-13	
Benzo[g,h,i]perylene	**ND**	0.0071	EPA 8270D/SIM	7-1-13	7-2-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*65*	*43 - 116*				
Pyrene-d10	*80*	*33 - 124*				
Terphenyl-d14	*74*	*38 - 125*				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
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Project: 0183-085-00

PAHs by EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	~~Result~~	~~PQL~~	~~Method~~	Date ~~Prepared~~	Date ~~Analyzed~~	~~Flags~~
~~Client ID:~~	~~1G-TP1-0-1~~					
~~Laboratory ID:~~	~~06-242-13~~					
~~Naphthalene~~	~~**0.042**~~	~~0.0072~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~2-Methylnaphthalene~~	~~**0.062**~~	~~0.0072~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~1-Methylnaphthalene~~	~~**0.045**~~	~~0.0072~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Acenaphthylene~~	~~**ND**~~	~~0.0072~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Acenaphthene~~	~~**ND**~~	~~0.0072~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Fluorene~~	~~**ND**~~	~~0.0072~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Phenanthrene~~	~~**0.038**~~	~~0.0072~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Anthracene~~	~~**ND**~~	~~0.0072~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Fluoranthene~~	~~**0.035**~~	~~0.0072~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Pyrene~~	~~**0.036**~~	~~0.0072~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Benzo[a]anthracene~~	~~**0.020**~~	~~0.0072~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Chrysene~~	~~**0.022**~~	~~0.0072~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Benzo[b]fluoranthene~~	~~**0.026**~~	~~0.0072~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Benzo(j,k)fluoranthene~~	~~**ND**~~	~~0.0072~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Benzo[a]pyrene~~	~~**0.017**~~	~~0.0072~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Indeno(1,2,3-c,d)pyrene~~	~~**0.012**~~	~~0.0072~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Dibenz[a,h]anthracene~~	~~**ND**~~	~~0.0072~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Benzo[g,h,i]perylene~~	~~**0.014**~~	~~0.0072~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~*Surrogate:*~~	~~*Percent Recovery*~~	~~*Control Limits*~~				
~~*2-Fluorobiphenyl*~~	~~*49*~~	~~*43 - 116*~~				
~~*Pyrene-d10*~~	~~*65*~~	~~*33 - 124*~~				
~~*Terphenyl-d14*~~	~~*60*~~	~~*38 - 125*~~				

Date of Report: July 8, 2013
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PAHs by EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**1G-TP1-2-3**					
Laboratory ID:	06-242-14					
Naphthalene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
2-Methylnaphthalene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
1-Methylnaphthalene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
Acenaphthylene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
Acenaphthene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
Fluorene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
Phenanthrene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
Anthracene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
Fluoranthene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
Pyrene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
Benzo[a]anthracene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
Chrysene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
Benzo[b]fluoranthene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
Benzo(j,k)fluoranthene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
Benzo[a]pyrene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
Dibenz[a,h]anthracene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
Benzo[g,h,i]perylene	**ND**	0.0073	EPA 8270D/SIM	7-1-13	7-2-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*42*	*43 - 116*				Q
Pyrene-d10	*54*	*33 - 124*				
Terphenyl-d14	*48*	*38 - 125*				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

PAHs by EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~**Client ID:**~~	~~**1G-TP1-4-5**~~					
~~Laboratory ID:~~	~~06-242-15~~					
~~Naphthalene~~	~~**ND**~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~2-Methylnaphthalene~~	~~**ND**~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~1-Methylnaphthalene~~	~~**ND**~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Acenaphthylene~~	~~**ND**~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Acenaphthene~~	~~**ND**~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Fluorene~~	~~**ND**~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Phenanthrene~~	~~**0.018**~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Anthracene~~	~~**ND**~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Fluoranthene~~	~~**0.029**~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Pyrene~~	~~**0.031**~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Benzo[a]anthracene~~	~~**0.016**~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Chrysene~~	~~**0.019**~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Benzo[b]fluoranthene~~	~~**0.020**~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Benzo(j,k)fluoranthene~~	~~**ND**~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Benzo[a]pyrene~~	~~**0.016**~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Indeno(1,2,3-c,d)pyrene~~	~~**0.011**~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Dibenz[a,h]anthracene~~	~~**ND**~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Benzo[g,h,i]perylene~~	~~**0.013**~~	~~0.0074~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~*Surrogate:*~~	~~*Percent Recovery*~~	~~*Control Limits*~~				
~~*2-Fluorobiphenyl*~~	~~*65*~~	~~*43 - 116*~~				
~~*Pyrene-d10*~~	~~*76*~~	~~*33 - 124*~~				
~~*Terphenyl-d14*~~	~~*70*~~	~~*38 - 125*~~				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

PAHs by EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	~~**Result**~~	~~**PQL**~~	~~**Method**~~	**Date** ~~**Prepared**~~	**Date** ~~**Analyzed**~~	~~**Flags**~~
~~**Client ID:**~~	~~**1G-TP2-0-1**~~					
~~Laboratory ID:~~	~~06-242-16~~					
~~Naphthalene~~	~~**0.018**~~	~~0.0075~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~2-Methylnaphthalene~~	~~**0.013**~~	~~0.0075~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~1-Methylnaphthalene~~	~~**0.013**~~	~~0.0075~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Acenaphthylene~~	~~**ND**~~	~~0.0075~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Acenaphthene~~	~~**0.012**~~	~~0.0075~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Fluorene~~	~~**0.010**~~	~~0.0075~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Phenanthrene~~	~~**0.14**~~	~~0.0075~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Anthracene~~	~~**0.038**~~	~~0.0075~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Fluoranthene~~	~~**0.17**~~	~~0.0075~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Pyrene~~	~~**0.22**~~	~~0.0075~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Benzo[a]anthracene~~	~~**0.094**~~	~~0.0075~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Chrysene~~	~~**0.10**~~	~~0.0075~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Benzo[b]fluoranthene~~	~~**0.10**~~	~~0.0075~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Benzo(j,k)fluoranthene~~	~~**0.033**~~	~~0.0075~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Benzo[a]pyrene~~	~~**0.093**~~	~~0.0075~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Indeno(1,2,3-c,d)pyrene~~	~~**0.056**~~	~~0.0075~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Dibenz[a,h]anthracene~~	~~**0.016**~~	~~0.0075~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Benzo[g,h,i]perylene~~	~~**0.069**~~	~~0.0075~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~*Surrogate:*~~	~~*Percent Recovery*~~	~~*Control Limits*~~				
~~*2-Fluorobiphenyl*~~	~~*64*~~	~~*43 - 116*~~				
~~*Pyrene-d10*~~	~~*82*~~	~~*33 - 124*~~				
~~*Terphenyl-d14*~~	~~*76*~~	~~*38 - 125*~~				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

PAHs by EPA 8270D/SIM

Matrix: Soil
Units: mg/Kg

Analyte	~~Result~~	~~PQL~~	~~Method~~	Date ~~Prepared~~	Date ~~Analyzed~~	~~Flags~~
~~**Client ID:**~~	~~**1G-TP2-3-4**~~					
~~Laboratory ID:~~	~~06-242-17~~					
~~Naphthalene~~	~~**0.023**~~	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~2-Methylnaphthalene~~	~~**0.016**~~	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~1-Methylnaphthalene~~	~~**0.012**~~	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Acenaphthylene~~	~~**0.010**~~	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Acenaphthene~~	~~**ND**~~	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Fluorene~~	~~**ND**~~	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Phenanthrene~~	~~**0.049**~~	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Anthracene~~	~~**0.016**~~	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Fluoranthene~~	~~**0.094**~~	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Pyrene~~	~~**0.093**~~	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Benzo[a]anthracene~~	~~**0.049**~~	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Chrysene~~	~~**0.059**~~	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Benzo[b]fluoranthene~~	~~**0.079**~~	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Benzo(j,k)fluoranthene~~	~~**0.022**~~	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Benzo[a]pyrene~~	~~**0.055**~~	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Indeno(1,2,3-c,d)pyrene~~	~~**0.040**~~	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Dibenz[a,h]anthracene~~	~~**0.011**~~	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Benzo[g,h,i]perylene~~	~~**0.046**~~	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~*Surrogate:*~~	~~*Percent Recovery*~~	~~*Control Limits*~~				
~~*2-Fluorobiphenyl*~~	~~*60*~~	~~*43 - 116*~~				
~~*Pyrene-d10*~~	~~*69*~~	~~*33 - 124*~~				
~~*Terphenyl-d14*~~	~~*65*~~	~~*38 - 125*~~				

~~Date of Report: July 8, 2013~~
~~Samples Submitted: June 26, 2013~~
~~Laboratory Reference: 1306-242~~
~~Project: 0183-085-00~~

~~PAHs by EPA 8270D/SIM~~

~~Matrix: Soil~~
~~Units: mg/Kg~~

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~Client ID:~~	**~~1G-TP2-6-7~~**					
~~Laboratory ID:~~	~~06-242-18~~					
~~Naphthalene~~	**~~ND~~**	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~2-Methylnaphthalene~~	**~~ND~~**	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~1-Methylnaphthalene~~	**~~ND~~**	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Acenaphthylene~~	**~~ND~~**	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Acenaphthene~~	**~~ND~~**	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Fluorene~~	**~~ND~~**	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Phenanthrene~~	**~~ND~~**	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Anthracene~~	**~~ND~~**	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Fluoranthene~~	**~~ND~~**	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Pyrene~~	**~~ND~~**	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Benzo[a]anthracene~~	**~~ND~~**	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Chrysene~~	**~~ND~~**	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Benzo[b]fluoranthene~~	**~~ND~~**	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Benzo(j,k)fluoranthene~~	**~~ND~~**	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Benzo[a]pyrene~~	**~~ND~~**	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Indeno(1,2,3-c,d)pyrene~~	**~~ND~~**	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Dibenz[a,h]anthracene~~	**~~ND~~**	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Benzo[g,h,i]perylene~~	**~~ND~~**	~~0.0081~~	~~EPA 8270D/SIM~~	~~7-1-13~~	~~7-2-13~~	
~~Surrogate:~~	*~~Percent Recovery~~*	*~~Control Limits~~*				
~~2-Fluorobiphenyl~~	*~~57~~*	*~~43 - 116~~*				
~~Pyrene-d10~~	*~~62~~*	*~~33 - 124~~*				
~~Terphenyl-d14~~	*~~59~~*	*~~38 - 125~~*				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-~~00~~

~~**TOTAL METALS**~~
~~**EPA 6010C/7471B**~~

~~Matrix:~~ ~~Soil~~
~~Units:~~ ~~mg/kg (ppm)~~

~~**Analyte**~~	~~**Result**~~	~~**PQL**~~	~~**EPA Method**~~	~~**Date Prepared**~~	~~**Date Analyzed**~~	~~**Flags**~~
~~Lab ID:~~	~~06-242-02~~					
~~**Client ID:**~~	~~**1D-TP2-0-1**~~					
~~Arsenic~~	~~**ND**~~	~~13~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Barium~~	~~**240**~~	~~3.2~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Cadmium~~	~~**1.0**~~	~~0.63~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Chromium~~	~~**48**~~	~~0.63~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Lead~~	~~**280**~~	~~6.3~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Mercury~~	~~**1.1**~~	~~0.32~~	~~7471B~~	~~7-1-13~~	~~7-1-13~~	
~~Selenium~~	~~**ND**~~	~~13~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Silver~~	~~**ND**~~	~~1.3~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Lab ID:~~	~~06-242-03~~					
~~**Client ID:**~~	~~**1D-TP2-3.5-4.5**~~					
~~Arsenic~~	~~**ND**~~	~~12~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Barium~~	~~**82**~~	~~3.1~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Cadmium~~	~~**ND**~~	~~0.62~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Chromium~~	~~**57**~~	~~0.62~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Lead~~	~~**ND**~~	~~6.2~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Mercury~~	~~**ND**~~	~~0.31~~	~~7471B~~	~~7-1-13~~	~~7-1-13~~	
~~Selenium~~	~~**ND**~~	~~12~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Silver~~	~~**ND**~~	~~1.2~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

TOTAL METALS
EPA 6010C/7471B

Matrix: Soil
Units: mg/kg (~~ppm)~~

~~Analyte~~	~~Result~~	~~PQL~~	~~EPA Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~Lab ID:~~	~~06-242-05~~					
~~**Client ID:**~~	~~**1C-TP1-0-1**~~					
~~Arsenic~~	~~**24**~~	~~14~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Barium~~	~~**680**~~	~~34~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Cadmium~~	~~**3.5**~~	~~0.68~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Chromium~~	~~**64**~~	~~0.68~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Lead~~	~~**800**~~	~~6.8~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Mercury~~	~~**0.72**~~	~~0.34~~	~~7471B~~	~~7-1-13~~	~~7-1-13~~	
~~Selenium~~	~~**ND**~~	~~14~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Silver~~	~~**ND**~~	~~1.4~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	

~~Lab ID:~~	~~06-242-06~~					
~~**Client ID:**~~	~~**1C-TP1-2-3**~~					
~~Arsenic~~	~~**ND**~~	~~12~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Barium~~	~~**81**~~	~~2.9~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Cadmium~~	~~**ND**~~	~~0.58~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Chromium~~	~~**50**~~	~~0.58~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Lead~~	~~**10**~~	~~5.8~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Mercury~~	~~**ND**~~	~~0.29~~	~~7471B~~	~~7-1-13~~	~~7-1-13~~	
~~Selenium~~	~~**ND**~~	~~12~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Silver~~	~~**ND**~~	~~1.2~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

TOTAL METALS
EPA 6010C/7471B

Matrix: Soil
Units: ~~mg/kg (ppm)~~

~~Analyte~~	~~Result~~	~~PQL~~	~~EPA Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~Lab ID:~~	~~06-242-08~~					
~~Client ID:~~	**~~1C-TP2-0-1~~**					
~~Arsenic~~	**~~ND~~**	~~11~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Barium~~	**~~83~~**	~~2.7~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Cadmium~~	**~~ND~~**	~~0.53~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Chromium~~	**~~33~~**	~~0.53~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Lead~~	**~~19~~**	~~5.3~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Mercury~~	**~~ND~~**	~~0.27~~	~~7471B~~	~~7-1-13~~	~~7-1-13~~	
~~Selenium~~	**~~ND~~**	~~11~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Silver~~	**~~ND~~**	~~1.1~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	

~~Lab ID:~~	~~06-242-09~~					
~~Client ID:~~	**~~1C-TP2-3-4~~**					
~~Arsenic~~	**~~17~~**	~~12~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Barium~~	**~~440~~**	~~3.1~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Cadmium~~	**~~0.81~~**	~~0.62~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Chromium~~	**~~60~~**	~~0.62~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Lead~~	**~~750~~**	~~6.2~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Mercury~~	**~~0.50~~**	~~0.31~~	~~7471B~~	~~7-1-13~~	~~7-1-13~~	
~~Selenium~~	**~~ND~~**	~~12~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Silver~~	**~~ND~~**	~~1.2~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

TOTAL METALS
EPA 6010C/7471B

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	~~06-242-10~~					
~~**Client ID:**~~	~~**1C-TP2-6-7**~~					
~~Arsenic~~	~~**ND**~~	~~12~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Barium~~	~~**120**~~	~~3.1~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Cadmium~~	~~**ND**~~	~~0.62~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Chromium~~	~~**50**~~	~~0.62~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Lead~~	~~**ND**~~	~~6.2~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Mercury~~	~~**ND**~~	~~0.31~~	~~7471B~~	~~7-1-13~~	~~7-1-13~~	
~~Selenium~~	~~**ND**~~	~~12~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Silver~~	~~**ND**~~	~~1.2~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	06-242-11					
Client ID:	**1H-TP1-0-1**					
Arsenic	**ND**	11	6010C	6-28-13	6-28-13	
Barium	**38**	2.7	6010C	6-28-13	6-28-13	
Cadmium	**ND**	0.55	6010C	6-28-13	6-28-13	
Chromium	**25**	0.55	6010C	6-28-13	6-28-13	
Lead	**ND**	5.5	6010C	6-28-13	6-28-13	
Mercury	**ND**	0.27	7471B	7-1-13	7-1-13	
Selenium	**ND**	11	6010C	6-28-13	6-28-13	
Silver	**ND**	1.1	6010C	6-28-13	6-28-13	

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

TOTAL METALS
EPA 6010C/7471B

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	06-242-12					
Client ID:	**1H-TP1-5-6**					
Arsenic	**ND**	11	6010C	6-28-13	6-28-13	
Barium	**36**	2.7	6010C	6-28-13	6-28-13	
Cadmium	**ND**	0.53	6010C	6-28-13	6-28-13	
Chromium	**17**	0.53	6010C	6-28-13	6-28-13	
Lead	**ND**	5.3	6010C	6-28-13	6-28-13	
Mercury	**ND**	0.27	7471B	7-1-13	7-1-13	
Selenium	**ND**	11	6010C	6-28-13	6-28-13	
Silver	**ND**	1.1	6010C	6-28-13	6-28-13	

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
~~Lab ID:~~	~~06-242-13~~					
~~**Client ID:**~~	~~**1G-TP1-0-1**~~					
~~Arsenic~~	~~**ND**~~	~~11~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Barium~~	~~**130**~~	~~2.7~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Cadmium~~	~~**ND**~~	~~0.54~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Chromium~~	~~**33**~~	~~0.54~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Lead~~	~~**37**~~	~~5.4~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Mercury~~	~~**ND**~~	~~0.27~~	~~7471B~~	~~7-1-13~~	~~7-1-13~~	
~~Selenium~~	~~**ND**~~	~~11~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Silver~~	~~**ND**~~	~~1.1~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

TOTAL METALS
EPA 6010C/7471B

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	~~06-242-14~~					
~~Client ID:~~	**~~1G-TP1-2-3~~**					
~~Arsenic~~	**~~ND~~**	~~11~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Barium~~	**~~85~~**	~~2.7~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Cadmium~~	**~~ND~~**	~~0.54~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Chromium~~	**~~49~~**	~~0.54~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Lead~~	**~~8.6~~**	~~5.4~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Mercury~~	**~~ND~~**	~~0.27~~	~~7471B~~	~~7-1-13~~	~~7-1-13~~	
~~Selenium~~	**~~ND~~**	~~11~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Silver~~	**~~ND~~**	~~1.1~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	

~~Lab ID:~~	~~06-242-15~~					
~~Client ID:~~	**~~1G-TP1-4-5~~**					
~~Arsenic~~	**~~ND~~**	~~11~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Barium~~	**~~88~~**	~~2.8~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Cadmium~~	**~~ND~~**	~~0.56~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Chromium~~	**~~40~~**	~~0.56~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Lead~~	**~~25~~**	~~5.6~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Mercury~~	**~~0.42~~**	~~0.28~~	~~7471B~~	~~7-1-13~~	~~7-1-13~~	
~~Selenium~~	**~~ND~~**	~~11~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Silver~~	**~~ND~~**	~~1.1~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

TOTAL METALS
EPA 6010C/7471B

Matrix: Soil
Units: mg/k~~g (ppm)~~

~~Analyte~~	~~Result~~	~~PQL~~	~~EPA Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~Lab ID:~~	~~06-242-16~~					
~~**Client ID:**~~	~~**1G-TP2-0-1**~~					
~~Arsenic~~	~~**ND**~~	~~11~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Barium~~	~~**140**~~	~~2.8~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Cadmium~~	~~**ND**~~	~~0.57~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Chromium~~	~~**52**~~	~~0.57~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Lead~~	~~**250**~~	~~5.7~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Mercury~~	~~**ND**~~	~~0.28~~	~~7471B~~	~~7-1-13~~	~~7-1-13~~	
~~Selenium~~	~~**ND**~~	~~11~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Silver~~	~~**ND**~~	~~1.1~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	

~~Lab ID:~~	~~06-242-17~~					
~~**Client ID:**~~	~~**1G-TP2-3-4**~~					
~~Arsenic~~	~~**ND**~~	~~12~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Barium~~	~~**150**~~	~~3.0~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Cadmium~~	~~**ND**~~	~~0.61~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Chromium~~	~~**41**~~	~~0.61~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Lead~~	~~**220**~~	~~6.1~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Mercury~~	~~**ND**~~	~~0.30~~	~~7471B~~	~~7-1-13~~	~~7-1-13~~	
~~Selenium~~	~~**ND**~~	~~12~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Silver~~	~~**ND**~~	~~1.2~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

TOTAL METALS
EPA 6010C/7471B

Matrix: Soil
Units: mg/kg (ppm)

~~Analyte~~	~~Result~~	~~PQL~~	~~EPA Method~~	Date ~~Prepared~~	Date ~~Analyzed~~	~~Flags~~
~~Lab ID:~~	~~06-242-18~~					
~~Client ID:~~	~~1G-TP2-6-7~~					
~~Arsenic~~	~~ND~~	~~12~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Barium~~	~~100~~	~~3.0~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Cadmium~~	~~ND~~	~~0.60~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Chromium~~	~~39~~	~~0.60~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Lead~~	~~ND~~	~~6.0~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Mercury~~	~~ND~~	~~0.30~~	~~7471B~~	~~7-1-13~~	~~7-1-13~~	
~~Selenium~~	~~ND~~	~~12~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	
~~Silver~~	~~ND~~	~~1.2~~	~~6010C~~	~~6-28-13~~	~~6-28-13~~	

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

NWTPH-HCID
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0627S1					
Gasoline Range Organics	**ND**	20	NWTPH-HCID	6-27-13	6-27-13	
Diesel Range Organics	**ND**	50	NWTPH-HCID	6-27-13	6-27-13	
Lube Oil Range Organics	**ND**	100	NWTPH-HCID	6-27-13	6-27-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*99*	*50-150*				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

NWTPH-Dx
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0703S1					
Diesel Range Organics	**ND**	25	NWTPH-Dx	7-3-13	7-5-13	
Lube Oil Range Organics	**ND**	50	NWTPH-Dx	7-3-13	7-5-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*100*	*50-150*				

Analyte	Result		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE								
Laboratory ID:	07-004-02							
	ORIG	DUP						
Mineral Oil	**4850**	**2930**				49	NA	X1
Surrogate:								
o-Terphenyl			*90*	*91*	*50-150*			

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

VOLATILES by EPA 8260C
METHOD BLANK QUALITY CONTROL
page 1 of 2

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0627W1					
Dichlorodifluoromethane	ND	0.30	EPA 8260C	6-27-13	6-27-13	
Chloromethane	ND	1.0	EPA 8260C	6-27-13	6-27-13	
Vinyl Chloride	ND	0.10	EPA 8260C	6-27-13	6-27-13	
Bromomethane	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Chloroethane	ND	1.0	EPA 8260C	6-27-13	6-27-13	
Trichlorofluoromethane	ND	0.20	EPA 8260C	6-27-13	6-27-13	
1,1-Dichloroethene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Acetone	ND	5.0	EPA 8260C	6-27-13	6-27-13	
Iodomethane	ND	1.0	EPA 8260C	6-27-13	6-27-13	
Carbon Disulfide	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Methylene Chloride	ND	1.0	EPA 8260C	6-27-13	6-27-13	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Methyl t-Butyl Ether	ND	0.20	EPA 8260C	6-27-13	6-27-13	
1,1-Dichloroethane	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Vinyl Acetate	ND	1.0	EPA 8260C	6-27-13	6-27-13	
2,2-Dichloropropane	ND	0.20	EPA 8260C	6-27-13	6-27-13	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
2-Butanone	ND	5.0	EPA 8260C	6-27-13	6-27-13	
Bromochloromethane	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Chloroform	ND	0.20	EPA 8260C	6-27-13	6-27-13	
1,1,1-Trichloroethane	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Carbon Tetrachloride	ND	0.20	EPA 8260C	6-27-13	6-27-13	
1,1-Dichloropropene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Benzene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
1,2-Dichloroethane	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Trichloroethene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
1,2-Dichloropropane	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Dibromomethane	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Bromodichloromethane	ND	0.20	EPA 8260C	6-27-13	6-27-13	
2-Chloroethyl Vinyl Ether	ND	1.0	EPA 8260C	6-27-13	6-27-13	
(cis) 1,3-Dichloropropene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Methyl Isobutyl Ketone	ND	2.0	EPA 8260C	6-27-13	6-27-13	
Toluene	ND	1.0	EPA 8260C	6-27-13	6-27-13	
(trans) 1,3-Dichloropropene	ND	0.20	EPA 8260C	6-27-13	6-27-13	

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

VOLATILES by EPA 8260C
METHOD BLANK QUALITY CONTROL
page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0627W1					
1,1,2-Trichloroethane	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Tetrachloroethene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
1,3-Dichloropropane	ND	0.20	EPA 8260C	6-27-13	6-27-13	
2-Hexanone	ND	2.0	EPA 8260C	6-27-13	6-27-13	
Dibromochloromethane	ND	0.20	EPA 8260C	6-27-13	6-27-13	
1,2-Dibromoethane	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Chlorobenzene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
1,1,1,2-Tetrachloroethane	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Ethylbenzene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
m,p-Xylene	ND	0.40	EPA 8260C	6-27-13	6-27-13	
o-Xylene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Styrene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Bromoform	ND	1.0	EPA 8260C	6-27-13	6-27-13	
Isopropylbenzene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
Bromobenzene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
1,1,2,2-Tetrachloroethane	ND	0.20	EPA 8260C	6-27-13	6-27-13	
1,2,3-Trichloropropane	ND	0.20	EPA 8260C	6-27-13	6-27-13	
n-Propylbenzene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
2-Chlorotoluene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
4-Chlorotoluene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
1,3,5-Trimethylbenzene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
tert-Butylbenzene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
1,2,4-Trimethylbenzene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
sec-Butylbenzene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
1,3-Dichlorobenzene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
p-Isopropyltoluene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
1,4-Dichlorobenzene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
1,2-Dichlorobenzene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
n-Butylbenzene	ND	0.20	EPA 8260C	6-27-13	6-27-13	
1,2-Dibromo-3-chloropropane	ND	1.0	EPA 8260C	6-27-13	6-27-13	
1,2,4-Trichlorobenzene	ND	0.26	EPA 8260C	6-27-13	6-27-13	
Hexachlorobutadiene	ND	0.25	EPA 8260C	6-27-13	6-27-13	
Naphthalene	ND	1.3	EPA 8260C	6-27-13	6-27-13	
1,2,3-Trichlorobenzene	ND	0.31	EPA 8260C	6-27-13	6-27-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*103*	*62-122*				
Toluene-d8	*99*	*70-120*				
4-Bromofluorobenzene	*97*	*71-120*				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

VOLATILES by EPA 8260C
MS/MSD QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
MATRIX SPIKES											
Laboratory ID:	06-173-04										
	MS	MSD	MS	MSD		MS	MSD				
1,1-Dichloroethene	**8.64**	**8.33**	10.0	10.0	ND	86	83	57-133	4	15	
Benzene	**9.35**	**9.24**	10.0	10.0	ND	94	92	78-117	1	15	
Trichloroethene	**8.52**	**8.31**	10.0	10.0	ND	85	83	77-120	2	15	
Toluene	**9.27**	**9.21**	10.0	10.0	ND	93	92	80-115	1	15	
Chlorobenzene	**10.1**	**9.92**	10.0	10.0	ND	101	99	80-122	2	15	
Surrogate:											
Dibromofluoromethane						*103*	*102*	*62-122*			
Toluene-d8						*97*	*97*	*70-120*			
4-Bromofluorobenzene						*98*	*97*	*71-120*			

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

VOLATILES by EPA 8260C
METHOD BLANK QUALITY CONTROL
page 1 of 2

Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0628S1					
Dichlorodifluoromethane	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Chloromethane	ND	0.0050	EPA 8260C	6-28-13	6-28-13	
Vinyl Chloride	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Bromomethane	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Chloroethane	ND	0.0050	EPA 8260C	6-28-13	6-28-13	
Trichlorofluoromethane	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
1,1-Dichloroethene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Acetone	ND	0.0050	EPA 8260C	6-28-13	6-28-13	
Iodomethane	ND	0.0050	EPA 8260C	6-28-13	6-28-13	
Carbon Disulfide	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Methylene Chloride	ND	0.0050	EPA 8260C	6-28-13	6-28-13	
(trans) 1,2-Dichloroethene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Methyl t-Butyl Ether	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
1,1-Dichloroethane	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Vinyl Acetate	ND	0.0050	EPA 8260C	6-28-13	6-28-13	
2,2-Dichloropropane	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
(cis) 1,2-Dichloroethene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
2-Butanone	ND	0.0050	EPA 8260C	6-28-13	6-28-13	
Bromochloromethane	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Chloroform	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
1,1,1-Trichloroethane	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Carbon Tetrachloride	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
1,1-Dichloropropene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Benzene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
1,2-Dichloroethane	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Trichloroethene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
1,2-Dichloropropane	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Dibromomethane	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Bromodichloromethane	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
2-Chloroethyl Vinyl Ether	ND	0.0050	EPA 8260C	6-28-13	6-28-13	
(cis) 1,3-Dichloropropene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Methyl Isobutyl Ketone	ND	0.0050	EPA 8260C	6-28-13	6-28-13	
Toluene	ND	0.010	EPA 8260C	6-28-13	6-28-13	
(trans) 1,3-Dichloropropene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

VOLATILES by EPA 8260C
METHOD BLANK QUALITY CONTROL
page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0628S1					
1,1,2-Trichloroethane	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Tetrachloroethene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
1,3-Dichloropropane	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
2-Hexanone	ND	0.0050	EPA 8260C	6-28-13	6-28-13	
Dibromochloromethane	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
1,2-Dibromoethane	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Chlorobenzene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
1,1,1,2-Tetrachloroethane	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Ethylbenzene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
m,p-Xylene	ND	0.0020	EPA 8260C	6-28-13	6-28-13	
o-Xylene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Styrene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Bromoform	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Isopropylbenzene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Bromobenzene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
1,1,2,2-Tetrachloroethane	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
1,2,3-Trichloropropane	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
n-Propylbenzene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
2-Chlorotoluene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
4-Chlorotoluene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
1,3,5-Trimethylbenzene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
tert-Butylbenzene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
1,2,4-Trimethylbenzene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
sec-Butylbenzene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
1,3-Dichlorobenzene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
p-Isopropyltoluene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
1,4-Dichlorobenzene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
1,2-Dichlorobenzene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
n-Butylbenzene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
1,2-Dibromo-3-chloropropane	ND	0.0050	EPA 8260C	6-28-13	6-28-13	
1,2,4-Trichlorobenzene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Hexachlorobutadiene	ND	0.0050	EPA 8260C	6-28-13	6-28-13	
Naphthalene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
1,2,3-Trichlorobenzene	ND	0.0010	EPA 8260C	6-28-13	6-28-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*98*	*65-129*				
Toluene-d8	*98*	*77-122*				
4-Bromofluorobenzene	*102*	*73-124*				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

VOLATILES by EPA 8260C
SB/SBD QUALITY CONTROL

Matrix: Soil
Units: mg/kg

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS										
Laboratory ID:	SB0628S1									
	SB	SBD	SB	SBD	SB	SBD				
1,1-Dichloroethene	**0.0338**	**0.0348**	0.0500	0.0500	68	70	56-141	3	15	
Benzene	**0.0378**	**0.0392**	0.0500	0.0500	76	78	70-121	4	15	
Trichloroethene	**0.0439**	**0.0446**	0.0500	0.0500	88	89	74-118	2	15	
Toluene	**0.0414**	**0.0435**	0.0500	0.0500	83	87	75-120	5	15	
Chlorobenzene	**0.0501**	**0.0515**	0.0500	0.0500	100	103	75-120	3	15	
Surrogate:										
Dibromofluoromethane					*92*	*96*	*65-129*			
Toluene-d8					*92*	*98*	*77-122*			
4-Bromofluorobenzene					*94*	*99*	*73-124*			

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

PAHs by EPA 8270D/SIM
METHOD BLANK QUALITY CONTROL

Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0701S1					
Naphthalene	**ND**	0.0067	EPA 8270D/SIM	7-1-13	7-1-13	
2-Methylnaphthalene	**ND**	0.0067	EPA 8270D/SIM	7-1-13	7-1-13	
1-Methylnaphthalene	**ND**	0.0067	EPA 8270D/SIM	7-1-13	7-1-13	
Acenaphthylene	**ND**	0.0067	EPA 8270D/SIM	7-1-13	7-1-13	
Acenaphthene	**ND**	0.0067	EPA 8270D/SIM	7-1-13	7-1-13	
Fluorene	**ND**	0.0067	EPA 8270D/SIM	7-1-13	7-1-13	
Phenanthrene	**ND**	0.0067	EPA 8270D/SIM	7-1-13	7-1-13	
Anthracene	**ND**	0.0067	EPA 8270D/SIM	7-1-13	7-1-13	
Fluoranthene	**ND**	0.0067	EPA 8270D/SIM	7-1-13	7-1-13	
Pyrene	**ND**	0.0067	EPA 8270D/SIM	7-1-13	7-1-13	
Benzo[a]anthracene	**ND**	0.0067	EPA 8270D/SIM	7-1-13	7-1-13	
Chrysene	**ND**	0.0067	EPA 8270D/SIM	7-1-13	7-1-13	
Benzo[b]fluoranthene	**ND**	0.0067	EPA 8270D/SIM	7-1-13	7-1-13	
Benzo(j,k)fluoranthene	**ND**	0.0067	EPA 8270D/SIM	7-1-13	7-1-13	
Benzo[a]pyrene	**ND**	0.0067	EPA 8270D/SIM	7-1-13	7-1-13	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0067	EPA 8270D/SIM	7-1-13	7-1-13	
Dibenz[a,h]anthracene	**ND**	0.0067	EPA 8270D/SIM	7-1-13	7-1-13	
Benzo[g,h,i]perylene	**ND**	0.0067	EPA 8270D/SIM	7-1-13	7-1-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*83*	*43 - 116*				
Pyrene-d10	*89*	*33 - 124*				
Terphenyl-d14	*82*	*38 - 125*				

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

PAHs by EPA 8270D/SIM
MS/MSD QUALITY CONTROL

Matrix: Soil
Units: mg/Kg

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
MATRIX SPIKES											
Laboratory ID:	06-242-06										
	MS	MSD	MS	MSD		MS	MSD				
Naphthalene	**0.0492**	**0.0504**	0.0833	0.0833	ND	59	61	47 - 99	2	30	
Acenaphthylene	**0.0636**	**0.0677**	0.0833	0.0833	ND	76	81	41 - 118	6	26	
Acenaphthene	**0.0501**	**0.0521**	0.0833	0.0833	ND	60	63	43 - 112	4	28	
Fluorene	**0.0551**	**0.0587**	0.0833	0.0833	ND	66	70	41 - 119	6	25	
Phenanthrene	**0.0534**	**0.0572**	0.0833	0.0833	ND	64	69	40 - 115	7	24	
Anthracene	**0.0672**	**0.0729**	0.0833	0.0833	ND	81	88	41 - 117	8	25	
Fluoranthene	**0.0633**	**0.0695**	0.0833	0.0833	ND	76	83	36 -128	9	26	
Pyrene	**0.0604**	**0.0665**	0.0833	0.0833	ND	73	80	36 - 123	10	24	
Benzo[a]anthracene	**0.0677**	**0.0740**	0.0833	0.0833	ND	81	89	33 - 123	9	26	
Chrysene	**0.0540**	**0.0589**	0.0833	0.0833	ND	65	71	35 - 123	9	25	
Benzo[b]fluoranthene	**0.0656**	**0.0742**	0.0833	0.0833	ND	79	89	30 - 125	12	28	
Benzo(j,k)fluoranthene	**0.0589**	**0.0618**	0.0833	0.0833	ND	71	74	31 - 122	5	30	
Benzo[a]pyrene	**0.0584**	**0.0639**	0.0833	0.0833	ND	70	77	29 - 125	9	28	
Indeno(1,2,3-c,d)pyrene	**0.0681**	**0.0745**	0.0833	0.0833	ND	82	89	28 - 125	9	27	
Dibenz[a,h]anthracene	**0.0644**	**0.0704**	0.0833	0.0833	ND	77	85	32 - 124	9	27	
Benzo[g,h,i]perylene	**0.0601**	**0.0659**	0.0833	0.0833	ND	72	79	30 - 120	9	26	
Surrogate:											
2-Fluorobiphenyl						*62*	*66*	*43 - 116*			
Pyrene-d10						*69*	*77*	*33 - 124*			
Terphenyl-d14						*64*	*70*	*38 - 125*			

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

TOTAL METALS
EPA 6010C/7471B
METHOD BLANK QUALITY CONTROL

Date Extracted: 6-28&7-1-13
Date Analyzed: 6-28&7-1-13

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: MB0628SM2&MB0701S1

Analyte	Method	Result	PQL
Arsenic	6010C	**ND**	10
Barium	6010C	**ND**	2.5
Cadmium	6010C	**ND**	0.50
Chromium	6010C	**ND**	0.50
Lead	6010C	**ND**	5.0
Mercury	7471B	**ND**	0.25
Selenium	6010C	**ND**	10
Silver	6010C	**ND**	1.0

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

TOTAL METALS
EPA 6010C/7471B
DUPLICATE QUALITY CONTROL

Date Extracted: 6-28&7-1-13
Date Analyzed: 6-28&7-1-13

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: 06-242-14

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Arsenic	**ND**	**ND**	NA	10	
Barium	**78.4**	**74.4**	5	2.5	
Cadmium	**ND**	**ND**	NA	0.50	
Chromium	**45.2**	**38.6**	16	0.50	
Lead	**7.87**	**7.62**	3	5.0	
Mercury	**ND**	**ND**	NA	0.25	
Selenium	**ND**	**ND**	NA	10	
Silver	**ND**	**ND**	NA	1.0	

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

TOTAL METALS
EPA 6010C/7471B
MS/MSD QUALITY CONTROL

Date Extracted: 6-28&7-1-13
Date Analyzed: 6-28&7-1-13

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: 06-242-14

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Arsenic	100	**87.8**	88	**83.9**	84	5	
Barium	100	**169**	91	**174**	96	3	
Cadmium	50.0	**45.7**	91	**46.0**	92	1	
Chromium	100	**126**	81	**129**	84	3	
Lead	250	**242**	94	**241**	93	0	
Mercury	0.500	**0.478**	96	**0.470**	94	2	
Selenium	100	**90.3**	90	**87.9**	88	3	
Silver	25.0	**19.3**	77	**19.1**	76	1	

Date of Report: July 8, 2013
Samples Submitted: June 26, 2013
Laboratory Reference: 1306-242
Project: 0183-085-00

% MOISTURE

Date Analyzed: 6-27-13

Client ID	Lab ID	% Moisture
1D-TP2-0-1	06-242-02	21
1D-TP2-3.5-4.5	06-242-03	19
1C-TP1-0-1	06-242-05	27
1C-TP1-2-3	06-242-06	14
1C-TP2-0-1	06-242-08	6
1C-TP2-3-4	06-242-09	19
1C-TP2-6-7	06-242-10	20
1H-TP1-0-1	06-242-11	9
1H-TP1-5-6	06-242-12	6
1G-TP1-0-1	06-242-13	8
1G-TP1-2-3	06-242-14	8
1G-TP1-4-5	06-242-15	10
1G-TP2-0-1	06-242-16	12
1G-TP2-3-4	06-242-17	18
1G-TP2-6-7	06-242-18	17

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-napthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical ____________.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1- Sample extract treated with a Sulfuric acid/Silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in method 8260C, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

OnSite Environmental Inc.
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Chain of Custody

Laboratory Number: 06-242

Company: GeoEngineers
Project Number: 0183-085-00
Project Name: UW-Priority Development
Project Manager: Tricia DeOme
Sampled by: JLD

Turnaround Request (in working days)
(Check One)
☐ Same Day ☐ 1 Day
☐ 2 Days ☐ 3 Days
☒ Standard (7 Days) (TPH analysis 5 Days)
☐ ________ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID★	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Volatiles 8260C	Halogenated Volatiles 8260C	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals/MTCA Metals (circle one)	TCLP Metals	HEM (oil and grease) 1664A	Hold	% Moisture
1	TRIP-130625			W	2					X												
2	ID-TP2-0-1	6/25/13	0755	S	5	X				X			X					X				X
3	ID-TP2-3.5-4.5		0800			X				X			X					X				↓
4	ID-TP2-5-6		0810																		X	
5	IC-TP1-0-1		~~0900~~ 0845			X				X			X					X				X
6	IC-TP1-2-3		0900			X				X			X					X				↓
7	IC-TP1-5-6		0905																		X	
8	IC-TP2-0-1		0935			X				X			X					X				X
9	IC-TP2-3-4		0945			X				X			X					X				
10	IC-TP2-6-7		0950			X				X			X					X				↓

	Signature	Company	Date	Time
Relinquished	[signature]	GeoEngineers	6/26/13	10:40
Received	[signature]	Speedy Msngr	6-26-13	1040
Relinquished	[signature]	" "	" "	1335
Received	[signature]	OSE	6/26/13	1335
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions
★ Follow up w/ NWTPH-Dx + NWTPH-Gx
⊗ added 7/1/13. DB (STA)

Chromatograms with final report ☐

Data Package: Level III ☐ Level IV ☐ Electronic Data Deliverables (EDDs) ☐ ________

OnSite Environmental Inc.
Analytical Laboratory Testing Services
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Phone: (425) 883-3881 • www.onsite-env.com

Chain of Custody

Laboratory Number: 06-242

Company: GeoEngineers
Project Number: 0183-085-00
Project Name: UW- Priority Development
Project Manager: Tricia DeOme
Sampled by: JLD

Turnaround Request (in working days)
(Check One)
☐ Same Day ☐ 1 Day
☐ 2 Days ☐ 3 Days
☒ Standard (7 Days) (TPH analysis 5 Days)
☐ ______ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID ✱	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Volatiles 8260C	Halogenated Volatiles 8260C	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals/MTCA Metals (circle one)	TCLP Metals	HEM (oil and grease) 1664A							% Moisture
11	1H-TP1-0-1	6/25/13	1050	S	5	X				X			X					X									X
12	1H-TP1-5-6		1055			X				X			X					X									
13	1G-TP1-0-1		1125			X				X			X					X									
14	1G-TP1-2-3		1130			X				X			X					X									
15	1G-TP1-4-5		1135			X				X			X					X									
16	1G-TP2-0-1		1205			X				X			X					X									
17	1G-TP2-3-4		1210			X			X	X			X					X									
18	1G-TP2-6-7		1220			X				X			X					X									

	Signature	Company	Date	Time
Relinquished	[signature]	GeoEngineers	6/26/13	10:40
Received	[signature]	Speedy Msngr	6-26-13	1040
Relinquished	[signature]	" "	" "	1335
Received	[signature]	OSE	6/26/13	1335
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions
✱ Followup w/ NWTPH-Dx and NWTPH-Gx
Ⓧ Added 7/1/13. DB (STA)

Chromatograms with final report ☐

Data Package: Level III ☐ Level IV ☐ Electronic Data Deliverables (EDDs) ☐ ______

OnSite Environmental Inc.

14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

July 8, 2013

Tricia DeOme
GeoEngineers, Inc.
1101 Fawcett Avenue South, Suite 200
Tacoma, WA 98402

Re:	Analytical Data for Project 0183-085-00
Laboratory Reference No. 1307-016

Dear Tricia:

Enclosed are the analytical results and associated quality control data for samples submitted on July 2, 2013.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: July 8, 2013
Samples Submitted: July 2, 2013
Laboratory Reference: 1307-016
Project: 0183-085-00

Case Narrative

Samples were collected on July 1, 2013 and received by the laboratory on July 2, 2013. They were maintained at the laboratory at a temperature of 2^oC to 6^oC.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

Date of Report: July 8, 2013
Samples Submitted: July 2, 2013
Laboratory Reference: 1307-016
Project: 0183-085-00

ANALYTICAL REPORT FOR SAMPLES

Client ID	Laboratory ID	Matrix	Date Sampled	Date Received	Notes
UG-MW29S-130701	07-016-01	Water	7-1-13	7-2-13	
UG-MW29D-130701	07-016-02	Water	7-1-13	7-2-13	
TRIP-MW-130701	07-016-03	Water	7-1-13	7-2-13	

Date of Report: July 8, 2013
Samples Submitted: July 2, 2013
Laboratory Reference: 1307-016
Project: 0183-085-00

NWTPH-Gx

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW29S-130701**					
Laboratory ID:	07-016-01					
Gasoline	**ND**	100	NWTPH-Gx	7-2-13	7-2-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*92*	*71-112*				
Client ID:	**UG-MW29D-130701**					
Laboratory ID:	07-016-02					
Gasoline	**ND**	100	NWTPH-Gx	7-2-13	7-2-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*91*	*71-112*				

Date of Report: July 8, 2013
Samples Submitted: July 2, 2013
Laboratory Reference: 1307-016
Project: 0183-085-00

NWTPH-Dx

Matrix: Water
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW29S-130701**					
Laboratory ID:	07-016-01					
Diesel Range Organics	**ND**	0.25	NWTPH-Dx	7-3-13	7-5-13	
Lube Oil Range Organics	**ND**	0.41	NWTPH-Dx	7-3-13	7-5-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*76*	*50-150*				
Client ID:	**UG-MW29D-130701**					
Laboratory ID:	07-016-02					
Diesel Range Organics	**ND**	0.25	NWTPH-Dx	7-3-13	7-5-13	
Lube Oil Range Organics	**ND**	0.40	NWTPH-Dx	7-3-13	7-5-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*82*	*50-150*				

Date of Report: July 8, 2013
Samples Submitted: July 2, 2013
Laboratory Reference: 1307-016
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 1 of 2

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW29S-130701**					
Laboratory ID:	07-016-01					
Dichlorodifluoromethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Chloromethane	ND	1.0	EPA 8260C	7-3-13	7-3-13	
Vinyl Chloride	ND	0.10	EPA 8260C	7-3-13	7-3-13	
Bromomethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Chloroethane	ND	1.0	EPA 8260C	7-3-13	7-3-13	
Trichlorofluoromethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,1-Dichloroethene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Acetone	ND	5.0	EPA 8260C	7-3-13	7-3-13	
Iodomethane	ND	1.0	EPA 8260C	7-3-13	7-3-13	
Carbon Disulfide	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Methylene Chloride	ND	1.0	EPA 8260C	7-3-13	7-3-13	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Methyl t-Butyl Ether	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,1-Dichloroethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Vinyl Acetate	ND	1.0	EPA 8260C	7-3-13	7-3-13	
2,2-Dichloropropane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
2-Butanone	ND	5.0	EPA 8260C	7-3-13	7-3-13	
Bromochloromethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Chloroform	0.56	0.20	EPA 8260C	7-3-13	7-3-13	
1,1,1-Trichloroethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Carbon Tetrachloride	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,1-Dichloropropene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Benzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,2-Dichloroethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Trichloroethene	42	0.20	EPA 8260C	7-3-13	7-3-13	
1,2-Dichloropropane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Dibromomethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Bromodichloromethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
2-Chloroethyl Vinyl Ether	ND	1.0	EPA 8260C	7-3-13	7-3-13	
(cis) 1,3-Dichloropropene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Methyl Isobutyl Ketone	ND	2.0	EPA 8260C	7-3-13	7-3-13	
Toluene	ND	1.0	EPA 8260C	7-3-13	7-3-13	
(trans) 1,3-Dichloropropene	ND	0.20	EPA 8260C	7-3-13	7-3-13	

Date of Report: July 8, 2013
Samples Submitted: July 2, 2013
Laboratory Reference: 1307-016
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW29S-130701**					
Laboratory ID:	07-016-01					
1,1,2-Trichloroethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Tetrachloroethene	0.29	0.20	EPA 8260C	7-3-13	7-3-13	
1,3-Dichloropropane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
2-Hexanone	ND	2.0	EPA 8260C	7-3-13	7-3-13	
Dibromochloromethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,2-Dibromoethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Chlorobenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,1,1,2-Tetrachloroethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Ethylbenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
m,p-Xylene	ND	0.40	EPA 8260C	7-3-13	7-3-13	
o-Xylene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Styrene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Bromoform	ND	1.0	EPA 8260C	7-3-13	7-3-13	
Isopropylbenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Bromobenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,1,2,2-Tetrachloroethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,2,3-Trichloropropane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
n-Propylbenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
2-Chlorotoluene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
4-Chlorotoluene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,3,5-Trimethylbenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
tert-Butylbenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,2,4-Trimethylbenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
sec-Butylbenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,3-Dichlorobenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
p-Isopropyltoluene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,4-Dichlorobenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,2-Dichlorobenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
n-Butylbenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,2-Dibromo-3-chloropropane	ND	1.3	EPA 8260C	7-3-13	7-3-13	
1,2,4-Trichlorobenzene	ND	0.29	EPA 8260C	7-3-13	7-3-13	
Hexachlorobutadiene	ND	0.30	EPA 8260C	7-3-13	7-3-13	
Naphthalene	ND	1.7	EPA 8260C	7-3-13	7-3-13	
1,2,3-Trichlorobenzene	ND	0.40	EPA 8260C	7-3-13	7-3-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*108*	*62-122*				
Toluene-d8	*99*	*70-120*				
4-Bromofluorobenzene	*98*	*71-120*				

Date of Report: July 8, 2013
Samples Submitted: July 2, 2013
Laboratory Reference: 1307-016
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 1 of 2

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW29D-130701**					
Laboratory ID:	07-016-02					
Dichlorodifluoromethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Chloromethane	ND	1.0	EPA 8260C	7-3-13	7-3-13	
Vinyl Chloride	ND	0.10	EPA 8260C	7-3-13	7-3-13	
Bromomethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Chloroethane	ND	1.0	EPA 8260C	7-3-13	7-3-13	
Trichlorofluoromethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,1-Dichloroethene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Acetone	ND	5.0	EPA 8260C	7-3-13	7-3-13	
Iodomethane	ND	1.0	EPA 8260C	7-3-13	7-3-13	
Carbon Disulfide	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Methylene Chloride	ND	1.0	EPA 8260C	7-3-13	7-3-13	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Methyl t-Butyl Ether	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,1-Dichloroethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Vinyl Acetate	ND	1.0	EPA 8260C	7-3-13	7-3-13	
2,2-Dichloropropane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
2-Butanone	ND	5.0	EPA 8260C	7-3-13	7-3-13	
Bromochloromethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Chloroform	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,1,1-Trichloroethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Carbon Tetrachloride	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,1-Dichloropropene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Benzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,2-Dichloroethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Trichloroethene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,2-Dichloropropane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Dibromomethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Bromodichloromethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
2-Chloroethyl Vinyl Ether	ND	1.0	EPA 8260C	7-3-13	7-3-13	
(cis) 1,3-Dichloropropene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Methyl Isobutyl Ketone	ND	2.0	EPA 8260C	7-3-13	7-3-13	
Toluene	ND	1.0	EPA 8260C	7-3-13	7-3-13	
(trans) 1,3-Dichloropropene	ND	0.20	EPA 8260C	7-3-13	7-3-13	

Date of Report: July 8, 2013
Samples Submitted: July 2, 2013
Laboratory Reference: 1307-016
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW29D-130701**					
Laboratory ID:	07-016-02					
1,1,2-Trichloroethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Tetrachloroethene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,3-Dichloropropane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
2-Hexanone	ND	2.0	EPA 8260C	7-3-13	7-3-13	
Dibromochloromethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,2-Dibromoethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Chlorobenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,1,1,2-Tetrachloroethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Ethylbenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
m,p-Xylene	ND	0.40	EPA 8260C	7-3-13	7-3-13	
o-Xylene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Styrene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Bromoform	ND	1.0	EPA 8260C	7-3-13	7-3-13	
Isopropylbenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Bromobenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,1,2,2-Tetrachloroethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,2,3-Trichloropropane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
n-Propylbenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
2-Chlorotoluene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
4-Chlorotoluene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,3,5-Trimethylbenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
tert-Butylbenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,2,4-Trimethylbenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
sec-Butylbenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,3-Dichlorobenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
p-Isopropyltoluene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,4-Dichlorobenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,2-Dichlorobenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
n-Butylbenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,2-Dibromo-3-chloropropane	ND	1.3	EPA 8260C	7-3-13	7-3-13	
1,2,4-Trichlorobenzene	ND	0.29	EPA 8260C	7-3-13	7-3-13	
Hexachlorobutadiene	ND	0.30	EPA 8260C	7-3-13	7-3-13	
Naphthalene	ND	1.7	EPA 8260C	7-3-13	7-3-13	
1,2,3-Trichlorobenzene	ND	0.40	EPA 8260C	7-3-13	7-3-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*102*	*62-122*				
Toluene-d8	*94*	*70-120*				
4-Bromofluorobenzene	*97*	*71-120*				

Date of Report: July 8, 2013
Samples Submitted: July 2, 2013
Laboratory Reference: 1307-016
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 1 of 2

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TRIP-MW-130701**					
Laboratory ID:	07-016-03					
Dichlorodifluoromethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Chloromethane	ND	1.0	EPA 8260C	7-3-13	7-3-13	
Vinyl Chloride	ND	0.10	EPA 8260C	7-3-13	7-3-13	
Bromomethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Chloroethane	ND	1.0	EPA 8260C	7-3-13	7-3-13	
Trichlorofluoromethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,1-Dichloroethene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Acetone	ND	5.0	EPA 8260C	7-3-13	7-3-13	
Iodomethane	ND	1.0	EPA 8260C	7-3-13	7-3-13	
Carbon Disulfide	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Methylene Chloride	ND	1.0	EPA 8260C	7-3-13	7-3-13	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Methyl t-Butyl Ether	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,1-Dichloroethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Vinyl Acetate	ND	1.0	EPA 8260C	7-3-13	7-3-13	
2,2-Dichloropropane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
2-Butanone	ND	5.0	EPA 8260C	7-3-13	7-3-13	
Bromochloromethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Chloroform	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,1,1-Trichloroethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Carbon Tetrachloride	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,1-Dichloropropene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Benzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,2-Dichloroethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Trichloroethene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,2-Dichloropropane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Dibromomethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Bromodichloromethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
2-Chloroethyl Vinyl Ether	ND	1.0	EPA 8260C	7-3-13	7-3-13	
(cis) 1,3-Dichloropropene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Methyl Isobutyl Ketone	ND	2.0	EPA 8260C	7-3-13	7-3-13	
Toluene	ND	1.0	EPA 8260C	7-3-13	7-3-13	
(trans) 1,3-Dichloropropene	ND	0.20	EPA 8260C	7-3-13	7-3-13	

Date of Report: July 8, 2013
Samples Submitted: July 2, 2013
Laboratory Reference: 1307-016
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TRIP-MW-130701**					
Laboratory ID:	07-016-03					
1,1,2-Trichloroethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Tetrachloroethene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,3-Dichloropropane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
2-Hexanone	ND	2.0	EPA 8260C	7-3-13	7-3-13	
Dibromochloromethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,2-Dibromoethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Chlorobenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,1,1,2-Tetrachloroethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Ethylbenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
m,p-Xylene	ND	0.40	EPA 8260C	7-3-13	7-3-13	
o-Xylene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Styrene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Bromoform	ND	1.0	EPA 8260C	7-3-13	7-3-13	
Isopropylbenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Bromobenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,1,2,2-Tetrachloroethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,2,3-Trichloropropane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
n-Propylbenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
2-Chlorotoluene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
4-Chlorotoluene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,3,5-Trimethylbenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
tert-Butylbenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,2,4-Trimethylbenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
sec-Butylbenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,3-Dichlorobenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
p-Isopropyltoluene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,4-Dichlorobenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,2-Dichlorobenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
n-Butylbenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,2-Dibromo-3-chloropropane	ND	1.3	EPA 8260C	7-3-13	7-3-13	
1,2,4-Trichlorobenzene	ND	0.29	EPA 8260C	7-3-13	7-3-13	
Hexachlorobutadiene	ND	0.30	EPA 8260C	7-3-13	7-3-13	
Naphthalene	ND	1.7	EPA 8260C	7-3-13	7-3-13	
1,2,3-Trichlorobenzene	ND	0.40	EPA 8260C	7-3-13	7-3-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*97*	*62-122*				
Toluene-d8	*98*	*70-120*				
4-Bromofluorobenzene	*94*	*71-120*				

Date of Report: July 8, 2013
Samples Submitted: July 2, 2013
Laboratory Reference: 1307-016
Project: 0183-085-00

PAHs by EPA 8270D/SIM

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW29S-130701**					
Laboratory ID:	07-016-01					
Naphthalene	**ND**	0.097	EPA 8270D/SIM	7-3-13	7-3-13	
2-Methylnaphthalene	**ND**	0.097	EPA 8270D/SIM	7-3-13	7-3-13	
1-Methylnaphthalene	**ND**	0.097	EPA 8270D/SIM	7-3-13	7-3-13	
Acenaphthylene	**ND**	0.097	EPA 8270D/SIM	7-3-13	7-3-13	
Acenaphthene	**ND**	0.097	EPA 8270D/SIM	7-3-13	7-3-13	
Fluorene	**ND**	0.097	EPA 8270D/SIM	7-3-13	7-3-13	
Phenanthrene	**ND**	0.097	EPA 8270D/SIM	7-3-13	7-3-13	
Anthracene	**ND**	0.097	EPA 8270D/SIM	7-3-13	7-3-13	
Fluoranthene	**ND**	0.097	EPA 8270D/SIM	7-3-13	7-3-13	
Pyrene	**ND**	0.097	EPA 8270D/SIM	7-3-13	7-3-13	
Benzo[a]anthracene	**ND**	0.0097	EPA 8270D/SIM	7-3-13	7-3-13	
Chrysene	**ND**	0.0097	EPA 8270D/SIM	7-3-13	7-3-13	
Benzo[b]fluoranthene	**ND**	0.0097	EPA 8270D/SIM	7-3-13	7-3-13	
Benzo(j,k)fluoranthene	**ND**	0.0097	EPA 8270D/SIM	7-3-13	7-3-13	
Benzo[a]pyrene	**ND**	0.0097	EPA 8270D/SIM	7-3-13	7-3-13	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0097	EPA 8270D/SIM	7-3-13	7-3-13	
Dibenz[a,h]anthracene	**ND**	0.0097	EPA 8270D/SIM	7-3-13	7-3-13	
Benzo[g,h,i]perylene	**ND**	0.0097	EPA 8270D/SIM	7-3-13	7-3-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*70*	*40 - 107*				
Pyrene-d10	*95*	*41 - 106*				
Terphenyl-d14	*88*	*44 - 124*				

Date of Report: July 8, 2013
Samples Submitted: July 2, 2013
Laboratory Reference: 1307-016
Project: 0183-085-00

PAHs by EPA 8270D/SIM

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW29D-130701**					
Laboratory ID:	07-016-02					
Naphthalene	**ND**	0.094	EPA 8270D/SIM	7-3-13	7-3-13	
2-Methylnaphthalene	**ND**	0.094	EPA 8270D/SIM	7-3-13	7-3-13	
1-Methylnaphthalene	**ND**	0.094	EPA 8270D/SIM	7-3-13	7-3-13	
Acenaphthylene	**ND**	0.094	EPA 8270D/SIM	7-3-13	7-3-13	
Acenaphthene	**ND**	0.094	EPA 8270D/SIM	7-3-13	7-3-13	
Fluorene	**ND**	0.094	EPA 8270D/SIM	7-3-13	7-3-13	
Phenanthrene	**ND**	0.094	EPA 8270D/SIM	7-3-13	7-3-13	
Anthracene	**ND**	0.094	EPA 8270D/SIM	7-3-13	7-3-13	
Fluoranthene	**ND**	0.094	EPA 8270D/SIM	7-3-13	7-3-13	
Pyrene	**ND**	0.094	EPA 8270D/SIM	7-3-13	7-3-13	
Benzo[a]anthracene	**ND**	0.0094	EPA 8270D/SIM	7-3-13	7-3-13	
Chrysene	**ND**	0.0094	EPA 8270D/SIM	7-3-13	7-3-13	
Benzo[b]fluoranthene	**ND**	0.0094	EPA 8270D/SIM	7-3-13	7-3-13	
Benzo(j,k)fluoranthene	**ND**	0.0094	EPA 8270D/SIM	7-3-13	7-3-13	
Benzo[a]pyrene	**ND**	0.0094	EPA 8270D/SIM	7-3-13	7-3-13	
Indeno(1,2,3-c,d)pyrene	**ND**	0.0094	EPA 8270D/SIM	7-3-13	7-3-13	
Dibenz[a,h]anthracene	**ND**	0.0094	EPA 8270D/SIM	7-3-13	7-3-13	
Benzo[g,h,i]perylene	**ND**	0.0094	EPA 8270D/SIM	7-3-13	7-3-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*71*	*40 - 107*				
Pyrene-d10	*86*	*41 - 106*				
Terphenyl-d14	*80*	*44 - 124*				

Date of Report: July 8, 2013
Samples Submitted: July 2, 2013
Laboratory Reference: 1307-016
Project: 0183-085-00

TOTAL METALS
EPA 200.8/7470A

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	07-016-01					
Client ID:	**UG-MW29S-130701**					
Arsenic	**ND**	3.3	200.8	7-3-13	7-3-13	
Barium	**ND**	28	200.8	7-3-13	7-3-13	
Cadmium	**ND**	4.4	200.8	7-3-13	7-3-13	
Chromium	**ND**	11	200.8	7-3-13	7-3-13	
Lead	**ND**	1.1	200.8	7-3-13	7-3-13	
Mercury	**ND**	0.50	7470A	7-3-13	7-3-13	
Selenium	**ND**	5.6	200.8	7-3-13	7-3-13	
Silver	**ND**	11	200.8	7-3-13	7-3-13	
Lab ID:	07-016-02					
Client ID:	**UG-MW29D-130701**					
Arsenic	**ND**	3.3	200.8	7-3-13	7-3-13	
Barium	**51**	28	200.8	7-3-13	7-3-13	
Cadmium	**ND**	4.4	200.8	7-3-13	7-3-13	
Chromium	**ND**	11	200.8	7-3-13	7-3-13	
Lead	**ND**	1.1	200.8	7-3-13	7-3-13	
Mercury	**ND**	0.50	7470A	7-3-13	7-3-13	
Selenium	**ND**	5.6	200.8	7-3-13	7-3-13	
Silver	**ND**	11	200.8	7-3-13	7-3-13	

Date of Report: July 8, 2013
Samples Submitted: July 2, 2013
Laboratory Reference: 1307-016
Project: 0183-085-00

NWTPH-Gx
QUALITY CONTROL

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0702W1					
Gasoline	**ND**	100	NWTPH-Gx	7-2-13	7-2-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*89*	*71-112*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	07-016-01										
	ORIG	DUP									
Gasoline	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Surrogate:											
Fluorobenzene						*92*	*92*	*71-112*			

Date of Report: July 8, 2013
Samples Submitted: July 2, 2013
Laboratory Reference: 1307-016
Project: 0183-085-00

NWTPH-Dx
QUALITY CONTROL

Matrix: Water
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0703W1					
Diesel Range Organics	**ND**	0.25	NWTPH-Dx	7-3-13	7-5-13	
Lube Oil Range Organics	**ND**	0.40	NWTPH-Dx	7-3-13	7-5-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*71*	*50-150*				

Analyte	Result		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE								
Laboratory ID:	06-260-01							
	ORIG	DUP						
Diesel Range Organics	**ND**	**ND**				NA	NA	
Lube Oil Range Organics	**ND**	**ND**				NA	NA	
Surrogate:								
o-Terphenyl			*73*	*80*	*50-150*			

Date of Report: July 8, 2013
Samples Submitted: July 2, 2013
Laboratory Reference: 1307-016
Project: 0183-085-00

VOLATILES by EPA 8260C
METHOD BLANK QUALITY CONTROL
Page 1 of 2

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0703W1					
Dichlorodifluoromethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Chloromethane	ND	1.0	EPA 8260C	7-3-13	7-3-13	
Vinyl Chloride	ND	0.10	EPA 8260C	7-3-13	7-3-13	
Bromomethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Chloroethane	ND	1.0	EPA 8260C	7-3-13	7-3-13	
Trichlorofluoromethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,1-Dichloroethene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Acetone	ND	5.0	EPA 8260C	7-3-13	7-3-13	
Iodomethane	ND	1.0	EPA 8260C	7-3-13	7-3-13	
Carbon Disulfide	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Methylene Chloride	ND	1.0	EPA 8260C	7-3-13	7-3-13	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Methyl t-Butyl Ether	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,1-Dichloroethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Vinyl Acetate	ND	1.0	EPA 8260C	7-3-13	7-3-13	
2,2-Dichloropropane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
2-Butanone	ND	5.0	EPA 8260C	7-3-13	7-3-13	
Bromochloromethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Chloroform	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,1,1-Trichloroethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Carbon Tetrachloride	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,1-Dichloropropene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Benzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,2-Dichloroethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Trichloroethene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,2-Dichloropropane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Dibromomethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Bromodichloromethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
2-Chloroethyl Vinyl Ether	ND	1.0	EPA 8260C	7-3-13	7-3-13	
(cis) 1,3-Dichloropropene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Methyl Isobutyl Ketone	ND	2.0	EPA 8260C	7-3-13	7-3-13	
Toluene	ND	1.0	EPA 8260C	7-3-13	7-3-13	
(trans) 1,3-Dichloropropene	ND	0.20	EPA 8260C	7-3-13	7-3-13	

Date of Report: July 8, 2013
Samples Submitted: July 2, 2013
Laboratory Reference: 1307-016
Project: 0183-085-00

VOLATILES by EPA 8260C
METHOD BLANK QUALITY CONTROL
Page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0703W1					
1,1,2-Trichloroethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Tetrachloroethene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,3-Dichloropropane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
2-Hexanone	ND	2.0	EPA 8260C	7-3-13	7-3-13	
Dibromochloromethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,2-Dibromoethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Chlorobenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,1,1,2-Tetrachloroethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Ethylbenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
m,p-Xylene	ND	0.40	EPA 8260C	7-3-13	7-3-13	
o-Xylene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Styrene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Bromoform	ND	1.0	EPA 8260C	7-3-13	7-3-13	
Isopropylbenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
Bromobenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,1,2,2-Tetrachloroethane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,2,3-Trichloropropane	ND	0.20	EPA 8260C	7-3-13	7-3-13	
n-Propylbenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
2-Chlorotoluene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
4-Chlorotoluene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,3,5-Trimethylbenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
tert-Butylbenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,2,4-Trimethylbenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
sec-Butylbenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,3-Dichlorobenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
p-Isopropyltoluene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,4-Dichlorobenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,2-Dichlorobenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
n-Butylbenzene	ND	0.20	EPA 8260C	7-3-13	7-3-13	
1,2-Dibromo-3-chloropropane	ND	1.3	EPA 8260C	7-3-13	7-3-13	
1,2,4-Trichlorobenzene	ND	0.29	EPA 8260C	7-3-13	7-3-13	
Hexachlorobutadiene	ND	0.30	EPA 8260C	7-3-13	7-3-13	
Naphthalene	ND	1.7	EPA 8260C	7-3-13	7-3-13	
1,2,3-Trichlorobenzene	ND	0.40	EPA 8260C	7-3-13	7-3-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*97*	*62-122*				
Toluene-d8	*96*	*70-120*				
4-Bromofluorobenzene	*98*	*71-120*				

Date of Report: July 8, 2013
Samples Submitted: July 2, 2013
Laboratory Reference: 1307-016
Project: 0183-085-00

VOLATILES by EPA 8260C
SB/SBD QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS										
Laboratory ID:	SB0703W1									
	SB	SBD	SB	SBD	SB	SBD				
1,1-Dichloroethene	**12.4**	**12.2**	10.0	10.0	124	122	63-142	2	17	
Benzene	**10.7**	**10.6**	10.0	10.0	107	106	78-125	1	15	
Trichloroethene	**9.29**	**9.15**	10.0	10.0	93	92	80-125	2	15	
Toluene	**9.94**	**9.90**	10.0	10.0	99	99	80-125	0	15	
Chlorobenzene	**10.8**	**10.7**	10.0	10.0	108	107	80-140	1	15	
Surrogate:										
Dibromofluoromethane					*97*	*105*	*62-122*			
Toluene-d8					*95*	*101*	*70-120*			
4-Bromofluorobenzene					*92*	*103*	*71-120*			

Date of Report: July 8, 2013
Samples Submitted: July 2, 2013
Laboratory Reference: 1307-016
Project: 0183-085-00

PAHs by EPA 8270D/SIM
METHOD BLANK QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0703W1					
Naphthalene	**ND**	0.10	EPA 8270D/SIM	7-3-13	7-3-13	
2-Methylnaphthalene	**ND**	0.10	EPA 8270D/SIM	7-3-13	7-3-13	
1-Methylnaphthalene	**ND**	0.10	EPA 8270D/SIM	7-3-13	7-3-13	
Acenaphthylene	**ND**	0.10	EPA 8270D/SIM	7-3-13	7-3-13	
Acenaphthene	**ND**	0.10	EPA 8270D/SIM	7-3-13	7-3-13	
Fluorene	**ND**	0.10	EPA 8270D/SIM	7-3-13	7-3-13	
Phenanthrene	**ND**	0.10	EPA 8270D/SIM	7-3-13	7-3-13	
Anthracene	**ND**	0.10	EPA 8270D/SIM	7-3-13	7-3-13	
Fluoranthene	**ND**	0.10	EPA 8270D/SIM	7-3-13	7-3-13	
Pyrene	**ND**	0.10	EPA 8270D/SIM	7-3-13	7-3-13	
Benzo[a]anthracene	**ND**	0.010	EPA 8270D/SIM	7-3-13	7-3-13	
Chrysene	**ND**	0.010	EPA 8270D/SIM	7-3-13	7-3-13	
Benzo[b]fluoranthene	**ND**	0.010	EPA 8270D/SIM	7-3-13	7-3-13	
Benzo(j,k)fluoranthene	**ND**	0.010	EPA 8270D/SIM	7-3-13	7-3-13	
Benzo[a]pyrene	**ND**	0.010	EPA 8270D/SIM	7-3-13	7-3-13	
Indeno(1,2,3-c,d)pyrene	**ND**	0.010	EPA 8270D/SIM	7-3-13	7-3-13	
Dibenz[a,h]anthracene	**ND**	0.010	EPA 8270D/SIM	7-3-13	7-3-13	
Benzo[g,h,i]perylene	**ND**	0.010	EPA 8270D/SIM	7-3-13	7-3-13	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorobiphenyl	*68*	*40 - 107*				
Pyrene-d10	*92*	*41 - 106*				
Terphenyl-d14	*85*	*44 - 124*				

Date of Report: July 8, 2013
Samples Submitted: July 2, 2013
Laboratory Reference: 1307-016
Project: 0183-085-00

PAHs by EPA 8270D/SIM
SB/SBD QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS										
Laboratory ID:	SB0703W1									
	SB	SBD	SB	SBD	SB	SBD				
Naphthalene	**0.341**	**0.374**	0.500	0.500	68	75	31 - 110	9	46	
Acenaphthylene	**0.389**	**0.424**	0.500	0.500	78	85	40 - 118	9	43	
Acenaphthene	**0.325**	**0.356**	0.500	0.500	65	71	38 - 112	9	40	
Fluorene	**0.356**	**0.403**	0.500	0.500	71	81	45 - 114	12	41	
Phenanthrene	**0.371**	**0.425**	0.500	0.500	74	85	47 - 112	14	36	
Anthracene	**0.455**	**0.529**	0.500	0.500	91	106	46 - 122	15	37	
Fluoranthene	**0.477**	**0.551**	0.500	0.500	95	110	51 - 127	14	35	
Pyrene	**0.463**	**0.536**	0.500	0.500	93	107	50 - 125	15	37	
Benzo[a]anthracene	**0.487**	**0.555**	0.500	0.500	97	111	46 - 123	13	34	
Chrysene	**0.405**	**0.461**	0.500	0.500	81	92	49 - 120	13	34	
Benzo[b]fluoranthene	**0.478**	**0.553**	0.500	0.500	96	111	46 - 126	15	37	
Benzo(j,k)fluoranthene	**0.444**	**0.499**	0.500	0.500	89	100	43 - 125	12	39	
Benzo[a]pyrene	**0.418**	**0.480**	0.500	0.500	84	96	44 - 129	14	37	
Indeno(1,2,3-c,d)pyrene	**0.521**	**0.586**	0.500	0.500	104	117	40 - 124	12	42	
Dibenz[a,h]anthracene	**0.507**	**0.570**	0.500	0.500	101	114	35 - 122	12	44	
Benzo[g,h,i]perylene	**0.473**	**0.533**	0.500	0.500	95	107	37 - 122	12	45	
Surrogate:										
2-Fluorobiphenyl					*66*	*65*	*40 - 107*			
Pyrene-d10					*85*	*98*	*41 - 106*			
Terphenyl-d14					*78*	*89*	*44 - 124*			

Date of Report: July 8, 2013
Samples Submitted: July 2, 2013
Laboratory Reference: 1307-016
Project: 0183-085-00

TOTAL METALS
EPA 200.8
METHOD BLANK QUALITY CONTROL

Date Extracted: 7-3-13
Date Analyzed: 7-3-13

Matrix: Water
Units: ug/L (ppb)

Lab ID: MB0703WM2

Analyte	Method	Result	PQL
Arsenic	200.8	**ND**	3.3
Barium	200.8	**ND**	28
Cadmium	200.8	**ND**	4.4
Chromium	200.8	**ND**	11
Lead	200.8	**ND**	1.1
Selenium	200.8	**ND**	5.6
Silver	200.8	**ND**	11

Date of Report: July 8, 2013
Samples Submitted: July 2, 2013
Laboratory Reference: 1307-016
Project: 0183-085-00

TOTAL MERCURY
EPA 7470A
METHOD BLANK QUALITY CONTROL

Date Extracted:	7-3-13
Date Analyzed:	7-3-13
Matrix:	Water
Units:	ug/L (ppb)
Lab ID:	MB0703W1

Analyte	Method	Result	PQL
Mercury	7470A	**ND**	0.50

Date of Report: July 8, 2013
Samples Submitted: July 2, 2013
Laboratory Reference: 1307-016
Project: 0183-085-00

TOTAL METALS
EPA 200.8
DUPLICATE QUALITY CONTROL

Date Extracted: 7-3-13
Date Analyzed: 7-3-13

Matrix: Water
Units: ug/L (ppb)

Lab ID: 06-268-02

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Arsenic	**ND**	**ND**	NA	3.3	
Barium	**ND**	**ND**	NA	28	
Cadmium	**ND**	**ND**	NA	4.4	
Chromium	**ND**	**ND**	NA	11	
Lead	**ND**	**ND**	NA	1.1	
Selenium	**ND**	**ND**	NA	5.6	
Silver	**ND**	**ND**	NA	11	

Date of Report: July 8, 2013
Samples Submitted: July 2, 2013
Laboratory Reference: 1307-016
Project: 0183-085-00

TOTAL MERCURY
EPA 7470A
DUPLICATE QUALITY CONTROL

Date Extracted:	7-3-13
Date Analyzed:	7-3-13
Matrix:	Water
Units:	ug/L (ppb)
Lab ID:	06-260-04

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Mercury	**ND**	**ND**	NA	0.50	

Date of Report: July 8, 2013
Samples Submitted: July 2, 2013
Laboratory Reference: 1307-016
Project: 0183-085-00

TOTAL METALS
EPA 200.8
MS/MSD QUALITY CONTROL

Date Extracted: 7-3-13
Date Analyzed: 7-3-13

Matrix: Water
Units: ug/L (ppb)

Lab ID: 06-268-02

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Arsenic	111	**104**	94	**106**	95	1	
Barium	111	**107**	96	**107**	96	0	
Cadmium	111	**103**	92	**105**	94	2	
Chromium	111	**99.4**	90	**101**	91	2	
Lead	111	**105**	94	**107**	96	2	
Selenium	111	**103**	93	**105**	95	3	
Silver	111	**97.0**	87	**101**	91	4	

Date of Report: July 8, 2013
Samples Submitted: July 2, 2013
Laboratory Reference: 1307-016
Project: 0183-085-00

TOTAL MERCURY
EPA 7470A
MS/MSD QUALITY CONTROL

Date Extracted: 7-3-13
Date Analyzed: 7-3-13

Matrix: Water
Units: ug/L (ppb)

Lab ID: 06-260-04

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Mercury	12.5	**12.1**	97	**12.1**	97	0	

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-napthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical ____________.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1- Sample extract treated with a Sulfuric acid/Silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in method 8260C, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

OnSite Environmental Inc.

Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Chain of Custody

Page 1 of 1

Laboratory Number: 07-016

Company: GeoEngineers
Project Number: 0183-085-00
Project Name: UWT-PDA
Project Manager: TDeOme
Sampled by: TML

Turnaround Request (in working days)
(Check One)
☐ Same Day ☐ 1 Day
☐ 2 Days ☐ 3 Days
☒ Standard (7 Days) (TPH analysis 5 Days)
☐ ______ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Volatiles 8260C	Halogenated Volatiles 8260C	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals/ MTCA Metals (circle one)	TCLP Metals	HEM (oil and grease) 1664A	Dissolved RCRA*	% Moisture
1	UG-MW29S-130701	7/1/13	1215	W	12			X	X	X			X					X				
2	UG-MW29D-130701	7/1/13	1510	W	12			X	X	X			X					X				
3	TRIP-MW-130701	—	—	↓	2					X												

	Signature	Company	Date	Time
Relinquished	[signature]	GeoEngineers	7/1/13	1715
Received	[signature]	GeoEngineers	7/1/13	1745
Relinquished	[signature]	GeoEngineers	7/1/13	1258
Received	[signature]	SPEEDY #4	7/2/13	1250
Relinquished	[signature]	SPEEDY #4	7/2/13	1357
Received	[signature]	OnSite Env	7/2/13	1357
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions
* Lab Filter, but hold for total analysis

Chromatograms with final report ☐

Data Package: Level III ☐ Level IV ☐ Electronic Data Deliverables (EDDs) ☐ ______

OnSite Environmental Inc.
14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

July 10, 2013

Tricia DeOme
GeoEngineers, Inc.
1101 Fawcett Avenue South, Suite 200
Tacoma, WA 98402

Re: Analytical Data for Project 0183-085-00
Laboratory Reference No. 1307-040

Dear Tricia:

Enclosed are the analytical results and associated quality control data for samples submitted on July 3, 2013.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: July 10, 2013
Samples Submitted: July 3, 2013
Laboratory Reference: 1307-040
Project: 0183-085-00

Case Narrative

Samples were collected on July 2, 2013 and received by the laboratory on July 3, 2013. They were maintained at the laboratory at a temperature of 2^oC to 6^oC.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

NWTPH Gx Analysis

The gasoline result for sample JP-MW2-130702 is attributed to a single peak (Chlorobenzene).

Any other QA/QC issues associated with this extraction and analysis will be indicated with a footnote reference and discussed in detail on the Data Qualifier page.

PAHs EPA 8270D/SIM Analysis

Sample UG-MW27-130702 had one surrogate recovery out of control limits. This is within allowance of our standard operating procedure as long as the recovery is above 10%.

Any other QA/QC issues associated with this extraction and analysis will be indicated with a footnote reference and discussed in detail on the Data Qualifier page.

Date of Report: July 10, 2013
Samples Submitted: July 3, 2013
Laboratory Reference: 1307-040
Project: 0183-085-00

ANALYTICAL REPORT FOR SAMPLES

Client ID	Laboratory ID	Matrix	Date Sampled	Date Received	Notes
UG-MW28-130702	07-040-01	Water	7-2-13	7-3-13	
~~UG-MW27-130702~~	~~07-040-02~~	~~Water~~	~~7-2-13~~	~~7-3-13~~	
~~CR-MW8-130702~~	~~07-040-03~~	~~Water~~	~~7-2-13~~	~~7-3-13~~	
~~JP-MW2-130702~~	~~07-040-04~~	~~Water~~	~~7-2-13~~	~~7-3-13~~	
~~UG-MW1-130702~~	~~07-040-05~~	~~Water~~	~~7-2-13~~	~~7-3-13~~	
TRIP-130702-1	07-040-06	Water	7-2-13	7-3-13	

Date of Report: July 10, 2013
Samples Submitted: July 3, 2013
Laboratory Reference: 1307-040
Project: 0183-085-00

NWTPH-Gx

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW28-130702**					
Laboratory ID:	07-040-01					
Gasoline	**ND**	100	NWTPH-Gx	7-8-13	7-8-13	
Surrogate:	***Percent Recovery***	***Control Limits***				
Fluorobenzene	***89***	***71-112***				
~~**Client ID:**~~	~~**UG-MW27-130702**~~					
~~Laboratory ID:~~	~~07-040-02~~					
~~Gasoline~~	~~**ND**~~	~~100~~	~~NWTPH-Gx~~	~~7-8-13~~	~~7-8-13~~	
~~***Surrogate:***~~	~~***Percent Recovery***~~	~~***Control Limits***~~				
~~***Fluorobenzene***~~	~~***87***~~	~~***71-112***~~				
~~**Client ID:**~~	~~**CR-MW8-130702**~~					
~~Laboratory ID:~~	~~07-040-03~~					
~~Gasoline~~	~~**ND**~~	~~100~~	~~NWTPH-Gx~~	~~7-8-13~~	~~7-8-13~~	
~~***Surrogate:***~~	~~***Percent Recovery***~~	~~***Control Limits***~~				
~~***Fluorobenzene***~~	~~***87***~~	~~***71-112***~~				
~~**Client ID:**~~	~~**JP-MW2-130702**~~					
~~Laboratory ID:~~	~~07-040-04~~					
~~Gasoline~~	~~**540**~~	~~100~~	~~NWTPH-Gx~~	~~7-8-13~~	~~7-8-13~~	~~Z~~
~~***Surrogate:***~~	~~***Percent Recovery***~~	~~***Control Limits***~~				
~~***Fluorobenzene***~~	~~***92***~~	~~***71-112***~~				
~~**Client ID:**~~	~~**UG-MW1-130702**~~					
~~Laboratory ID:~~	~~07-040-05~~					
~~Gasoline~~	~~**ND**~~	~~100~~	~~NWTPH-Gx~~	~~7-8-13~~	~~7-8-13~~	
~~***Surrogate:***~~	~~***Percent Recovery***~~	~~***Control Limits***~~				
~~***Fluorobenzene***~~	~~***89***~~	~~***71-112***~~				

Date of Report: July 10, 2013
Samples Submitted: July 3, 2013
Laboratory Reference: 1307-040
Project: 0183-085-00

NWTPH-Dx

Matrix: Water
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW28-130702**					
Laboratory ID:	07-040-01					
Diesel Range Organics	**ND**	0.25	NWTPH-Dx	7-8-13	7-8-13	
Lube Oil Range Organics	**ND**	0.41	NWTPH-Dx	7-8-13	7-8-13	
Surrogate:	***Percent Recovery***	***Control Limits***				
o-Terphenyl	***85***	***50-150***				
~~**Client ID:**~~	~~**UG-MW27-130702**~~					
~~Laboratory ID:~~	~~07-040-02~~					
~~Diesel Range Organics~~	~~**ND**~~	~~0.26~~	~~NWTPH-Dx~~	~~7-8-13~~	~~7-8-13~~	
~~Lube Oil Range Organics~~	~~**ND**~~	~~0.41~~	~~NWTPH-Dx~~	~~7-8-13~~	~~7-8-13~~	
~~***Surrogate:***~~	~~***Percent Recovery***~~	~~***Control Limits***~~				
~~***o-Terphenyl***~~	~~***79***~~	~~***50-150***~~				
~~**Client ID:**~~	~~**CR-MW8-130702**~~					
~~Laboratory ID:~~	~~07-040-03~~					
~~Diesel Range Organics~~	~~**ND**~~	~~0.27~~	~~NWTPH-Dx~~	~~7-8-13~~	~~7-8-13~~	
~~Lube Oil Range Organics~~	~~**ND**~~	~~0.44~~	~~NWTPH-Dx~~	~~7-8-13~~	~~7-8-13~~	
~~***Surrogate:***~~	~~***Percent Recovery***~~	~~***Control Limits***~~				
~~***o-Terphenyl***~~	~~***85***~~	~~***50-150***~~				
~~**Client ID:**~~	~~**JP-MW2-130702**~~					
~~Laboratory ID:~~	~~07-040-04~~					
~~Diesel Range Organics~~	~~**ND**~~	~~0.27~~	~~NWTPH-Dx~~	~~7-8-13~~	~~7-8-13~~	
~~Lube Oil Range Organics~~	~~**ND**~~	~~0.43~~	~~NWTPH-Dx~~	~~7-8-13~~	~~7-8-13~~	
~~***Surrogate:***~~	~~***Percent Recovery***~~	~~***Control Limits***~~				
~~***o-Terphenyl***~~	~~***89***~~	~~***50-150***~~				
~~**Client ID:**~~	~~**UG-MW1-130702**~~					
~~Laboratory ID:~~	~~07-040-05~~					
~~Diesel Range Organics~~	~~**ND**~~	~~0.27~~	~~NWTPH-Dx~~	~~7-8-13~~	~~7-8-13~~	
~~Lube Oil Range Organics~~	~~**ND**~~	~~0.44~~	~~NWTPH-Dx~~	~~7-8-13~~	~~7-8-13~~	
~~***Surrogate:***~~	~~***Percent Recovery***~~	~~***Control Limits***~~				
~~***o-Terphenyl***~~	~~***90***~~	~~***50-150***~~				

Date of Report: July 10, 2013
Samples Submitted: July 3, 2013
Laboratory Reference: 1307-040
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 1 of 2

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW28-130702**					
Laboratory ID:	07-040-01					
Dichlorodifluoromethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Chloromethane	ND	1.0	EPA 8260C	7-8-13	7-8-13	
Vinyl Chloride	ND	0.10	EPA 8260C	7-8-13	7-8-13	
Bromomethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Chloroethane	ND	1.0	EPA 8260C	7-8-13	7-8-13	
Trichlorofluoromethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,1-Dichloroethene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Acetone	ND	5.0	EPA 8260C	7-8-13	7-8-13	
Iodomethane	ND	1.0	EPA 8260C	7-8-13	7-8-13	
Carbon Disulfide	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Methylene Chloride	ND	1.0	EPA 8260C	7-8-13	7-8-13	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Methyl t-Butyl Ether	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,1-Dichloroethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Vinyl Acetate	ND	1.0	EPA 8260C	7-8-13	7-8-13	
2,2-Dichloropropane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
2-Butanone	ND	5.0	EPA 8260C	7-8-13	7-8-13	
Bromochloromethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Chloroform	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,1,1-Trichloroethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Carbon Tetrachloride	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,1-Dichloropropene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Benzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,2-Dichloroethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Trichloroethene	0.21	0.20	EPA 8260C	7-8-13	7-8-13	
1,2-Dichloropropane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Dibromomethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Bromodichloromethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
2-Chloroethyl Vinyl Ether	ND	1.0	EPA 8260C	7-8-13	7-8-13	
(cis) 1,3-Dichloropropene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Methyl Isobutyl Ketone	ND	2.0	EPA 8260C	7-8-13	7-8-13	
Toluene	ND	1.0	EPA 8260C	7-8-13	7-8-13	
(trans) 1,3-Dichloropropene	ND	0.20	EPA 8260C	7-8-13	7-8-13	

Date of Report: July 10, 2013
Samples Submitted: July 3, 2013
Laboratory Reference: 1307-040
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW28-130702**					
Laboratory ID:	07-040-01					
1,1,2-Trichloroethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Tetrachloroethene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,3-Dichloropropane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
2-Hexanone	ND	2.0	EPA 8260C	7-8-13	7-8-13	
Dibromochloromethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,2-Dibromoethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Chlorobenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,1,1,2-Tetrachloroethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Ethylbenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
m,p-Xylene	ND	0.40	EPA 8260C	7-8-13	7-8-13	
o-Xylene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Styrene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Bromoform	ND	1.0	EPA 8260C	7-8-13	7-8-13	
Isopropylbenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Bromobenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,1,2,2-Tetrachloroethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,2,3-Trichloropropane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
n-Propylbenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
2-Chlorotoluene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
4-Chlorotoluene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,3,5-Trimethylbenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
tert-Butylbenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,2,4-Trimethylbenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
sec-Butylbenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,3-Dichlorobenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
p-Isopropyltoluene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,4-Dichlorobenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,2-Dichlorobenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
n-Butylbenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,2-Dibromo-3-chloropropane	ND	1.0	EPA 8260C	7-8-13	7-8-13	
1,2,4-Trichlorobenzene	ND	0.27	EPA 8260C	7-8-13	7-8-13	
Hexachlorobutadiene	ND	0.29	EPA 8260C	7-8-13	7-8-13	
Naphthalene	ND	1.4	EPA 8260C	7-8-13	7-8-13	
1,2,3-Trichlorobenzene	ND	0.34	EPA 8260C	7-8-13	7-8-13	
Surrogate:	***Percent Recovery***	***Control Limits***				
Dibromofluoromethane	***108***	***62-122***				
Toluene-d8	***97***	***70-120***				
4-Bromofluorobenzene	***101***	***71-120***				

Date of Report: July 10, 2013
Samples Submitted: July 3, 2013
Laboratory Reference: 1307-040
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 1 of 2

Matrix: Water
~~Units: ug/L~~

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~Client ID:~~	~~UG-MW27-130702~~					
~~Laboratory ID:~~	~~07-040-02~~					
~~Dichlorodifluoromethane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Chloromethane~~	~~ND~~	~~1.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Vinyl Chloride~~	~~ND~~	~~0.10~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Bromomethane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Chloroethane~~	~~ND~~	~~1.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Trichlorofluoromethane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,1-Dichloroethene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Acetone~~	~~ND~~	~~5.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Iodomethane~~	~~ND~~	~~1.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Carbon Disulfide~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Methylene Chloride~~	~~ND~~	~~1.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~(trans) 1,2-Dichloroethene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Methyl t-Butyl Ether~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,1-Dichloroethane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Vinyl Acetate~~	~~ND~~	~~1.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~2,2-Dichloropropane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~(cis) 1,2-Dichloroethene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~2-Butanone~~	~~ND~~	~~5.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Bromochloromethane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Chloroform~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,1,1-Trichloroethane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Carbon Tetrachloride~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,1-Dichloropropene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Benzene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2-Dichloroethane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Trichloroethene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2-Dichloropropane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Dibromomethane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Bromodichloromethane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~2-Chloroethyl Vinyl Ether~~	~~ND~~	~~1.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~(cis) 1,3-Dichloropropene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Methyl Isobutyl Ketone~~	~~ND~~	~~2.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Toluene~~	~~ND~~	~~1.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~(trans) 1,3-Dichloropropene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	

Date of Report: July 10, 2013
Samples Submitted: July 3, 2013
Laboratory Reference: 1307-040
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 2 of 2

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	Date ~~Prepared~~	Date ~~Analyzed~~	~~Flags~~
~~Client ID:~~	~~UG-MW27-130702~~					
~~Laboratory ID:~~	~~07-040-02~~					
~~1,1,2-Trichloroethane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Tetrachloroethene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,3-Dichloropropane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~2-Hexanone~~	~~ND~~	~~2.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Dibromochloromethane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2-Dibromoethane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Chlorobenzene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,1,1,2-Tetrachloroethane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Ethylbenzene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~m,p-Xylene~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~o-Xylene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Styrene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Bromoform~~	~~ND~~	~~1.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Isopropylbenzene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Bromobenzene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,1,2,2-Tetrachloroethane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2,3-Trichloropropane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~n-Propylbenzene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~2-Chlorotoluene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~4-Chlorotoluene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,3,5-Trimethylbenzene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~tert-Butylbenzene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2,4-Trimethylbenzene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~sec-Butylbenzene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,3-Dichlorobenzene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~p-Isopropyltoluene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,4-Dichlorobenzene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2-Dichlorobenzene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~n-Butylbenzene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2-Dibromo-3-chloropropane~~	~~ND~~	~~1.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2,4-Trichlorobenzene~~	~~ND~~	~~0.27~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Hexachlorobutadiene~~	~~ND~~	~~0.29~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Naphthalene~~	~~ND~~	~~1.4~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2,3-Trichlorobenzene~~	~~ND~~	~~0.34~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Surrogate:~~	***~~Percent Recovery~~***	***~~Control Limits~~***				
~~Dibromofluoromethane~~	***~~109~~***	***~~62-122~~***				
~~Toluene-d8~~	***~~95~~***	***~~70-120~~***				
~~4-Bromofluorobenzene~~	***~~102~~***	***~~71-120~~***				

Date of Report: July 10, 2013
Samples Submitted: July 3, 2013
Laboratory Reference: 1307-040
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 1 of 2

~~Matrix: Water~~
~~Units: ug/L~~

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~Client ID:~~	~~CR-MW8-130702~~					
~~Laboratory ID:~~	~~07-040-03~~					
~~Dichlorodifluoromethane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Chloromethane~~	~~ND~~	~~1.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Vinyl Chloride~~	~~ND~~	~~0.10~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Bromomethane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Chloroethane~~	~~ND~~	~~1.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Trichlorofluoromethane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,1-Dichloroethene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Acetone~~	~~ND~~	~~5.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Iodomethane~~	~~ND~~	~~1.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Carbon Disulfide~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Methylene Chloride~~	~~ND~~	~~1.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~(trans) 1,2-Dichloroethene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Methyl t-Butyl Ether~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,1-Dichloroethane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Vinyl Acetate~~	~~ND~~	~~1.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~2,2-Dichloropropane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~(cis) 1,2-Dichloroethene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~2-Butanone~~	~~ND~~	~~5.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Bromochloromethane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Chloroform~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,1,1-Trichloroethane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Carbon Tetrachloride~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,1-Dichloropropene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Benzene~~	~~1.9~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2-Dichloroethane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Trichloroethene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2-Dichloropropane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Dibromomethane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Bromodichloromethane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~2-Chloroethyl Vinyl Ether~~	~~ND~~	~~1.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~(cis) 1,3-Dichloropropene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Methyl Isobutyl Ketone~~	~~ND~~	~~2.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Toluene~~	~~ND~~	~~1.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~(trans) 1,3-Dichloropropene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	

Date of Report: July 10, 2013
Samples Submitted: July 3, 2013
Laboratory Reference: 1307-040
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 2 of 2

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	Date ~~Prepared~~	Date ~~Analyzed~~	~~Flags~~
~~Client ID:~~	~~CR-MW8-130702~~					
~~Laboratory ID:~~	~~07-040-03~~					
~~1,1,2-Trichloroethane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Tetrachloroethene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,3-Dichloropropane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~2-Hexanone~~	~~ND~~	~~2.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Dibromochloromethane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2-Dibromoethane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Chlorobenzene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,1,1,2-Tetrachloroethane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Ethylbenzene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~m,p-Xylene~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~o-Xylene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Styrene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Bromoform~~	~~ND~~	~~1.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Isopropylbenzene~~	~~0.36~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Bromobenzene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,1,2,2-Tetrachloroethane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2,3-Trichloropropane~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~n-Propylbenzene~~	~~0.84~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~2-Chlorotoluene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~4-Chlorotoluene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,3,5-Trimethylbenzene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~tert-Butylbenzene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2,4-Trimethylbenzene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~sec-Butylbenzene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,3-Dichlorobenzene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~p-Isopropyltoluene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,4-Dichlorobenzene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2-Dichlorobenzene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~n-Butylbenzene~~	~~ND~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2-Dibromo-3-chloropropane~~	~~ND~~	~~1.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2,4-Trichlorobenzene~~	~~ND~~	~~0.27~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Hexachlorobutadiene~~	~~ND~~	~~0.29~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Naphthalene~~	~~ND~~	~~1.4~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2,3-Trichlorobenzene~~	~~ND~~	~~0.34~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Surrogate:~~	***~~Percent Recovery~~***	***~~Control Limits~~***				
~~Dibromofluoromethane~~	***~~107~~***	***~~62-122~~***				
~~Toluene-d8~~	***~~98~~***	***~~70-120~~***				
~~4-Bromofluorobenzene~~	***~~100~~***	***~~71-120~~***				

Date of Report: July 10, 2013
Samples Submitted: July 3, 2013
Laboratory Reference: 1307-040
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 1 of 2

~~Matrix: Water~~
~~Units: ug/L~~

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~Client ID:~~	~~JP-MW2-130702~~					
~~Laboratory ID:~~	~~07-040-04~~					
~~Dichlorodifluoromethane~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Chloromethane~~	~~ND~~	~~20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Vinyl Chloride~~	~~120~~	~~2.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Bromomethane~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Chloroethane~~	~~ND~~	~~20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Trichlorofluoromethane~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,1-Dichloroethene~~	~~10~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Acetone~~	~~ND~~	~~100~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Iodomethane~~	~~ND~~	~~20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Carbon Disulfide~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Methylene Chloride~~	~~ND~~	~~20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~(trans) 1,2-Dichloroethene~~	~~38~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Methyl t-Butyl Ether~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,1-Dichloroethane~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Vinyl Acetate~~	~~ND~~	~~20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~2,2-Dichloropropane~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~(cis) 1,2-Dichloroethene~~	~~600~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~2-Butanone~~	~~ND~~	~~100~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Bromochloromethane~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Chloroform~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,1,1-Trichloroethane~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Carbon Tetrachloride~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,1-Dichloropropene~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Benzene~~	~~57~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2-Dichloroethane~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Trichloroethene~~	~~500~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2-Dichloropropane~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Dibromomethane~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Bromodichloromethane~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~2-Chloroethyl Vinyl Ether~~	~~ND~~	~~20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~(cis) 1,3-Dichloropropene~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Methyl Isobutyl Ketone~~	~~ND~~	~~40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Toluene~~	~~ND~~	~~20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~(trans) 1,3-Dichloropropene~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	

~~Date of Report: July 10, 2013~~
~~Samples Submitted: July 3, 2013~~
~~Laboratory Reference: 1307-040~~
~~Project: 0183-085-00~~

~~VOLATILES by EPA 8260C~~
~~Page 2 of 2~~

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~Client ID:~~	~~JP-MW2-130702~~					
~~Laboratory ID:~~	~~07-040-04~~					
~~1,1,2-Trichloroethane~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Tetrachloroethene~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,3-Dichloropropane~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~2-Hexanone~~	~~ND~~	~~40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Dibromochloromethane~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2-Dibromoethane~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Chlorobenzene~~	~~170~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,1,1,2-Tetrachloroethane~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Ethylbenzene~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~m,p-Xylene~~	~~ND~~	~~8.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~o-Xylene~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Styrene~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Bromoform~~	~~ND~~	~~20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Isopropylbenzene~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Bromobenzene~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,1,2,2-Tetrachloroethane~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2,3-Trichloropropane~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~n-Propylbenzene~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~2-Chlorotoluene~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~4-Chlorotoluene~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,3,5-Trimethylbenzene~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~tert-Butylbenzene~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2,4-Trimethylbenzene~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~sec-Butylbenzene~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,3-Dichlorobenzene~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~p-Isopropyltoluene~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,4-Dichlorobenzene~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2-Dichlorobenzene~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~n-Butylbenzene~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2-Dibromo-3-chloropropane~~	~~ND~~	~~20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2,4-Trichlorobenzene~~	~~ND~~	~~5.4~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Hexachlorobutadiene~~	~~ND~~	~~5.8~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Naphthalene~~	~~ND~~	~~28~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2,3-Trichlorobenzene~~	~~ND~~	~~6.8~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Surrogate:~~	***~~Percent Recovery~~***	***~~Control Limits~~***				
~~Dibromofluoromethane~~	***~~111~~***	***~~62-122~~***				
~~Toluene-d8~~	***~~102~~***	***~~70-120~~***				
~~4-Bromofluorobenzene~~	***~~101~~***	***~~71-120~~***				

Date of Report: July 10, 2013
Samples Submitted: July 3, 2013
Laboratory Reference: 1307-040
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 1 of 2

~~Matrix: Water~~
~~Units: ug/L~~

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~Client ID:~~	**~~UG-MW1-130702~~**					
~~Laboratory ID:~~	~~07-040-05~~					
~~Dichlorodifluoromethane~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Chloromethane~~	~~ND~~	~~2.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Vinyl Chloride~~	~~9.7~~	~~0.20~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Bromomethane~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Chloroethane~~	~~ND~~	~~2.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Trichlorofluoromethane~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,1-Dichloroethene~~	~~0.63~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Acetone~~	~~ND~~	~~10~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Iodomethane~~	~~ND~~	~~2.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Carbon Disulfide~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Methylene Chloride~~	~~ND~~	~~2.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~(trans) 1,2-Dichloroethene~~	~~0.81~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Methyl t-Butyl Ether~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,1-Dichloroethane~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Vinyl Acetate~~	~~ND~~	~~2.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~2,2-Dichloropropane~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~(cis) 1,2-Dichloroethene~~	~~19~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~2-Butanone~~	~~ND~~	~~10~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Bromochloromethane~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Chloroform~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,1,1-Trichloroethane~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Carbon Tetrachloride~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,1-Dichloropropene~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Benzene~~	~~56~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2-Dichloroethane~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Trichloroethene~~	~~1.1~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2-Dichloropropane~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Dibromomethane~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Bromodichloromethane~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~2-Chloroethyl Vinyl Ether~~	~~ND~~	~~2.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~(cis) 1,3-Dichloropropene~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Methyl Isobutyl Ketone~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Toluene~~	~~ND~~	~~2.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~(trans) 1,3-Dichloropropene~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	

Date of Report: July 10, 2013
Samples Submitted: July 3, 2013
Laboratory Reference: 1307-040
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 2 of 2

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	Date ~~Prepared~~	Date ~~Analyzed~~	~~Flags~~
~~Client ID:~~	~~UG-MW1-130702~~					
~~Laboratory ID:~~	~~07-040-05~~					
~~1,1,2-Trichloroethane~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Tetrachloroethene~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,3-Dichloropropane~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~2-Hexanone~~	~~ND~~	~~4.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Dibromochloromethane~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2-Dibromoethane~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Chlorobenzene~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,1,1,2-Tetrachloroethane~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Ethylbenzene~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~m,p-Xylene~~	~~ND~~	~~0.80~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~o-Xylene~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Styrene~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Bromoform~~	~~ND~~	~~2.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Isopropylbenzene~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Bromobenzene~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,1,2,2-Tetrachloroethane~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2,3-Trichloropropane~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~n-Propylbenzene~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~2-Chlorotoluene~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~4-Chlorotoluene~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,3,5-Trimethylbenzene~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~tert-Butylbenzene~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2,4-Trimethylbenzene~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~sec-Butylbenzene~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,3-Dichlorobenzene~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~p-Isopropyltoluene~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,4-Dichlorobenzene~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2-Dichlorobenzene~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~n-Butylbenzene~~	~~ND~~	~~0.40~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2-Dibromo-3-chloropropane~~	~~ND~~	~~2.0~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2,4-Trichlorobenzene~~	~~ND~~	~~0.54~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Hexachlorobutadiene~~	~~ND~~	~~0.58~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Naphthalene~~	~~ND~~	~~2.8~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~1,2,3-Trichlorobenzene~~	~~ND~~	~~0.68~~	~~EPA 8260C~~	~~7-8-13~~	~~7-8-13~~	
~~Surrogate:~~	***~~Percent Recovery~~***	***~~Control Limits~~***				
~~Dibromofluoromethane~~	***~~111~~***	***~~62-122~~***				
~~Toluene-d8~~	***~~102~~***	***~~70-120~~***				
~~4-Bromofluorobenzene~~	***~~105~~***	***~~71-120~~***				

Date of Report: July 10, 2013
Samples Submitted: July 3, 2013
Laboratory Reference: 1307-040
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 1 of 2

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TRIP-130702-1**					
Laboratory ID:	07-040-06					
Dichlorodifluoromethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Chloromethane	ND	1.0	EPA 8260C	7-8-13	7-8-13	
Vinyl Chloride	ND	0.10	EPA 8260C	7-8-13	7-8-13	
Bromomethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Chloroethane	ND	1.0	EPA 8260C	7-8-13	7-8-13	
Trichlorofluoromethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,1-Dichloroethene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Acetone	ND	5.0	EPA 8260C	7-8-13	7-8-13	
Iodomethane	ND	1.0	EPA 8260C	7-8-13	7-8-13	
Carbon Disulfide	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Methylene Chloride	ND	1.0	EPA 8260C	7-8-13	7-8-13	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Methyl t-Butyl Ether	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,1-Dichloroethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Vinyl Acetate	ND	1.0	EPA 8260C	7-8-13	7-8-13	
2,2-Dichloropropane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
2-Butanone	ND	5.0	EPA 8260C	7-8-13	7-8-13	
Bromochloromethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Chloroform	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,1,1-Trichloroethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Carbon Tetrachloride	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,1-Dichloropropene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Benzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,2-Dichloroethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Trichloroethene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,2-Dichloropropane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Dibromomethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Bromodichloromethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
2-Chloroethyl Vinyl Ether	ND	1.0	EPA 8260C	7-8-13	7-8-13	
(cis) 1,3-Dichloropropene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Methyl Isobutyl Ketone	ND	2.0	EPA 8260C	7-8-13	7-8-13	
Toluene	ND	1.0	EPA 8260C	7-8-13	7-8-13	
(trans) 1,3-Dichloropropene	ND	0.20	EPA 8260C	7-8-13	7-8-13	

Date of Report: July 10, 2013
Samples Submitted: July 3, 2013
Laboratory Reference: 1307-040
Project: 0183-085-00

VOLATILES by EPA 8260C
Page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**TRIP-130702-1**					
Laboratory ID:	07-040-06					
1,1,2-Trichloroethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Tetrachloroethene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,3-Dichloropropane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
2-Hexanone	ND	2.0	EPA 8260C	7-8-13	7-8-13	
Dibromochloromethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,2-Dibromoethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Chlorobenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,1,1,2-Tetrachloroethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Ethylbenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
m,p-Xylene	ND	0.40	EPA 8260C	7-8-13	7-8-13	
o-Xylene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Styrene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Bromoform	ND	1.0	EPA 8260C	7-8-13	7-8-13	
Isopropylbenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Bromobenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,1,2,2-Tetrachloroethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,2,3-Trichloropropane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
n-Propylbenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
2-Chlorotoluene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
4-Chlorotoluene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,3,5-Trimethylbenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
tert-Butylbenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,2,4-Trimethylbenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
sec-Butylbenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,3-Dichlorobenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
p-Isopropyltoluene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,4-Dichlorobenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,2-Dichlorobenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
n-Butylbenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,2-Dibromo-3-chloropropane	ND	1.0	EPA 8260C	7-8-13	7-8-13	
1,2,4-Trichlorobenzene	ND	0.27	EPA 8260C	7-8-13	7-8-13	
Hexachlorobutadiene	ND	0.29	EPA 8260C	7-8-13	7-8-13	
Naphthalene	ND	1.4	EPA 8260C	7-8-13	7-8-13	
1,2,3-Trichlorobenzene	ND	0.34	EPA 8260C	7-8-13	7-8-13	
Surrogate:	***Percent Recovery***	***Control Limits***				
Dibromofluoromethane	***108***	***62-122***				
Toluene-d8	***97***	***70-120***				
4-Bromofluorobenzene	***97***	***71-120***				

Date of Report: July 10, 2013
Samples Submitted: July 3, 2013
Laboratory Reference: 1307-040
Project: 0183-085-00

PAHs by EPA 8270D/SIM

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**UG-MW28-130702**					
Laboratory ID:	07-040-01					
Naphthalene	**ND**	0.10	EPA 8270D/SIM	7-8-13	7-8-13	
2-Methylnaphthalene	**ND**	0.10	EPA 8270D/SIM	7-8-13	7-8-13	
1-Methylnaphthalene	**ND**	0.10	EPA 8270D/SIM	7-8-13	7-8-13	
Acenaphthylene	**ND**	0.10	EPA 8270D/SIM	7-8-13	7-8-13	
Acenaphthene	**ND**	0.10	EPA 8270D/SIM	7-8-13	7-8-13	
Fluorene	**ND**	0.10	EPA 8270D/SIM	7-8-13	7-8-13	
Phenanthrene	**ND**	0.10	EPA 8270D/SIM	7-8-13	7-8-13	
Anthracene	**ND**	0.10	EPA 8270D/SIM	7-8-13	7-8-13	
Fluoranthene	**ND**	0.10	EPA 8270D/SIM	7-8-13	7-8-13	
Pyrene	**ND**	0.10	EPA 8270D/SIM	7-8-13	7-8-13	
Benzo[a]anthracene	**ND**	0.010	EPA 8270D/SIM	7-8-13	7-8-13	
Chrysene	**ND**	0.010	EPA 8270D/SIM	7-8-13	7-8-13	
Benzo[b]fluoranthene	**ND**	0.010	EPA 8270D/SIM	7-8-13	7-8-13	
Benzo(j,k)fluoranthene	**ND**	0.010	EPA 8270D/SIM	7-8-13	7-8-13	
Benzo[a]pyrene	**ND**	0.010	EPA 8270D/SIM	7-8-13	7-8-13	
Indeno(1,2,3-c,d)pyrene	**ND**	0.010	EPA 8270D/SIM	7-8-13	7-8-13	
Dibenz[a,h]anthracene	**ND**	0.010	EPA 8270D/SIM	7-8-13	7-8-13	
Benzo[g,h,i]perylene	**ND**	0.010	EPA 8270D/SIM	7-8-13	7-8-13	
Surrogate:	***Percent Recovery***	***Control Limits***				
2-Fluorobiphenyl	***86***	***40 - 107***				
Pyrene-d10	***96***	***41 - 106***				
Terphenyl-d14	***97***	***44 - 124***				

Date of Report: July 10, 2013
Samples Submitted: July 3, 2013
Laboratory Reference: 1307-040
Project: 0183-085-00

PAHs by EPA 8270D/SIM

~~Matrix: Water~~
~~Units: ug/L~~

~~Analyte~~	~~Result~~	~~PQL~~	~~Method~~	~~Date Prepared~~	~~Date Analyzed~~	~~Flags~~
~~Client ID:~~	**~~UG-MW27-130702~~**					
~~Laboratory ID:~~	~~07-040-02~~					
~~Naphthalene~~	**~~ND~~**	~~0.10~~	~~EPA 8270D/SIM~~	~~7-8-13~~	~~7-8-13~~	
~~2-Methylnaphthalene~~	**~~ND~~**	~~0.10~~	~~EPA 8270D/SIM~~	~~7-8-13~~	~~7-8-13~~	
~~1-Methylnaphthalene~~	**~~ND~~**	~~0.10~~	~~EPA 8270D/SIM~~	~~7-8-13~~	~~7-8-13~~	
~~Acenaphthylene~~	**~~ND~~**	~~0.10~~	~~EPA 8270D/SIM~~	~~7-8-13~~	~~7-8-13~~	
~~Acenaphthene~~	**~~ND~~**	~~0.10~~	~~EPA 8270D/SIM~~	~~7-8-13~~	~~7-8-13~~	
~~Fluorene~~	**~~ND~~**	~~0.10~~	~~EPA 8270D/SIM~~	~~7-8-13~~	~~7-8-13~~	
~~Phenanthrene~~	**~~ND~~**	~~0.10~~	~~EPA 8270D/SIM~~	~~7-8-13~~	~~7-8-13~~	
~~Anthracene~~	**~~ND~~**	~~0.10~~	~~EPA 8270D/SIM~~	~~7-8-13~~	~~7-8-13~~	
~~Fluoranthene~~	**~~ND~~**	~~0.10~~	~~EPA 8270D/SIM~~	~~7-8-13~~	~~7-8-13~~	
~~Pyrene~~	**~~ND~~**	~~0.10~~	~~EPA 8270D/SIM~~	~~7-8-13~~	~~7-8-13~~	
~~Benzo[a]anthracene~~	**~~ND~~**	~~0.010~~	~~EPA 8270D/SIM~~	~~7-8-13~~	~~7-8-13~~	
~~Chrysene~~	**~~ND~~**	~~0.010~~	~~EPA 8270D/SIM~~	~~7-8-13~~	~~7-8-13~~	
~~Benzo[b]fluoranthene~~	**~~ND~~**	~~0.010~~	~~EPA 8270D/SIM~~	~~7-8-13~~	~~7-8-13~~	
~~Benzo(j,k)fluoranthene~~	**~~ND~~**	~~0.010~~	~~EPA 8270D/SIM~~	~~7-8-13~~	~~7-8-13~~	
~~Benzo[a]pyrene~~	**~~ND~~**	~~0.010~~	~~EPA 8270D/SIM~~	~~7-8-13~~	~~7-8-13~~	
~~Indeno(1,2,3-c,d)pyrene~~	**~~ND~~**	~~0.010~~	~~EPA 8270D/SIM~~	~~7-8-13~~	~~7-8-13~~	
~~Dibenz[a,h]anthracene~~	**~~ND~~**	~~0.010~~	~~EPA 8270D/SIM~~	~~7-8-13~~	~~7-8-13~~	
~~Benzo[g,h,i]perylene~~	**~~ND~~**	~~0.010~~	~~EPA 8270D/SIM~~	~~7-8-13~~	~~7-8-13~~	
~~Surrogate:~~	***~~Percent Recovery~~***	***~~Control Limits~~***				
~~2-Fluorobiphenyl~~	***~~89~~***	***~~40 - 107~~***				
~~Pyrene-d10~~	***~~108~~***	***~~41 - 106~~***				~~Q~~
~~Terphenyl-d14~~	***~~93~~***	***~~44 - 124~~***				

Date of Report: July 10, 2013
Samples Submitted: July 3, 2013
Laboratory Reference: 1307-040
Project: 0183-085-00

TOTAL METALS
EPA 200.8/7470A

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	07-040-01					
Client ID:	**UG-MW28-130702**					
Arsenic	**ND**	3.3	200.8	7-9-13	7-9-13	
Barium	**33**	28	200.8	7-9-13	7-9-13	
Cadmium	**ND**	4.4	200.8	7-9-13	7-9-13	
Chromium	**ND**	11	200.8	7-9-13	7-9-13	
Lead	**ND**	1.1	200.8	7-9-13	7-9-13	
Mercury	**ND**	0.50	7470A	7-9-13	7-9-13	
Selenium	**ND**	5.6	200.8	7-9-13	7-9-13	
Silver	**ND**	11	200.8	7-9-13	7-9-13	

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	07-040-02					
~~**Client ID:**~~	~~**UG-MW27-130702**~~					
~~Arsenic~~	~~**ND**~~	~~3.3~~	~~200.8~~	~~7-9-13~~	~~7-9-13~~	
~~Barium~~	~~**ND**~~	~~28~~	~~200.8~~	~~7-9-13~~	~~7-9-13~~	
~~Cadmium~~	~~**ND**~~	~~4.4~~	~~200.8~~	~~7-9-13~~	~~7-9-13~~	
~~Chromium~~	~~**ND**~~	~~11~~	~~200.8~~	~~7-9-13~~	~~7-9-13~~	
~~Lead~~	~~**ND**~~	~~1.1~~	~~200.8~~	~~7-9-13~~	~~7-9-13~~	
~~Mercury~~	~~**ND**~~	~~0.50~~	~~7470A~~	~~7-9-13~~	~~7-9-13~~	
~~Selenium~~	~~**ND**~~	~~5.6~~	~~200.8~~	~~7-9-13~~	~~7-9-13~~	
~~Silver~~	~~**ND**~~	~~11~~	~~200.8~~	~~7-9-13~~	~~7-9-13~~	

Date of Report: July 10, 2013
Samples Submitted: July 3, 2013
Laboratory Reference: 1307-040
Project: 0183-085-00

NWTPH-Gx
QUALITY CONTROL

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0708W1					
Gasoline	**ND**	100	NWTPH-Gx	7-8-13	7-8-13	
Surrogate:	***Percent Recovery***	***Control Limits***				
Fluorobenzene	***89***	***71-112***				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	07-040-02										
	ORIG	DUP									
Gasoline	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Surrogate:											
Fluorobenzene						***87***	***87***	***71-112***			

Date of Report: July 10, 2013
Samples Submitted: July 3, 2013
Laboratory Reference: 1307-040
Project: 0183-085-00

NWTPH-Dx
QUALITY CONTROL

Matrix: Water
Units: mg/L (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0708W1					
Diesel Range Organics	**ND**	0.25	NWTPH-Dx	7-8-13	7-8-13	
Lube Oil Range Organics	**ND**	0.40	NWTPH-Dx	7-8-13	7-8-13	
Surrogate:	***Percent Recovery***	***Control Limits***				
o-Terphenyl	***82***	***50-150***				

Analyte	Result		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE								
Laboratory ID:	07-033-01							
	ORIG	DUP						
Diesel Fuel #2	**0.782**	**0.587**				28	NA	
Lube Oil Range Organics	**ND**	**ND**				NA	NA	
Surrogate:								
o-Terphenyl			***87***	***93***	***50-150***			

Date of Report: July 10, 2013
Samples Submitted: July 3, 2013
Laboratory Reference: 1307-040
Project: 0183-085-00

VOLATILES by EPA 8260C
METHOD BLANK QUALITY CONTROL
Page 1 of 2

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0708W1					
Dichlorodifluoromethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Chloromethane	ND	1.0	EPA 8260C	7-8-13	7-8-13	
Vinyl Chloride	ND	0.10	EPA 8260C	7-8-13	7-8-13	
Bromomethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Chloroethane	ND	1.0	EPA 8260C	7-8-13	7-8-13	
Trichlorofluoromethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,1-Dichloroethene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Acetone	ND	5.0	EPA 8260C	7-8-13	7-8-13	
Iodomethane	ND	1.0	EPA 8260C	7-8-13	7-8-13	
Carbon Disulfide	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Methylene Chloride	ND	1.0	EPA 8260C	7-8-13	7-8-13	
(trans) 1,2-Dichloroethene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Methyl t-Butyl Ether	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,1-Dichloroethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Vinyl Acetate	ND	1.0	EPA 8260C	7-8-13	7-8-13	
2,2-Dichloropropane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
(cis) 1,2-Dichloroethene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
2-Butanone	ND	5.0	EPA 8260C	7-8-13	7-8-13	
Bromochloromethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Chloroform	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,1,1-Trichloroethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Carbon Tetrachloride	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,1-Dichloropropene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Benzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,2-Dichloroethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Trichloroethene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,2-Dichloropropane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Dibromomethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Bromodichloromethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
2-Chloroethyl Vinyl Ether	ND	1.0	EPA 8260C	7-8-13	7-8-13	
(cis) 1,3-Dichloropropene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Methyl Isobutyl Ketone	ND	2.0	EPA 8260C	7-8-13	7-8-13	
Toluene	ND	1.0	EPA 8260C	7-8-13	7-8-13	
(trans) 1,3-Dichloropropene	ND	0.20	EPA 8260C	7-8-13	7-8-13	

Date of Report: July 10, 2013
Samples Submitted: July 3, 2013
Laboratory Reference: 1307-040
Project: 0183-085-00

VOLATILES by EPA 8260C
METHOD BLANK QUALITY CONTROL
Page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0708W1					
1,1,2-Trichloroethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Tetrachloroethene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,3-Dichloropropane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
2-Hexanone	ND	2.0	EPA 8260C	7-8-13	7-8-13	
Dibromochloromethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,2-Dibromoethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Chlorobenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,1,1,2-Tetrachloroethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Ethylbenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
m,p-Xylene	ND	0.40	EPA 8260C	7-8-13	7-8-13	
o-Xylene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Styrene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Bromoform	ND	1.0	EPA 8260C	7-8-13	7-8-13	
Isopropylbenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
Bromobenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,1,2,2-Tetrachloroethane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,2,3-Trichloropropane	ND	0.20	EPA 8260C	7-8-13	7-8-13	
n-Propylbenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
2-Chlorotoluene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
4-Chlorotoluene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,3,5-Trimethylbenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
tert-Butylbenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,2,4-Trimethylbenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
sec-Butylbenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,3-Dichlorobenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
p-Isopropyltoluene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,4-Dichlorobenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,2-Dichlorobenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
n-Butylbenzene	ND	0.20	EPA 8260C	7-8-13	7-8-13	
1,2-Dibromo-3-chloropropane	ND	1.0	EPA 8260C	7-8-13	7-8-13	
1,2,4-Trichlorobenzene	ND	0.27	EPA 8260C	7-8-13	7-8-13	
Hexachlorobutadiene	ND	0.29	EPA 8260C	7-8-13	7-8-13	
Naphthalene	ND	1.4	EPA 8260C	7-8-13	7-8-13	
1,2,3-Trichlorobenzene	ND	0.34	EPA 8260C	7-8-13	7-8-13	
Surrogate:	***Percent Recovery***	***Control Limits***				
Dibromofluoromethane	***104***	***62-122***				
Toluene-d8	***97***	***70-120***				
4-Bromofluorobenzene	***98***	***71-120***				

Date of Report: July 10, 2013
Samples Submitted: July 3, 2013
Laboratory Reference: 1307-040
Project: 0183-085-00

VOLATILES by EPA 8260C
SB/SBD QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS										
Laboratory ID:	SB0708W1									
	SB	SBD	SB	SBD	SB	SBD				
1,1-Dichloroethene	**12.9**	**12.7**	10.0	10.0	129	127	63-142	2	17	
Benzene	**10.8**	**10.8**	10.0	10.0	108	108	78-125	0	15	
Trichloroethene	**9.65**	**9.44**	10.0	10.0	97	94	80-125	2	15	
Toluene	**10.5**	**10.1**	10.0	10.0	105	101	80-125	4	15	
Chlorobenzene	**11.2**	**10.9**	10.0	10.0	112	109	80-140	3	15	
Surrogate:										
Dibromofluoromethane					***102***	***103***	***62-122***			
Toluene-d8					***98***	***97***	***70-120***			
4-Bromofluorobenzene					***91***	***101***	***71-120***			

Date of Report: July 10, 2013
Samples Submitted: July 3, 2013
Laboratory Reference: 1307-040
Project: 0183-085-00

PAHs by EPA 8270D/SIM
METHOD BLANK QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0708W1					
Naphthalene	**ND**	0.10	EPA 8270D/SIM	7-8-13	7-8-13	
2-Methylnaphthalene	**ND**	0.10	EPA 8270D/SIM	7-8-13	7-8-13	
1-Methylnaphthalene	**ND**	0.10	EPA 8270D/SIM	7-8-13	7-8-13	
Acenaphthylene	**ND**	0.10	EPA 8270D/SIM	7-8-13	7-8-13	
Acenaphthene	**ND**	0.10	EPA 8270D/SIM	7-8-13	7-8-13	
Fluorene	**ND**	0.10	EPA 8270D/SIM	7-8-13	7-8-13	
Phenanthrene	**ND**	0.10	EPA 8270D/SIM	7-8-13	7-8-13	
Anthracene	**ND**	0.10	EPA 8270D/SIM	7-8-13	7-8-13	
Fluoranthene	**ND**	0.10	EPA 8270D/SIM	7-8-13	7-8-13	
Pyrene	**ND**	0.10	EPA 8270D/SIM	7-8-13	7-8-13	
Benzo[a]anthracene	**ND**	0.010	EPA 8270D/SIM	7-8-13	7-8-13	
Chrysene	**ND**	0.010	EPA 8270D/SIM	7-8-13	7-8-13	
Benzo[b]fluoranthene	**ND**	0.010	EPA 8270D/SIM	7-8-13	7-8-13	
Benzo(j,k)fluoranthene	**ND**	0.010	EPA 8270D/SIM	7-8-13	7-8-13	
Benzo[a]pyrene	**ND**	0.010	EPA 8270D/SIM	7-8-13	7-8-13	
Indeno(1,2,3-c,d)pyrene	**ND**	0.010	EPA 8270D/SIM	7-8-13	7-8-13	
Dibenz[a,h]anthracene	**ND**	0.010	EPA 8270D/SIM	7-8-13	7-8-13	
Benzo[g,h,i]perylene	**ND**	0.010	EPA 8270D/SIM	7-8-13	7-8-13	
Surrogate:	***Percent Recovery***	***Control Limits***				
2-Fluorobiphenyl	***88***	***40 - 107***				
Pyrene-d10	***101***	***41 - 106***				
Terphenyl-d14	***93***	***44 - 124***				

Date of Report: July 10, 2013
Samples Submitted: July 3, 2013
Laboratory Reference: 1307-040
Project: 0183-085-00

PAHs by EPA 8270D/SIM
SB/SBD QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS										
Laboratory ID:	SB0708W1									
	SB	SBD	SB	SBD	SB	SBD				
Naphthalene	**0.338**	**0.475**	0.500	0.500	68	95	31 - 110	34	46	
Acenaphthylene	**0.388**	**0.483**	0.500	0.500	78	97	40 - 118	22	43	
Acenaphthene	**0.386**	**0.488**	0.500	0.500	77	98	38 - 112	23	40	
Fluorene	**0.412**	**0.437**	0.500	0.500	82	87	45 - 114	6	41	
Phenanthrene	**0.433**	**0.491**	0.500	0.500	87	98	47 - 112	13	36	
Anthracene	**0.435**	**0.489**	0.500	0.500	87	98	46 - 122	12	37	
Fluoranthene	**0.524**	**0.525**	0.500	0.500	105	105	51 - 127	0	35	
Pyrene	**0.521**	**0.519**	0.500	0.500	104	104	50 - 125	0	37	
Benzo[a]anthracene	**0.506**	**0.581**	0.500	0.500	101	116	46 - 123	14	34	
Chrysene	**0.453**	**0.524**	0.500	0.500	91	105	49 - 120	15	34	
Benzo[b]fluoranthene	**0.401**	**0.475**	0.500	0.500	80	95	46 - 126	17	37	
Benzo(j,k)fluoranthene	**0.404**	**0.462**	0.500	0.500	81	92	43 - 125	13	39	
Benzo[a]pyrene	**0.392**	**0.449**	0.500	0.500	78	90	44 - 129	14	37	
Indeno(1,2,3-c,d)pyrene	**0.388**	**0.447**	0.500	0.500	78	89	40 - 124	14	42	
Dibenz[a,h]anthracene	**0.378**	**0.435**	0.500	0.500	76	87	35 - 122	14	44	
Benzo[g,h,i]perylene	**0.376**	**0.434**	0.500	0.500	75	87	37 - 122	14	45	
Surrogate:										
2-Fluorobiphenyl					***69***	***94***	***40 - 107***			
Pyrene-d10					***106***	***107***	***41 - 106***			
Terphenyl-d14					***95***	***110***	***44 - 124***			

Date of Report: July 10, 2013
Samples Submitted: July 3, 2013
Laboratory Reference: 1307-040
Project: 0183-085-00

TOTAL METALS
EPA 200.8/7470A
METHOD BLANK QUALITY CONTROL

Date Extracted:	7-9-13
Date Analyzed:	7-9-13
Matrix:	Water
Units:	ug/L (ppb)
Lab ID:	MB0709WM1&MB0709W1

Analyte	Method	Result	PQL
Arsenic	200.8	**ND**	3.3
Barium	200.8	**ND**	28
Cadmium	200.8	**ND**	4.4
Chromium	200.8	**ND**	11
Lead	200.8	**ND**	1.1
Mercury	7470A	**ND**	0.50
Selenium	200.8	**ND**	5.6
Silver	200.8	**ND**	11

Date of Report: July 10, 2013
Samples Submitted: July 3, 2013
Laboratory Reference: 1307-040
Project: 0183-085-00

TOTAL METALS
EPA 200.8/7470A
DUPLICATE QUALITY CONTROL

Date Extracted: 7-9-13
Date Analyzed: 7-9-13

Matrix: Water
Units: ug/L (ppb)

Lab ID: 07-040-01

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Arsenic	**ND**	**ND**	NA	3.3	
Barium	**32.6**	**30.4**	7	28	
Cadmium	**ND**	**ND**	NA	4.4	
Chromium	**ND**	**ND**	NA	11	
Lead	**ND**	**ND**	NA	1.1	
Mercury	**ND**	**ND**	NA	0.50	
Selenium	**ND**	**ND**	NA	5.6	
Silver	**ND**	**ND**	NA	11	

Date of Report: July 10, 2013
Samples Submitted: July 3, 2013
Laboratory Reference: 1307-040
Project: 0183-085-00

TOTAL METALS
EPA 200.8/7470A
MS/MSD QUALITY CONTROL

Date Extracted: 7-9-13
Date Analyzed: 7-9-13

Matrix: Water
Units: ug/L (ppb)

Lab ID: 07-040-01

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Arsenic	111	**104**	93	**107**	96	3	
Barium	111	**133**	91	**135**	93	2	
Cadmium	111	**105**	95	**106**	96	1	
Chromium	111	**93.4**	84	**94.1**	85	1	
Lead	111	**104**	94	**107**	96	3	
Mercury	12.5	**11.2**	90	**11.2**	90	0	
Selenium	111	**99.1**	89	**104**	94	5	
Silver	111	**98.8**	89	**103**	93	4	

OnSite
Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-napthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical ____________.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1- Sample extract treated with a Sulfuric acid/Silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in method 8260C, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Z - The gasoline result is attributed to a single peak (Chlorobenzene).

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

OnSite Environmental Inc.
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Chain of Custody

Page 1 of 1

Laboratory Number: 07-040

Company: GeoEngineers
Project Number: 0183-085-00
Project Name: UWT-PDA
Project Manager: Tricia DeOme
Sampled by: TML

Turnaround Request (in working days)
(Check One)
☐ Same Day ☐ 1 Day
☐ 2 Days ☐ 3 Days
☒ Standard (7 Days) (TPH analysis 5 Days)
☐ ________ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Volatiles 8260C	Halogenated Volatiles 8260C	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals/ MTCA Metals (circle one)	TCLP Metals	HEM (oil and grease) 1664A	Dissolved Metals*						% Moisture
1	UG-MW28-130702	7/2/13	1020	Water	12			X	X	X			X					X			X						
2	UG-MW27-130702	7/2/13	1530	Water	~~12~~ 11			X	X	X			X					X			X						
3	CR-MW8-130702		1000		8			X	X	X																	
4	SP-MW2-130702		1330		8			X	X	X																	
5	UG-MW1-130702		1715		8 ~~2~~			Y	X	X																	
6	TRIP-130702-1		—	W	2					X																	

	Signature	Company	Date	Time	Comments/Special Instructions
Relinquished	[signature]	GeoEngineers	7/2/13	@1730	*Lab filter and hold analysis
Received	Andrea Brown	GeoEngineers	7/2/13	@1730	
Relinquished	Andrea Brown	GeoEngineers	7/3/13	@ 4:10	
Received	[signature]	Speedy #4	7/3/13	@ 4:10	
Relinquished	[signature]	Speedy #4	7/3/13	546pm	
Received	[signature]	OnSite Env	7/3/13	1746	
Reviewed/Date		Reviewed/Date			Chromatograms with final report ☐

Data Package: Level III ☐ Level IV ☐ Electronic Data Deliverables (EDDs) ☐ ________

APPENDIX C

MTCA Method B Groundwater Screening Level Protective of Indoor Air Calculation

APPENDIX C
MTCA METHOD B GROUNDWATER SCREENING LEVEL PROTECTIVE OF INDOOR AIR CALCULATION

Groundwater screening levels are calculated using "Equation 1: Generic groundwater screening levels" from Ecology's October 2009 review draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action" (Ecology, 2009).

$SL_{GW} = SL_{IA} / (VAF * UCF * H_{cc})$

Where:

SL_{GW} = Screening level in groundwater protective of indoor air (µg/L)

SL_{IA} = Indoor air screening level (µg/m^3). MTCA Method B air CUL (WAC 173-340-750)

VAF = Vapor attenuation factor (unitless). Ecology default value of 0.001 assumed (Ecology, 2009)

UCF = Unit conversion factor (1,000 L/m^3)

H_{cc} = Henry's Law constant (unitless)

	SL_{GW} (µg/L)	SL_{IA} (µg/m^3)	VAF (unitless)	UCF (L/m^3)	H_{cc} (unitless)
PCE	24	9.6	0.001	1,000	0.398
TCE	1.5	0.37	0.001	1,000	0.239
TCE (short term)	8.4	2.0	0.001	1,000	0.239

Note:
Henry's Law constants are temperature adjusted values based on average Washington shallow groundwater temperature of 13 degrees Celsius (Ecology, 2009). Temperature adjusted values were calculated using EPA's 2004 advanced groundwater Johnson and Ettinger model workbook (GW-ADV-Feb04.xls). The TCE indoor air screening level of 2.0 µg/m^3 is intended to be protective of short-term (21-day) exposure by women of reproductive age (EPA, 2012b).

APPENDIX D
Report Limitations and Guidelines for Use

APPENDIX D
REPORT LIMITATIONS AND GUIDELINES FOR USE[1]

This appendix provides information to help you manage your risks with respect to the use of this report. Please confer with GeoEngineers if you need to know more about how these "Report Limitations and Guidelines for Use" apply to your project or property.

Read These Provisions Closely

It is important to recognize that environmental engineering and geoscience practices (geotechnical engineering, geology and environmental science) are less exact than other engineering and natural science disciplines. GeoEngineers includes these explanatory "limitations" provisions in our reports to help reduce the risk of misunderstandings or unrealistic expectations that lead to disappointments, claims and disputes.

Environmental Services Are Performed for Specific Purposes, Persons and Projects

GeoEngineers has performed this Subsurface Investigation of the Proposed YMCA Building in general accordance with the scope and limitations of our proposal, dated March 18, 2013. This report has been prepared for the exclusive use of University of Washington. This report is not intended for use by others, and the information contained herein is not applicable to other properties.

GeoEngineers structures its services to meet the specific needs of its clients. For example, an ESA study conducted for a property owner may not fulfill the needs of a prospective purchaser of the same property. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and property. Use of this report is not recommended for any purpose or project other than as expressly stated in this report.

This Environmental Report is Based on a Unique Set of Project-Specific Factors

This report has been prepared for the Proposed YMCA Building at 1710 and 1726 Market Street, Tacoma, Washington. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this Project. Unless GeoEngineers specifically indicates otherwise, it is important not to rely on this report if it was:

- not prepared for you,
- not prepared for your Project,
- not prepared for the specific site explored, or
- completed before Project changes were made.

---

1 Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

If changes to the Project or property occur after the date of this report, GeoEngineers cannot be responsible for any consequences of such changes in relation to this report unless we have been given the opportunity to review our interpretations and recommendations in the context of such changes. Based on that review, we can provide written modifications or confirmation, as appropriate.

Reliance Conditions for Third Parties

This report was prepared for the exclusive use of the party(ies) to whom this report is addressed. No other party may rely on the product of our services unless we agree to such reliance in advance and in writing. Within the limitations of the agreed Project scope, schedule and budget, our services have been executed in accordance with our Agreement with the Client and generally accepted environmental practices in this area at the time this report was prepared.

Environmental Regulations Change and Evolve

Some substances may be present in the vicinity of the subject property in quantities or under conditions that may have led, or may lead, to contamination of the subject property, but are not included in current local, state or federal regulatory definitions of hazardous substances or do not otherwise present current potential liability. GeoEngineers cannot be responsible if the standards for appropriate inquiry, or regulatory definitions of hazardous substances, change or if more stringent environmental standards are developed in the future.

Uncertainty May Remain Even After This Subsurface Investigation is Completed

Performance of a subsurface investigation is intended to reduce uncertainty regarding the potential for contamination in connection with a property, but no investigation can wholly eliminate that uncertainty. Our interpretation of subsurface conditions in this study is based on field observations and chemical analytical data from widely spaced sampling locations. It is always possible that contamination exists in areas that were not explored, sampled or analyzed.

Subsurface Conditions Can Change

This environmental report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by man-made events such as construction on or adjacent to the subject property, by new releases of hazardous substances, new information or technology that become available subsequent to the report date, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Please contact GeoEngineers before applying this report for its intended purpose so that GeoEngineers may evaluate whether changed conditions affect the continued applicability of the report.

Soil and Groundwater End Use

The cleanup levels referenced in this report are site- and situation-specific. The cleanup levels may not be applicable for other properties or for other on-site uses of the affected soil and/or groundwater. Note that hazardous substances may be present in some of the on-site soil and/or groundwater at detectable concentrations that are less than the referenced cleanup levels. GeoEngineers should be contacted prior to the export of soil or groundwater from the subject property or reuse of the affected soil or groundwater on-site to evaluate the potential for associated environmental liabilities. GeoEngineers will not assume responsibility for potential environmental liability arising out of the transfer of soil and/or groundwater from the subject property to another location, or the reuse of such soil and/or groundwater on-site in any instances that we did not recommend, know of, or control.

Most Environmental Findings Are Professional Opinions

Our interpretations of subsurface conditions are based on field observations and chemical analytical data from widely spaced sampling locations at the subject property. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied its professional judgment to render an informed opinion about subsurface conditions throughout the property. Actual subsurface conditions may differ significantly from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

Do Not Redraw the Exploration Logs

Environmental scientists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in an environmental report should never be redrawn for inclusion in other design documents. Only photographic or electronic reproduction that preserves the entire original boring log is acceptable, but separating logs from the report can create increase the risk of potential misinterpretation.

Biological Pollutants

GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention or assessment of the presence of Biological Pollutants. Accordingly, this report does not include any interpretations, recommendations, findings or conclusions regarding the detecting, assessing, preventing or abating of Biological Pollutants, and no conclusions or inferences should be drawn regarding Biological Pollutants as they may relate to this Project. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria and viruses, and/or any of their byproducts.

A Client that desires these specialized services is advised to obtain them from a consultant who offers services in this specialized field.

PDA 2A – Sound Care

Priority Development Area 2A
Environmental Subsurface Investigation

Environmental Subsurface Investigation Project
UW Capital Project Office Project No. 204277
1748 Jefferson Avenue
Tacoma, Washington

for
University of Washington

December 19, 2014

GEOENGINEERS

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Priority Development Area 2A
Environmental Subsurface Investigation
UW Capital Project Office
Project No. 204277
1748 Jefferson Avenue
Tacoma, Washington

File No. 0183-085-00

December 19, 2014

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Table of Contents

1.0 INTRODUCTION **1**

2.0 SITE HISTORICAL USE **1**

3.0 CURRENT SITE FEATURES **2**

4.0 ENVIRONMENTAL SUBSURFACE EXPLORATIONS **2**

4.1. Historic Research and Magnetic Anomaly Findings 2
4.2. Soil Borings 2
4.3. Groundwater Sampling –Monitoring Wells 3

5.0 SOIL AND GROUNDWATER CONDITIONS **3**

5.1. Soil Conditions 3
5.2. Groundwater Conditions 3

6.0 CHEMICAL ANALYTICAL PROGRAM **4**

6.1. General 4
6.2. Criteria for Characterization of Soil and Groundwater 4
6.3. Soil 5
6.3.1. Petroleum Hydrocarbons 6
6.3.2. VOCs 6
6.3.3. PAHs 7
6.3.4. RCRA Metals 7
6.4. Groundwater 7
6.4.1. Gasoline-Range Petroleum Hydrocarbons 8
6.4.2. VOCs 8

7.0 CONCLUSIONS **8**

7.1. Shallow Aquifer 9
7.2. Deep Aquifer 9
7.3. Contaminated and Impacted Soil 9

8.0 PROPOSED DEVELOPMENT PLANS **9**

9.0 POTENTIAL IMPACTS AND MITIGATION MEASURES TO DESIGN AND CONSTRUCTION **9**

9.1. TCE-Contaminated Groundwater 10
9.2. Soil is Contaminated with Chemicals of Concern 12

10.0 LIMITATIONS **13**

11.0 REFERENCES **13**

LIST OF TABLES

Table 1. Summary of Chemical Analytical Results – Soil
Table 2. Summary of Chemical Analytical Results – Groundwater

LIST OF FIGURES

Figure 1. Vicinity Map
Figure 2. Site Plan – PDA 2A – Sound Care

APPENDICES

Appendix A. Report Limitations and Guidelines for Use

1.0 INTRODUCTION

This report presents the results of our environmental subsurface investigation completed for the University of Washington (UW) at the former Sound Care facility site (Priority Development Area [PDA] – 2A) located on the UW Tacoma (UWT) campus at 1748 Jefferson Avenue in Tacoma, Washington. The former Sound Care facility property is herein referred to as the "site." The site was identified as PDA 2A for this project. The site is bound by Market Street to the west, the Court 17 apartment building to the north, Court C to the east and South 19th Street to the south. A Vicinity Map of the site is included as Figure 1. See Figure 2 for the layout of the site in relation to adjacent properties.

The subsurface investigation was completed under the UWT Environmental Subsurface Investigation Project, UW project number 204277. This report was completed as a subset of the larger subsurface investigation report titled "2013 Environmental Subsurface Investigation – University of Washington-Tacoma, Tacoma, Washington" dated December 19, 2014 to assist with development of the property. This report should be used in context with the larger subsurface investigation report. Borings logs, subsurface investigation methodologies and chemical analytical data packages are included in the larger investigation report mentioned above.

General impacts and potential mitigation measures are provided in this report that may be employed in design and construction. It is important to recognize that additional environmental investigations may be necessary prior to selection of the final mitigation measure. Mitigation measures and associated costs provided in this report will likely need refinement based on the results of the additional environmental investigations. The project team should contact UW Environmental Health & Safety (UW EH&S) to discuss the need for additional environmental investigations at this site. UW EH&S is the liaison with the Washington State Department of Ecology (Ecology) for review and approval of mitigation measures.

2.0 SITE HISTORICAL USE

Single family homes and associated sheds/stables were noted on the site from at least 1888 to the 1940s. A mattress factory was located on the central portion of the site along Court C early in the site development. A Japanese hand laundry facility operated on the southeast corner of the site in 1912 followed by a barber shop from 1921 to 1942 including a marble/stone company adjacent to the barber shop. A shoe and umbrella repair business and residence were present on the southwest portion of the site from 1912 to 1936. These buildings were demolished in the 1940s when the Jefferson House/Sound Care (nursing home) was constructed in 1945. The nursing home operated until 2000 when it was demolished. The site was utilized as a lay down yard for construction activities completed on the UWT campus. The site was recently redeveloped into a park in 2013.

Permit records indicate that a 300-gallon diesel underground storage tank (UST) used a backup generator was removed in 2000. The Sound Care building was heated using a broiler likely powered by heating oil. It appears a heater conversion permit was issued in 1961 further indicating the building was likely heated with oil prior to 1961. It is unknown if the potential heating oil UST was removed from the site as there were no records observed within the records search indicating the UST was removed since the early 1960s.

3.0 CURRENT SITE FEATURES

The site was recently redeveloped into a park in 2013. Park development included regrading and placement of fill, installation of light posts and planting grass and trees. The environmental subsurface explorations described in this report were completed prior to development of the park. Exploration locations and elevations are described relative to the site conditions that existed at the time of the subsurface investigation.

The elevation of Court C is approximately 100 feet east of the site. The site slopes approximately 5 vertical feet from Court C to South 19th Street. The site is generally flat in the central portion of the site. The edges of the site along the south and west sides of the site slope steeply to South 19th Street and Market Street (approximately Elevation 124 feet).

4.0 ENVIRONMENTAL SUBSURFACE EXPLORATIONS

The environmental subsurface investigation activities completed on the site consisted of a magnetic/GPR (M/GPR) survey with test pits, direct-push borings, installation of monitoring wells and groundwater development and sampling of new and existing wells. The investigation activities were completed between June 2013 and January 2014.

4.1. Historic Research and Magnetic Anomaly Findings

Historic research results indicated the potential for USTs to be present at the site given the age of the former buildings and the source of heat typically used during these time periods. In addition, heating conversion permits were listed in the permit records. An M/GPR survey was performed in the areas around the footprint of the existing building in June 2013.

Two magnetic anomalies were identified near the northeast corner of the site as shown on Figure 2. The magnetic anomalies were designated using the following identification nomenclature: 2A-A1 where 2A identifies the PDA and –A1 is the number of the anomaly at the site.

Test pits were completed in the vicinity of magnetic anomalies 2A-A1 and 2A-A2 on June 26, 2013. Native soil was observed beneath the field grass at a depth of approximately 0.5 feet below ground surface (bgs) in the test pit completed at magnetic anomaly 2A-A1. No metal debris or structures were observed indicative of USTs. Metal fence debris was observed in the field grass to a depth of approximately 0.5 feet bgs in the test pit located at magnetic anomaly 2A-A2. Native soil was observed at approximately 0.5 feet bgs. The magnetic anomaly identified was likely related to the metal fence debris observed in the field grass.

4.2. Soil Borings

Seven direct-push borings (2A-B1 through 2A-B7) were completed at the site on June 17, 2013. The direct-push borings ranged in depth between 5 and 12 feet bgs. The borings were terminated when practical refusal was encountered.

4.3. Groundwater Sampling –Monitoring Wells

Groundwater samples were collected from six existing monitoring wells between June 18 and 25, 2013. A groundwater sample was also collected on January 22, 2014 from one monitoring well installed during this investigation (JS-MW7A).

Five existing monitoring wells (UG MW-3, DD-MW1, UG-MW13, UG-MW7 and UG-MW8) are screened within the deep aquifer (advance outwash) and one well (UG-MW13) is screened within the shallow aquifer (ice-contact deposits). Wells DD-MW1, UG-MW13, UG-MW7, and UG-MW8 are located upgradient of the site, well UG-MW4 is located on the site, and well UG-MW3 is located downgradient of the site.

New permanent well JS-MW7A is located along Court C downgradient of the site. Well JS-MW7A is screened within the shallow aquifer.

5.0 SOIL AND GROUNDWATER CONDITIONS

5.1. Soil Conditions

Subsurface conditions consist of fill, ice-contact deposits, silt layer and advance outwash. The fill units consisted of silt and sand (silt with sand and/or sand with silt) to gravel with silt from 0 to 4 feet bgs. Glacially consolidated ice-contact deposits comprised of silt with sand to sand with gravel and silt were observed below the fill. A unit of gray silt was observed beneath the ice-contact deposits in the following wells completed during this investigation and by others:

- UG-MW3: 17 and 27 feet bgs
- UG-MW4: 33 to 43 feet bgs
- UG-MW7: 40 to 52 feet bgs
- UG-MW8: 41 to 49 feet bgs
- UG-MW13: 42 to 44 feet bgs
- JS-MW7A: 11 to 12 feet bgs

The silt layer was not observed in upgradient well DD-MW1 completed by others. However, soil samples were not collected at the depths the silt layer would be anticipated based on information provided in the boring log. The silt layer is underlain by advance outwash consisting of gravel with sand and silt.

5.2. Groundwater Conditions

It appears that groundwater conditions observed consist of a shallow (ice-contact deposits) and deep aquifers (advance outwash) to the depths explored during this investigation. The shallow and deep aquifers appear to be separated by the silt layer located between the ice-contact deposits and advance outwash.

Groundwater within the shallow aquifer appears to be present within the sand and gravel seams of the ice-contact deposits. The hydraulic connection of the sand seams within the shallow aquifer is unknown in and around the project site. Groundwater within the deep aquifer appears to be continuous with interbeds of moist to wet silt at depth. The deep aquifer within the advance outwash appears to be under a confined condition.

Groundwater elevation of the shallow aquifer ranged between 100 feet from the west to 90 feet to the east side of the site. Groundwater elevation of the deep aquifer generally ranged between 90 feet from the west to 55 feet on the east side of the site with the exception of the groundwater levels observed in monitoring well DD-MW1. The groundwater level in monitoring well DD-MW1 was approximately 101 feet, which is similar to the groundwater level in the shallow aquifer in the area. A silt layer was not documented in the boring log for well DD-MW1. However, the soil samples were not collected where the silt was anticipated to be encountered (40 to 50 feet bgs). It is unknown if the higher groundwater level in monitoring well DD-MW1 is related to the silt layer not being present at this location, or if the well is screened across the shallow and deep aquifers.

6.0 CHEMICAL ANALYTICAL PROGRAM

6.1. General

Soil and groundwater samples were submitted to OnSite Environmental, Inc., in Redmond, Washington for chemical analysis. The chemical analytical data are summarized in Tables 1 and 2. Chemicals that were not detected at or greater than the laboratory reporting limits in the analyzed samples are typically not included on the tables.

6.2. Criteria for Characterization of soil and Groundwater

The following criteria were used to evaluate impacted and contaminated soil and groundwater.

- Tetrachloroethene (PCE) and Trichloroethene (TCE) Impacted or Contaminated Soil
  - PCE, TCE and breakdown products at concentrations detected in the analyzed soil samples.
- Contaminated Soil
  - Petroleum hydrocarbons, carcinogenic polycyclic aromatic hydrocarbons (cPAHs), metals and volatile organic compounds (VOCs) detected at concentrations greater than the Model Toxics Control Act (MTCA) Method A Unrestricted Land Use (ULU) cleanup level or MTCA B screening level.
- Impacted Soil

  Some contaminants were detected at concentrations less than the respective MTCA cleanup levels. UWT may be able to reuse certain types of soil depending on the sampling results. UW EH&S must review the chemical analytical data to evaluate if reuse or disposal at an off site facility is necessary. Soil reuse and disposal are subject to Ecology Guidance for Remediation of Petroleum Contaminated Sites (Ecology, 2011), solid waste regulations and disposal facility permit conditions. The criteria below is herein referred to as "Reuse Criteria."

  - Petroleum hydrocarbons, cPAHs and/or Lead

    The Ecology guidance indicates that soil with diesel- and/or lube oil-range petroleum hydrocarbons detected at concentrations less than 200 milligrams per kilogram (mg/kg) and/or gasoline-range petroleum hydrocarbons detected at concentrations less than

30 mg/kg are suitable for reuse as commercial fill at UWT campus with the following limitations:

- placed above the highest water table,
- not within 100 feet of a drinking water well,
- not within wellhead protection area of public water supply,
- not within wetlands or where surface water contact is possible, and
- not within a surface water infiltration facility or septic drain field.

If the concentrations exceed the above limits but are still less than respective MTCA cleanup levels the soil may be reused in road and bridge embankment construction, landfill daily cover or asphalt manufacturing with UW EH&S approval.

- Arsenic, Cadmium, and/or Mercury

  Soil with concentrations of arsenic, cadmium and/or mercury above what is normally found in the natural background environment (Puget Sound Background levels - Ecology, 1994) is typically suitable for disposal at an inert waste landfill or a Department of Natural Resources (DNR) reclamation pit. UW EH&S approval is necessary.

  Soil at and near the UWT campus has been well documented to contain chromium at concentrations slightly above the natural background level and is not considered in the "Reuse Criteria."

- Contaminated Groundwater
  - Petroleum hydrocarbons, PAHs and metals detected at concentrations greater than the respective MTCA Method A groundwater cleanup levels. Method B criteria were used for comparison of specific compounds if Method A groundwater cleanup levels are not established for those compounds.
  - VOCs detected at concentrations greater than the respective MTCA Method A groundwater cleanup levels, and MTCA Method B groundwater screening levels protective of indoor air. The updated TCE/PCE screening levels were calculated using Equation 1 from Ecology's review draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action" dated October 2009 (Ecology, 2009) and Environmental Protection Agency's (EPA's) TCE and PCE toxicity factors updated in 2011 and available on EPA's online Integrated Risk Information System (IRIS). The other values were obtained from Ecology's review draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action."

6.3. Soil

Soil samples collected from the soil borings were submitted for chemical analysis. The soil samples collected from the subsurface explorations were identified using the following identification system: A#-B#-start depth-end depth, where A# is the area designation number, B# is the boring and start depth-end depth is the depth interval in feet below the ground of specific sample (e.g., 2A-B1-6-7 was collected in Area 2A from boring B1 from 6 to 7 feet bgs).

Soil samples were submitted for chemical analysis based on the following criteria:

- Where field screening indicated the soil is impacted.
- Directly below potentially impacted soil to delineate the vertical extent.
- Where wet sand seams were encountered within the glacial drift.
- At the soil/groundwater interface if groundwater was encountered.
- At the top of confining units if encountered.

The soil samples were submitted for chemical analysis of petroleum hydrocarbon identification by Ecology-approved method NWTPH-HCID (with appropriate follow-up analysis of diesel range total petroleum hydrocarbons by Ecology-approved method NWTPH-Dx), VOCs by Environmental Protection Agency (EPA) method 8260C, polycyclic aromatic hydrocarbons (PAHs) by EPA method 8270DSIM, and Resource Conservation and Recovery Act (RCRA) metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver) by EPA method 6000/7000 series.

6.3.1. Petroleum Hydrocarbons

FILL

Gasoline-, diesel- and lube oil-range petroleum hydrocarbons were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels or the Ecology Reuse Criteria in the analyzed soil samples.

ICE-CONTACT DEPOSITS

Gasoline-, diesel- and lube oil-range petroleum hydrocarbons were not detected in the analyzed soil samples.

6.3.2. VOCs

FILL

PCE, TCE, and associated breakdown products were not detected in the analyzed soil samples. Other VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels or Method B criteria in the analyzed soil samples.

ICE-CONTACT DEPOSITS

TCE was detected at a concentration greater than the MTCA Method A ULU cleanup level (0.03 milligrams per kilogram [mg/kg]) in soil sample 2A-B5-7-8 (0.11 mg/kg). TCE was detected at concentrations less than the MTCA Method A ULU cleanup level in the following soil samples with the concentrations detected identified in parenthesis.

- 2A-B3-10-11 (0.013 mg/kg)
- 2A-B4-5-6 (0.0012 mg/kg)
- 2A-B4-7-8 (0.0066 mg/kg)

TCE was not detected in the remaining analyzed soil samples.

Cis-1,2-dichloroethene was detected at a concentration less than the MTCA Method B criteria (160 mg/kg) in soil sample 2A-B5-7-8 (0.00085 mg/kg). Cis-1,2-dichloroethene was not detected in the remaining analyzed soil samples.

Other VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels or Method B criteria in the remaining analyzed soil samples.

6.3.3. PAHs

FILL

CPAHs were detected at concentrations (total toxicity equivalent concentration [TTEC]) greater than the MTCA Method A ULU cleanup level (0.1 mg/kg) in the following soil samples with the detected concentration identified in parenthesis.

- 2A-B1-1-2 (0.23 mg/kg)
- 2A-B7-2.5-3.5 (0.64 mg/kg)

PAHs and cPAHs were detected at concentrations less than the respective MTCA Method A ULU cleanup level in four soil samples collected from the ground surface up to 3 feet bgs. PAHs and cPAHs were not detected in the remaining analyzed soil samples.

ICE-CONTACT DEPOSITS

PAHs and cPAHs were not detected in the analyzed soil samples.

6.3.4. RCRA Metals

FILL

Lead was detected at concentrations greater than the Ecology Reuse Criteria (50 mg/kg) but less than the MTCA Method A ULU cleanup level in the following soil samples with the concentrations detected identified in parenthesis (Ecology, 1994).

- 2A-B1-1-2 (59 mg/kg)
- 2A-B7-2.5-3.5 (200 mg/kg)

Lead was either not detected or was detected at concentrations less than the respective MTCA Method A cleanup levels, Method B ULU criteria or the Reuse Criteria in the remaining analyzed soil samples.

Other RCRA metals were either not detected or were detected at concentrations less than the respective MTCA Method A cleanup levels, Method B criteria, and Reuse Criteria in the analyzed soil samples.

ICE-CONTACT DEPOSITS

RCRA metals were either not detected or were detected at concentrations less than the respective MTCA Method A cleanup levels, Method B criteria or Reuse Criteria in the analyzed soil samples.

6.4. Groundwater

Groundwater samples were collected from the seven monitoring wells for chemical analysis. The groundwater samples collected were identified using the following identification system: WELL-ID-yymmdd, where WELL-ID is the well identification number and yymmdd is the date when the sample was collected (e.g., UG-MW4-130619 was collected from monitoring well UG-MW4 on June 19, 2013). Groundwater samples were submitted for chemical analysis of VOCs by EPA method 8260C. The groundwater sample from JA-MW7A was also submitted for chemical analysis of gasoline-range total petroleum hydrocarbons by Ecology-approved method NWTPH-Gx.

6.4.1. Gasoline-Range Petroleum Hydrocarbons

Gasoline-range petroleum hydrocarbons were not detected in the sample collected from monitoring well JS-MW7A.

6.4.2. VOCs

SHALLOW AQUIFER

TCE was detected at a concentration of 110 micrograms per liter [µg/L] in groundwater sample UG-MW13-130625 collected from well UG-MW13. This detected concentration of TCE is greater than the MTCA Method A groundwater cleanup level (5 µg/L) and MTCA Method B groundwater screening levels protective of indoor air (1.5 µg/L).

TCE was detected at a concentration of 1.8 µg/L in groundwater sample JS-MW7A-140122. This detected concentration of TCE is greater the MTCA Method B groundwater screening levels protective of indoor air but less than the MTCA Method A groundwater cleanup level.

Additional groundwater samples were not collected in the shallow aquifer.

PCE was detected at a concentration of 1.4 µg/L in groundwater sample UG-MW13-130625 collected from well UG-MW13. The detected concentration of PCE is less than the MTCA Method A groundwater cleanup level (5 µg/L) and the MTCA Method B groundwater screening levels protective of indoor air (24 µg/L). PCE was not detected in groundwater sample JS-MW7A-140122.

Other VOCs were not detected in the analyzed groundwater samples collected in the shallow aquifer.

DEEP AQUIFER

TCE was detected at a concentration greater than the MTCA Method A groundwater cleanup level and the MTCA Method B groundwater screening levels protective of indoor air in the following groundwater samples with the detected concentration identified in parenthesis.

- DD-MW1-130619 (130 µg/L)
- UG-MW3-130618 (13 µg/L)
- UG-MW8-130619 (56 µg/L)

TCE was not detected in the remaining analyzed groundwater samples. Other VOCs were either not detected or were detected at concentrations less than the MTCA Method A groundwater cleanup level and the MTCA Method B groundwater screening levels protective of indoor air in the analyzed groundwater samples.

7.0 CONCLUSIONS

TCE-contaminated soil and groundwater are present on the site in the shallow and deep aquifers based on the results of this investigation. CPAHs-contaminated and impacted soil is present on the site.

The TCE appears to likely originate from an upgradient source. PDA 2A is situated near the northeast (downgradient) extent of the Westerly Plume comprised primarily of TCE. The identified historical property uses at the site are unlikely to be the source of TCE and PCE contamination based on the available information reviewed to date. However, the actual source is unknown at the time of this report.

7.1. Shallow Aquifer

TCE-contaminated groundwater is present in the shallow aquifer in upgradient well (UG-MW13) and downgradient well (JS-MW7A). TCE is present in soil on the site and in groundwater upgradient and downgradient of the site indicating that TCE-contaminated groundwater is likely present in the shallow aquifer at the site. The estimated groundwater elevation of the shallow aquifer ranges between approximately 90 to 100 feet.

7.2. Deep Aquifer

TCE-contaminated groundwater is present in the deep aquifer in two upgradient wells (DD-MW1 and UG-MW8) and two downgradient wells (UG-MW3 and JS-MW4) located east and west of the southern portion of the site. TCE was not detected in the groundwater sample within the deep aquifer on the northern portion of the site (UG-MW4). TCE-contaminated groundwater is likely present within the deep aquifer on the southern and central portions of the site as shown on Figure 2.

The estimated groundwater elevation of the deep aquifer is approximately 90 feet on the east side and 55 feet on the west side of the site.

7.3. Contaminated and Impacted Soil

CPAH-contaminated soil was present from the ground surface to 4 feet bgs on the southeastern portion of PDA 2A at the time of sampling. One to 2 feet of fill was placed on PDA 2A following sampling activities during development of the existing park. Metals- and cPAHs-impacted soil are present from the ground surface to 3 feet bgs on the remaining portions of PDA 2A.

8.0 PROPOSED DEVELOPMENT PLANS

We understand UWT plans to construct a new building at PDA 2A. GeoEngineers assumes the new building will be 48,000 square feet with a finished floor Elevation of 100 feet. The estimated amount of soil to be generated based on the above assumptions is approximately 30,000 tons to excavate PDA 2A to subgrade (Elevation 167 feet). An additional 5,000 tons is estimated to be generated from the footings.

9.0 POTENTIAL IMPACTS AND MITIGATION MEASURES TO DESIGN AND CONSTRUCTION

We recommend UW develop and implement appropriate administrative institutional controls to limit or prohibit activities that may result in exposure to hazardous substances remaining at the site. Potential impacts to the design and construction of the site are the following:

- Groundwater is contaminated with TCE.
- Soil is contaminated with chemicals of concern (TCE and cPAHs).
- Soil is impacted with chemicals of concern (metals and cPAHs).

Potential long-term impacts include:

- Long-term disposal of underslab/perimeter footing drain TCE-impacted groundwater.
- Continued maintenance of vapor intrusion mitigation system, if necessary.
- Potential periodic indoor air sampling to confirm the vapor intrusion mitigation system may be necessary to evaluate the system is operating properly, if necessary.
- TCE-contaminated or TCE-impacted soil may remain adjacent and beneath the building following construction activities. UW should develop and implement appropriate institutional controls to help prevent exposure to residual contamination.

The following sections described potential impacts, mitigation measures and estimated costs to design and construction.

9.1. TCE-Contaminated Groundwater

The presence of the contaminated groundwater in the shallow and deep aquifers is anticipated based on the TCE detections in the soil on the site and TCE-contaminated groundwater encountered upgradient and downgradient of the site. Groundwater was not sampled within the shallow aquifer at the site during this investigation. Groundwater was sampled within the deep aquifer on the northern portion of the site and TCE was not detected in the groundwater sample.

TCE-contaminated groundwater within the shallow aquifer will likely be encountered during construction throughout the site. TCE-contaminated groundwater within the deep aquifer may be encountered during excavation of the footings. This also indicates the TCE-contaminated groundwater will be in contact with the west side and bottom of the proposed building. Mitigation measures include:

Additional Investigation. Further subsurface investigation may be necessary to evaluate the vertical and lateral limits of the TCE-impacted soil and/or groundwater at the site. Soil vapor sampling is recommended to evaluate if a potential vapor intrusion pathway exists. The estimated cost for soil vapor sampling and additional investigation is between $50,000 and $100,000.

Vapor Mitigation. Vapor intrusion occurs when VOCs migrate from contaminated soil or groundwater into overlying buildings through openings in the foundation. The route VOCs take from a subsurface source to the air inside a building is referred to as the vapor intrusion pathway. The most common sources of soil vapor are VOCs including TCE and PCE, which may pose short-term (TCE only) and long-term (chronic) risks through inhalation of contaminated indoor air.

Groundwater and soil vapor concentrations are typically utilized as screening levels regarding the potential for vapor intrusion. TCE was detected at a concentration that exceeds the screening level for updated MTCA Method B groundwater screening level protective of indoor air in the groundwater samples collected in the deep and shallow aquifers surrounding the site. TCE-contaminated groundwater in the shallow and deep aquifers could be in contact with the west side and base of the proposed building depending on the design.

TCE detected in the deeper aquifer may represent a lesser concern for vapor intrusion because of the depth to groundwater in the deeper aquifer. However, the Elevation (99 feet) of the proposed building may penetrate through the silt layer.

Soil vapor sampling was not completed as part of this investigation. Additional on-site characterization may be necessary to evaluate the vertical and lateral limits of the soil vapors. Soil vapor sampling is recommended near the elevation of the proposed subgrade to evaluate if a potential vapor intrusion pathway exists. If a potential vapor intrusion pathway exists, then a vapor intrusion mitigation system may be necessary. Potential mitigation options to prevent vapor intrusion include:

- A passive vapor barrier beneath the building. Passive vapor barriers are typically used in combination with another mitigation option (venting or building pressurization). We recommend the vapor barrier be installed below the elevation of penetrations (pipes, etc.) that may be installed after the programing is identified in the future. Penetrating the vapor barrier following the construction will add to the cost of construction.
- Passive or active venting system beneath the building. The venting system may need to be combined with an underslab and perimeter drain to reduce the potential for shallow groundwater to enter the venting system.

The estimated cost for design and installation of indoor air mitigation system ranges from $5 per square foot to $12 per square foot of building space. The estimated costs for the vapor mitigation system for a building on the entire site ranges between $240,000 and $576,000. Potential periodic indoor air sampling to confirm the vapor intrusion mitigation system may be necessary to evaluate whether the system is operating properly following construction of the building. The estimated cost for long-term monitoring is unknown.

Underslab/Footing Drainage. Underslab/footing drainage system may be required to prevent water from entering into the vapor mitigation vent system. The water will likely have to be directed to the City of Tacoma sanitary sewer, but may be directed to the storm sewer based on concentrations of the chemicals of concern in the groundwater. A long-term cost may be associated with discharge of the water to the City sanitary sewer system. However, the groundwater may be suitable for discharge to the storm system based on the concentrations detected in the existing wells during this investigation. An underslab footing drain will likely be required based on the elevation of the groundwater (90 to 100 feet). The estimated cost of the underslab footing drain is $144,000 to $288,000.

Construction Water Management. TCE-contaminated groundwater encountered during construction will have to be managed. Water generated during construction will likely be stored in tanks, sampled and analyzed. Water disposal will be coordinated with UW EH&S at a UW-approved disposal facility. It is anticipated the construction dewatering water will be suitable for discharge into the storm sewer based on the concentrations detected in the existing wells during this investigation. The water may be disposed in the City of Tacoma sanitary sewer. The City of Tacoma charges approximately $0.0034 per gallon of water. The estimated volume of water generated will be based on construction methods. The base cost estimate includes the cost of disposal of water for 120 days of earthwork construction, approximate cost of collecting 10 water samples over the course of the project ($15,000) and two 25,000 gallon storage tanks ($7,000 each per month).

Approximately 10,000 gallons per day is estimated to be generated on the site from dewatering activities. The estimated cost of construction water management if disposal into the City of Tacoma sanitary sewer is necessary is approximately $47,000.

Cross-Contamination. It appears the proposed building will penetrate through the silt layer between the shallow and deep aquifers. TCE-contaminated groundwater also appears to be present in the shallow and deep aquifers.

Additional investigation will be necessary to evaluate the potential for cross-contamination between the two aquifers. This investigation could be completed in concurrence with the additional investigation to evaluate the lateral and vertical extent of the contamination. However, it appears that mitigation for cross-contamination between the two aquifers is likely not warranted at this site because TCE-contaminated groundwater is present in the shallow and deep aquifers. For budgeting purposes, additional construction cost is estimated to be between $24,000 and $144,000 if cross-contamination is identified as an impact.

Health and Safety. Workers who may be in contact with potentially contaminated soil or groundwater at a state-listed cleanup site have HAZWOPER training. The requirement is consistent with the Washington Administrative Code (WAC) 296-843-100, Hazardous Waste Operations, which indicates that on-site personnel are required to have current health and safety training in accordance with Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response requirements in 29 CFR 1910.120. The rule also requires the earthwork contractor and other personnel who could potentially contact contaminated materials to develop and implement a written safety and health program for their employees involved in hazardous waste operations under 29 CFR 1910.120. The estimated cost for the contractor to be HAZWOPER trained and have appropriate liability insurance is roughly between $10,000 and $70,000 depending on the number of subcontractors that require training, and the contractor markup factor.

9.2. Soil is Contaminated with Chemicals of Concern

Contaminated soil (cPAHs) and impacted soil (TCE, metals and cPAHs) will likely be generated during construction activities. We recommend UW implement the following actions.

- Characterize Soil and Groundwater for Disposal. In-situ characterization or stockpiling and subsequent sampling will need to be performed on soil that is generated during construction in areas of TCE-impacted, cPAH-contaminated and metals-/cPAHs-impacted soil. The estimate cost of the soil sampling for soil disposal is $60,000 to $80,000 based on the amount of soil to be excavated.
- TCE-Impacted and Contaminated Soil. When TCE and breakdown products are detected in soil, UW EH&S will work with Ecology on obtaining a "contained-in determination" for disposal of the waste. The source of the solvent contamination, the concentration of the solvents and a Toxicity Characteristic Leaching Procedure (TCLP) analytical test result will be used when evaluating if the soil is disposed as hazardous waste by UW EH&S at a RCRA permitted Subtitle C landfill or as a solid waste at a UW-approved Subtitle D landfill. Past experience has demonstrated that it is fairly likely that the "contained-in determination" will be granted, thus we based our cost estimates on this assumption.

  The estimated cost to transport and dispose (not including excavation and loading) soil at a Subtitle D landfill with a contained-in determination is $80 to $100 per ton. The typical cost for transportation and disposal (not including excavation and loading) of soil at a RCRA Subtitle C Landfill is $250 to $300 per ton. The cost estimates provided in this report assume disposal at a Subtitle D landfill.

The estimated mass of TCE-contaminated and impacted soil is approximately 15,000 tons. This estimated assumes the western 70 feet of the site is impacted below Elevation 105 feet to subgrade 99 feet. The estimated cost for transportation and disposal of the TCE-contaminated and impacted soil is $1,200,000 to $1,500,000. This estimate could be reduced if the building is raised in elevation.

- **CPAHs-Contaminated Soil.** The contaminated soil will be removed as necessary for construction or as required by Ecology. CPAHs-contaminated soil will be disposed at an UW-approved RCRA permitted Subtitle D landfill. The estimated cost for transportation and disposal at a RCRA-subtitle D facility is $60 to $80 per ton. We estimate the amount of the cPAH-contaminated soil to be 3,500 tons. This estimate assumes contaminants in the top 2 feet in the southwest portion of the site. The estimated cost for transportation and disposal is between $ 210,000 and $280,000.
- **Metals- and cPAHs-Impacted Soil.** Metals- and cPAHs-impacted soil is present throughout most of the site to a depth of approximately 3 feet bgs. For budgeting purposes, we assumed the transportation and disposal of metals- and cPAHs-impacted soil is $30 to $50 per ton. We estimate the amount of the metals- and cPAHs-impacted soil to be 8,000 tons. This estimate assumes metals- and cPAHs-impacted soil is present on the entire site to a depth of approximately 3 feet bgs. The estimated cost for transportation and disposal ranges from $240,000 to $400,000.
- **Health and Safety.** As discussed in the contaminated groundwater section, Washington State requires its earthwork contractor and other personnel who could potentially contact contaminated materials to comply with training requirements for handling soil and potentially groundwater on the site. The health and safety costs are not included as separate item in the soil, because the costs in the groundwater section will apply.

10.0 LIMITATIONS

This report has been prepared for use by the University of Washington for the Priority Development Area 2A – Sound Care located in Tacoma, Washington at the University of Washington Tacoma campus.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

Please refer to Appendix A titled “Report Limitations and Guidelines for Use” for additional information pertaining to use of this report.

11.0 REFERENCES

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Table 1

Summary of Chemical Analytical Results[1] - Soil

Area 2A - Sound Care
Priority Development Areas - University of Washington Tacoma
Tacoma, Washington

Boring/Test Pit	2A-B1		2A-B2		2A-B3			2A-B4			2A-B5		2A-B6		2A-B7			MTCA Method A ULU Cleanup Level	Reuse Criteria[13]
Sample Identification[2]	2A-B1-1-2	2A-B1-6-7	2A-B2-0.5-1.5	2A-B2-7-8	2A-B3-0-1	2A-B3-2-3	2A-B3-10-11	2A-B4-0.5-1.5	2A-B4-5-6	2A-B4-7-8	2A-B5-1-2	2A-B5-7-8	2A-B6-1-2	2A-B6-4-5	2A-B7-2.5-3.5	2A-B7-4-5	2A-B7-8-9		
Sample Depth (feet bgs)	1 to 2	6 to 7	0.5 to 1.5	7 to 8	0 to 1	2 to 3	10 to 11	0.5 to 1.5	5 to 6	7 to 8	1 to 2	7 to 8	1 to 2	4 to 5	2.5 to 3.5	4 to 5	8 to 9		
Soil Type	Fill	Qvi	Fill	Qvi	Fill	Fill	Qvi	Fill	Qvi	Qvi	Fill	Qvi	Fill	Qvi	Fill	Qvi	Qvi		
NWTPH-HCID[3] (mg/kg)																			
Gasoline-Range	23 U	23 U	21 U	22 U	22 U	22 U	--	22 U	22 U	--	22 U	22 U	21 U	--	26 U	24 U	--	30/100[10]	30
Diesel-Range	57 U	58 U	53 U	55 U	56 U	56 U	--	55 U	55 U	--	55 U	55 U	53 U	--	65 U	59 U	--	2,000	200
Lube Oil-Range	110 U	120 U	DET	110 U	110 U	110 U	--	110 U	110 U	--	DET	110 U	110 U	--	130 U	120 U	--	2,000	200
NWTPH-Dx[4] (mg/kg)																			
Diesel-Range Petroleum Hydrocarbons	--	--	27 U	--	--	--	--	--	--	--	27 U	--	--	--	--	--	--	2,000	200
Lube Oil-Range Petroleum Hydrocarbons	--	--	140	--	--	--	--	--	--	--	91	--	--	--	--	--	--	2,000	200
VOCs[5] (mg/kg)																			
Tetrachloroethene (PCE)	0.00095 U	0.00081 U	0.0013 U	0.00079 U	0.0010 U	0.00097 U	0.00087 U	0.00088 U	0.00080 U	0.00080 U	0.00076 U	0.00078 U	0.00076 U	0.00095 U	0.00096 U	0.00094 U	0.0011 U	0.05	DET
Trichloroethene (TCE)	0.00095 U	0.00081 U	0.0013 U	0.00079 U	0.0010 U	0.00097 U	0.013	0.00088 U	0.0012	0.0066	0.00076 U	0.11	0.00076 U	0.00095 U	0.00096 U	0.00094 U	0.0011 U	0.03	DET
(cis) 1,2-Dichloroethene	0.00095 U	0.00081 U	0.0013 U	0.00079 U	0.0010 U	0.00097 U	0.00087 U	0.00088 U	0.00080 U	0.00080 U	0.00076 U	0.00085	0.00076 U	0.00095 U	0.00096 U	0.00094 U	0.0011 U	160[11]	DET
(trans) 1,2-Dichloroethene	0.00095 U	0.00081 U	0.0013 U	0.00079 U	0.0010 U	0.00097 U	0.00087 U	0.00088 U	0.00080 U	0.00080 U	0.00076 U	0.00078 U	0.00076 U	0.00095 U	0.00096 U	0.00094 U	0.0011 U	1,600[11]	DET
Vinyl Chloride	0.00095 U	0.00081 U	0.0013 U	0.00079 U	0.0010 U	0.00097 U	0.00087 U	0.00088 U	0.00080 U	0.00080 U	0.00076 U	0.00078 U	0.00076 U	0.00095 U	0.00096 U	0.00094 U	0.0011 U	0.67[11]	DET
Acetone[6]	0.0048 U	0.0041 U	0.0063 U	0.0039 U	0.0052 U	0.0048 U	0.0044 U	0.0044 U	0.0040 U	0.0040 U	0.0038 U	0.0059	0.0038 U	0.0064	0.0048 U	0.0047 U	0.0054 U	72,000[11]	NE
Xylene[7]	0.0019 U	0.0016 U	0.0025 U	0.0016 U	0.0021 U	0.0019 U	0.0017 U	0.0018 U	0.0016 U	0.0016 U	0.0017	0.0016 U	0.0015 U	0.0019 U	0.0019 U	0.0019 U	0.0022 U	9	NE
PAHs[8] (mg/kg)																			
1-Methylnaphthalene	0.015	0.0078 U	0.0071 U	0.0073 U	0.0075 U	0.0075 U	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.0071 U	--	0.045	0.0078 U	--	35[11]	NE
2-Methylnaphthalene	0.016	0.0078 U	0.0071 U	0.0073 U	0.0075 U	0.0075 U	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.0071 U	--	0.048	0.0078 U	--	320[11]	NE
Acenaphthene	0.040	0.0078 U	0.0071 U	0.0073 U	0.0075 U	0.0075 U	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.0071 U	--	0.012	0.0078 U	--	4,800[11]	NE
Acenaphthylene	0.012	0.0078 U	0.0071 U	0.0073 U	0.0075 U	0.0075 U	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.0071 U	--	0.097	0.0078 U	--	NE	NE
Anthracene	0.074	0.0078 U	0.0071 U	0.0073 U	0.0075 U	0.0075 U	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.0071 U	--	0.078	0.0078 U	--	24,000[11]	NE
Benzo[g,h,i]perylene	0.093	0.0078 U	0.023	0.0073 U	0.012	0.021	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.013	--	0.32	0.0078 U	--	NE	NE
Fluoranthene	0.33	0.0078 U	0.066	0.0073 U	0.025	0.051	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.035	--	0.74	0.0078 U	--	3,200[11]	NE
Fluorene	0.036	0.0078 U	0.0071 U	0.0073 U	0.0075 U	0.0075 U	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.0071 U	--	0.018	0.0078 U	--	3,200[11]	NE
Naphthalene	0.035	0.0078 U	0.0071 U	0.0073 U	0.0075 U	0.016	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.0071 U	--	0.063	0.0078 U	--	5	NE
Phenanthrene	0.39	0.0078 U	0.038	0.0073 U	0.015	0.029	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.036	--	0.26	0.0078 U	--	NE	NE
Pyrene	0.37	0.0078 U	0.054	0.0073 U	0.024	0.054	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.044	--	0.91	0.0078 U	--	2,400[11]	NE
cPAHs[8] (mg/kg)																			
Benzo (a) anthracene (TEF 0.1)	0.15	0.0078 U	0.025	0.0073 U	0.016	0.027	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.016	--	0.37	0.0078 U	--	MTCA ULU cleanup level for the sum of all cPAHs is 0.1 mg/kg	Reuse Criteria for the sum of all cPAHs is 0.1 mg/kg
Benzo (a) pyrene (TEF 1)	0.18	0.0078 U	0.029	0.0073 U	0.018	0.031	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.018	--	0.50	0.0078 U	--		
Benzo (b) fluoranthene (TEF 0.1)	0.17	0.0078 U	0.040	0.0073 U	0.023	0.041	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.019	--	0.51	0.0078 U	--		
Benzo (J,k) fluoranthene (TEF 0.1)	0.058	0.0078 U	0.011	0.0073 U	0.0075 U	0.011	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.0071 U	--	0.14	0.0078 U	--		
Chrysene (TEF 0.01)	0.17	0.0078 U	0.030	0.0073 U	0.016	0.034	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.018	--	0.39	0.0078 U	--		
Dibenz (a,h) anthracene (TEF 0.1)	0.025	0.0078 U	0.0071 U	0.0073 U	0.0075 U	0.0075 U	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.0071 U	--	0.068	0.0078 U	--		
Indeno (1,2,3-cd) pyrene (TEF 0.1)	0.079	0.0078 U	0.017	0.0073 U	0.0093	0.018	--	0.0073 U	0.0073 U	--	0.0073 U	0.0073 U	0.0091	--	0.27	0.0078 U	--		
Total TTEC of cPAHs (detect only)	0.23	N/A	0.039	N/A	0.023	0.041	--	N/A	N/A	--	N/A	N/A	0.023	--	0.64	N/A	--	0.1	0.1

Boring/Test Pit	2A-B1		2A-B2		2A-B3			2A-B4			2A-B5		2A-B6		2A-B7			MTCA Method A ULU Cleanup Level	Reuse Criteria[13]
Sample Identification[2]	2A-B1-1-2	2A-B1-6-7	2A-B2-0.5-1.5	2A-B2-7-8	2A-B3-0-1	2A-B3-2-3	2A-B3-10-11	2A-B4-0.5-1.5	2A-B4-5-6	2A-B4-7-8	2A-B5-1-2	2A-B5-7-8	2A-B6-1-2	2A-B6-4-5	2A-B7-2.5-3.5	2A-B7-4-5	2A-B7-8-9		
Sample Depth (feet bgs)	1 to 2	6 to 7	0.5 to 1.5	7 to 8	0 to 1	2 to 3	10 to 11	0.5 to 1.5	5 to 6	7 to 8	1 to 2	7 to 8	1 to 2	4 to 5	2.5 to 3.5	4 to 5	8 to 9		
Soil Type	Fill	Qvi	Fill	Qvi	Fill	Fill	Qvi	Fill	Qvi	Qvi	Fill	Qvi	Fill	Qvi	Fill	Qvi	Qvi		
Metals[9] (mg/kg)																			
Arsenic	11 U	12 U	11 U	11 U	11 U	11 U	--	11 U	11 U	--	11 U	11 U	11 U	--	13 U	12 U	--	20	7
Barium	**93**	**42**	**50**	**55**	**69**	**140**	--	**48**	**42**	--	**40**	**56**	**42**	--	**310**	**45**	--	16,000[11]	NE
Cadmium	0.57 U	0.58 U	0.53 U	0.55 U	0.56 U	0.56 U	--	0.54 U	0.55 U	--	0.55 U	0.55 U	0.53 U	--	**0.71**	0.59 U	--	2.0	1
Chromium	**35**	**27**	**29**	**45**	**48**	**59**	--	**30**	**27**	--	**25**	**49**	**33**	--	**37**	**24**	--	2,000[12]	48[14]
Lead	**59**	5.8 U	**8.0**	5.5 U	**21**	**37**	--	**7.9**	5.5 U	--	5.5 U	5.5 U	5.3 U	--	**200**	5.9 U	--	250	50
Mercury	0.29 U	0.29 U	0.27 U	0.27 U	0.28 U	0.28 U	--	0.27 U	0.27 U	--	0.27 U	0.28 U	0.27 U	--	0.32 U	0.29 U	--	2.0	0.07 or DET
Selenium	11 U	12 U	11 U	11 U	11 U	11 U	--	11 U	11 U	--	11 U	11 U	11 U	--	13 U	12 U	--	400[11]	NE
Silver	1.1 U	1.2 U	1.1 U	1.1 U	1.1 U	1.1 U	--	1.1 U	1.1 U	--	1.1 U	1.1 U	1.1 U	--	1.3 U	1.2 U	--	400[11]	NE

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc., of Redmond, Washington.

[2] Sample ID = Area number - boring/test pit number - starting depth of sample [feet bgs] -end depth [feet bgs], Area 2A Boring 1 collected 1-2 feet bgs = 2A-B1-1-2.

[3] Washington State Department of Ecology (Ecology)-approved method NWTPH-HCID.

[4] Ecology-approved method NWTPH-Dx.

[5] VOCs were analyzed by U.S. Environmental Protection Agency (EPA) method 8260B. Other VOCs were analyzed but not detected.

[6] Acetone is a common laboratory contaminant.

[7] Total xylenes consists of m,p- and o- xylenes. The higher detection limit is shown.

[8] Polycyclic aromatic hydrocarbons (PAHs) and carcinogenic PAHs (cPAHs) were analyzed by EPA method 8270D/SIM. Other PAHs were analyzed but not detected.

[9] Resource Conservation Recovery Act (RCRA) metals analyzed by EPA 6000/7000 series method.

[10] MTCA Method A cleanup level for gasoline is 30 mg/kg if benzene is detected or if the sum of toluene, ethylbenzene and xylenes are equal to or greater than 1% of the total gasoline detection.

[11] MTCA Method B criteria represented because MTCA Method A cleanup level has not been established.

[12] MTCA Method A cleanup level for Trivalent Chromium.

[13] Guidance for Remediation of Petroleum Contaminated Sites (Publication 10-09-057) Ecology, October 2011; Summary Natural Background Soil Metals Concentrations in Washington State (Publication 94-115) dated October 1994; and Hazardous Waste Regulations 40 CFR Part 260.

[14] Chromium was not compared to the Reuse Criteria listed above for soils based on historic soil analytical results indicating chromium is not a prevalent chemical of concern on the UWT campus.

mg/kg = milligram per kilogram
-- = sample not analyzed
N/A = not applicable
Qvi = Ice-contact deposit

MTCA = Model Toxics Control Act
bgs = below ground surface
DET = Detected at concentrations greater than laboratory reporting limit

U = Analyte was not detected at or greater than the listed reporting limit

TEF = Toxicity Equivalency Factor as defined in WAC 173-340-900 Table 708-2

Total Toxic Equivalent Concentration (TTEC) is the sum of each individual cPAH concentration multiplied by its corresponding TEF.

Bold font type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Bold font type and gray shading indicates that the detected concentration is greater than the respective MTCA cleanup level.

Dashed outline indicates the value is greater than the Reuse Criteria.

Table 2

Summary of Chemical Analytical Results[1] - Groundwater

Area 2A - Sound Care
Priority Development Areas - University of Washington Tacoma
Tacoma, Washington

Boring Identification	DD-MW1	UG-MW3	UG-MW4	UG-MW7	UG-MW8	UG-MW13	JS-MW7A	MTCA Method A Groundwater Cleanup Level	MTCA Method B Air Screening Levels[9]
Sample ID[2]	DD-MW1-130619	UG-MW3-130618	UG-MW4-130619	UG-MW7-130619	UG-MW8-130619	UG-MW13-130625	JS-MW7A-140122		
Sample Date	6/19/2013	6/18/2013	6/19/2013	6/19/2013	6/19/2013	6/25/2013	1/22/2014		
Approximate Depth to Groundwater (feet btoc)[3]	20.33	44.35	50.52	35.68	33.01	21.15	11.02		
Elevation of Groundwater Level[4]	101.79	55.28	55.15	88.29	90.49	101.81	85.73		
Top of Well Screen Elevation (feet)[4]	76.83	63.28	60.31	68.29	68.29	99.29	90		
Bottom of Well Screen Elevation (feet)[4]	61.83	47.28	45.31	54.29	53.29	79.26	85		
Lithology At Well Screen	Advance Outwash	Advance Outwash	Advance Outwash	Advance Outwash	Advance Outwash	Qvi	Qvi		
Chemical									
NWTPH-Gx[5] (µg/L)									
Gasoline-Range	--	--	--	--	--	--	100 U	800/1,000[7]	NE
VOCs[6] (µg/L)									
Trichloroethene (TCE)	**130**	**13**	0.20 U	0.20 U	**56**	**110**	**1.8**	5	1.5
Tetrachloroethene (PCE)	**1.2**	0.20 U	0.20 U	0.20 U	0.40 U	**1.4**	0.20 U	5	24
(cis) 1,2-Dichloroethene	1.0 U	0.20 U	0.20 U	0.20 U	**0.44**	1.0 U	0.20 U	16[8]	160
(trans) 1,2-Dichloroethene	1.0 U	0.20 U	0.20 U	0.20 U	0.40 U	1.0 U	0.20 U	160[8]	110
Vinyl Chloride	0.50 U	0.10 U	0.10 U	0.10 U	0.20 U	0.50 U	0.20 U	0.2	0.35
1,1-Dichloroethane	1.0 U	**0.25**	0.20 U	0.20 U	0.40 U	1.0 U	0.20 U	400[8]	130

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc. in Redmond, Washington.

[2] Sample ID = Area number - Boring number - Date (i.e., a water sample collected from UG-MW35 on January 22, 2014 = UG-MW35-140122).

[3] Groundwater level was measured below the top of casing.

[4] Based on survey completed by AHBL November 6, 2013. Horizontal datum - NAD 83/91 Washington State Plane - South Zone (City of Tacoma Horizontal Control Holding City Monument Numbers 411 and 414). Vertical datum NGVD 29 (brass monument at South 19th and Fawcett Avenue, Elevation 165.15).

[5] Washington State Department of Ecology (Ecology)-approved method NWTPH-Gx.

[6] Volatile organic compounds (VOCs) were analyzed by U.S. Environmental Protection Agency (EPA) method 8260C. Other VOCs were analyzed but not detected.

[7] MTCA Method A cleanup level for gasoline is 800 µg/L if benzene is detected or if the sum of toluene, ethylbenzene and xylenes are equal to or greater than 1% of the total gasoline detection.

[8] MTCA Method B criteria represented because MTCA Method A cleanup level has not been established.

[9] MTCA Method B Indoor Air Screening Level from Washington State Depportment of Ecology Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action. Values updated as appropriate to incorporate recent toxicity data.

MTCA = Model Toxics Control Act

NE = Not established
Qvi = Ice-contact deposit

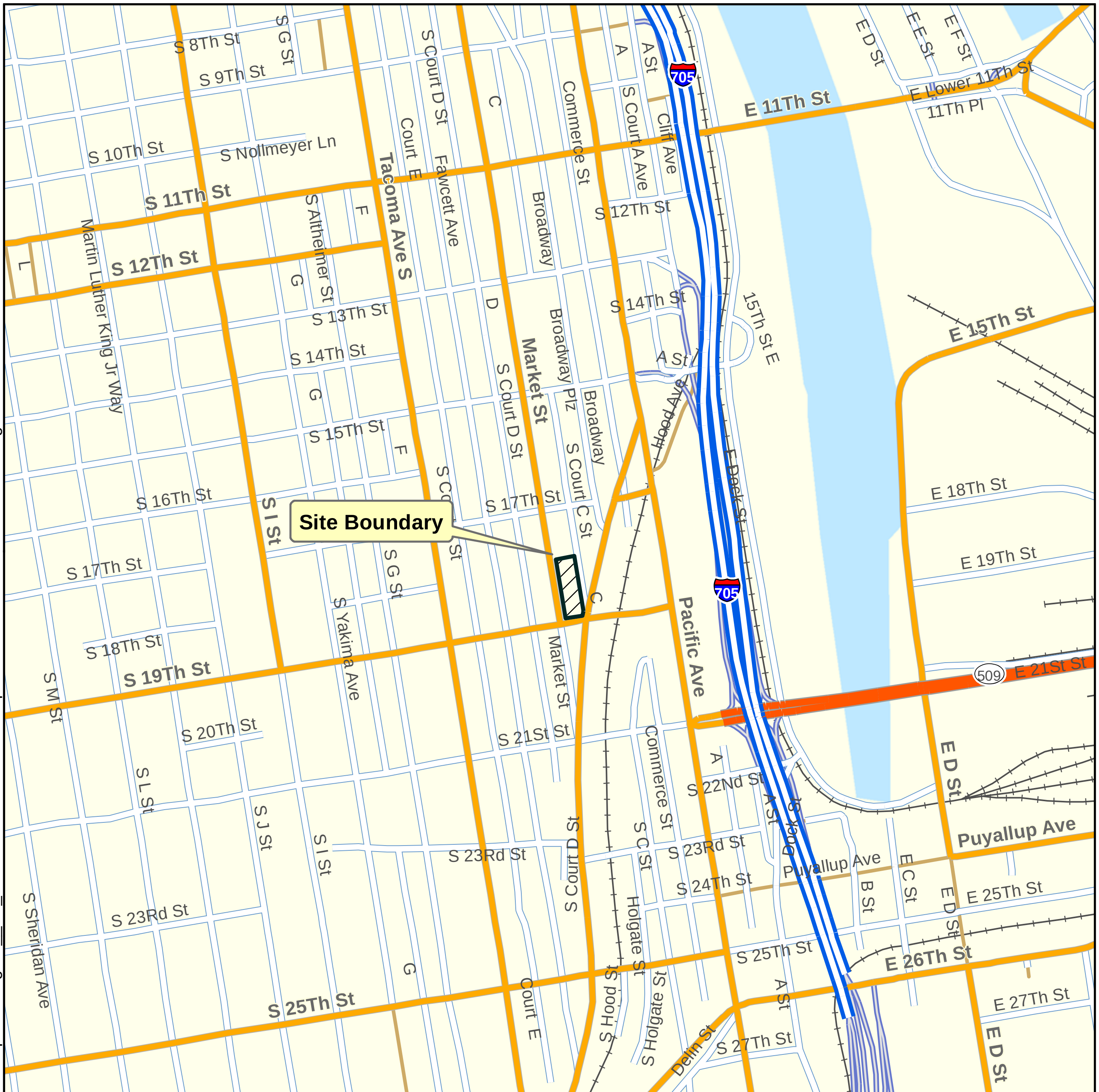
µg/L = microgram per Liter
DET = Detected at concentrations greater than laboratory reporting limit

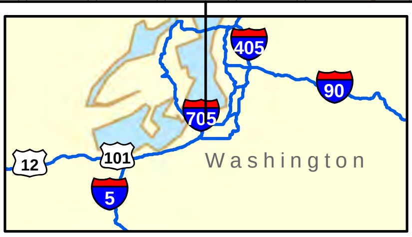
U = Analyte was not detected at or greater than the listed reporting limit

Bold font type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Bold font type and gray shading indicates analyte was detected at a concentration greater than the MTCA Method groundwater cleanup/criteria level.

Dashed outline indicates analyte was detected at a concentration greater than the MTCA Method B Indoor Air Screening Level.





N
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1,000 0 1,000
Feet

Notes:
CPO = University of Washington Capital Project Office
UWT = University of Washington Tacoma
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Data Sources: ESRI Data & Maps

Projection: NAD 1983 UTM Zone 10N

Vicinity Map

UWT Environmental Investigation
Priority Development Areas - CPO Project No. 204277
Tacoma, Washington

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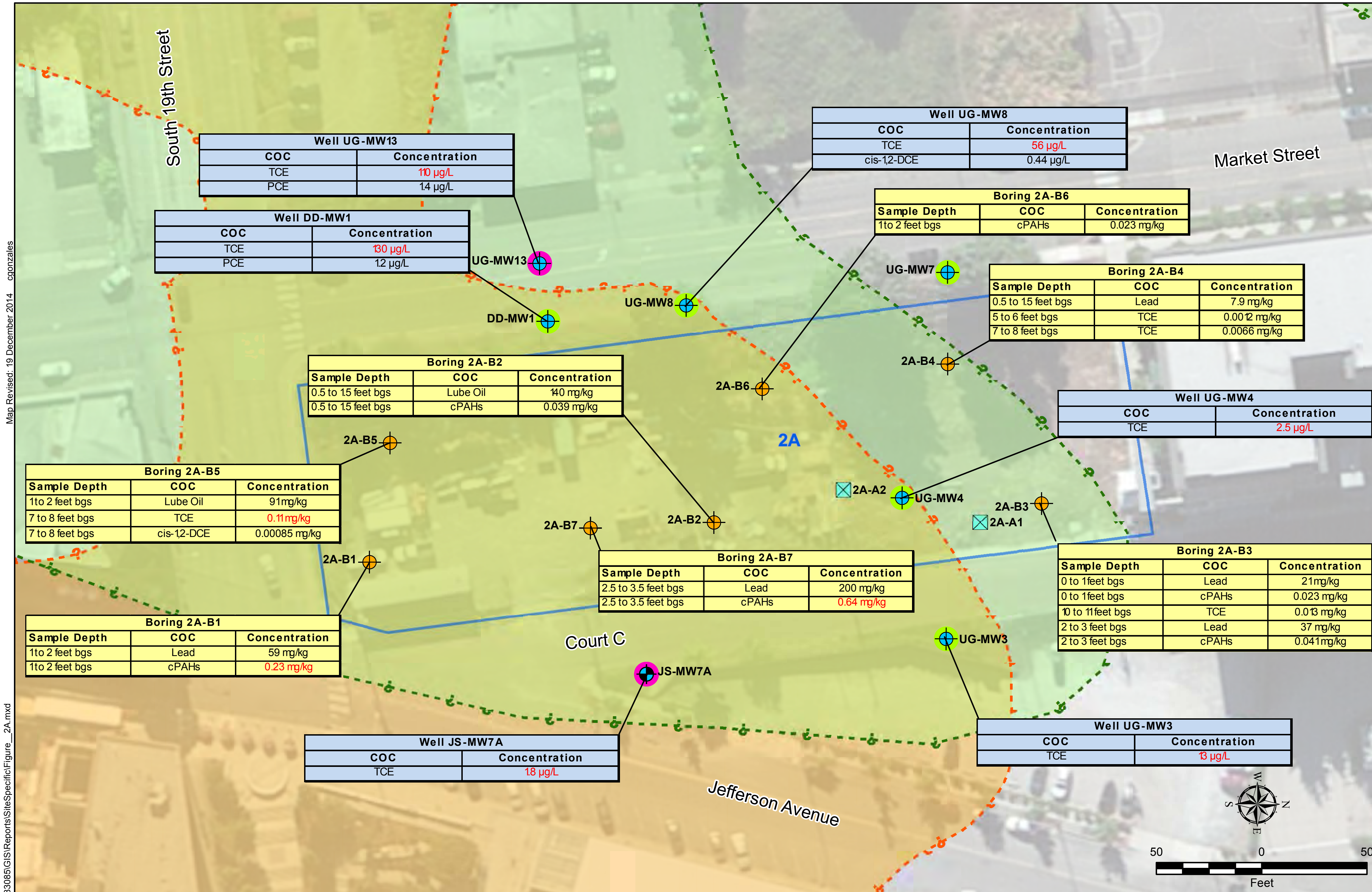
Figure 1

Office: TAC Path: \\tac\projects\0\0183085\GIS\Reports\SiteSpecific\Figure_2A_VM.mxd Map Revised: 17 December 2014 cgonzales



Well UG-MW13	
COC	Concentration
TCE	110 µg/L
PCE	1.4 µg/L

Well DD-MW1	
COC	Concentration
TCE	130 µg/L
PCE	1.2 µg/L

Well UG-MW8	
COC	Concentration
TCE	56 µg/L
cis-1,2-DCE	0.44 µg/L

Boring 2A-B6		
Sample Depth	COC	Concentration
1 to 2 feet bgs	cPAHs	0.023 mg/kg

Boring 2A-B4		
Sample Depth	COC	Concentration
0.5 to 1.5 feet bgs	Lead	7.9 mg/kg
5 to 6 feet bgs	TCE	0.0012 mg/kg
7 to 8 feet bgs	TCE	0.0066 mg/kg

Boring 2A-B2		
Sample Depth	COC	Concentration
0.5 to 1.5 feet bgs	Lube Oil	140 mg/kg
0.5 to 1.5 feet bgs	cPAHs	0.039 mg/kg

Well UG-MW4	
COC	Concentration
TCE	2.5 µg/L

Boring 2A-B5		
Sample Depth	COC	Concentration
1 to 2 feet bgs	Lube Oil	91 mg/kg
7 to 8 feet bgs	TCE	0.11 mg/kg
7 to 8 feet bgs	cis-1,2-DCE	0.00085 mg/kg

Boring 2A-B7		
Sample Depth	COC	Concentration
2.5 to 3.5 feet bgs	Lead	200 mg/kg
2.5 to 3.5 feet bgs	cPAHs	0.64 mg/kg

Boring 2A-B3		
Sample Depth	COC	Concentration
0 to 1 feet bgs	Lead	21 mg/kg
0 to 1 feet bgs	cPAHs	0.023 mg/kg
10 to 11 feet bgs	TCE	0.013 mg/kg
2 to 3 feet bgs	Lead	37 mg/kg
2 to 3 feet bgs	cPAHs	0.041 mg/kg

Boring 2A-B1		
Sample Depth	COC	Concentration
1 to 2 feet bgs	Lead	59 mg/kg
1 to 2 feet bgs	cPAHs	0.23 mg/kg

Well UG-MW3	
COC	Concentration
TCE	13 µg/L

Well JS-MW7A	
COC	Concentration
TCE	1.8 µg/L

Soil Results*

Boring 2A-B7		
Sample Depth	COC	Concentration
2.5 to 3.5 feet bgs	Lead	200 mg/kg
2.5 to 3.5 feet bgs	cPAHs	0.64 mg/kg

Groundwater Results*

Well UG-MW13	
COC	Concentration
TCE	110 µg/L
PCE	1.4 µg/L

*Chemicals shown in red were detected at concentrations greater than the respective MTCA Method A cleanup levels.

Only analytical results of the chemicals of concern are shown if detected. Other chemicals that were analyzed and detected are not shown unless detected at concentrations greater than the respective MTCA cleanup levels.

Legend

Approximate Location of Priority Development Area 2A

Approximate Subsurface Location and Identification

Existing Monitoring Well

Direct Push Boring

Sonic Core Boring - Permanent New Monitoring Well

Magnetic Anomaly Where Test Pit Was Completed

Lithology of Well Screen Interval

Ice-Contact Deposit (Shallow Aquifer)

Advance Outwash (Deep Aquifer)

Approximate Lateral Extent of TCE-Contaminated Groundwater Plume in Shallow Aquifer

Approximate Lateral Extent of TCE-Contaminated Groundwater Plume in Deep Aquifer

Approximate Lateral Extent of TCE-Contaminated Groundwater Plume in Shallow and Deep Aquifers

Map Revised: 19 December 2014 cgonzales

Path: \\tac\projects\0\0183085\GIS\Reports\SiteSpecific\Figure__2A.mxd

Office: TAC

Notes:
UWT = University of Washington Tacoma
cPAHs concentrations shown as TTEC.
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

COC = Chemical of Concern
PDA = Priority Development Area
PCE = tetrachloroethene
TCE = trichloroethene
cPAH = Carcinogenic Polycyclic Aromatic Hydrocarbons
mg/kg = milligram per kilogram
µg/L = microgram per Liter
bgs = Below Ground Surface
TTEC = Total Toxicity Equivalency Concentration
DCE = dichloroethene
MCTA = Model Toxics Control Act
ULU = Unrestricted Land Use

Soil MTCA Cleanup/Criteria Levels:
PCE = 0.05 mg/kg (Method A ULU)
TCE = 0.03 mg/kg (Method A ULU)
Benzene = 0.03 mg/kg (Method A ULU)
Vinyl Chloride = 0.67 mg/kg (Method B)
Lube Oil-Range Petroleum Hydrocarbons = 2,000 mg/kg (Method A ULU)
Diesel-Range Petroleum Hydrocarbons = 2,000 mg/kg (Method A ULU)
Gasoline-Range Petroleum Hydrocarbons = 100 mg/kg (Method A ULU)
cPAHs (TTEC) = 0.1 mg/kg (Method A ULU)
Lead = 250 mg/kg (Method A ULU)
Arsenic = 20 mg/kg (Method A ULU)
Cadmium = 2 mg/kg (Method A ULU)
Mercury = 2 mg/kg (Method A ULU)
cis-1,2-DCE = 160 mg/kg (Method B)

Groundwater MTCA Cleanup/Criteria Levels:
PCE = 5 µg/L (Method A); 24 µg/L (Indoor Air)
TCE = 5 µg/L (Method A); 1.5 µg/L (Indoor Air)
cis-1,2-DCE= 16 µg/L (Method B); 160 µg/L (Indoor Air)
trans-1,2-DCE = 160 µg/L (Method B); 110 µg/L (Indoor Air)
Vinyl Chloride = 0.2 µg/L (Method A); 0.35 µg/L (Indoor Air)
Benzene = 5 µg/L (Method A); 2.4 µg/L (Indoor Air)
Lube Oil-Range Petroleum Hydrocarbons = 0.5 mg/L (Method A)
Arsenic = 5 µg/L (Method A)
cPAHs= 0.1 µg/L (Method A)

Site Plan – PDA 2A/Sound Care

UWT Environmental Investigation
Priority Development Areas - CPO Project No. 204277
Tacoma, Washington

GeoEngineers

Figure 2

APPENDIX A
Report Limitations and Guidelines for Use

APPENDIX A
REPORT LIMITATIONS AND GUIDELINES FOR USE[1]

This appendix provides information to help you manage your risks with respect to the use of this report.

Environmental Services are Performed for Specific Purposes, Persons and Projects

This report has been prepared for use by University of Washington. This report is not intended for use by others, and the information contained herein is not applicable to other sites.

GeoEngineers structures our services to meet the specific needs of our clients. For example, an environmental site assessment study conducted for a property owner may not fulfill the needs of a prospective purchaser of the same property. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and project site. No one except University of Washington should rely on this environmental report without first conferring with GeoEngineers. This report should not be applied for any purpose or project except the one originally contemplated.

This Environmental Report is Based on a Unique Set of Project-Specific Factors

This report has been prepared for the Priority Development Areas (PDAs) Environmental Assessment Project at the UW – Tacoma (UWT) campus located in Tacoma, Washington. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, do not rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

If important changes are made after the date of this report, GeoEngineers should be given the opportunity to review our interpretations and recommendations and provide written modifications or confirmation, as appropriate.

Reliance Conditions for Third Parties

If a lending agency or other parties intend to place legal reliance on the product of our services, we require that those parties indicate in writing their acknowledgement that the scope of services provided, and the general conditions under which the services were rendered including the limitation of professional liability, are understood and accepted by them. This is to provide our firm with reasonable

---

[1] Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions.

Environmental Regulations are Always Evolving

Some substances may be present in the site vicinity in quantities or under conditions that may have led, or may lead, to contamination of the subject site, but are not included in current local, state or federal regulatory definitions of hazardous substances or do not otherwise present current potential liability. GeoEngineers cannot be responsible if the standards for appropriate inquiry, or regulatory definitions of hazardous substance, change or if more stringent environmental standards are developed in the future.

Subsurface Conditions can Change

This environmental report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by manmade events such as construction on or adjacent to the site, by new releases of hazardous substances, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Always contact GeoEngineers before applying this report to determine if it is still applicable.

Topsoil

For the purposes of this report, we consider topsoil to consist of generally fine-grained soil with an appreciable amount of organic matter based on visual examination, and to be unsuitable for direct support of the proposed improvements. However, the organic content and other mineralogical and gradational characteristics used to evaluate the suitability of soil for use in landscaping and agricultural purposes was not determined, nor considered in our analyses. Therefore, the information and recommendations in this report, and our logs and descriptions should not be used as a basis for estimating the volume of topsoil available for such purposes.

Most Environmental Findings are Professional Opinions

Our interpretations of subsurface conditions are based on field observations and chemical analytical data from widely spaced sampling locations at the site. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ – sometimes significantly – from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

Do Not Redraw the Exploration Logs

Environmental scientists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in an environmental report should never be redrawn for inclusion in other design drawings. Only photographic or electronic reproduction is acceptable, but recognize that separating logs from the report can elevate risk.

Read These Provisions Closely

Some clients, design professionals and contractors may not recognize that the geoscience practices (geotechnical engineering, geology and environmental science) are far less exact than other engineering

and natural science disciplines. This lack of understanding can create unrealistic expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory "limitations" provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you are unclear how these "Report Limitations and Guidelines for Use" apply to your project or site.

Geotechnical, Geologic and Geoenvironmental Reports Should Not Be Interchanged

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually relate any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding a specific project.

Biological Pollutants

GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention, or assessment of the presence of Biological Pollutants in or around any structure. Accordingly, this report includes no interpretations, recommendations, findings, or conclusions for the purpose of detecting, preventing, assessing, or abating Biological Pollutants. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts.

PDA 2B – Jefferson Street Parcel/Transit Turnaround

Priority Development Area 2B
Jefferson Street Parcel and Transit Turnaround
Environmental Subsurface Investigation

Environmental Subsurface Investigation Project
UW Capital Project Office Project No. 204277
1748 Jefferson Avenue
Tacoma, Washington

for
University of Washington

December 19, 2014

GeoEngineers

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Priority Development Area 2B –
Jefferson Street Parcel and Transit Turnaround
Environmental Subsurface Investigation
UW Capital Project Office
Project No. 204277
1748 Jefferson Avenue
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Table of Contents

1.0 INTRODUCTION **1**

2.0 SITE HISTORICAL USE **1**

3.0 CURRENT SITE FEATURES **2**

4.0 ENVIRONMENTAL SUBSURFACE EXPLORATIONS **2**

4.1. Historic Research and Magnetic Anomaly Findings 2
4.2. Soil Borings 2
4.3. Groundwater Sampling – Monitoring Wells 2

5.0 SOIL AND GROUNDWATER CONDITIONS **3**

5.1. Soil Conditions 3
5.2. Groundwater Conditions 3

6.0 CHEMICAL ANALYTICAL PROGRAM **3**

6.1. General 3
6.2. Criteria for Characterization of Soil and Groundwater 4
6.3. Soil 5
 6.3.1. Petroleum Hydrocarbons 5
 6.3.2. VOCs 6
 6.3.3. PAHs 6
 6.3.4. RCRA Metals 6
6.4. Groundwater 6
 6.4.1. Petroleum Hydrocarbons 7
 6.4.2. VOCs 7
 6.4.3. PAHs 8
 6.4.4. RCRA Metals 8

7.0 CONCLUSIONS **8**

7.1. Soil 8
7.2. Groundwater 8

8.0 PROPOSED DEVELOPMENT PLANS **8**

9.0 POTENTIAL IMPACTS AND MITIGATION MEASURES TO DESIGN AND CONSTRUCTION **9**

9.1. Potential UST 9
9.2. TCE-Contaminated Groundwater 9
9.3. Soil is Contaminated with Chemicals of Concern 12

10.0 LIMITATIONS **13**

11.0 REFERENCES **13**

LIST OF TABLES

Table 1. Summary of Chemical Analytical Results – Soil
Table 2. Summary of Chemical Analytical Results – Groundwater

LIST OF FIGURES

Figure 1. Vicinity Map
Figure 2. Site Plan – Area 2B/Jefferson Street Parcel and Transit Turnaround

APPENDICES

Appendix A. Report Limitations and Guidelines for Use

1.0 INTRODUCTION

This report presents the results of our environmental subsurface investigation completed for the University of Washington (UW) at the Jefferson Street Parcel and Transit Turnaround site (Priority Development Area [PDA] – 2B) located on the UW Tacoma (UWT) campus at 1748 Jefferson Avenue in Tacoma, Washington. The Jefferson Street/Transit Turnaround site is herein referred to as the "site." The site was identified as PDA 2B for this project. The site is bound by Court C to the west, the Pinkerton building to the north, Jefferson Avenue to the east and South 19th Street to the south. A Vicinity Map of the site is included as Figure 1. See Figure 2 for the layout of the site.

The subsurface investigation was completed under the UWT Environmental Subsurface Investigation Project, UW project number 204277. This report was completed as a subset of the larger subsurface investigation report titled "2013 Environmental Subsurface Investigation – University of Washington-Tacoma, Tacoma, Washington" dated December 19, 2014 to assist with development of the property. This report should be used in context with the larger subsurface investigation report. Boring logs, subsurface investigation methodologies and chemical analytical data packages are included in the larger investigation report.

General impacts and potential mitigation measures are provided in this report that may be employed in design and construction. It is important to recognize that additional environmental investigations may be necessary prior to selection of the final mitigation measure. Mitigation measures and associated costs provided in this report will likely need refinement based on the results of the additional environmental investigations. The project team should contact UW Environmental Health & Safety (UW EH&S) to discuss the need for additional environmental investigations at this site. UW EH&S is the liaison with the Washington State Department of Ecology (Ecology) for review and approval of mitigation measures.

2.0 SITE HISTORICAL USE

Single family homes were present within the site boundary from 1888 to 1912. A portion of the residences were demolished and stores (of unknown use) were constructed by 1912. The residences were completely demolished by 1932 and the southern and northern portions of the site were divided into different uses as described below.

Jefferson Street Parcel. A Standard Oil fuel station and tire repair facility operated on the southern portion of the site from 1932 until 1973. One pump island with fuel dispensers, a repair/service area with hydraulic lift and floor drain/sump were located on the southern corner of the site. The former service station and fuel dispenser island were demolished by at least 1973. Underground storage tanks (USTs) and service station components were removed including excavation of approximately 447 tons of petroleum-contaminated soil from the site in 2012. Chemicals of concern were either not detected or were detected at concentrations less than the respective Model Toxics Control Act (MTCA) cleanup levels in the confirmation soil samples with the exception of one soil sample collected along Jefferson Avenue at a depth of approximately 6 feet below ground surface (bgs). Gasoline-range petroleum hydrocarbons and benzene were detected at concentrations greater than the respective MTCA cleanup levels at this location.

Transit Turnaround. The inspector's office of the former street car and coffee shop were present from at least 1931 to 1936 on the northern portion of the site. A transit turnaround and restaurant operated on the northern portion of the site from 1942 to 1993.

3.0 CURRENT SITE FEATURES

The southern portion of the site is currently used as a parking area for the Old Spaghetti Factory restaurant. The former transit turnaround area located at the northern portion of the site is currently used for parking of UW vehicles.

4.0 ENVIRONMENTAL SUBSURFACE EXPLORATIONS

The environmental subsurface investigation completed at the site consisted of a magnetic/ground penetrating radar (M/GPR) survey, direct-push borings and groundwater development and sampling of existing monitoring wells. The investigation was completed in June 2013.

4.1. Historic Research and Magnetic Anomaly Findings

Historic research results indicated the potential for USTs to be present at the site given the age of the former buildings and the source of heat typically used during these time periods. In addition, heating conversion permits were listed in the permit records. An M/GPR survey was performed in the areas around the footprint of the existing building.

Four magnetic anomalies were identified near the northeast corner of the site. The magnetic anomalies were designated using the following identification nomenclature: 2B-A1 where 2B identifies the PDA and –A1 is the number of the anomaly at the site. The magnetic anomalies identified at PDA 2B were likely due to the presence of underground utilities. Test pit explorations were not completed at these locations; however, one boring (2B-B3) was completed near magnetic anomaly 2B-A4.

4.2. Soil Borings

Two direct-push borings (2B-B2 and 2B-B3) were completed at the site on June 18, 2013. A third boring (2B-B1) was not completed in the right-of-way as planned because of the presence of underground utilities. The direct-push borings were completed to a depth of approximately 10 feet bgs when practical refusal was encountered.

4.3. Groundwater Sampling – Monitoring Wells

Groundwater samples were collected from five existing monitoring wells between June 18 and June 25, 2013 and from three monitoring wells installed during this investigation between September 13, 2013 and January 22, 2014. The locations of the wells are shown on Figure 2.

The five existing monitoring wells include UG-MW3, UG-MW4, JS-MW1, JS-MW2 and JS-MW3.

The new permanent wells installed during this investigation include JS-MW3S, JS-MW4 and JS-MW7A. Monitoring wells UG-MW3, JS-MW1, JS-MW2 and JS-MW7A are located on the site. Well UG-MW4 is located upgradient (west) of the site and JS-MW3, JS-MW3S and JS-MW4 are located downgradient (east) of the site.

The monitoring wells are either screened in the shallow (ice-contact deposits) or deep aquifer (advance outwash). Monitoring wells JS-MW3S and JS-MW7A are screened within the shallow aquifer. Monitoring wells UG-MW3, UG-MW4, JS-MW1, JS-MW2, JS-MW3 and JS-MW4 are screened within the deep aquifer. Table 2 describes the approximate well screen elevations and depths.

5.0 SOIL AND GROUNDWATER CONDITIONS

5.1. Soil Conditions

Subsurface conditions consist of fill, ice-contact deposits, silt layer and advance outwash. The fill consists of silt and sand (silt with sand and/or sand with silt) from below the surface to depths ranging from 0 to 4 feet bgs. Native soil conditions underlying the fill consist of glacially consolidated ice-contact deposits. The ice-contact deposits consisted of silty gravel with sand in monitoring wells UG-MW3, UG-MW4 and JS-MW7A and sandy silt in monitoring wells JS-MW1, JS-MW2, JS-MW3 and JS-MW3S. A unit of gray silt was observed beneath the ice-contact deposits in the wells completed on and adjacent to the site during this investigation as well as previous investigations by others. The silt layer is underlain by advance outwash consisting of gravel with sand and silt.

5.2. Groundwater Conditions

It appears that groundwater conditions observed consist of shallow (ice-contact deposits) and deep aquifers (advance outwash) to the depths explored during this investigation. The shallow and deep aquifers appear to be separated by a silt layer located between the ice-contact deposits and advance outwash.

Groundwater within the shallow aquifer appears to be present within the sand and gravel seams within the ice-contact deposits. The hydraulic connection of the sand seams within the shallow aquifer is unknown in and around the project site. Groundwater within the deep aquifer appears to be continuous with interbeds of moist to wet silt at depth. The deep aquifer within the advance outwash appears to be under a confined condition.

Groundwater elevation of the shallow aquifer ranged between 85 and 75 feet from the west to the east sides of the site. Groundwater elevation within the deep aquifer appears to be at approximately 55 feet across the site. It should be noted that groundwater levels will vary depending on season, precipitation and other factors.

6.0 CHEMICAL ANALYTICAL PROGRAM

6.1. General

Soil and groundwater samples were submitted to OnSite Environmental, Inc., in Redmond, Washington for chemical analysis. The chemical analytical data are summarized in Tables 1 and 2. Chemicals that were not detected at or greater than the laboratory reporting limits in the analyzed samples are typically not included on the tables.

6.2. Criteria for Characterization of Soil and Groundwater

The following criteria were used to evaluate impacted and contaminated soil and groundwater.

- Contained-In Contaminated Soil
  - Tetrachloroethene (PCE), Trichloroethene (TCE) and breakdown products at concentrations detected in the analyzed soil samples.
- Contaminated Soil
  - Petroleum hydrocarbons, carcinogenic polycyclic aromatic hydrocarbons (cPAHs), metals and volatile organic compounds (VOCs) detected at concentrations greater than the MTCA Method A Unrestricted Land Use (ULU) cleanup level or MTCA B screening level.
- Impacted Soil

  Some contaminants were detected at concentrations less than the respective MTCA cleanup levels. UWT may be able to reuse certain types of soil depending on the sampling results. UW EH&S must review the chemical analytical data to evaluate if reuse or disposal at an off site facility is necessary. Soil reuse and disposal are subject to Ecology Guidance for Remediation of Petroleum Contaminated Sites (Ecology, 2011), solid waste regulations and disposal facility permit conditions. The criteria below is herein referred to as "Reuse Criteria."

  - Petroleum hydrocarbons, cPAHs and/or Lead

    The Ecology guidance indicates that soil with diesel- and/or lube oil-range petroleum hydrocarbons detected at concentrations less than 200 milligrams per kilogram (mg/kg) and/or gasoline-range petroleum hydrocarbons detected at concentrations less than 30 mg/kg are suitable for reuse as commercial fill at UWT campus with the following limitations:

    - placed above the highest water table,
    - not within 100 feet of a drinking water well,
    - not within wellhead protection area of public water supply,
    - not within wetlands or where surface water contact is possible, and
    - not within a surface water infiltration facility or septic drain field.

    If the concentrations exceed the above limits but are still less than respective MTCA cleanup levels the soil may be reused in road and bridge embankment construction, landfill daily cover or asphalt manufacturing with UW EH&S approval.

  - Arsenic, Cadmium, and/or Mercury

    Soil with concentrations of arsenic, cadmium and/or mercury above what is normally found in the natural background environment (Puget Sound Background levels - Ecology, 1994) is typically suitable for disposal at an inert waste landfill or a Department of Natural Resources (DNR) reclamation pit. UW EH&S approval is necessary.

Soil at and near the UWT campus has been well documented to contain chromium at concentrations slightly above the natural background level and is not considered in the "Reuse Criteria."

- Contaminated Groundwater
  - Petroleum hydrocarbons, PAHs and metals detected at concentrations greater than the respective MTCA Method A groundwater cleanup levels. Method B criteria were used for comparison of specific compounds if Method A groundwater cleanup levels are not established for those compounds.
  - VOCs detected at concentrations greater than the respective MTCA Method A groundwater cleanup levels, and MTCA Method B groundwater screening levels protective of indoor air. The updated TCE/PCE screening levels were calculated using Equation 1 from Ecology's review draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action" dated October 2009 (Ecology, 2009) and Environmental Protection Agency's (EPA's) TCE and PCE toxicity factors updated in 2011 and available on EPA's online Integrated Risk Information System (IRIS). The other values were obtained from Ecology's review draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action."

6.3. Soil

Soil samples were collected from the soil borings and during the installation of monitoring wells JS-MW7 (decommissioned) and JS-MW7A. Samples were identified using the following identification system: A#-B#-start depth-end depth, where A# is the area designation number, B# is the boring and start depth-end depth is the depth interval in feet below the ground of specific sample (e.g., 2B-B2-5-6 was collected in Area 2B from boring B2 from 5 to 6 feet bgs).

Soil samples were submitted for chemical analysis based on the following criteria:

- Where field screening indicated the soil is impacted.
- Directly below potentially impacted soil to delineate the vertical extent.
- Where wet sand seams were encountered within the glacial drift.
- At the soil/groundwater interface if groundwater was encountered.
- At the top of confining units if encountered.

The soil samples were submitted for chemical analysis of petroleum hydrocarbon identification by Ecology-approved method NWTPH-HCID, VOCs by EPA method 8260C, polycyclic aromatic hydrocarbons (PAHs) by EPA method 8270DSIM, and Resource Conservation and Recovery Act (RCRA) metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver) by EPA method 6000/7000 series.

6.3.1. Petroleum Hydrocarbons

Lube oil-range petroleum hydrocarbons were detected at a concentration less than the MTCA Method A ULU cleanup level (2,000 milligrams per kilogram [mg/kg]) but greater than the Ecology Reuse Criteria in soil sample JS-MW7A-0-1 (210 mg/kg). Lube oil-range petroleum hydrocarbons were not detected in the remaining analyzed soil samples.

Gasoline- and diesel-range petroleum hydrocarbons were not detected in the analyzed soil samples.

6.3.2. VOCs

VOCs were not detected in the analyzed soil samples.

6.3.3. PAHs

CPAHs were detected at a concentration (total toxicity equivalent concentration [TTEC]) greater than the MTCA Method A ULU cleanup level (0.1 mg/kg) in soil sample JS-MW7A-0-1 (3.49 mg/kg). CPAHs were either not detected or were detected at concentrations less than the respective MTCA Method ULU cleanup level in the remaining analyzed soil samples.

PAHs were either not detected or were detected at concentrations less than the respective MTCA Method ULU cleanup level and Ecology Reuse Criteria in the remaining analyzed soil samples.

6.3.4. RCRA Metals

Lead was detected at a concentration greater than the MTCA Method A ULU cleanup level (250 mg/kg) in soil sample JS-MW7A-0-1 (1,100 mg/kg). Lead was either not detected or was detected at concentrations less than the MTCA Method A ULU cleanup level in the remaining analyzed soil samples.

Mercury was detected at a concentration greater than the Reuse Criteria in soil sample JS-MW7A-0-1 (0.44 mg/kg). Mercury was not detected in the remaining analyzed soil samples.

Other RCRA metals were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels, Method B criteria or the Reuse Criteria in the analyzed soil samples.

6.4. Groundwater

Groundwater samples were collected from the eight monitoring wells for chemical analysis. The groundwater samples collected from the wells were identified using the following identification system: WELL-ID-yymmdd, where WELL-ID is the well identification number and yymmdd is the date when the sample was collected (e.g., UG-MW4-130619 was collected from monitoring well UG-MW4 on June 19, 2013). The groundwater samples were submitted for chemical analysis of VOCs by EPA method 8260C. Some of the groundwater samples were also submitted for additional analysis as described below:

- JS-MW3S-130913. Gasoline-range petroleum hydrocarbons by Ecology-approved method NWTPH-Gx; diesel- and lube oil-range petroleum hydrocarbons by Ecology-approved method NWTPH-Dx; PAHs by EPA method 8270D/SIM; RCRA metals by EPA methods 200.8/7470A.
- JS-MW3S-140122. Gasoline-range petroleum hydrocarbons by Ecology-approved method NWTPH-Gx.
- JS-MW4D-130919. Diesel- and lube oil-range petroleum hydrocarbons by Ecology-approved method NWTPH-Dx; PAHs by EPA method 8270D/SIM; RCRA metals by EPA methods 200.8/7470A.
- JS-MW7A. Gasoline-range petroleum hydrocarbons by Ecology-approved method NWTPH-Gx.

The chemical analytical data for groundwater are described below and summarized in Table 2.

6.4.1. Petroleum Hydrocarbons

Gasoline-, diesel- and lube-oil range petroleum hydrocarbons were either not detected or were detected at concentrations less than the respective MTCA Method A groundwater cleanup levels in the analyzed groundwater samples.

6.4.2. VOCs

SHALLOW AQUIFER

TCE was detected at a concentration of 1.8 micrograms per liter (µg/L) in groundwater sample JS-MW7A-140122. This detected concentration of TCE is greater than the MTCA Method B groundwater screening levels protective of indoor air (1.5 µg/L) but less than the MTCA Method A groundwater cleanup level (5 µg/L).

Bromodichloromethane was detected at a concentration greater than the MTCA Method B groundwater cleanup level (0.71 µg/L) in the groundwater sample collected from monitoring well JS-MW3S on September 13, 2013 (0.98 µg/L). Chloroform and dibromochloromethane were also detected at concentrations less than the respective groundwater cleanup level but greater than the MTCA Method B groundwater screening level protective of indoor air.

City of Tacoma supplied water was utilized during development of well JS-MW3S due to drawdown observed during development. Bromodichloromethane, chloroform and dibromochloromethane are typical byproducts of the chlorine used to disinfect municipally-supplied water. Following receipt of the chemical analytical data from JS-MW3S, a groundwater sample was collected from the municipal water supply. Bromodichloromethane was detected at a concentration (2.2 µg/L), which is greater than the MTCA Method B groundwater cleanup level collected from the municipally-supplied water. Chloroform and dibromochloromethane were also detected at concentrations less than the MTCA Method B groundwater screening level but greater than the MTCA Method B groundwater screening level protective of indoor air in the sample of municipally-supplied water.

Monitoring well JS-MW3S was resampled on January 22, 2014. Bromodichloromethane and dibromochloromethane were not detected in the analyzed groundwater sample collected in January 2014. Chloroform was detected but a concentration approximately 300 times less than the groundwater sample collected in September. The chemical concentrations in September appear to be related to the use of municipal water during development.

Other VOCs were not detected in the analyzed groundwater samples.

DEEP AQUIFER

TCE was detected at a concentration greater than the MTCA Method A ULU cleanup level and the MTCA Method B groundwater screening levels protective of indoor air in the following groundwater samples with the concentrations detected identified in parenthesis.

- UG-MW3-130618 (13 µg/L)
- JS-MW2-130618 (14 µg/L)

TCE was detected at a concentration less than MTCA Method A ULU cleanup level but greater than the MTCA Method B screening levels protective of indoor air in sample JS-MW4D-130919 (2.5 µg/L).

TCE was either not detected or was detected at concentrations less than the MTCA Method A cleanup level in the remaining analyzed groundwater samples.

Other VOCs were either not detected or were detected at concentrations less than the respective MTCA cleanup levels in the remaining analyzed groundwater samples.

6.4.3. PAHs

PAHs were not detected in the analyzed groundwater samples.

6.4.4. RCRA Metals

RCRA metals were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels or Method B criteria in the analyzed groundwater samples.

7.0 CONCLUSIONS

Soil and groundwater samples were collected for chemical analysis to evaluate potential impacts to development.

7.1. Soil

Lead- and cPAHs-contaminated soil were present from the ground surface to 1 foot bgs on the southern portion of PDA 2B (boring JS-MW7A). Gasoline- and benzene-contaminated soil is also present at a depth of approximately 6 feet bgs along Jefferson Avenue. The gasoline-range petroleum hydrocarbons and benzene-contaminated soil was left in place during a remedial excavation completed on PDA 2B.

Petroleum hydrocarbon-, metals- and cPAHs-impacted soil are present from the ground surface to 2 feet bgs on the southern and western portions of the site (JS-MW7A and 2B-B2).

7.2. Groundwater

TCE-contaminated groundwater is present in the shallow and deep aquifers on the southern portion of the site as shown on Figure 2. The estimated groundwater elevation of the shallow aquifer ranges between approximately 85 feet to 75 feet. The estimated groundwater elevation of the deep aquifer is approximately 55 feet.

The TCE appears to originate from an upgradient source based on the soil and groundwater chemical analytical results. PDA 2B is situated near the northeast (downgradient) extent of the Westerly Contaminant Groundwater Plume, which is comprised primarily of TCE. The identified historical property uses at the site are unlikely to be the source of TCE and PCE contamination based on information reviewed to date. However, the actual source is unknown at the time of this report.

8.0 PROPOSED DEVELOPMENT PLANS

We understand UWT plans to construct a new building at PDA 2B. GeoEngineers assumes the new building will be 50,000 square feet with a finished floor Elevation of 86 feet. The estimated amount of soil to be generated based on the above assumptions is approximately 35,000 tons to excavate PDA 2B to subgrade (Elevation 85 feet) which includes the soil prism within Court C. An additional 6,000 tons is estimated to be generated from the footings.

9.0 POTENTIAL IMPACTS AND MITIGATION MEASURES TO DESIGN AND CONSTRUCTION

We recommend UW develop and implement appropriate administrative institutional controls to limit or prohibit activities that may result in exposure to hazardous substances remaining at the site. Potential impacts to the design and construction of the site are the following:

- Four potential USTs are present on the site.
- TCE-contaminated groundwater is present in the shallow and deep aquifers on the southern portion of the site.
- Soil is contaminated and impacted with chemicals of concern (metals, petroleum hydrocarbons and cPAHs).

Potential long-term impacts include:

- Long-term disposal of underslab/perimeter footing drain TCE-impacted groundwater.
- Continued maintenance of vapor intrusion mitigation system, if necessary.
- Potential periodic indoor air sampling to confirm the vapor intrusion mitigation system may be necessary to evaluate the system is operating properly, if necessary.
- TCE-contaminated or TCE-impacted soil may remain adjacent and beneath the building following construction activities. UW should develop and implement appropriate institutional controls to help prevent exposure to residual contamination.

The following sections describe potential impacts, mitigation measures and estimated costs to design and construction.

9.1. Potential UST

Four magnetic anomalies were identified but not investigated because the anomalies were located in the parking lot or in areas containing a concrete surface. Heating oil USTs may be present in the area of the magnetic anomalies. The estimated cost to remove the four heating oil USTs is $40,000 to $80,000.

9.2. TCE-Contaminated Groundwater

TCE was detected in groundwater at concentrations greater than the MTCA Method A Groundwater cleanup level and/or updated MTCA Method B groundwater screening level protective of indoor air in the shallow and deep aquifer wells located on the southern portion of the site.

TCE-contaminated groundwater within the shallow aquifer will likely be encountered during construction in the southwest portion of the site based on the elevation of the groundwater of the shallow and deep aquifers and the anticipated cut of the building to Elevation 85 feet. This also indicates the TCE-contaminated groundwater will be in contact with the west side of the building and present beneath the building. TCE-contaminated groundwater within the deep aquifer will likely not be encountered during excavation of the footings, but may be encountered for deep excavations (elevator or shoring). Mitigation measures include:

Additional Investigation. Further subsurface investigation may be necessary to evaluate the vertical and lateral limits of the TCE-impacted soil and/or groundwater at the site. Soil vapor sampling is recommended to evaluate if a potential vapor intrusion pathway exists. The estimated cost for soil vapor sampling and additional investigation is $50,000 to $100,000.

Vapor Mitigation. Vapor intrusion occurs when VOCs migrate from contaminated soil or groundwater into overlying buildings through openings in the foundation. The route VOCs take from a subsurface source to the air inside a building is referred to as the vapor intrusion pathway. The most common sources of soil vapor are VOCs including TCE and PCE, which may pose short-term (TCE only) and long-term (chronic) risks through inhalation of contaminated indoor air.

Groundwater and soil vapor concentrations are typically utilized as screening levels regarding the potential for vapor intrusion. TCE was detected at a concentration that exceeds the screening level for updated MTCA Method B groundwater screening level protective of indoor air in the groundwater sample collected from monitoring well JS-MW7A screened within the shallow aquifer. TCE-contaminated groundwater in the shallow aquifer may be in contact with the west side of the finished building and present beneath the building.

The TCE concentrations in the deeper aquifer represent a lesser concern for vapor intrusion because the depth of the groundwater, the presence of the shallow aquifer and a confining to semi-confining silt layer may preclude a contaminant pathway to the surface.

Soil vapor sampling was not completed as part of this investigation. Additional on-site characterization may be necessary to evaluate the vertical and lateral limits of the TCE-contaminated impacted soil vapors. Soil vapor sampling is recommended near the elevation of the proposed subgrade to evaluate if a potential vapor intrusion pathway exists. If a potential vapor intrusion pathway exists, then a vapor intrusion mitigation system may be necessary. Potential mitigation options to prevent vapor intrusion include:

- A passive vapor barrier beneath the building. Passive vapor barriers are typically used in combination with another mitigation option (venting or building pressurization). We recommend the vapor barrier be installed below the elevation of penetrations (pipes, etc.) that may be installed after the programing is identified in the future. Penetrating the vapor barrier following the construction will add to the cost of construction.
- Passive or active venting system beneath the building. The venting system may need to be combined with an underslab and perimeter drain to reduce the potential for shallow groundwater to enter the venting system.

The estimated cost for design and installation of indoor air mitigation system ranges between $5 per square foot to $12 per square foot of building space. The estimated costs for the vapor mitigation system for a building on the entire site ranges from $250,000 to $600,000. Potential periodic indoor air sampling to confirm the vapor intrusion mitigation system may be necessary to evaluate the system is operating properly following construction of the building. The estimated cost for long-term monitoring is unknown.

Alternatively, the shallow and deep aquifers does not appear to be impacted on the northern portion of the site. If the building is located in this area, a vapor mitigation system may not be necessary, but additional investigation is recommended (as described above) to confirm TCE-contaminated groundwater is not present in the area.

Underslab/Footing Drainage. Underslab/footing drainage system may be required to prevent water from entering into the vapor mitigation vent system. The water will likely have to be directed to the City of Tacoma sanitary sewer based on concentrations of the chemicals of concern in the groundwater. A long-term cost may be associated with discharge of the water to the City sanitary sewer system. However, it is anticipated the groundwater will be suitable for discharge to the storm system based on the concentrations detected in the existing wells during this investigation. An underslab footing drain will likely be required based on the elevation of the groundwater (85 feet). The estimated cost of the underslab footing drain is $150,000 to $300,000.

Construction Water Management. TCE-contaminated groundwater encountered during construction will have to be managed. Water generated during construction will likely be stored in tanks, sampled and analyzed. Water disposal will be coordinated with UW EH&S at a UW-approved disposal facility. It is anticipated the construction dewatering water will be suitable for discharge into the storm sewer based on the concentrations detected in the existing wells during this investigation. The water may be disposed in the City of Tacoma sanitary sewer. The City of Tacoma charges approximately $0.0034 per gallon of water. The estimated volume of water generated will be based on construction methods. The base cost estimate includes the cost of disposal of water for 120 days of earthwork construction, approximate cost of collecting ten water samples over the course of the project ($15,000) and two 25,000 gallon storage tanks ($7,000 each per month).

Approximately 10,000 gallons per day is estimated to be generated on the site from dewatering activities. The estimated cost of construction water management if disposal into the City of Tacoma sanitary sewer is necessary is approximately $47,000.

Cross-Contamination. It does not appear the proposed building will cut through the silt layer that is a semi-confining to confining unit for the shallow and deep aquifers. TCE-contaminated groundwater also appears to be present in the shallow and deep aquifers.

Additional investigation will be necessary to evaluate the potential for cross-contamination between the two aquifers. This investigation could be completed in concurrence with the additional investigation to evaluate the lateral and vertical extent of the contamination. However, it appears that cross-contamination between the two aquifers is likely not warranted at this site. For budgeting purposes, additional construction cost is estimated to be between $25,000 and $150,000 if cross-contamination is identified as an impact.

Health and Safety. Workers who may be in contact with potentially contaminated soil or groundwater at a state-listed cleanup site have HAZWOPER training. The requirement is consistent with the Washington Administrative Code (WAC) 296-843-100, *Hazardous Waste Operations*, which indicates that on-site personnel are required to have current health and safety training in accordance with Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response requirements in 29 CFR 1910.120. The rule also requires the earthwork contractor and other personnel who could potentially contact contaminated materials to develop and implement a written safety and health program for their employees involved in hazardous waste operations under 29 CFR 1910.120. The estimated cost for the contractor to be HAZWOPER trained and have appropriate liability insurance is roughly between $10,000 and $70,000 depending on the number of subcontractors that require training, and the contractor markup factor.

9.3. Soil is Contaminated with Chemicals of Concern

Contaminated soil (metals and cPAHs) and impacted soil (TCE, petroleum, metals and cPAHs) will likely be generated during construction activities. We recommend UW implement the following actions.

- Characterize Soil and Groundwater for Disposal. In-situ characterization or stockpiling and subsequent sampling will need to be performed on soil that is generated during construction in areas of TCE-impacted, metals/cPAHs-contaminated and petroleum-, metals-/cPAHs-impacted soil. The estimate cost of the soil sampling for soil disposal is $60,000 to $80,000 based on the mass of soil to be excavated. This cost may be reduced if the amount of soil is reduced by not removing the soil prism in Court C.
- Complete Remedial Excavation of Petroleum-Contaminated Soil. Gasoline-range petroleum hydrocarbons and benzene impacted soil is present in the right-of-way along Jefferson Avenue. Remedial excavation of the benzene-contaminated soil may be required during construction of the building. The mass of soil to be excavated is approximately 50 tons. The estimated cost for excavation, transportation and disposal at a RCRA subtitle D landfill or treatment facility is $8,000 assuming the contractor has mobilized to the site and restoration of the area is completed as part of the building construction project.
- TCE-Impacted and Contaminated Soil. When TCE and breakdown products are detected in soil, UW EH&S will work with Ecology on obtaining a “contained-in determination” for disposal of the waste. The source of the solvent contamination, the concentration of the solvents and a Toxicity Characteristic Leaching Procedure (TCLP) analytical test result will be used when evaluating if the soil is disposed as hazardous waste by UW EH&S at a RCRA permitted Subtitle C landfill or as a solid waste at a UW-approved Subtitle D landfill. Past experience has demonstrated that it is fairly likely that the “contained-in determination” will be granted, thus we based our cost estimates on this assumption.

  The estimated cost to transport and dispose (not including excavation and loading) soil at a Subtitle D landfill with a contained-in determination is $80 to $100 per ton. The typical cost for transportation and disposal (not including excavation and loading) of soil at a RCRA Subtitle C Landfill is $250 to $300 per ton. The cost estimates provided in this report assume disposal at a Subtitle D landfill.

  The source of the TCE-contaminated soil that may be removed during construction is not known at this time and a Contained-In Determination from Ecology may not be necessary based on our current understanding of the regulations. However, we recommend the UWT assume the source may be identified by construction or Ecology will require a Contained-In Determination for budgeting purposes. The estimated mass of TCE-contaminated and impacted soil is approximately 10,000 tons. This estimate assumes the southwestern 18,000 square-feet of the site is impacted with chemicals of concern at depths below elevation 90 feet to 95-feet. This area also includes Court C. The estimated cost for transportation and disposal of the TCE-contaminated and impacted soil is between

$800,000 and $1,000,000. This estimate could be reduced if the building was raised in elevation or soil prism within Court C was not removed.

- **Lead and cPAHs-Contaminated Soil.** Lead and cPAHs- contaminated soil will be disposed at an UW-approved RCRA permitted Subtitle D landfill. The contaminated soil shall be removed as necessary for construction and Ecology requirements. CPAHs- and metals-contaminated soil will be disposed at an UW-approved RCRA permitted Subtitle D landfill. CPAHs- and metals-contaminated soil left in place shall be capped with a building or hardscape as required by Ecology. The estimated cost for transportation and disposal at a RCRA Subtitle D facility is $60 to $80 per ton. We estimate the mass of the lead and cPAH -contaminated soil to be 400 tons. This estimate assumes contamination in the top 2 feet in the southwest portion of the site. The estimated cost for transportation and disposal is between $24,000 and $32,000.
- **Metals-, Petroleum-, cPAHs-Impacted Soil.** Metals- petroleum- and cPAHs-impacted soil is present on the west-central portion of the site to a depth of approximately 2 feet bgs. Soil is impacted with cPAHs, petroleum hydrocarbons and metals. Metals-, cPAHs, and petroleum-impacted soil is typically suitable disposal at a UW-approved permitted inert waste landfill or reclamation pit. For budgeting purposes, we assumed the transportation and disposal of cPAHs-, metals- and petroleum-impacted soil is $30 to $50 per ton. We estimate the mass of the metals- and cPAHs-impacted soil to be 500 tons. This estimate assumes the surficial 2 feet in the central western portion of the site. The estimated cost for transportation and disposal is between $15,000 and $25,000.
- **Health and Safety.** As discussed in the contaminated groundwater section, Washington State requires its earthwork contractor and other personnel who could potentially contact contaminated materials to comply with training requirements for handling soil and potentially groundwater on the site. The health and safety costs are not included as separate item in the soil, because the costs in the groundwater section will apply.

10.0 LIMITATIONS

This report has been prepared for use by the University of Washington for the Priority Development Area 2B – Jefferson Street Parcel and Transit Turnaround located in Tacoma, Washington at the University of Washington Tacoma campus.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

Please refer to Appendix A titled "Report Limitations and Guidelines for Use" for additional information pertaining to use of this report.

11.0 REFERENCES

Ecology, 2009. Washington State Department of Ecology. Draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action" dated October 2009.

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Table 1

Summary of Chemical Analytical Results[1] - Soil

Area 2B - Jefferson Street Parcel/Transit Turnaround

Priority Development Areas - University of Washington Tacoma

Tacoma, Washington

Boring/Test Pit	2B-B2		2B-B3	JS-MW7						JS-MW7A		MTCA Method A ULU Cleanup Level	Reuse Criteria [12]
Sample Identification [2]	2B-B2-1-2	2B-B2-5-6	2B-B3-1-2	JS-MW7-7-8	JS-MW7-8-9	JS-MW7-11-12	JS-MW7-18-19	JS-MW7-22-23	JS-MW7-24-25	JS-MW7A-0-1	JS-MW7A-1-2		
Sample Depth (feet bgs)	1 to 2	5 to 6	1 to 2	7 to 8	8 to 9	11 to 12	18 to 19	22 to 23	24 to 25	0 to 1	1 to 2		
Soil Type	Qvi	Qvi	Qvi	Qvi	Qvi	Qvi	Qvi	Outwash	Outwash	Fill	Fill		
NWTPH-HCID [3] (mg/kg)													
Gasoline-Range	23 U	22 U	22 U	–	–	–	–	–	–	23 U	26 U	30/100[9]	30
Diesel-Range	57 U	55 U	56 U	–	–	–	–	–	–	DET	65 U	2,000	200
Lube Oil-Range	110 U	110 U	110 U	–	–	–	–	–	–	DET	130 U	2,000	200
NWTPH-Dx [4] (mg/kg)													
Diesel-Range	–	–	–	–	–	–	–	–	–	29 U	–	2,000	200
Lube Oil-Range	–	–	–	–	–	–	–	–	–	210	–	2,000	200
VOCs [5] (mg/kg)													
Tetrachloroethene (PCE)	0.00093 U	0.00084 U	0.00098 U	0.00080 U	0.00099 U	0.00081 U	0.00073 U	0.00080 U	0.00085 U	0.00097 U	0.0011 U	0.05	DET
Trichloroethene (TCE)	0.00093 U	0.00084 U	0.00098 U	0.00080 U	0.00099 U	0.00081 U	0.00073 U	0.00080 U	0.00085 U	0.00097 U	0.0011 U	0.03	DET
(cis) 1,2-Dichloroethene	0.00093 U	0.00084 U	0.00098 U	0.00080 U	0.00099 U	0.00081 U	0.00073 U	0.00080 U	0.00085 U	0.00097 U	0.0011 U	160[10]	DET
(trans) 1,2-Dichloroethene	0.00093 U	0.00084 U	0.00098 U	0.00080 U	0.00099 U	0.00081 U	0.00073 U	0.00080 U	0.00085 U	0.00097 U	0.0011 U	1,600[10]	DET
Vinyl Chloride	0.00093 U	0.00084 U	0.00098 U	0.00080 U	0.00099 U	0.00081 U	0.00073 U	0.00080 U	0.00085 U	0.00097 U	0.0011 U	0.67[10]	DET
Acetone[6]	0.0047 U	0.0042 U	0.0049 U	0.0040 U	0.0049 U	0.0040 U	0.0037 U	0.0040 U	0.0042 U	0.021	0.0055 U	72,000[10]	NE
Carbon Disulfide[6]	0.00093 U	0.00084 U	0.00098 U	0.00080 U	0.00099 U	0.00081 U	0.00073 U	0.0033	0.00085 U	0.00097 U	0.0011 U	8,000[10]	NE
Trichlorofluoromethane (CFC-11)[6]	0.00093 U	0.00084 U	0.00098 U	0.0032	0.0055	0.0013	0.0027	0.0026	0.0032	0.00097 U	0.0011 U	24,000[10]	NE
PAHs [7] (mg/kg)													
1-Methylnaphthalene	0.0076 U	0.0073 U	0.0075 U	–	–	–	–	–	–	0.21	0.0086 U	35[10]	NE
2-Methylnaphthalene	0.0076 U	0.0073 U	0.0075 U	–	–	–	–	–	–	0.22	0.0086 U	320[10]	NE
Acenaphthene	0.0076 U	0.0073 U	0.0075 U	–	–	–	–	–	–	0.21	0.0086 U	4,800[10]	NE
Acenaphthylene	0.0085	0.0073 U	0.0075 U	–	–	–	–	–	–	0.59	0.0086 U	NE	NE
Anthracene	0.011	0.0073 U	0.0075 U	–	–	–	–	–	–	0.74	0.0086 U	24,000[10]	NE
Benzo[g,h,i]perylene	0.035	0.0073 U	0.0075 U	–	–	–	–	–	–	1.3	0.0086 U	NE	NE
Fluoranthene	0.064	0.0073 U	0.0075 U	–	–	–	–	–	–	6.4	0.0086 U	3,200[10]	NE
Fluorene	0.0076 U	0.0073 U	0.0075 U	–	–	–	–	–	–	0.38	0.0086 U	3,200[10]	NE
Naphthalene	0.014	0.0073 U	0.0075 U	–	–	–	–	–	–	0.36	0.0086 U	5	5
Phenanthrene	0.020	0.0073 U	0.0075 U	–	–	–	–	–	–	6.4	0.0086 U	NE	NE
Pyrene	0.083	0.0073 U	0.0075 U	–	–	–	–	–	–	6.1	0.0086 U	2,400[10]	NE
cPAHs [7] (mg/kg)													
Benzo (a) anthracene (TEF 0.1)	0.044	0.0073 U	0.0075 U	–	–	–	–	–	–	2.3	0.0086 U	MTCA ULU cleanup level for the sum of all cPAHs is 0.1 mg/kg	Reuse Criteria for the sum of all cPAHs is 0.1 mg/kg
Benzo (a) pyrene (TEF 1)	0.058	0.0073 U	0.0075 U	–	–	–	–	–	–	2.7	0.0086 U		
Benzo (b) fluoranthene (TEF 0.1)	0.055	0.0073 U	0.0075 U	–	–	–	–	–	–	3.1	0.0086 U		
Benzo (J,k) fluoranthene (TEF 0.1)	0.018	0.0073 U	0.0075 U	–	–	–	–	–	–	0.76	0.0086 U		
Chrysene (TEF 0.01)	0.051	0.0073 U	0.0075 U	–	–	–	–	–	–	2.5	0.0086 U		
Dibenz (a,h) anthracene (TEF 0.1)	0.0082	0.0073 U	0.0075 U	–	–	–	–	–	–	0.36	0.0086 U		
Indeno (1,2,3-cd) pyrene (TEF 0.1)	0.028	0.0073 U	0.0075 U	–	–	–	–	–	–	1.1	0.0086 U		
Total TTEC of cPAHs (detect only)	0.074	N/A	N/A	–	–	–	–	–	–	3.5	N/A	0.1	0.1

Boring/Test Pit	2B-B2		2B-B3	JS-MW7						JS-MW7A		MTCA Method A ULU Cleanup Level	Reuse Criteria [12]
Sample Identification [2]	2B-B2-1-2	2B-B2-5-6	2B-B3-1-2	JS-MW7-7-8	JS-MW7-8-9	JS-MW7-11-12	JS-MW7-18-19	JS-MW7-22-23	JS-MW7-24-25	JS-MW7A-0-1	JS-MW7A-1-2		
Sample Depth (feet bgs)	1 to 2	5 to 6	1 to 2	7 to 8	8 to 9	11 to 12	18 to 19	22 to 23	24 to 25	0 to 1	1 to 2		
Soil Type	Qvi	Qvi	Qvi	Qvi	Qvi	Qvi	Qvi	Outwash	Outwash	Fill	Fill		
Metals[8] (mg/kg)													
Arsenic	11 U	11 U	11 U	--	--	--	--	--	--	11 U	13 U	20	7
Barium	**70**	**54**	**52**	--	--	--	--	--	--	**240**	**140**	16,000[10]	NE
Cadmium	0.57 U	0.55 U	0.56 U	--	--	--	--	--	--	**0.65**	0.65 U	2.0	1.0
Chromium	**71**	**33**	**38**	--	--	--	--	--	--	**55 J**	**70 J**	2,000 [11]	48[13]
Lead	**30**	5.5 U	5.6 U	--	--	--	--	--	--	**1,100**	6.5 U	250	50
Mercury	0.28 U	0.27 U	0.28 U	--	--	--	--	--	--	**0.44**	0.32 U	2.0	0.07 or DET
Selenium	11 U	11 U	11 U	--	--	--	--	--	--	11 U	13 U	400[10]	NE
Silver	1.1 U	1.1 U	1.1 U	--	--	--	--	--	--	1.1 U	1.3 U	400[10]	NE

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc., of Redmond, Washington.

[2] Sample ID = Area number - boring/test pit number - starting depth of sample [feet bgs] -end depth [feet bgs], Area 2B Boring 2 collected 1-2 feet bgs = 2B-B2-1-2.

[3] Washington State Department of Ecology (Ecology)-approved method NWTPH-HCID and NWTPH-Dx.

[4] Ecology-approved method NWTPH-Dx.

[5] VOCs were analyzed by U.S. Environmental Protection Agency (EPA) method 8260B. Other VOCs were analyzed but not detected.

[6] Common laboratory contaminant.

[7] Polycyclic aromatic hydrocarbons (PAHs) and carcinogenic PAHs (cPAHs) were analyzed by EPA method 8270D/SIM.

[8] Resource Conservation Recovery Act (RCRA) metals analyzed by EPA 6000/7000 series method.

[9] MTCA Method A cleanup level for gasoline is 30 mg/kg if benzene is detected or if the sum of toluene, ethylbenzene and xylenes are equal to or greater than 1% of the total gasoline detection.

[10] MTCA Method B criteria represented because MTCA Method A cleanup level has not been established.

[11] MTCA Method A cleanup level for Trivalent Chromium.

[12] Guidance for Remediation of Petroleum Contaminated Sites (Publication 10-09-057) Ecology, October 2011; Summary Natural Background Soil Metals Concentrations in Washington State (Publication 94-115) dated October 1994; and Hazardous Waste Regulations 40 CFR Part 260.

[13] Chromium was not compared to the Reuse Criteria listed above for soils based on historic soil analytical results indicating chromium is not a prevalent chemical of concern on the UWT campus.

-- = sample not analyzed

N/A = not applicable

mg/kg = milligram per kilogram

Qvi = Ice-contact deposit

MTCA = Model Toxics Control Act

DET = Detected at concentrations greater than laboratory reporting limit

U = Analyte was not detected at or greater than the listed reporting limit

J = Estimated result by the labortory

TEF = Toxicity Equivalency Factor as defined in WAC 173-340-900 Table 708-2

Total Toxic Equivalent Concentration (TTEC) is the sum of each individual cPAH concentration multiplied by its corresponding TEF.

Bold font type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Bold font type and gray shading indicates that the detected concentration is greater than the respective MTCA cleanup level.

Dashed outline indicates the value is greater than the Reuse Criteria.

Table 2

Summary of Chemical Analytical Results[1] - Groundwater

Area 2B - Jefferson Street Parcel/Transit Turnaround
Priority Development Areas - University of Washington Tacoma
Tacoma, Washington

Boring Identification	UG-MW3	UG-MW4	JS-MW1	JS-MW2	JS-MW3	JS-MW3S	JS-MW3S	Municipal Water	JS-MW4	JS- MW7A	MTCA Method A Groundwater Cleanup Level	MTCA Method B Groundwater Screening Level Protective of Indoor [13]
Sample ID[2]	UG-MW3-130618	UG-MW4-130619	JS-MW1-130618	JS-MW2-130618	JS-MW3-130625	JS-MW3S-130913	JS-MW3S-140122	WATER-130924	JS-MW4D-130919	JS-MW7A-140122		
Sample Date	6/18/2013	6/19/2013	6/18/2013	6/18/2013	6/25/2013	9/13/2013	1/22/2014	9/24/2013	9/19/2013	1/22/2014		
Approximate Depth to Groundwater (feet btoc)[3]	44.35	50.52	34.81	34.92	36.52	18.81	18.85	N/A	40.18	8.84		
Approximate Elevation of Groundwater[4]	55.28	55.15	55.34	55.41	52.83	70.05		N/A	53.48	88.73		
Top of Well Screen Elevation (feet)[4]	63.28	60.31	56.27	56.56	50.97	77.39	77.39	N/A	51.21	90		
Bottom of Well Screen Elevation (feet)[4]	47.28	45.31	41.27	41.56	35.97	67.36	67.36	N/A	41.21	85		
Lithology At Well Screen	Outwash	Outwash	Outwash	Outwash	Outwash	Qvi	Qvi	N/A	Outwash	Qvi		
Chemical												
NWTPH-Gx[5] (µg/L)												
Gasoline-Range	--	--	--	--	--	100 U	100 U	100 U	100 U	100 U	800/1,000[10]	NE
NWTPH-Dx[6] (mg/L)												
Diesel-Range	--	--	--	--	--	0.31	--	0.26 U	260 U	--	0.5	NE
Lube Oil-Range	--	--	--	--	--	0.43 U	--	0.42 U	420 U	--	0.5	NE
VOCs[7] (µg/L)												
Trichloroethene (TCE)	13	0.20 U	1.4	14	0.20 U	0.20 U	0.20 U	0.20 U	2.5	1.8	5	1.5
Tetrachloroethene (PCE)	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5	24
(cis) 1,2-Dichloroethene	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	16[11]	160
(trans) 1,2-Dichloroethene	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	160[11]	110
Vinyl Chloride	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.2	0.35
1,1-Dichloroethane	0.25	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	400[11]	130
1,1,1-Trichloroethane	0.20 U	0.20 U	0.20 U	0.21	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	200	5,500
Bromodichloromethane	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.98	0.20 U	2.2	0.20 U	0.20 U	0.71[11]	1.8
Chloroform	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	8.7	0.28	28	0.20 U	0.20 U	1.41[11]	1.2
Carbon Disulfide	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.25	0.20 U	0.20 U	0.20 U	NE	400
Dibromochloromethane	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	0.23	0.20 U	0.27	0.20 U	0.20 U	0.52[11]	4.5
PAHs[8] (µg/L)												
Naphthalene	--	--	--	--	--	0.10 U	--	0.097 U	1.6 U	--	160	8.9

Boring Identification	UG-MW3	UG-MW4	JS-MW1	JS-MW2	JS-MW3	JS-MW3S	JS-MW3S	Municipal Water	JS-MW4	JS- MW7A	MTCA Method A Groundwater Cleanup Level	MTCA Method B Groundwater Screening Level Protective of Indoor[13]
Sample ID[2]	UG-MW3-130618	UG-MW4-130619	JS-MW1-130618	JS-MW2-130618	JS-MW3-130625	JS-MW3S-130913	JS-MW3S-140122	WATER-130924	JS-MW4D-130919	JS-MW7A-140122		
Sample Date	6/18/2013	6/19/2013	6/18/2013	6/18/2013	6/25/2013	9/13/2013	1/22/2014	9/24/2013	9/19/2013	1/22/2014		
Approximate Depth to Groundwater (feet btoc)[3]	44.35	50.52	34.81	34.92	36.52	18.81	18.85	N/A	40.18	8.84		
Approximate Elevation of Groundwater[4]	55.28	55.15	55.34	55.41	52.83	70.05		N/A	53.48	88.73		
Top of Well Screen Elevation (feet)[4]	63.28	60.31	56.27	56.56	50.97	77.39	77.39	N/A	51.21	90		
Bottom of Well Screen Elevation (feet)[4]	47.28	45.31	41.27	41.56	35.97	67.36	67.36	N/A	41.21	85		
Lithology At Well Screen	Outwash	Outwash	Outwash	Outwash	Outwash	Qvi	Qvi	N/A	Outwash	Qvi		
Chemical												
cPAHs[8] (µg/L)												
Benzo (a) anthracene (TEF 0.1)	--	--	--	--	--	0.010 U	--	0.0097 U	0.0095 U	--	MTCA ULU cleanup level for the sum of all cPAHs is 0.1 µg/L	NE
Benzo (a) pyrene (TEF 1)	--	--	--	--	--	0.010 U	--	0.0097 U	0.0095 U	--		NE
Benzo (b) fluoranthene (TEF 0.1)	--	--	--	--	--	0.010 U	--	0.0097 U	0.0095 U	--		NE
Benzo (j,k) fluoranthene (TEF 0.1)	--	--	--	--	--	0.010 U	--	0.0097 U	0.0095 U	--		NE
Chrysene (TEF 0.01)	--	--	--	--	--	0.010 U	--	0.0097 U	0.0095 U	--		NE
Dibenz (a,h) anthracene (TEF 0.1)	--	--	--	--	--	0.010 U	--	0.0097 U	0.0095 U	--		NE
Indeno (1,2,3-cd) pyrene (TEF 0.1)	--	--	--	--	--	0.010 U	--	0.0097 U	0.0095 U	--		NE
Total TTEC of cPAHs (detect only)	--	--	--	--	--	N/A	--	N/A	N/A		0.1	NE
Total Metals[9] (µg/L)												
Arsenic	--	--	--	--	--	3.0 U	--	3.0 U	3.0 U	--	5	NE
Barium	--	--	--	--	--	**69**	--	25 U	25 U	--	3,200[11]	NE
Cadmium	--	--	--	--	--	4.0 U	--	4.0 U	4.0 U	--	5	NE
Chromium	--	--	--	--	--	**18**	--	10 U	10 U	--	50[12]	NE
Lead	--	--	--	--	--	**2.0**	--	**3.4**	**1.3**	--	15	NE
Mercury	--	--	--	--	--	0.50 U	--	0.50 U	0.50 U	--	2	NE
Selenium	--	--	--	--	--	5.0 U	--	5.0 U	5.0 U	--	80[11]	NE
Silver	--	--	--	--	--	10 U	--	10 U	10 U	--	80[11]	NE

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc. in Redmond, Washington.

[2] Sample ID = Area number - Boring number - Date (i.e., a water sample collected from UG-MW35 on January 22, 2014 = UG-MW35-140122).

[3] Groundwater level was measured below the top of casing on November 8, 2013.

[4] Based on survey completed by AHBL November 6, 2013. Horizontal datum - NAD 83/91 Washington State Plane - South Zone (City of Tacoma Horizontal Control Holding City Monument Numbers 411 and 414). Vertical datum NGVD 29 (brass monument at South 19th and Fawcett Avenue, Elevation 165.15).

[5] Washington State Department of Ecology (Ecology)-approved method NWTPH-Gx.

[6] Ecology-approved method NWTPH-Dx.

[7] Volatile organic compounds (VOCs) were analyzed by U.S. Environmental Protection Agency (EPA) method 8260C. Other VOCs were analyzed but not detected.

[8] Polycyclic Aromatic Hydrocarbons (PAHs) and carcinogenic PAHs (cPAHs) analyzed by EPA method 8270D/SIM.

[9] Metals analyzed by EPA 200.8 or 7470A method.

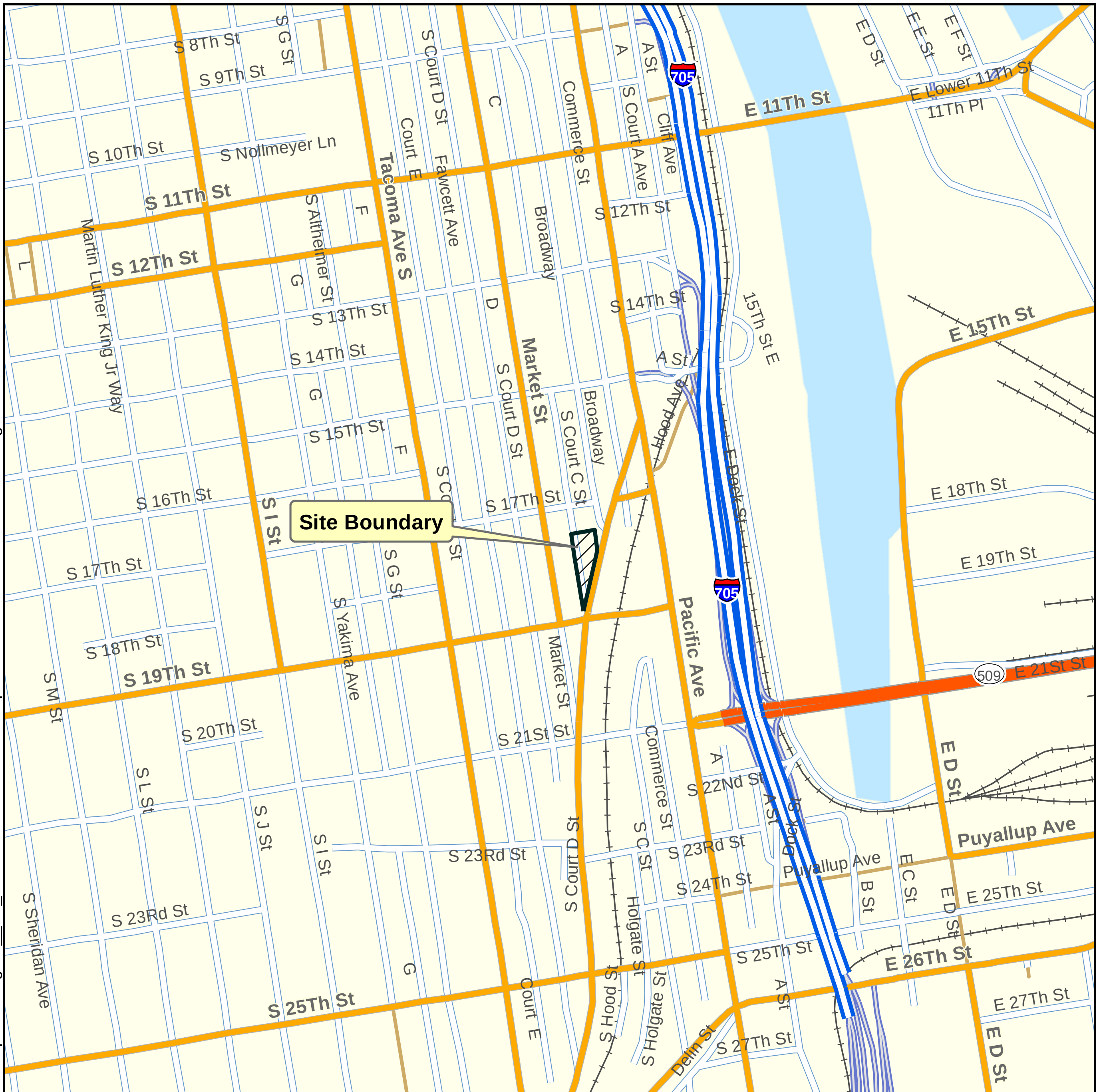
[10] MTCA Method A cleanup level for gasoline-range petroleum hydrocarbons is 800 µg/L if benzene is present and 1,000 µg/L if benzene is not present.

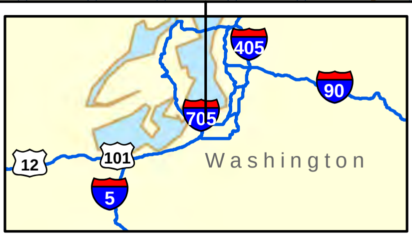
[11] MTCA Method B criteria represented because MTCA Method A cleanup level has not been established.

[12] MTCA Method A cleanup level for total chromium shown. Cleanup level for hexavalent chromium is 48 µg/L.

[13] MTCA Method B Indoor Air Screening Level from Washington State Deportment of Ecology Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action. Values updated as appropriate to incorporate recent toxicity data.

MTCA = Model Toxics Control Act
N/A = not applicable
-- = Analyte or sample not analyzed.
mg/L = milligram per Liter
Outwash = Advance Outwash
µg/L = microgram per Liter
Qvi = Ice-contact deposit
U = Analyte was not detected at or greater than the listed reporting limit
TEF = Toxicity Equivalency Factor as defined in WAC 173-340-900 Table 708-2
Total Toxic Equivalent Concentration (TTEC) is the sum of each individual cPAH concentration multiplied by its corresponding TEF.
Bold font type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.
Bold font type and gray shading indicates that the detected concentration is greater than the respective MTCA cleanup level.
Dashed outline indicates analyte is detected at a concentration greater than the MTCA Method B Indoor Air Screening Level.





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1,000 0 1,000

Feet

Notes:
CPO = University of Washington Capital Project Office
UWT = University of Washington Tacoma
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Data Sources: ESRI Data & Maps

Projection: NAD 1983 UTM Zone 10N

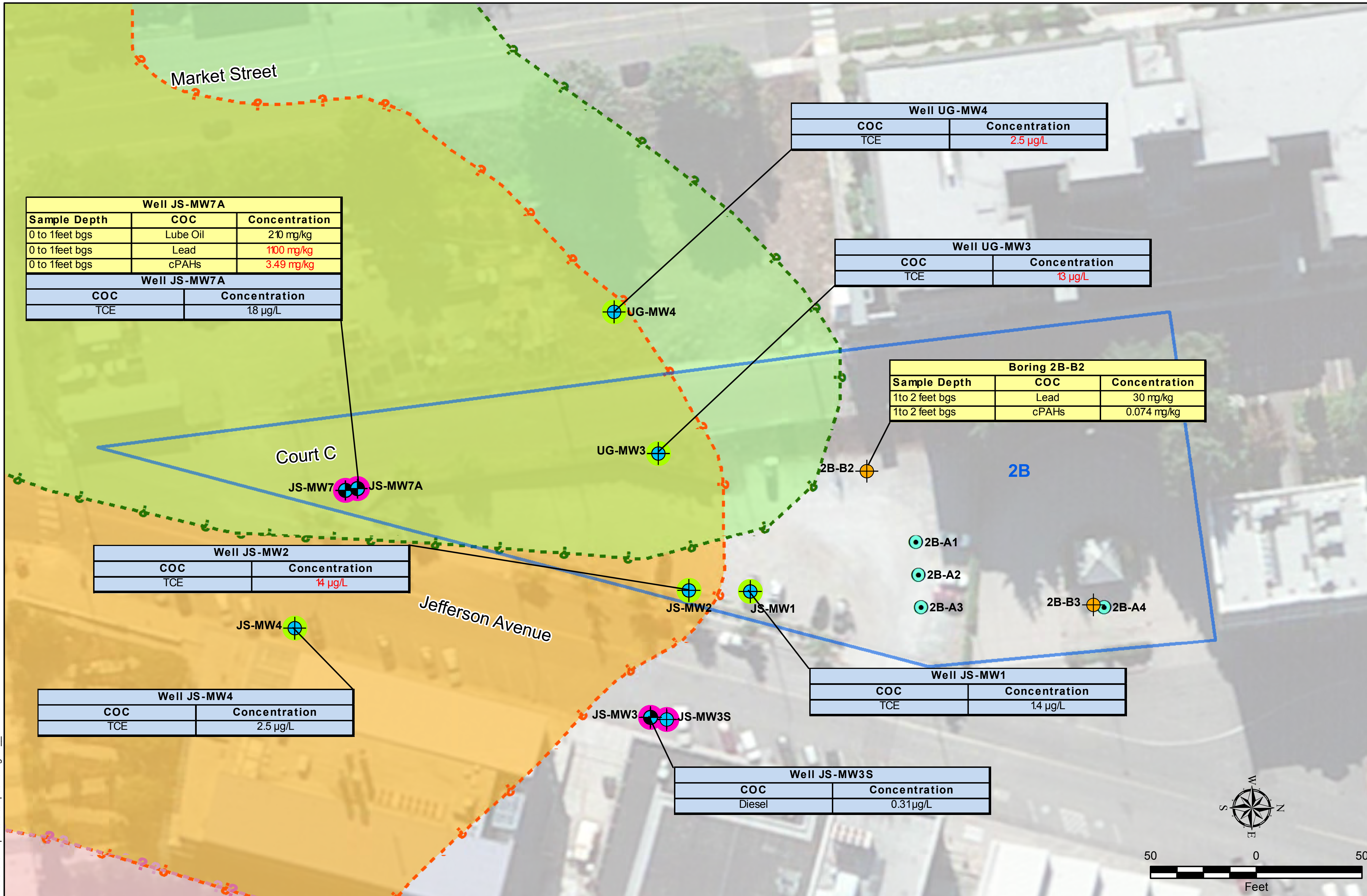
Vicinity Map

UWT Environmental Investigation
Priority Development Areas - CPO Project No. 204277
Tacoma, Washington

GeoEngineers

Figure 1

Office: TAC Path: \\tac\projects\0\0183085\GIS\Reports\SiteSpecific\Figure_2B_VM.mxd Map Revised: 19 December 2014 cgonzales



Well JS-MW7A		
Sample Depth	COC	Concentration
0 to 1feet bgs	Lube Oil	210 mg/kg
0 to 1feet bgs	Lead	1100 mg/kg
0 to 1feet bgs	cPAHs	3.49 mg/kg

Well JS-MW7A	
COC	Concentration
TCE	18 µg/L

Well UG-MW4	
COC	Concentration
TCE	2.5 µg/L

Well UG-MW3	
COC	Concentration
TCE	13 µg/L

Boring 2B-B2		
Sample Depth	COC	Concentration
1to 2 feet bgs	Lead	30 mg/kg
1to 2 feet bgs	cPAHs	0.074 mg/kg

Well JS-MW2	
COC	Concentration
TCE	14 µg/L

Well JS-MW4	
COC	Concentration
TCE	2.5 µg/L

Well JS-MW1	
COC	Concentration
TCE	14 µg/L

Well JS-MW3S	
COC	Concentration
Diesel	0.31µg/L

Soil Results*

Boring 2A-B7		
Sample Depth	COC	Concentration
2.5 to 3.5 feet bgs	Lead	200 mg/kg
2.5 to 3.5 feet bgs	cPAHs	0.64 mg/kg

Groundwater Results*

Well UG-MW13	
COC	Concentration
TCE	110 µg/L
PCE	1.4 µg/L

*Chemicals shown in red were detected at concentrations greater than the respective MTCA Method A cleanup levels.

Only analytical results of the chemicals of concern are shown if detected. Other chemicals that were analyzed and detected are not shown unless detected at concentrations greater than the respective MTCA cleanup levels.

Legend

Approximate Location of Priority Development Area 2B

Approximate Subsurface Location and Identification

Existing Monitoring Well

Direct Push Boring

Sonic Core Boring - Permanent New Monitoring Well

Magnetic Anomaly Where Test Pit Was Not Completed (Potential Utility or UST)

Lithology of Well Screen Interval

Ice-Contact Deposit (Shallow Aquifer)

Advance Outwash (Deep Aquifer)

Approximate Lateral Extent of TCE-Contaminated Groundwater Plume in Shallow Aquifer

Approximate Lateral Extent of TCE-Contaminated Groundwater Plume in Deep Aquifer

Approximate Lateral Extent of TCE-Contaminated Groundwater Plume in Not Determined Aquifer

Approximate Lateral Extent of TCE-Contaminated Groundwater Plume in Shallow and Deep Aquifers

Notes:
UWT = University of Washington Tacoma
cPAHs concentrations shown as TTEC.
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

COC = Chemical of Concern
PDA = Priority Development Area
PCE = tetrachloroethene
TCE = trichloroethene
cPAH = Carcinogenic Polycyclic Aromatic Hydrocarbons
mg/kg = milligram per kilogram
µg/L = microgram per Liter
bgs = Below Ground Surface
TTEC = Total Toxicity Equivalency Concentration
DCE = dichloroethene
MCTA = Model Toxics Control Act
ULU = Unrestricted Land Use

Soil MTCA Cleanup/Criteria Levels:
PCE = 0.05 mg/kg (Method A ULU)
TCE = 0.03 mg/kg (Method A ULU)
Benzene = 0.03 mg/kg (Method A ULU)
Vinyl Chloride = 0.67 mg/kg (Method B)
Lube Oil-Range Petroleum Hydrocarbons = 2,000 mg/kg (Method A ULU)
Diesel-Range Petroleum Hydrocarbons = 2,000 mg/kg (Method A ULU)
Gasoline-Range Petroleum Hydrocarbons = 100 mg/kg (Method A ULU)
cPAHs (TTEC) = 0.1 mg/kg (Method A ULU)
Lead = 250 mg/kg (Method A ULU)
Arsenic = 20 mg/kg (Method A ULU)
Cadmium = 2 mg/kg (Method A ULU)
Mercury = 2 mg/kg (Method A ULU)

Groundwater MTCA Cleanup/Criteria Levels:
PCE = 5 µg/L (Method A); 24 µg/L (Indoor Air)
TCE = 5 µg/L (Method A); 1.5 µg/L (Indoor Air)
cis-1,2-DCE= 16 µg/L (Method B); 160 µg/L (Indoor Air)
trans-1,2-DCE = 160 µg/L (Method B); 110 µg/L (Indoor Air)
1,1-DCA = 7.7 µg/L (Method B);11 µg/L (Indoor Air)
Vinyl Chloride = 0.2 µg/L (Method A); 0.35 µg/L (Indoor Air)
Benzene = 5 µg/L (Method A); 2.4 µg/L (Indoor Air)
Lube Oil-Range Petroleum Hydrocarbons = 0.5 mg/L (Method A)
Arsenic = 5 µg/L (Method A)
cPAHs= 0.1 µg/L (Method A)

Site Plan – PDA 2B/Jefferson Street Parcel and Transit Turnaround

UWT Environmental Investigation
Priority Development Areas - CPO Project No. 204277
Tacoma, Washington

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Figure 2

Path: \\tac\projects\0\0183085\GIS\Reports\SiteSpecific\Figure__2B.mxd

Office: TAC

APPENDIX A
Report Limitations and Guidelines for Use

APPENDIX A
REPORT LIMITATIONS AND GUIDELINES FOR USE[1]

This appendix provides information to help you manage your risks with respect to the use of this report.

Environmental Services are Performed for Specific Purposes, Persons and Projects

This report has been prepared for use by University of Washington. This report is not intended for use by others, and the information contained herein is not applicable to other sites.

GeoEngineers structures our services to meet the specific needs of our clients. For example, an environmental site assessment study conducted for a property owner may not fulfill the needs of a prospective purchaser of the same property. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and project site. No one except University of Washington should rely on this environmental report without first conferring with GeoEngineers. This report should not be applied for any purpose or project except the one originally contemplated.

This Environmental Report is Based on a Unique Set of Project-Specific Factors

This report has been prepared for the Priority Development Areas (PDAs) Environmental Assessment Project at the UW – Tacoma (UWT) campus located in Tacoma, Washington. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, do not rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

If important changes are made after the date of this report, GeoEngineers should be given the opportunity to review our interpretations and recommendations and provide written modifications or confirmation, as appropriate.

Reliance Conditions for Third Parties

If a lending agency or other parties intend to place legal reliance on the product of our services, we require that those parties indicate in writing their acknowledgement that the scope of services provided, and the general conditions under which the services were rendered including the limitation of professional liability, are understood and accepted by them. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions.

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[1] Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

Environmental Regulations are Always Evolving

Some substances may be present in the site vicinity in quantities or under conditions that may have led, or may lead, to contamination of the subject site, but are not included in current local, state or federal regulatory definitions of hazardous substances or do not otherwise present current potential liability. GeoEngineers cannot be responsible if the standards for appropriate inquiry, or regulatory definitions of hazardous substance, change or if more stringent environmental standards are developed in the future.

Subsurface Conditions can Change

This environmental report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by manmade events such as construction on or adjacent to the site, by new releases of hazardous substances, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Always contact GeoEngineers before applying this report to determine if it is still applicable.

Topsoil

For the purposes of this report, we consider topsoil to consist of generally fine-grained soil with an appreciable amount of organic matter based on visual examination, and to be unsuitable for direct support of the proposed improvements. However, the organic content and other mineralogical and gradational characteristics used to evaluate the suitability of soil for use in landscaping and agricultural purposes was not determined, nor considered in our analyses. Therefore, the information and recommendations in this report, and our logs and descriptions should not be used as a basis for estimating the volume of topsoil available for such purposes.

Most Environmental Findings are Professional Opinions

Our interpretations of subsurface conditions are based on field observations and chemical analytical data from widely spaced sampling locations at the site. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ – sometimes significantly – from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

Do Not Redraw the Exploration Logs

Environmental scientists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in an environmental report should never be redrawn for inclusion in other design drawings. Only photographic or electronic reproduction is acceptable, but recognize that separating logs from the report can elevate risk.

Read These Provisions Closely

Some clients, design professionals and contractors may not recognize that the geoscience practices (geotechnical engineering, geology and environmental science) are far less exact than other engineering and natural science disciplines. This lack of understanding can create unrealistic expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory “limitations”

provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you are unclear how these "Report Limitations and Guidelines for Use" apply to your project or site.

Geotechnical, Geologic and Geoenvironmental Reports Should Not Be Interchanged

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually relate any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding a specific project.

Biological Pollutants

GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention, or assessment of the presence of Biological Pollutants in or around any structure. Accordingly, this report includes no interpretations, recommendations, findings, or conclusions for the purpose of detecting, preventing, assessing, or abating Biological Pollutants. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts.

PDA 2C – Pinkerton Parking

Priority Development Area 2C
North of Pinkerton
Environmental Subsurface Investigation

Environmental Subsurface Investigation Project
UW Capital Project Office Project No. 204277
1702 Broadway
Tacoma, Washington

for
University of Washington

December 19, 2014

GeoEngineers

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Priority Development Area 2C
North of Pinkerton
Environmental Subsurface Investigation
UW Capital Project Office
Project No. 204277
1702 Broadway
Tacoma, Washington

File No. 0183-085-00

December 19, 2014

Prepared for:

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GEOENGINEERS

Table of Contents

1.0 INTRODUCTION 1
2.0 SITE HISTORICAL USE 1
3.0 CURRENT SITE FEATURES 1
4.0 ENVIRONMENTAL SUBSURFACE EXPLORATIONS 2
4.1. Historic Research and Magnetic Anomaly Findings 2
4.2. Soil Borings 2
5.0 SOIL AND GROUNDWATER CONDITIONS 2
5.1. Soil Conditions 2
5.2. Groundwater Conditions 2
6.0 CHEMICAL ANALYTICAL PROGRAM 3
6.1. General 3
6.2. Criteria for Characterization of Soil and Groundwater 3
6.3. Soil 4
6.3.1. Petroleum Hydrocarbons 5
6.3.2. VOCs 5
6.3.3. PAHs 5
6.3.4. RCRA Metals 5
7.0 CONCLUSIONS 5
7.1. Soil 6
7.2. Groundwater 6
8.0 PROPOSED DEVELOPMENT PLANS 6
9.0 POTENTIAL IMPACTS AND MITIGATION MEASURES TO DESIGN AND CONSTRUCTION 6
9.1. Potential UST 6
9.2. TCE-Contaminated Groundwater 7
9.3. Soil is Contaminated with Chemicals of Concern 7
10.0 LIMITATIONS 8
11.0 REFERENCES 8

LIST OF TABLES

Table 1. Summary of Chemical Analytical Results - Soil

LIST OF FIGURES

Figure 1. Vicinity Map
Figure 2. Site Plan – Area 2C/North of Pinkerton

APPENDICES

Appendix A. Report Limitations and Guidelines for Use

1.0 INTRODUCTION

This report presents the results of our environmental subsurface investigation completed for the University of Washington (UW) at the Pinkerton parking area (Priority Development Area [PDA] 2C) located on the UW Tacoma (UWT) campus at 1702 Broadway in Tacoma, Washington. The Pinkerton parking area is herein referred to as the "site." The site was identified as Area 2C for this project. The site is bound by Court C to the west, South 17th Street to the north, Broadway Street to the east and the Pinkerton building the south. A Vicinity Map of the site is included as Figure 1. See Figure 2 for the layout of the site.

The subsurface investigation was completed under the UWT Environmental Subsurface Investigation Project, UW project number 204277. This report was completed at a subset of the larger subsurface investigation report titled "2013 Environmental Subsurface Investigation – University of Washington-Tacoma, Tacoma, Washington" dated December 19, 2014 to assist with development of the property. This report should be used in context with the larger subsurface investigation report. Borings logs, subsurface investigation methodologies and chemical analytical data packages are included in the larger investigation report referenced above.

General impacts and potential mitigation measures are provided in this report that may be employed in design and construction. It is important to recognize that additional environmental investigations may be necessary prior to selection of the final mitigation measure. Mitigation measures and associated costs provided in this report will likely need refinement based on the results of the additional environmental investigations. The project team should contact UW Environmental Health & Safety (UW EH&S) to discuss the need for additional environmental investigations at this site. UW EH&S is the liaison with the Washington State Department of Ecology (Ecology) for review and approval of mitigation measures.

2.0 SITE HISTORICAL USE

A residence was present on the site in at least 1885. The residence was demolished and the Massasoit Hotel was constructed by 1888. A private auto garage was erected on the southwestern portion of the site by at least 1923. The Massasoit Hotel was damaged during a fire and was later demolished prior to 1950. The site appeared to be undeveloped and sloped in the 1950 aerial photograph. The site was developed into a parking lot by 1973.

3.0 CURRENT SITE FEATURES

The site is presently used as a parking lot for the Pinkerton Building and UWT campus. The site is relatively flat with a similar elevation to Broadway on the eastern and central portions of the site. The grade slopes up to the elevation of Court C on the western portion of site.

4.0 ENVIRONMENTAL SUBSURFACE EXPLORATIONS

Environmental subsurface investigation activities consisted of a magnetic/ground penetrating radar (M/GPR) survey and direct-push soil borings. The investigation activities were completed at the site in June 2013.

4.1. Historic Research and Magnetic Anomaly Findings

Historic research results indicate the potential for underground storage tanks (USTs) to be present at the site given the age of the former buildings and the source of heat typically used during these time periods. In addition, heating conversion permits were listed in the permit records. An M/GPR survey was performed at the site in June 2013.

The magnetic anomalies were designated using the following identification nomenclature: 2C-A1 where 2C identifies the PDA and –A1 is the number of the anomaly at the site. One magnetic anomaly was identified at the southeast corner of the site. The magnetic anomaly identified at PDA 2C may be due to a potential UST. Test pit exploration was not completed in the area because the magnetic anomaly is located within an existing sidewalk.

4.2. Soil Borings

Two direct-push borings (2C-B1 and 2C-B2) were completed at the site on June 18, 2013. Boring 2C-B1 was completed in the paved parking area at the northeast corner of the site. 2C-B2 was completed on the hill slope at the southwest corner of the site. The direct-push borings ranged in depth between 10 and 15 feet below ground surface (bgs) when practical refusal was encountered.

5.0 SOIL AND GROUNDWATER CONDITIONS

5.1. Soil Conditions

Subsurface conditions observed consist of fill and ice-contact deposits. The fill consisted of silt and sand (silt with sand and/or sand with silt) to gravel with silt at depths ranging from the ground surface to 7 feet bgs.

Native soil conditions observed underlying the fill consisted of glacially consolidated ice-contact deposits in both explorations. The ice-contact deposits were comprised of gravel with silt and sand to silt with sand and occasional gravel.

5.2. Groundwater Conditions

Monitoring wells were not installed or sampled at the site as part of this investigation. Other investigations completed on the UWT campus identified a shallow aquifer (ice-contact deposits) and an underlying deep aquifer (advance outwash). The shallow and deep aquifers appeared to be separated by a silt layer located between the ice-contact deposits and advance outwash.

Groundwater within the shallow aquifer appeared to be present within the sand and gravel seams. The hydraulic connection of the sand seams within the ice-contact deposit unit is unknown.

Groundwater within the deep aquifer appeared to be continuous with interbeds of moist to wet silt. The groundwater in the advance outwash appears to be under a confined condition.

Groundwater was encountered at a depth of approximately 14 feet bgs in soil boring 2C-B2 during the subsurface exploration activities at the site.

6.0 CHEMICAL ANALYTICAL PROGRAM

6.1. General

Soil and groundwater samples were submitted to OnSite Environmental, Inc., in Redmond, Washington for chemical analysis. The chemical analytical data are summarized in Table 1. Chemicals that were not detected at or greater than the laboratory reporting limits in the analyzed samples are typically not included in the tables.

6.2. Criteria for Characterization of Soil and Groundwater

The following criteria were used to evaluate impacted and contaminated soil and groundwater for disposal purposes.

- Contaminated Soil
  - Petroleum hydrocarbons, carcinogenic polycyclic aromatic hydrocarbons (cPAHs), metals and volatile organic compounds (VOCs) detected at concentrations greater than the Model Toxics Control Act (MTCA) Method A Unrestricted Land Use (ULU) cleanup level or MTCA B screening level.
- Impacted Soil

  Some contaminants were detected at concentrations less than the respective MTCA cleanup levels. UWT may be able to reuse certain types of soil depending on the sampling results. UW EH&S must review the chemical analytical data to evaluate if reuse or disposal at an off site facility is necessary. Soil reuse and disposal are subject to Ecology Guidance for Remediation of Petroleum Contaminated Sites (Ecology, 2011), solid waste regulations and disposal facility permit conditions. The criteria below is herein referred to as "Reuse Criteria."

  - Petroleum hydrocarbons, cPAHs and/or Lead

    The Ecology guidance indicates that soil with diesel- and/or lube oil-range petroleum hydrocarbons detected at concentrations less than 200 milligrams per kilogram (mg/kg) and/or gasoline-range petroleum hydrocarbons detected at concentrations less than 30 mg/kg are suitable for reuse as commercial fill at UWT campus with the following limitations:

    - placed above the highest water table,
    - not within 100 feet of a drinking water well,
    - not within wellhead protection area of public water supply,
    - not within wetlands or where surface water contact is possible, and

    - not within a surface water infiltration facility or septic drain field.

  If the concentrations exceed the above limits but are still less than respective MTCA cleanup levels the soil may be reused in road and bridge embankment construction, landfill daily cover or asphalt manufacturing with UW EH&S approval.

  - Arsenic, Cadmium, and/or Mercury

    Soil with concentrations of arsenic, cadmium and/or mercury above what is normally found in the natural background environment (Puget Sound Background levels - Ecology, 1994) is typically suitable for disposal at an inert waste landfill or a Department of Natural Resources (DNR) reclamation pit. UW EH&S approval is necessary.

    Soil at and near the UWT campus has been well documented to contain chromium at concentrations slightly above the natural background level and is not considered in the "Reuse Criteria."

- Contaminated Groundwater

  - Petroleum hydrocarbons, PAHs and metals detected at concentrations greater than the respective MTCA Method A groundwater cleanup levels. Method B criteria were used for comparison of specific compounds if Method A groundwater cleanup levels are not established for those compounds.

  - VOCs detected at concentrations greater than the respective MTCA Method A groundwater cleanup levels, and MTCA Method B groundwater screening levels protective of indoor air. The updated TCE/PCE screening levels were calculated using Equation 1 from Ecology's review draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action" dated October 2009 (Ecology, 2009) and Environmental Protection Agency's (EPA's) TCE and PCE toxicity factors updated in 2011 and available on EPA's online Integrated Risk Information System (IRIS). The other values were obtained from Ecology's review draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action."

6.3. Soil

Five soil samples collected from soil borings were submitted for chemical analysis. The soil samples collected from the subsurface explorations were identified using the following identification system: A#-B#-start depth-end depth, where A# is the area designation number, B# is the boring and start depth-end depth is the depth interval in feet below the ground of specific sample (e.g., 2C-B1-8-9 was collected in Area 2A from boring B1 from 8 to 9 feet bgs).

Soil samples were submitted for chemical analysis based on the following criteria:

- Where field screening indicated the soil is impacted.
- Directly below potentially impacted soil to delineate the vertical extent.
- Where wet sand seams were encountered within the glacial drift.

- At the soil/groundwater interface if groundwater was encountered.

The soil samples were submitted for chemical analysis of petroleum hydrocarbon identification by Ecology-approved method NWPTH-HCID (with appropriate follow-up analysis of diesel-range total petroleum hydrocarbons by Ecology-approved method NWPTH-Dx), VOCs by Environmental Protection Agency (EPA) method 8260C, polycyclic aromatic hydrocarbons (PAHs) by EPA method 8270DSIM, and Resource Conservation and Recovery Act (RCRA) metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver) by EPA method 6000/7000 series.

6.3.1. Petroleum Hydrocarbons

Gasoline-, diesel-, lube oil-range petroleum hydrocarbons were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup level or the Reuse Criteria.

6.3.2. VOCs

VOCs were not detected in the analyzed soil samples.

6.3.3. PAHs

CPAHs were detected at a concentration (total toxicity equivalent concentration [TTEC]) greater than the MTCA Method A ULU cleanup level (0.1 milligrams per kilogram [mg/kg]) in soil sample 2C-B2-1-2 (1.4 mg/kg). CPAHs were not detected in the remaining analyzed soil samples.

PAHs were not detected at concentrations greater than the Reuse Criteria in the remaining analyzed soil samples.

6.3.4. RCRA Metals

LEAD

Lead was detected at a concentration greater than the MTCA Method A ULU cleanup level (250 mg/kg) in soil sample 2C-B2-1-2 (730 mg/kg). Lead was not detected in the remaining analyzed soil samples.

MERCURY

Mercury was detected at a concentration greater than the Reuse Criteria (0.07 mg/kg), but less than the MTCA Method A ULU cleanup level (2 mg/kg) in soil sample 2F-B2-0-0.5 (0.41 mg/kg). Mercury was not detected in the remaining analyzed soil samples.

Other RCRA metals were either not detected or were detected at concentrations less than the respective MTCA Method A cleanup levels, Method B criteria or Reuse Criteria in the analyzed soil samples.

7.0 CONCLUSIONS

Soil and groundwater samples were collected for chemical analysis to evaluate potential impacts to future development.

7.1. Soil

Soil is contaminated with cPAHs and lead and impacted with mercury from the ground surface to 2 feet bgs in the area of boring 2C-B2.

7.2. Groundwater

Groundwater was not sampled within PDA 2C as part of this investigation. Additionally, TCE-contaminated soil was not encountered on the site. However, TCE-contaminated groundwater is present within the shallow aquifer approximately 250 feet upgradient (Y Student Center) of the site and may have potentially impacted the shallow groundwater beneath the site. For purposes of the evaluation of impacts and mitigation measures, we have assumed TCE-contaminated groundwater is not present within PDA 2C. If TCE-contaminated groundwater is discovered in PDA 2C, the impacts and associated mitigation measures should be evaluated.

8.0 PROPOSED DEVELOPMENT PLANS

We understand UW plans to construct a building at the site with a footprint of 8,400 square feet and a finished grade at a similar elevation as Broadway Street (86 feet above mean sea level [AMSL]). Subgrade is anticipated to be 1 foot below finish grade. The footings will extend approximately 5 feet deeper to Elevation 81 feet AMSL. The estimated amount of soil to be generated based on the above assumptions is approximately 5,000 tons to excavate PDA 2C to subgrade (Elevation 85 feet). An additional 2,000 tons is estimated to be generated from the footings.

9.0 POTENTIAL IMPACTS AND MITIGATION MEASURES TO DESIGN AND CONSTRUCTION

We recommend UW develop and implement appropriate administrative institutional controls to limit or prohibit activities that may result in exposure to hazardous substances remaining at the site. Potential impacts to the design and construction of the site are the following:

- One potential UST is present on the site.
- Potentially TCE-contaminated groundwater.
- Soil is contaminated (metals and cPAHs) and impacted with chemicals of concern (metals and petroleum hydrocarbons).

The following sections described potential impacts, mitigation measures and estimated costs for design and construction.

9.1. Potential UST

One magnetic anomaly was identified but was not investigated because the anomaly was located beneath the existing sidewalk. A heating oil UST may be present in the area of the anomaly. The estimated cost to remove a heating oil UST is $10,000 to $20,000.

9.2. TCE-Contaminated Groundwater

Groundwater was not sampled at the site as part of this investigation. TCE-contaminated groundwater within the shallow aquifer is present approximately 250 feet upgradient of the site. For purposes of this evaluation, we have assumed TCE-contaminated groundwater is not present on area PDA 2C. If TCE-contaminated groundwater is discovered in PDA 2C, the impacts and associated mitigation measures should be evaluated.

Additional Investigation. Further subsurface investigation may be necessary to evaluate if TCE-contaminated groundwater is present on PDA 2C. The estimated cost for additional investigation is $30,000 to $50,000.

Underslab/Footing Drainage. An underslab footing drain will likely be required based on the elevation of the groundwater observed during drilling (Elevation 90 feet). The estimated cost is not included in this estimate because the underslab drainage will be related to the building design, not management of TCE-contaminated water.

9.3. Soil is Contaminated with Chemicals of Concern

Contaminated soil (metal and cPAH) and impacted soil (metals) will likely be generated during construction activities. We recommend UW implement the following actions.

- Characterize Soil and Groundwater for Disposal. In-situ characterization or stockpiling and subsequent sampling will need to be performed on soil that is generated during construction in areas of metals/cPAHs-contaminated and metals/cPAHs-impacted soil. The estimated cost to perform the soil sampling to evaluate soil disposal options is $15,000 to $25,000 based on the estimated mass of soil to be excavated.
- Lead and cPAHs-Contaminated Soil. Lead- and cPAHs-contaminated soil will be disposed at a UW-approved RCRA permitted Subtitle D landfill. The contaminated soil shall be removed as necessary for construction and Ecology requirements. Typically, cPAHs- and metals-contaminated soil left in place shall be capped with a building or hardscape as required by Ecology. The estimated cost for transportation and disposal of contaminated soil at a RCRA-subtitle D facility is $60 to $80 per ton. We estimate the mass of the lead- and cPAHs-contaminated soil to be approximately 1,000 tons assuming the soil is 4 feet thick in the western portion of the site. The estimated cost for transportation and disposal is $60,000 to $80,000.
- Metals- and cPAHs-Impacted Soil. Metals- and cPAHs-impacted soil is present on the western portion of the site between 4 and 14 feet bgs. Metals- and cPAH-impacted soil is typically suitable for disposal at a UW-approved permitted inert waste landfill or reclamation pit. For budgeting purposes, we assumed the cost for transportation and disposal of cPAHs-, metals- and petroleum-impacted soil is $30 to $50 per ton. We estimate the mass of the metals- and cPAHs-impacted soil to be 2,000 tons. This mass does not include the area of metals and cPAHs-contaminated soil. The estimated cost for transportation and disposal is $60,000 to $100,000. If soil is reused on the site or UWT campus as fill, the cost would be reduced because off site disposal of the impacted soil would not be required.
- Health and Safety. Workers who may be in contact with potentially contaminated soil or groundwater at a state-listed cleanup site have HAZWOPER training. The requirement is

consistent with the Washington Administrative Code (WAC) 296-843-100, *Hazardous Waste Operations*, which indicates that on-site personnel are required to have current health and safety training in accordance with Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response requirements in 29 CFR 1910.120. The rule also requires the earthwork contractor and other personnel who could potentially contact contaminated materials to develop and implement a written safety and health program for their employees involved in hazardous waste operations under 29 CFR 1910.120. The estimated cost for the contractor to be HAZWOPER trained and have appropriate liability insurance and is roughly between $10,000 and $70,000 depending on the number of subcontractors that require training, and the contractor markup factor.

10.0 LIMITATIONS

This report has been prepared for use by the University of Washington for the Priority Development Area 2C located in Tacoma, Washington at the University of Washington Tacoma campus.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

Please refer to Appendix A titled "Report Limitations and Guidelines for Use" for additional information pertaining to use of this report.

11.0 REFERENCES

Ecology, 2009. Washington State Department of Ecology. Draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action" dated October 2009.

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United States Environmental Protection Agency. TCE Toxicity Factors updated 2011 available online Integrated Risk Information System (IRIS). http://www.epa.gov/iris/subst/0199.htm

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Table 1

Summary of Chemical Analytical Results[1] - Soil

PDA 2C - Pinkerton Parking

University of Washington Tacoma Priority Development Areas

Tacoma, Washington

Boring/Test Pit	2C-B1		2C-B2			MTCA Method A ULU Cleanup Level	Reuse Criteria [11]
Sample Identification [2]	2C-B1-1-2	2C-B1-8-9	2C-B2-1-2	2C-B2-7-8	2C-B2-13-14		
Sample Depth (feet bgs)	1 to 2	8 to 9	1 to 2	7 to 8	13 to 14		
Soil Type	Fill	Qvi	Fill	Fill	Qvi		
NWTPH-HCID [3] (mg/kg)							
Gasoline-Range	22 U	22 U	22 U	24 U	23 U	30/100[9]	30
Diesel-Range	55 U	54 U	56 U	61 U	58 U	2,000	200
Lube Oil-Range	110 U	110 U	**DET**	120 U	120 U	2,000	200
NWTPH-Dx [4] (mg/kg)							
Diesel-Range Petroleum Hydrocarbons	--	--	28 U	--	--	2,000	200
Lube Oil-Range Petroleum Hydrocarbons	--	--	**190**	--	--	2,000	200
VOCs [5] (mg/kg)							
Tetrachloroethene (PCE)	0.0018 U	0.00086 U	0.0011 U	0.00086 U	0.00080 U	0.05	DET
Trichloroethene (TCE)	0.0018 U	0.00086 U	0.0011 U	0.00086 U	0.00080 U	0.03	DET
(cis) 1,2-Dichloroethene	0.0018 U	0.00086 U	0.0011 U	0.00086 U	0.00080 U	160[9]	DET
(trans) 1,2-Dichloroethene	0.0018 U	0.00086 U	0.0011 U	0.00086 U	0.00080 U	1,600[9]	DET
Vinyl Chloride	0.0018 U	0.00086 U	0.0011 U	0.00086 U	0.00080 U	0.67[9]	DET
PAHs [6] (mg/kg)							
1-Methylnaphthalene	0.0074 U	0.0072 U	**0.057**	0.0081 U	0.0077 U	35[9]	NE
2-Methylnaphthalene	0.0074 U	0.0072 U	**0.072**	0.0081 U	0.0077 U	320[9]	NE
Acenaphthene	0.0074 U	0.0072 U	**0.12**	0.0081 U	0.0077 U	4,800[9]	NE
Acenaphthylene	0.0074 U	0.0072 U	**0.066**	0.0081 U	0.0077 U	NE	NE
Anthracene	0.0074 U	0.0072 U	**0.22**	0.0081 U	0.0077 U	24,000[9]	NE
Benzo[g,h,i]perylene	0.0074 U	0.0072 U	**0.72**	0.0081 U	0.0077 U	NE	NE
Fluoranthene	0.0074 U	0.0072 U	**1.8**	0.0081 U	0.0077 U	3,200[9]	NE
Fluorene	0.0074 U	0.0072 U	**0.087**	0.0081 U	0.0077 U	3,200[9]	NE
Naphthalene	0.0074 U	0.0072 U	**0.079**	0.0081 U	0.0077 U	5	5.00
Phenanthrene	0.0074 U	0.0072 U	**1.2**	0.0081 U	0.0077 U	NE	NE
Pyrene	0.0074 U	0.0072 U	**2.1**	0.0081 U	0.0077 U	2,400[9]	NE
cPAHs [6] (mg/kg)							
Benzo (a) anthracene (TEF 0.1)	0.0074 U	0.0072 U	**0.87**	0.0081 U	0.0077 U	MTCA ULU cleanup level for the sum of all cPAHs is 0.1 mg/kg	Reuse Criteria for the sum of all cPAHs is 0.1 mg/kg
Benzo (a) pyrene (TEF 1)	0.0074 U	0.0072 U	**1.1**	0.0081 U	0.0077 U		
Benzo (b) fluoranthene (TEF 0.1)	0.0074 U	0.0072 U	**1.1**	0.0081 U	0.0077 U		
Benzo (J,k) fluoranthene (TEF 0.1)	0.0074 U	0.0072 U	**0.36**	0.0081 U	0.0077 U		
Chrysene (TEF 0.01)	0.0074 U	0.0072 U	**1.0**	0.0081 U	0.0077 U		
Dibenz (a,h) anthracene (TEF 0.1)	0.0074 U	0.0072 U	**0.18**	0.0081 U	0.0077 U		
Indeno (1,2,3-cd) pyrene (TEF 0.1)	0.0074 U	0.0072 U	**0.61**	0.0081 U	0.0077 U		
Total TTEC of cPAHs (detect only)	N/A	N/A	**1.4**	N/A	N/A	0.1	0.1
Metals [7] (mg/kg)							
Arsenic	11 U	11 U	11 U	12 U	12 U	20	7
Barium	**78**	**55**	**440**	**100**	**51**	16,000[9]	NE
Cadmium	0.55 U	0.54 U	0.56 U	0.61 U	0.58 U	2.0	1
Chromium	**41**	**35**	**54**	**55**	**45**	2,000[10]	48[12]
Lead	5.5 U	5.4 U	**730**	6.1 U	5.8 U	250	50
Mercury	0.28 U	0.27 U	**0.41**	0.30 U	0.29 U	2.0	0.07 or DET
Selenium	11 U	11 U	11 U	12 U	12 U	400[9]	NE
Silver	1.1 U	1.1 U	1.1 U	1.2 U	1.2 U	400[9]	NE

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc., of Redmond, Washington.

[2] Sample ID = Area number - boring/test pit number - starting depth of sample [feet bgs] -end depth [feet bgs], Area 2C Boring 1 collected 1-2 feet bgs = 2C-B1-1-2.

[3] Washington State Department of Ecology (Ecology)-approved method NWTPH-HCID.

[4] Ecology-approved method NWTPH-Dx.

[5] VOCs were analyzed by EPA method 8260B. Other VOCs were analyzed but not detected.

[6] Polycyclic aromatic hydrocarbons (PAHs) and carcinogenic PAHs (cPAHs) were analyzed by U.S. Environmental Protection Agency (EPA) method 8270D/SIM. Other PAHs were analyzed but not detected.

[7] Resource Conservation Recovery Act (RCRA) metals analyzed by EPA 6000/7000 series method.

[8] MTCA Method A cleanup level for gasoline is 30 mg/kg if benzene is detected or if the sum of toluene, ethylbenzene and xylenes are equal to or greater than 1% of the total gasoline detection.

[9] MTCA Method B criteria represented because MTCA Method A cleanup level has not been established.

[10] MTCA Method A cleanup level for Trivalent Chromium.

[11] Guidance for Remediation of Petroleum Contaminated Sites (Publication 10-09-057) Ecology, October 2011; Summary Natural Background Soil Metals Concentrations in Washington State (Publication 94-115) dated October 1994; and Hazardous Waste Regulations 40 CFR Part 260.

[12] Chromium was not compared to the Reuse Criteria listed above for soils based on historic soil analytical results indicating chromium is not a prevalent chemical of concern on the UWT campus.

mg/kg = milligram per kilogram

DET = Detected at concentrations greater than laboratory reporting limit

N/A = not applicable

MTCA = Model Toxics Control Act

-- = sample not analyzed

Qvi = Ice-contact deposit

U = Analyte was not detected at or greater than the listed reporting limit

bgs = below ground surface

TEF = Toxicity Equivalency Factor as defined in WAC 173-340-900 Table 708-2

Total Toxic Equivalent Concentration (TTEC) is the sum of each individual cPAH concentration multiplied by its corresponding TEF.

Bold font type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Bold font type and gray shading indicates that the detected concentration is greater than the respective MTCA cleanup level.

Dashed outline indicates the value is greater than the Reuse Criteria.

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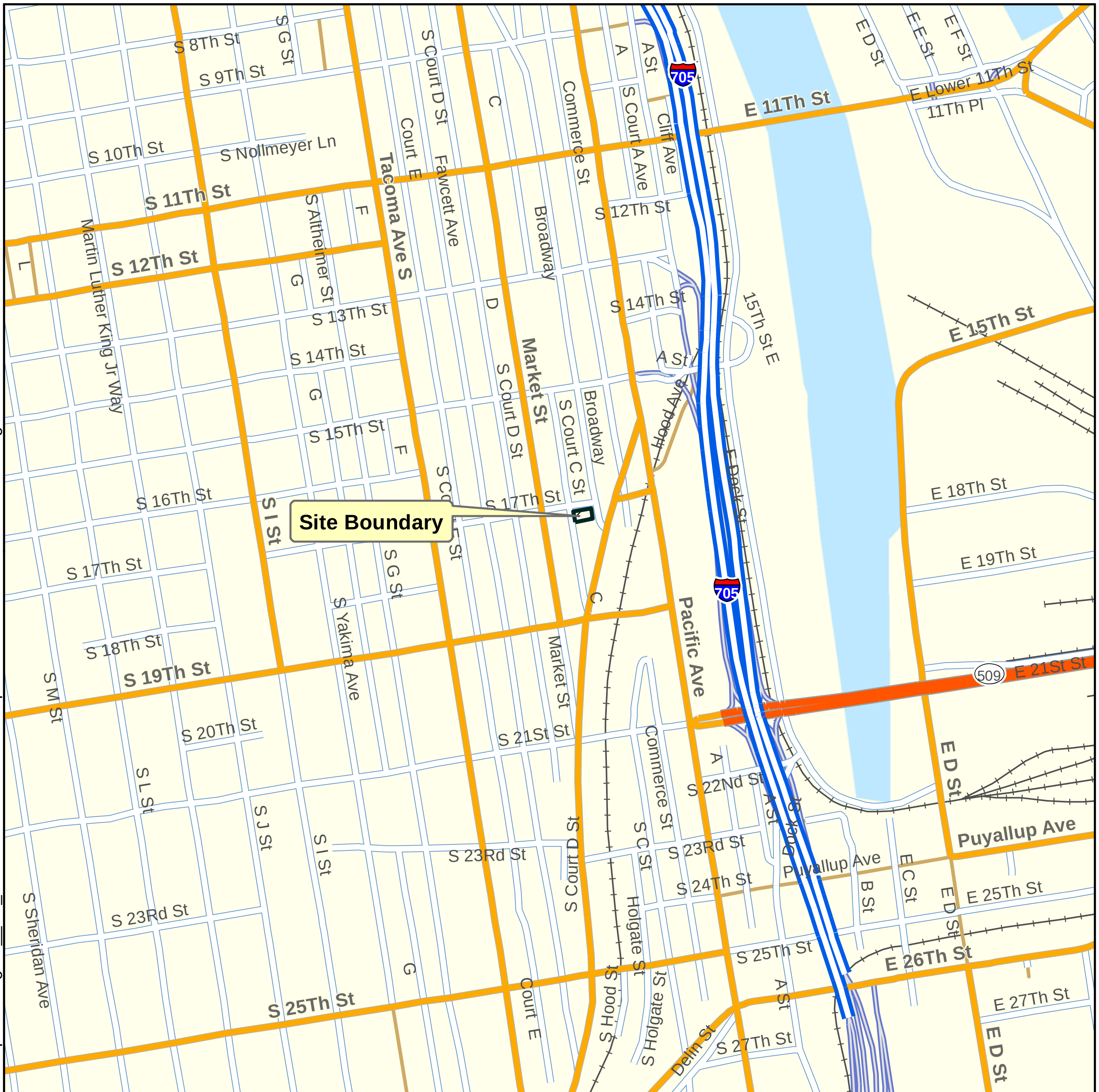

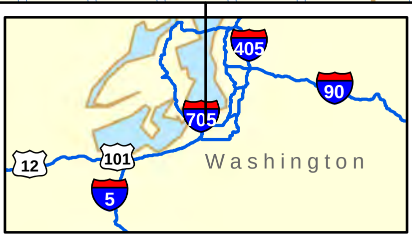

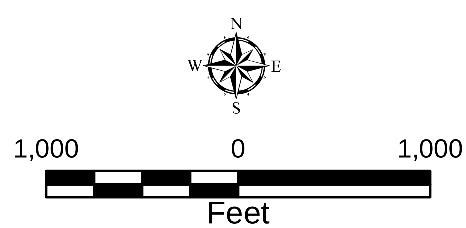

Notes:
CPO = University of Washington Capital Project Office
UWT = University of Washington Tacoma
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
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Data Sources: ESRI Data & Maps

Projection: NAD 1983 UTM Zone 10N

Vicinity Map

UWT Environmental Investigation
Priority Development Areas - CPO Project No. 204277
Tacoma, Washington

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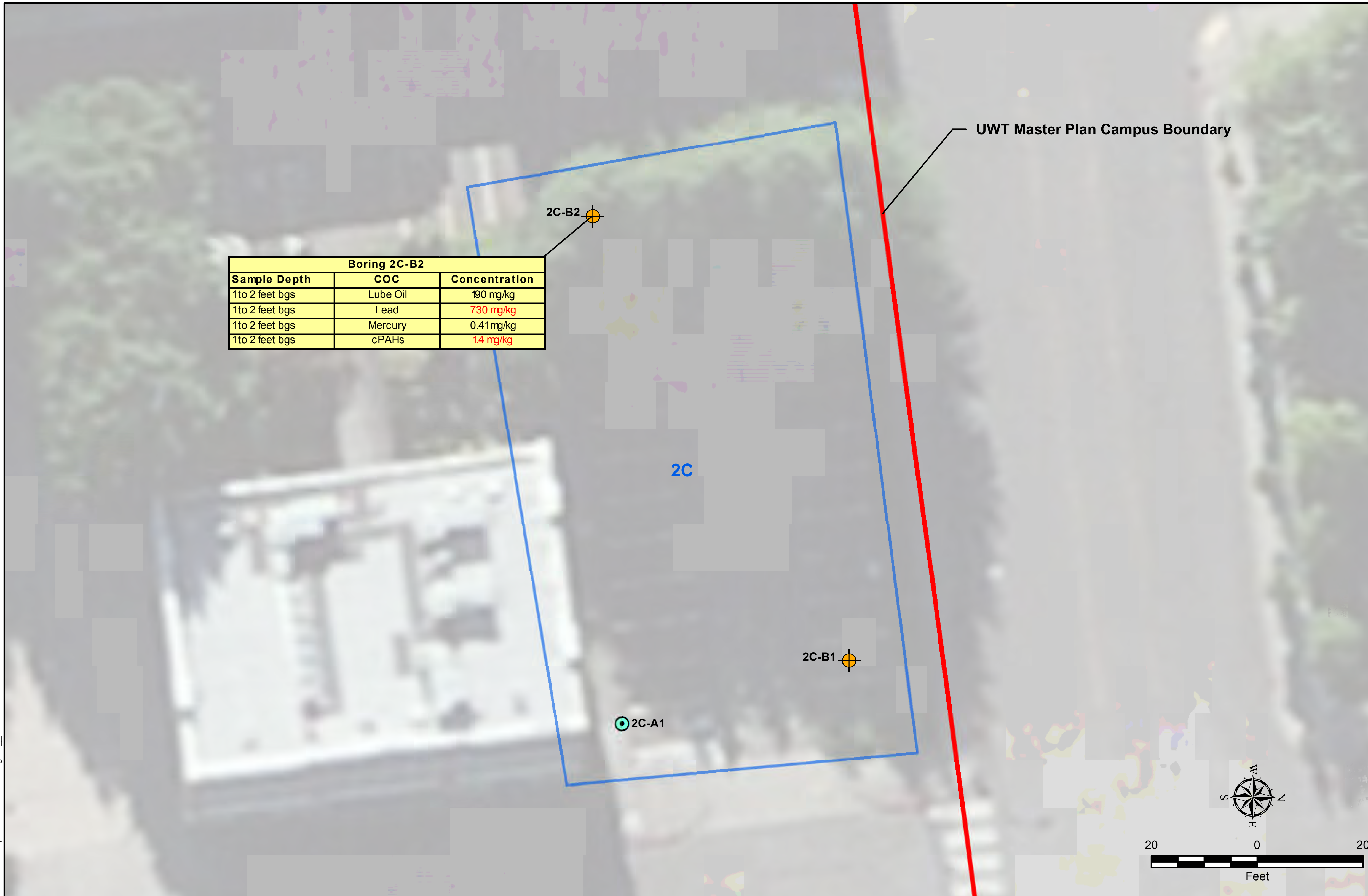
Figure 1



Boring 2C-B2		
Sample Depth	COC	Concentration
1to 2 feet bgs	Lube Oil	190 mg/kg
1to 2 feet bgs	Lead	730 mg/kg
1to 2 feet bgs	Mercury	0.41mg/kg
1to 2 feet bgs	cPAHs	14 mg/kg

Soil Results*

Boring 2A-B7		
Sample Depth	COC	Concentration
2.5 to 3.5 feet bgs	Lead	200 mg/kg
2.5 to 3.5 feet bgs	cPAHs	0.64 mg/kg

*Chemicals shown in red were detected at concentrations greater than the respective MTCA Method A cleanup levels.

Only analytical results of the chemicals of concern are shown if detected. Other chemicals that were analyzed and detected are not shown unless detected at concentrations greater than the respective MTCA cleanup levels.

Legend

Approximate Location of Priority Development Area 2C

Approximate Subsurface Location and Identification

Direct Push Boring

Magnetic Anomaly Where Test Pit Was Not Completed (Potential UST)

Notes:
UWT = University of Washington Tacoma
cPAHs concentrations shown as TTEC.
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

COC = Chemical of Concern
PDA = Priority Development Area
PCE = tetrachloroethene
TCE = trichloroethene
cPAH = Carcinogenic Polycyclic Aromatic Hydrocarbons
mg/kg = milligram per kilogram
µg/L = microgram per Liter
bgs = Below Ground Surface
TTEC = Total Toxicity Equivalency Concentration
DCE = dichloroethene
MCTA = Model Toxics Control Act
ULU = Unrestricted Land Use

Soil MTCA Cleanup/Criteria Levels:
PCE = 0.05 mg/kg (Method A ULU)
TCE = 0.03 mg/kg (Method A ULU)
Benzene = 0.03 mg/kg (Method A ULU)
Vinyl Chloride = 0.67 mg/kg (Method B)
Lube Oil-Range Petroleum Hydrocarbons = 2,000 mg/kg (Method A ULU)
Diesel-Range Petroleum Hydrocarbons = 2,000 mg/kg (Method A ULU)
Gasoline-Range Petroleum Hydrocarbons = 100 mg/kg (Method A ULU)
cPAHs (TTEC) = 0.1 mg/kg (Method A ULU)
Lead = 250 mg/kg (Method A ULU)
Arsenic = 20 mg/kg (Method A ULU)
Cadmium = 2 mg/kg (Method A ULU)
Mercury = 2 mg/kg (Method A ULU)

Groundwater MTCA Cleanup/Criteria Levels:
PCE = 5 µg/L (Method A); 24 µg/L (Indoor Air)
TCE = 5 µg/L (Method A); 1.5 µg/L (Indoor Air)
cis-1,2-DCE= 16 µg/L (Method B); 160 µg/L (Indoor Air)
trans-1,2-DCE = 160 µg/L (Method B); 110 µg/L (Indoor Air)
Vinyl Chloride = 0.2 µg/L (Method A); 0.35 µg/L (Indoor Air)
Benzene = 5 µg/L (Method A); 2.4 µg/L (Indoor Air)
Lube Oil-Range Petroleum Hydrocarbons = 0.5 mg/L (Method A)
Arsenic = 5 µg/L (Method A)
cPAHs= 0.1 µg/L (Method A)

Site Plan – PDA 2C/Pinkerton Parking

UWT Environmental Investigation
Priority Development Areas - CPO Project No. 204277
Tacoma, Washington

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Figure 2

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APPENDIX A
Report Limitations and Guidelines for Use

APPENDIX A
REPORT LIMITATIONS AND GUIDELINES FOR USE[1]

This appendix provides information to help you manage your risks with respect to the use of this report.

Environmental Services are Performed for Specific Purposes, Persons and Projects

This report has been prepared for use by University of Washington. This report is not intended for use by others, and the information contained herein is not applicable to other sites.

GeoEngineers structures our services to meet the specific needs of our clients. For example, an environmental site assessment study conducted for a property owner may not fulfill the needs of a prospective purchaser of the same property. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and project site. No one except University of Washington should rely on this environmental report without first conferring with GeoEngineers. This report should not be applied for any purpose or project except the one originally contemplated.

This Environmental Report is Based on a Unique Set of Project-Specific Factors

This report has been prepared for the Priority Development Areas (PDAs) Environmental Assessment Project at the UW – Tacoma (UWT) campus located in Tacoma, Washington. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, do not rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

If important changes are made after the date of this report, GeoEngineers should be given the opportunity to review our interpretations and recommendations and provide written modifications or confirmation, as appropriate.

Reliance Conditions for Third Parties

If a lending agency or other parties intend to place legal reliance on the product of our services, we require that those parties indicate in writing their acknowledgement that the scope of services provided, and the general conditions under which the services were rendered including the

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[1] Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

limitation of professional liability, are understood and accepted by them. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions.

Environmental Regulations are Always Evolving

Some substances may be present in the site vicinity in quantities or under conditions that may have led, or may lead, to contamination of the subject site, but are not included in current local, state or federal regulatory definitions of hazardous substances or do not otherwise present current potential liability. GeoEngineers cannot be responsible if the standards for appropriate inquiry, or regulatory definitions of hazardous substance, change or if more stringent environmental standards are developed in the future.

Subsurface Conditions can Change

This environmental report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by manmade events such as construction on or adjacent to the site, by new releases of hazardous substances, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Always contact GeoEngineers before applying this report to determine if it is still applicable.

Topsoil

For the purposes of this report, we consider topsoil to consist of generally fine-grained soil with an appreciable amount of organic matter based on visual examination, and to be unsuitable for direct support of the proposed improvements. However, the organic content and other mineralogical and gradational characteristics used to evaluate the suitability of soil for use in landscaping and agricultural purposes was not determined, nor considered in our analyses. Therefore, the information and recommendations in this report, and our logs and descriptions should not be used as a basis for estimating the volume of topsoil available for such purposes.

Most Environmental Findings are Professional Opinions

Our interpretations of subsurface conditions are based on field observations and chemical analytical data from widely spaced sampling locations at the site. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ – sometimes significantly – from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

Do Not Redraw the Exploration Logs

Environmental scientists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in an environmental report should never be redrawn for inclusion in other design drawings. Only photographic or electronic reproduction is acceptable, but recognize that separating logs from the report can elevate risk.

Read These Provisions Closely

Some clients, design professionals and contractors may not recognize that the geoscience practices (geotechnical engineering, geology and environmental science) are far less exact than other engineering and natural science disciplines. This lack of understanding can create unrealistic expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory "limitations" provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you are unclear how these "Report Limitations and Guidelines for Use" apply to your project or site.

Geotechnical, Geologic and Geoenvironmental Reports Should Not Be Interchanged

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually relate any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding a specific project.

Biological Pollutants

GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention, or assessment of the presence of Biological Pollutants in or around any structure. Accordingly, this report includes no interpretations, recommendations, findings, or conclusions for the purpose of detecting, preventing, assessing, or abating Biological Pollutants. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts.

PDA 2D – Tacoma Paper and Stationary

Priority Development Area 2D
Tacoma Paper and Supply Building
Environmental Subsurface Investigation

Environmental Subsurface Investigation Project
UW Capital Project Office Project No. 204277
1721 through 1735 Jefferson Street
Tacoma, Washington

for
University of Washington

December 19, 2014

GeoEngineers

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Tacoma, Washington 98402
253.383.4940

Priority Development Area 2D
Tacoma Paper and Supply Building
Environmental Subsurface Investigation
UW Capital Project Office
Project No. 204277
1721 through 1735 Jefferson Street
Tacoma, Washington

File No. 0183-085-00

December 19, 2014

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TSD:TRM:ch

GeoEngineers

Table of Contents

1.0 INTRODUCTION 1

2.0 HISTORICAL USE 1

3.0 CURRENT SITE FEATURES 2

4.0 ENVIRONMENTAL SUBSURFACE EXPLORATIONS 2

4.1. Soil Borings 2
4.2. Groundwater Sampling-Existing Monitoring Wells 3

5.0 SOIL AND GROUNDWATER CONDITIONS 3

5.1. Soil Conditions 3
5.2. Groundwater Conditions 3

6.0 CHEMICAL ANALYTICAL PROGRAM 4

6.1. General 4
6.2. Criteria for Characterization of soil and Groundwater 4
6.3. Soil 5
6.3.1. Petroleum Hydrocarbons 6
6.3.2. VOCs 6
6.3.3. PAHs 6
6.3.4. RCRA Metals 7
6.4. Groundwater 7
6.4.1. Petroleum-Range Hydrocarbons 7
6.4.2. VOCs 7
6.4.3. PAHs 8
6.4.4. Total RCRA Metals 8

7.0 CONCLUSIONS 8

8.0 PROPOSED DEVELOPMENT PLANS 8

9.0 POTENTIAL IMPACTS AND MITIGATION MEASURES TO DESIGN AND CONSTRUCTION 9

9.1. Site is a Potential Source 9
9.2. PCE-Contaminated Groundwater 9
9.3. Soil is Contaminated with Chemicals of Concern 11

10.0 LIMITATIONS 12

11.0 REFERENCES 12

LIST OF TABLES

Table 1. Summary of Chemical Analytical Results – Soil
Table 2. Summary of Chemical Analytical Results – Groundwater

LIST OF FIGURES

Figure 1. Vicinity Map
Figure 2. Subsurface Investigation Results Priority Development Area 2D

APPENDICES

Appendix A. Report Limitations and Guidelines for Use

1.0 INTRODUCTION

This report presents the results of our environmental subsurface investigation completed for the University of Washington (UW) at the Tacoma Paper Supply building (Priority Development Area [PDA] 2D) located on the University of Washington, Tacoma (UWT) campus at 1721 through 1735 Jefferson Street in Tacoma, Washington. The Tacoma Paper Supply building is herein referred to as the "site." The site was identified as PDA 2D for this project. The site is bound by Jefferson Street to the west, the Dougan building to the north, Prairie Line Trail to the east and the Science building to the south. A Vicinity Map of the site is included as Figure 1. See Figure 2 for the layout of the site.

The subsurface investigation was completed under the UWT Environmental Subsurface Investigation Project, UW Capital Project Office project number 204277. This report was completed at a subset of the larger subsurface investigation report titled "2013 Environmental Subsurface Investigation – University of Washington-Tacoma, Tacoma, Washington" dated December 19, 2014 to assist with development of the property. This report should be used in context with the larger subsurface investigation report. Borings logs, subsurface investigation methodologies and chemical analytical data packages are included in the larger investigation report.

An additional investigation was completed on October 2014 at the site under UW Capital Projects Office (CPO) Project No. 204701. The results of the additional investigation are not included in this report due to the timing of the finalization of this report and the report for the October 2014 investigation. Refer to subsurface investigation reports completed for CPO Project No. 204701 for this additional information.

General impacts and potential mitigation measures are provided in this report that may be employed in design and construction. It is important to recognize that additional environmental investigations may be necessary prior to selection of the final mitigation measure. Mitigation measures and associated costs provided in this report will likely need refinement based on the results of the additional environmental investigations. The project team should contact UW Environmental Health & Safety (UW EH&S) to discuss the need for additional environmental investigations at this site. UW EH&S is the liaison with the Washington State Department of Ecology (Ecology) for review and approval of mitigation measures.

2.0 HISTORICAL USE

The four-story Tacoma Paper Supply building was constructed in 1904 and 1905 initially as a candy factory for the Tacoma Biscuit and Candy Company. Boilers and ovens were located on the first floor in the warehouse and storeroom. A freight elevator located on the west side of the building serviced the four floors. Offices and the shop were located on the second floor at the elevation of Jefferson Avenue. The third floor was utilized as the main stockroom. The production area was on the fourth floor. The following summarizes the historical use of the building.

- 1906. Union Pacific Railroad purchased the building and Tacoma Biscuit and Candy Company vacated the building.
- 1907. A spice company used the building as temporary quarters.

- 1911 to 1942. Tacoma Paper and Stationary Company (wholesale paper company) was in operation during this time. The south end of the building was previously used as a sign printing shop based on information provided in the 1912 Sanborn map. Solvents may be associated with ink printing.
- 1943 to 1953. Blake, Moffitt and Towne, Inc. (wholesale paper company) operated their business at the site during this time. The 1950 Sanborn map indicates the space was utilized as merchandise warehouse.
- 1953 to 1957. Vacant.
- 1957 to 1961. McCormack Distributing.
- 1961 to 1968. Vacant.
- 1969 to 1971. Pacific Storage Company.
- 1971 to Present. Old Spaghetti Factory.

Permit records indicate that repairs occurred from a fire that damaged the building in 1928. Installation of an oil burner followed the repair activities in 1929. The location and presence of the tank that stored the heating oil for the oil burner is not known. Permit records also show that a 3,000-gallon grease interceptor tank was installed on the east side of the building within the Prairie Line Trail as recently as 1999. The grease trap is associated with the Old Spaghetti Factory restaurant.

3.0 CURRENT SITE FEATURES

The four-story building is situated within the site boundary. The first floor of the building is accessible from the Prairie Line Trail at approximately Elevation 70 feet. The second floor is accessible from Jefferson Avenue at approximately Elevation 90 feet.

The first floor is currently occupied by UWT for faculty and staff working space. The Old Spaghetti Factory currently occupies the second floor. The third and fourth floors are currently used for storage by UW.

4.0 ENVIRONMENTAL SUBSURFACE EXPLORATIONS

The environmental subsurface investigation activities completed on the site consisted of direct-push borings, groundwater development and sampling of existing monitoring wells and collection of a water sample from the municipal water supply. The investigation activities were completed in June 2013.

4.1. Soil Borings

Five direct-push borings (2D-B1 through 2D-B5) were completed on the first floor inside the existing building between June 18 and June 20, 2013. The direct-push borings ranged in depth between 3 and 12 feet below ground surface (bgs) when practical refusal was encountered. The existing ground surface at each boring location consisted of the concrete slab with the exception of boring 2D-B4. Boring 2D-B4 was completed using a hand-operated micro-core sampler through an existing wood floor over a concrete vault due to space limitations. The general elevation of the top of the borings was approximately 70 feet. The locations of the borings are shown on Figure 2.

4.2. Groundwater Sampling-Existing Monitoring Wells

Groundwater samples were collected from two existing wells (JS-MW3 and JS-MW3S) located on Jefferson Avenue to evaluate groundwater conditions upgradient of the site. Existing well JS-MW3 (deep aquifer) was sampled on June 25, 2013. Well JS-MW3S (shallow aquifer) was installed during this investigation and sampled on September 13, 2013 and January 22, 2014.

Water obtained from the municipal water supply was used for well development due to low recharge in the monitoring well. A water sample was also collected from the municipal water supply on September 24, 2013 to compare these analytical results to the results of the groundwater samples.

5.0 SOIL AND GROUNDWATER CONDITIONS

5.1. Soil Conditions

Subsurface conditions consist of fill, ice-contact deposits, silt layer and advance outwash. The fill consists of silt and sand (silt with sand and/or sand with silt) from the ground surface to depths ranging from 0.5 to 2 feet bgs.

Ice-contact deposits consisting of fine silty sand were observed in the direct-push borings and monitoring wells on and adjacent to the site. Ice-contact deposits were observed at approximately 20 feet bgs in the monitoring wells. The ice-contact deposits are underlain by a silt layer consisting of brown to gray fine sandy silt with a thickness of approximately 1 to 2 feet. The silt layer is underlain by advance outwash consisting of silty fine to coarse sand with gravel.

5.2. Groundwater Conditions

It appears that groundwater conditions observed consist of a shallow aquifer (ice-contact deposits) and deep aquifer (advance outwash) to the depths explored during this investigation. The shallow and deep aquifers appear to be separated by the silt layer located between the ice-contact deposits and advance outwash.

Groundwater within the shallow aquifer appears to be present within the sand and gravel seams the ice-contact deposits. The hydraulic connection of the sand seams within the shallow aquifer is unknown in and around the project site. Groundwater within the deep aquifer appears to be continuous with interbeds of moist to wet silt at depth. The deep aquifer within the advance outwash appears to be under a confined condition.

Groundwater elevation of the shallow aquifer is 70 feet west of the site. Groundwater elevation of the deep aquifer is 53 feet west of the site. Groundwater was not encountered in the subsurface explorations completed inside the building. Groundwater levels will vary depending on season, precipitation and other factors.

6.0 CHEMICAL ANALYTICAL PROGRAM

6.1. General

Soil and groundwater samples were submitted to OnSite Environmental, Inc., in Redmond, Washington for chemical analysis. The chemical analytical data are summarized in Tables 1 and 2. Chemicals that were not detected at or greater than the laboratory reporting limits in the analyzed samples are typically not included on the tables.

6.2. Criteria for Characterization of soil and Groundwater

The following criteria were used to evaluate impacted and contaminated soil and groundwater.

- Tetrachloroethene (PCE) and trichloroethene (TCE) Impacted or Contaminated Soil
  - PCE, TCE and breakdown products at concentrations detected in the analyzed soil samples.
- Contaminated Soil
  - Petroleum hydrocarbons, carcinogenic polycyclic aromatic hydrocarbons (cPAHs), metals and volatile organic compounds (VOCs) detected at concentrations greater than the Model Toxics Control Act (MTCA) Method A Unrestricted Land Use (ULU) cleanup level or MTCA B screening level.
- Impacted Soil

  Some contaminants were detected at concentrations less than the respective MTCA cleanup levels. UWT may be able to reuse certain types of soil depending on the sampling results. UW EH&S must review the chemical analytical data to evaluate if reuse or disposal at an off site facility is necessary. Soil reuse and disposal are subject to Ecology Guidance for Remediation of Petroleum Contaminated Sites (Ecology, 2011), solid waste regulations and disposal facility permit conditions. The criteria below is herein referred to as "Reuse Criteria."

  - Petroleum hydrocarbons, cPAHs and/or Lead

    The Ecology guidance indicates that soil with diesel- and/or lube oil-range petroleum hydrocarbons detected at concentrations less than 200 milligrams per kilogram (mg/kg) and/or gasoline-range petroleum hydrocarbons detected at concentrations less than 30 mg/kg are suitable for reuse as commercial fill at UWT campus with the following limitations:

    - placed above the highest water table,
    - not within 100 feet of a drinking water well,
    - not within wellhead protection area of public water supply,
    - not within wetlands or where surface water contact is possible, and
    - not within a surface water infiltration facility or septic drain field.

    If the concentrations exceed the above limits but are still less than respective MTCA cleanup levels the soil may be reused in road and bridge embankment construction, landfill daily cover or asphalt manufacturing with UW EH&S approval.

  - Arsenic, Cadmium, and/or Mercury

Soil with concentrations of arsenic, cadmium and/or mercury above what is normally found in the natural background environment (Puget Sound Background levels -Ecology, 1994) is typically suitable for disposal at an inert waste landfill or a Department of Natural Resources (DNR) reclamation pit. UW EH&S approval is necessary.

Soil at and near the UWT campus has been well documented to contain chromium at concentrations slightly above the natural background level and is not considered in the "Reuse Criteria."

- Contaminated Groundwater
  - Petroleum hydrocarbons, PAHs and metals detected at concentrations greater than the respective MTCA Method A groundwater cleanup levels. Method B criteria were used for comparison of specific compounds if Method A groundwater cleanup levels are not established for those compounds.
  - VOCs detected at concentrations greater than the respective MTCA Method A groundwater cleanup levels, and MTCA Method B groundwater screening levels protective of indoor air. The updated TCE/PCE screening levels were calculated using Equation 1 from Ecology's review draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action" dated October 2009 (Ecology, 2009) and Environmental Protection Agency's (EPA's) TCE and PCE toxicity factors updated in 2011 and available on EPA's online Integrated Risk Information System (IRIS). The other values were obtained from Ecology's review draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action."

6.3. Soil

Soil samples collected from subsurface explorations were submitted for chemical analysis. The soil samples collected from the subsurface explorations were identified using the following identification system: A#-B#-start depth-end depth, where A# is the area designation number, B# is the boring number and start depth-end depth is the depth interval in feet below the ground of specific sample (e.g., 2D-B1-8-9 was collected in Area 2D from boring B1 from 8 to 9 feet bgs). The soil samples collected from the monitoring well borings were identified using the following identification system: A#-start depth-end depth, where A# is the well identification number and start depth-end depth is the depth interval in feel below the ground of specific sample (e.g., JS-MW3S-8-9 was collected from the JS-MW3S boring from 8 to 9 feet bgs).

Soil samples were submitted for chemical analysis based on the following criteria:

- Where field screening indicated the soil is impacted.
- Directly below potentially impacted soil to delineate the vertical extent.
- Where wet sand seams were encountered within the glacial drift.
- At the soil/groundwater interface if groundwater was encountered.
- At the top of confining units if encountered.

The soil samples were submitted for chemical analysis of petroleum hydrocarbon identification by Washington State Department of Ecology (Ecology)-approved method NWTPH-HCID, volatile organic compounds (VOCs) by Environmental Protection Agency (EPA) method 8260C, polycyclic aromatic hydrocarbons (PAHs) by EPA method 8270DSIM, and Resource Conservation and Recovery Act (RCRA) metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver) by EPA method 6000/7000 series.

6.3.1. Petroleum Hydrocarbons

Gasoline-, diesel- and lube oil-range petroleum hydrocarbons were not detected in the analyzed soil samples.

6.3.2. VOCs

FILL

PCE was detected at concentrations less than the MTCA Method A ULU cleanup level (0.05 milligrams per kilogram [mg/kg]) in the following soil samples with the concentrations detected identified in parenthesis.

- 2D-B1-0-1 (0.0042 mg/kg)
- 2D-B2-0-1 (0.041 mg/kg)
- 2D-B3-0-1 (0.0024 mg/kg)
- 2D-B4-0-1 (0.0061 mg/kg)

PCE was not detected in the remaining analyzed soil samples within the fill.

Benzene was detected at a concentration less than the MTCA Method A ULU cleanup level (0.03 mg/kg) in soil sample 2D-B5-0-1 (0.0078 mg/kg). Benzene was not detected in the remaining analyzed soil samples.

Other VOCs were not detected in the analyzed soil samples.

ICE-CONTACT DEPOSITS

PCE was detected at concentrations greater than the MTCA Method A ULU cleanup level in the following soil samples with the concentrations detected identified in parenthesis.

- 2D-B1-8-9 (0.083 mg/kg)
- 2D-B2-4-5 (0.12 mg/kg)

PCE was detected at a concentration less than the MTCA Method A ULU in soil sample 2D-B3-11-12 (0.018 mg/kg). PCE was not detected in the remaining analyzed soil samples.

Other VOCs were not detected in the analyzed soil samples.

6.3.3. PAHs

PAHs and carcinogenic PAHs (cPAHs) were not detected in the analyzed soil samples.

6.3.4. RCRA Metals

RCRA metals were either not detected or were detected at concentrations less than the respective MTCA Method A cleanup levels, Method B criteria or Reuse Criteria in the analyzed soil samples.

6.4. Groundwater

Groundwater samples were collected from the two existing monitoring wells (JS-MW3 and JS-MW3S). The groundwater samples collected from monitoring well JS-MW3 (deep aquifer) and the municipal supply water sample were submitted for analysis of VOCs by EPA method 8260C. Two groundwater samples collected from monitoring well JS-MW3S (shallow aquifer) were submitted for chemical analysis of gasoline-range petroleum hydrocarbons by Ecology-approved method NWTPH-Gx, and diesel- and lube oil-range petroleum hydrocarbons by Ecology-approved method NWTPH-Dx with silica gel/acid cleanup, VOCs by EPA method 8260C, PAHs by EPA method 8270DSIM and total RCRA metals EPA method 200.8.

The chemical analytical data for groundwater are described below and summarized in Table 2.

6.4.1. Petroleum-Range Hydrocarbons

Diesel-range petroleum hydrocarbons were detected at a concentration less than the MTCA Method A cleanup level (0.5 micrograms per liter [μg/L]) in groundwater sample JS-MW3S-130913 (0.31 μg/L). Diesel-range petroleum hydrocarbons were not detected in the analyzed water sample collected from the municipal water supply.

Gasoline- and lube oil- range petroleum hydrocarbons were not detected in the analyzed groundwater and municipal water supply samples.

6.4.2. VOCs

TCE, PCE and associated breakdown products were not detected in the analyzed groundwater samples.

Bromodichloromethane was detected at a concentration greater than the MTCA Method B groundwater cleanup level (0.71 μg/L) in the groundwater sample collected from monitoring well JS-MW3S (0.98 μg/L). Chloroform and dibromochloromethane were also detected at concentrations less than the respective groundwater cleanup level in the groundwater sample collected from monitoring well JS-MW3S on September 13, 2013.

City of Tacoma supplied water was utilized during development of well JS-MW3S due to low recharge of the aquifer observed during development. Bromodichloromethane, chloroform and dibromochloromethane are typical byproducts of the chlorine used to disinfect municipal supply water. Following receipt of the chemical analytical data from JS-MW3S, a groundwater sample was collected from the municipal water supply. Bromodichloromethane was detected at a concentration (2.2 μg/L) greater than the MTCA Method B groundwater cleanup level collected from the municipal supply water. Chloroform and dibromochloromethane were also detected at concentrations less than the respective cleanup levels in the sample of municipal supply water.

Monitoring well JS-MW3S was resampled on January 22, 2014. Bromodichloromethane and dibromochloromethane were not detected in the analyzed groundwater sample collected in January 2014. Chloroform was detected but at concentration approximately 300 times less than the groundwater sample collected in September 2013. The chemical concentrations in September appear to be related to the use of municipal water during development. Other VOCs were not detected in the analyzed groundwater samples.

6.4.3. PAHs

PAHs and cPAHs were not detected in the analyzed groundwater samples.

6.4.4. Total RCRA Metals

Total RCRA metals were either not detected or were detected at concentrations less than the respective MTCA Method A cleanup levels or the Method B criteria in the analyzed groundwater samples.

7.0 CONCLUSIONS

PCE (contaminated and impacted) is present in soil beneath the building from below the slab to the full depth explored (12 feet bgs). PCE-contaminated soil may extend deeper than 12 feet bgs. Groundwater was not encountered in the borings completed inside the building during this investigation. PCE and TCE were not detected in the shallow and deep aquifers in the monitoring wells (JS-MW3S and JS-MW3) indicating the source of PCE in the soil does not appear to originate from an upgradient source. The source of the PCE is likely from within the building, but the exact location is unknown.

Industrial uses of PCE are dry cleaning/textile processing, metal degreasing, printing inks, typewriter correction fluids, adhesive formulations and paper coatings. A wholesale paper company operated in the building between 1911 and 1953 and a sign printing shop was located in the southern portion of the building in at least 1912. Historical operations of printing or coating paper may be the source of the PCE within the building; however the actual source is unknown. Due to storage of materials, we were unable to review the entire first floor for potential areas where PCE may have been disposed in the past (drywells or cisterns).

Benzene was detected in soil at concentrations less than the MTCA Method A ULU cleanup level to a depth of approximately 1 foot bgs on the northwest portion of the site.

Diesel-range petroleum hydrocarbons were detected in the groundwater sample collected in shallow monitoring well (JS-MW3S). The source of the diesel-range petroleum hydrocarbons is unknown, but may be from the former service station located on the Jefferson Street Parcel (PDA 2B) upgradient of the site. Petroleum-contaminated soil was remediated from the Jefferson Parcel in 2012.

8.0 PROPOSED DEVELOPMENT PLANS

We understand UWT plans to redevelop the existing building as a “core and shell” by 2016. Additional improvements will occur at a later date as the programs for the space are defined. A “core and shell” redevelopment will likely consist of a complete restoration of the building to include seismic upgrades that may require new footings and shear walls along with upgraded utilities. We have assumed the shell of the building and finished floor elevation of the building will remain (approximately 10,000 square feet and Elevation 70 feet). The footings may extend up to 5 feet below the existing finished floor. For budgeting purposes, we assumed 500 linear feet of footings and excavations 10 feet wide and 5 feet deep will be required. The estimated amount of soil to be generated based on the above assumptions is 2,000 tons.

9.0 POTENTIAL IMPACTS AND MITIGATION MEASURES TO DESIGN AND CONSTRUCTION

We recommend UW develop and implement appropriate administrative institutional controls to limit or prohibit activities that may result in exposure to hazardous substances remaining at the site. Potential impacts to the design and construction of the site are the following:

- Site is a potential source of PCE.
- Groundwater is potentially contaminated with PCE.
- Soil is contaminated with chemicals of concern (PCE).

Potential long-term impacts include:

- Long-term disposal of underslab/perimeter footing drain PCE-impacted groundwater.
- Continued maintenance of vapor intrusion mitigation system, if necessary.
- Potential periodic indoor air sampling to confirm the vapor intrusion mitigation system may be necessary to evaluate the system is operating properly, if necessary.
- PCE-contaminated or PCE-impacted soil may remain adjacent and beneath the building following construction activities. UW should develop and implement appropriate institutional controls to help prevent exposure to residual contamination.

The following sections described potential impacts, mitigation measures and estimated costs to design and construction.

9.1. Site is a Potential Source

PCE-contaminated groundwater has not been discovered on the site. However, PCE was detected in soil to the full depth explored throughout the building footprint. PCE was detected at concentrations greater than the MTCA Method A ULU cleanup level in the area of the historical sign printing in the southern portion of the building. PCE was not detected in the upgradient wells indicating the source of the PCE is potentially on the site. Additional investigation is recommended to evaluate the lateral and vertical extent of the PCE-contaminated soil and potentially-contaminated groundwater. The estimated cost for additional investigation to evaluate the source is $50,000 to $100,000. If the site is identified as a source of downgradient groundwater contamination, remedial action may be required by Ecology prior to redevelopment of the new building. The actual remedial cost will be based on the remedial alternative and the extent of the contamination but may range between $500,000 and $2,000,000.

9.2. PCE-Contaminated Groundwater

PCE-contaminated groundwater has not been documented on the site. If PCE-contaminated groundwater is documented then remediation is an option prior to building redevelopment.

Additional Investigation. Further subsurface investigation may be necessary to evaluate the vertical and lateral limits of the PCE-impacted soil and/or groundwater at the site will be completed as part of the evaluation of a source. If groundwater is not impacted, soil vapor and indoor air sampling is recommended to evaluate if a potential vapor intrusion pathway exists. The estimated cost for soil vapor sampling and additional investigation is $20,000 to $50,000.

Vapor Mitigation. Vapor intrusion occurs when VOCs migrate from contaminated soil or groundwater into overlying buildings through openings in the foundation. The route VOCs take from a subsurface source to the air inside a building is referred to as the vapor intrusion pathway. A common source of soil vapor is PCE, which may pose long-term (chronic) risks through inhalation of contaminated indoor air.

Groundwater and soil vapor concentrations are typically utilized as screening levels regarding the potential for vapor intrusion. PCE-contaminated soil was encountered but soil concentrations cannot be utilized as screening tool for vapor because of variability. Groundwater was not sampled within the building. Soil vapor sampling was not completed as part of this investigation.

Additional on-site characterization may be necessary to evaluate the vertical and lateral limits of the PCE-contaminated impacted soil vapors. Soil vapor sampling is recommended near the elevation of the proposed subgrade to evaluate if a potential vapor intrusion pathway exists. If a potential vapor intrusion pathway exists, then a vapor intrusion mitigation system may be necessary. Potential mitigation options to prevent vapor intrusion include:

- A passive vapor barrier beneath the building. Passive vapor barriers are typically used in combination with another mitigation option (venting or building pressurization). We recommend the vapor barrier be installed below the elevation of penetrations (pipes, etc.) that may be installed after the programing is identified in the future. Penetrating the vapor barrier following the construction will add to the cost of construction and reduce the effectiveness of the vapor barrier.
- Passive or active venting system beneath the building. The venting system may need to be combined with an underslab and perimeter drain to reduce the potential for shallow groundwater to enter the venting system.
- Depressurization or pressurization of subslab soil to prevent vapors from entering existing buildings.
- Pressurization of the building with building air circulation system.

The estimated cost for design and installation of indoor air mitigation system ranges between $5 per square foot to $12 per square foot of building space. The estimated costs for the vapor mitigation system for a building on the entire site $50,000 to $120,000. The design should also consider the future potential uses and subslab excavations required for those uses. Potential periodic indoor air sampling to confirm the vapor intrusion mitigation system may be necessary to evaluate the system is operating properly following construction of the building. The estimated cost for long term monitoring is unknown.

Underslab/Footing Drainage. Underslab/footing drainage system may be required to prevent water from entering into the vapor mitigation vent system based on the elevation of the shallow groundwater on the west side of the building (70 feet). The water may have to be directed to the City of Tacoma sanitary sewer or storm sewer based on concentrations of the chemicals of concern in the groundwater. A long-term cost may be associated with discharge of the water to the City sanitary sewer system. The estimated cost of the underslab footing drain is $30,000 to $60,000.

Construction Water Management. PCE-contaminated groundwater encountered during construction will have to be managed. Water generated during construction will likely be stored in tanks, sampled and analyzed. Water disposal will be coordinated with UW EH&S at a UW-approved disposal facility. The water may be disposed in the City of Tacoma sanitary sewer. The City of Tacoma charges approximately $0.0034 per gallon of water. The estimated volume of water generated will be based on construction methods. The base cost estimate includes the cost of disposal of water for 120 days of earthwork construction, approximate cost of collecting 10 water samples over the course of the project ($15,000) and two 25,000 gallon storage tanks ($7,000 each per month).

Approximately 5,000 gallons per day is estimated to be generated on the site from dewatering activities. The estimated cost of construction water management if disposal into the City of Tacoma sanitary sewer is necessary is approximately $45,000.

Cross-Contamination. It appears the existing building is located above or within the silt layer (semi-confining to confining unit between the shallow and deep aquifers). Therefore, a potential for cross-contamination between the shallow and deep aquifers may be a concern. Design considerations should evaluate if construction activities may create a pathway PCE in the soil to penetrate the groundwater. For budgeting purposes, additional construction cost is estimated to be between $5,000 and $30,000 if cross-contamination is identified as an impact.

Health and Safety. Workers who may be in contact with potentially contaminated soil or groundwater at a state-listed cleanup site have HAZWOPER training. The requirement is consistent with the Washington Administrative Code (WAC) 296-843-100, *Hazardous Waste Operations*, which indicates that on-site personnel are required to have current health and safety training in accordance with Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response requirements in 29 CFR 1910.120. The rule also requires the earthwork contractor and other personnel who could potentially contact contaminated materials to develop and implement a written safety and health program for their employees involved in hazardous waste operations under 29 CFR 1910.120. The estimated cost for the contractor to be HAZWOPER trained and have appropriate liability insurance is roughly between $10,000 and $70,000 depending on the number of subcontractors that require training, and the contractor markup factor.

9.3. Soil is Contaminated with Chemicals of Concern

Contaminated soil (PCE) and impacted soil (PCE and benzene) will likely be generated during construction activities. We recommend UW implement the following actions.

- **Characterize Soil and Groundwater for Disposal.** In-situ characterization or stockpiling and subsequent sampling will need to be performed on soil that is generated during construction in areas of PCE-contaminated soil and PCE- and benzene-impacted soil. The estimate cost of the soil sampling for soil disposal is $15,000 to $25,000 based on the mass of soil to be excavated.
- **PCE Impacted and Contaminated Soil.** When PCE and breakdown products are detected in soil, UW EH&S will work with Ecology on obtaining a "contained-in determination" for disposal of the waste. The source of the solvent contamination, the concentration of the solvents and a Toxicity Characteristic Leaching Procedure (TCLP) analytical test result will be used when evaluating if the soil is disposed as hazardous waste by UW EH&S at a RCRA permitted Subtitle C landfill or as a solid waste at a UW-approved Subtitle D landfill. Past experience has demonstrated that it is fairly likely

that the "contained-in determination" will be granted, thus we based our cost estimates on this assumption.

The estimated cost for transportation and disposal (not including excavation and loading) of soil to a Subtitle D landfill with a contained-in determination is $80 to $100 per ton. The cost for transportation and disposal (not including excavation and loading) of soil to a RCRA Subtitle C Landfill is $250 to $300 per ton. The cost estimates do not include transportation and disposal of soil as a dangerous waste at a RCRA-Subtitle C landfill.

The estimated mass of TCE-contaminated and impacted soil is approximately 2,000 tons. This estimate assumes all soil excavated from the site will be impacted with PCE. The estimated cost for transportation and disposal of the TCE-contaminated and impacted soil is $160,000 to $200,000.

- Health and Safety. As discussed in the contaminated groundwater section, UW requires its earthwork contractor and other personnel who could potentially contact contaminated materials to comply with training requirements for handling soil and potentially groundwater on the site. The health and safety costs are not included as separate item in the soil, because the costs in the groundwater section will apply.

10.0 LIMITATIONS

This report has been prepared for use by the University of Washington for the Priority Development Area 2D located in Tacoma, Washington at the University of Washington Tacoma campus.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

Please refer to Appendix A titled "Report Limitations and Guidelines for Use" for additional information pertaining to use of this report.

11.0 REFERENCES

Ecology, 2009 Washington State Department of Ecology. Draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action" dated October 2009.

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Table 1

Summary of Chemical Analytical Results[1] - Soil

Area 2D - Tacoma Paper Supply

Priority Development Areas - University of Washington Tacoma

Tacoma, Washington

Boring/Test Pit	2D-B1	2D-B1	2D-B2	2D-B2	2D-B3	2D-B3	2D-B4	2D-B5	2D-B5	JS-MW3S	JS-MW3S	JS-MW3S	JS-MW3S	JS-MW3S	JS-MW3S	JS-MW3S	JS-MW3S	MTCA Method A ULU Cleanup Level	Reuse Criteria[10]
Sample Identification[2]	2D-B1-0-1	2D-B1-8-9	2D-B2-0-1	2D-B2-4-5	2D-B3-0-1	2D-B3-11-12	2D-B4-0-1	2D-B5-0-1	2D-B5-6-7	JS-MW3S-8-9	JS-MW3S-10.5-11.5	JS-MW3S-12-12.5	JS-MW3S-13-14	JS-MW3S-18-19	JS-MW3S-21-22	JS-MW3S-23-24	JS-MW3S-24-25		
Sample Depth (feet bgs)	0 to 1	8 to 9	0 to 1	4 to 5	0 to 1	11 to 12	0 to 1	0 to 1	6 to 7	8 to 9	10.5 to 11.5	12 to 12.5	13 to 14	18 to 19	21 to 22	23 to 24	24 to 25		
Soil Type	Fill	Qvi	Fill	Qvi	Fill	Qvi	Fill	Fill	Qvi	Qvi	Qvi	Qvi	Qvi	Qvi	Qvi	Qvi	Silt		
NWTPH-HCID[3] (mg/kg)																			
Gasoline-Range	23 U	24 U	27 U	27 U	29 U	27 U	23 U	23 U	26 U	--	--	--	--	--	--	--	--	30/100[7]	30
Diesel-Range	57 U	59 U	67 U	66 U	74 U	66 U	57 U	57 U	65 U	--	--	--	--	--	--	--	--	2,000	200
Lube Oil-Range	110 U	120 U	130 U	130 U	150 U	130 U	110 U	120 U	130 U	--	--	--	--	--	--	--	--	2,000	200
VOCs[4] (mg/kg)																			
Tetrachloroethene (PCE)	0.0042	0.083	0.041 J	0.12	0.0024	0.018	0.0061	0.00096 U	0.0011 U	0.00091 U	0.00088 U	0.0011 U	0.00088 U	0.00092 U	0.00082 U	0.00089 U	0.00083 U	0.05	DET
Trichloroethene (TCE)	0.00096 U	0.00085 U	0.0012 U	0.0023 U	0.0010 U	0.0011 U	0.0014 U	0.00096 U	0.0011 U	0.00091 U	0.00088 U	0.0011 U	0.00088 U	0.00092 U	0.00082 U	0.00089 U	0.00083 U	0.03	DET
(cis) 1,2-Dichloroethene	0.00096 U	0.00085 U	0.0012 U	0.0023 U	0.0010 U	0.0011 U	0.0014 U	0.00096 U	0.0011 U	0.00091 U	0.00088 U	0.0011 U	0.00088 U	0.00092 U	0.00082 U	0.00089 U	0.00083 U	160[8]	DET
(trans) 1,2-Dichloroethene	0.00096 U	0.00085 U	0.0012 U	0.0023 U	0.0010 U	0.0011 U	0.0014 U	0.00096 U	0.0011 U	0.00091 U	0.00088 U	0.0011 U	0.00088 U	0.00092 U	0.00082 U	0.00089 U	0.00083 U	1,600[8]	DET
Vinyl Chloride	0.00096 U	0.00085 U	0.0012 U	0.0023 U	0.0010 U	0.0011 U	0.0014 U	0.00096 U	0.0011 U	0.00091 U	0.00088 U	0.0011 U	0.00088 U	0.00092 U	0.00082 U	0.00089 U	0.00083 U	0.67[8]	DET
Benzene	0.00096 U	0.00085 U	0.0012 U	0.0023 U	0.0010 U	0.0011 U	0.0014 U	0.0078	0.0011 U	0.00091 U	0.00088 U	0.0011 U	0.00088 U	0.00092 U	0.00082 U	0.00089 U	0.00083 U	0.03	0.03
PAHs[5] (mg/kg)																			
1-Methylnaphthalene	0.0076 U	0.0078 U	0.0089 U	0.0089 U	0.0098 U	0.0088 U	0.0076 U	0.0076 U	0.0087 U	--	--	--	--	--	--	--	--	35[8]	NE
2-Methylnaphthalene	0.0076 U	0.0078 U	0.0089 U	0.0089 U	0.0098 U	0.0088 U	0.0076 U	0.0076 U	0.0087 U	--	--	--	--	--	--	--	--	320[8]	NE
Acenaphthene	0.0076 U	0.0078 U	0.0089 U	0.0089 U	0.0098 U	0.0088 U	0.0076 U	0.0076 U	0.0087 U	--	--	--	--	--	--	--	--	4,800[8]	NE
Acenaphthylene	0.0076 U	0.0078 U	0.0089 U	0.0089 U	0.0098 U	0.0088 U	0.0076 U	0.0076 U	0.0087 U	--	--	--	--	--	--	--	--	NE	NE
Anthracene	0.0076 U	0.0078 U	0.0089 U	0.0089 U	0.0098 U	0.0088 U	0.0076 U	0.0076 U	0.0087 U	--	--	--	--	--	--	--	--	24,000[8]	NE
Benzo[g,h,i]perylene	0.0076 U	0.0078 U	0.0089 U	0.0089 U	0.0098 U	0.0088 U	0.0076 U	0.0076 U	0.0087 U	--	--	--	--	--	--	--	--	NE	NE
Fluoranthene	0.0076 U	0.0078 U	0.0089 U	0.0089 U	0.0098 U	0.0088 U	0.0076 U	0.0076 U	0.0087 U	--	--	--	--	--	--	--	--	3,200[8]	NE
Fluorene	0.0076 U	0.0078 U	0.0089 U	0.0089 U	0.0098 U	0.0088 U	0.0076 U	0.0076 U	0.0087 U	--	--	--	--	--	--	--	--	3,200[8]	NE
Naphthalene	0.0076 U	0.0078 U	0.0089 U	0.0089 U	0.0098 U	0.0088 U	0.0076 U	0.0076 U	0.0087 U	--	--	--	--	--	--	--	--	5	5
Phenanthrene	0.0076 U	0.0078 U	0.0089 U	0.0089 U	0.0098 U	0.0088 U	0.0076 U	0.0076 U	0.0087 U	--	--	--	--	--	--	--	--	NE	NE
Pyrene	0.0076 U	0.0078 U	0.0089 U	0.0089 U	0.0098 U	0.0088 U	0.0076 U	0.0076 U	0.0087 U	--	--	--	--	--	--	--	--	2,400[8]	NE
cPAHs[5] (mg/kg)																			
Benzo (a) anthracene (TEF 0.1)	0.0076 U	0.0078 U	0.0089 U	0.0089 U	0.0098 U	0.0088 U	0.0076 U	0.0076 U	0.0087 U	--	--	--	--	--	--	--	--	MTCA ULU cleanup level for the sum of all cPAHs is 0.1 mg/kg	Reuse Criteria for the sum of all cPAHs is 0.1 mg/kg
Benzo (a) pyrene (TEF 1)	0.0076 U	0.0078 U	0.0089 U	0.0089 U	0.0098 U	0.0088 U	0.0076 U	0.0076 U	0.0087 U	--	--	--	--	--	--	--	--		
Benzo (b) fluoranthene (TEF 0.1)	0.0076 U	0.0078 U	0.0089 U	0.0089 U	0.0098 U	0.0088 U	0.0076 U	0.0076 U	0.0087 U	--	--	--	--	--	--	--	--		
Benzo (J,k) fluoranthene (TEF 0.1)	0.0076 U	0.0078 U	0.0089 U	0.0089 U	0.0098 U	0.0088 U	0.0076 U	0.0076 U	0.0087 U	--	--	--	--	--	--	--	--		
Chrysene (TEF 0.01)	0.0076 U	0.0078 U	0.0089 U	0.0089 U	0.0098 U	0.0088 U	0.0076 U	0.0076 U	0.0087 U	--	--	--	--	--	--	--	--		
Dibenz (a,h) anthracene (TEF 0.1)	0.0076 U	0.0078 U	0.0089 U	0.0089 U	0.0098 U	0.0088 U	0.0076 U	0.0076 U	0.0087 U	--	--	--	--	--	--	--	--		
Indeno (1,2,3-cd) pyrene (TEF 0.1)	0.0076 U	0.0078 U	0.0089 U	0.0089 U	0.0098 U	0.0088 U	0.0076 U	0.0076 U	0.0087 U	--	--	--	--	--	--	--	--		
Total TTEC of cPAHs (detect only)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	--	--	--	--	--	--	--	--	0.1	0.1

Boring/Test Pit	2D-B1	2D-B1	2D-B2	2D-B2	2D-B3	2D-B3	2D-B4	2D-B5	2D-B5	JS-MW3S	JS-MW3S	JS-MW3S	JS-MW3S	JS-MW3S	JS-MW3S	JS-MW3S	JS-MW3S	MTCA Method A ULU Cleanup Level	Reuse Criteria[10]
Sample Identification[2]	2D-B1-0-1	2D-B1-8-9	2D-B2-0-1	2D-B2-4-5	2D-B3-0-1	2D-B3-11-12	2D-B4-0-1	2D-B5-0-1	2D-B5-6-7	JS-MW3S-8-9	JS-MW3S-10.5-11.5	JS-MW3S-12-12.5	JS-MW3S-13-14	JS-MW3S-18-19	JS-MW3S-21-22	JS-MW3S-23-24	JS-MW3S-24-25		
Sample Depth (feet bgs)	0 to 1	8 to 9	0 to 1	4 to 5	0 to 1	11 to 12	0 to 1	0 to 1	6 to 7	8 to 9	10.5 to 11.5	12 to 12.5	13 to 14	18 to 19	21 to 22	23 to 24	24 to 25		
Soil Type	Fill	Qvi	Fill	Qvi	Fill	Qvi	Fill	Fill	Qvi	Qvi	Qvi	Qvi	Qvi	Qvi	Qvi	Qvi	Silt		
Metals[6] (mg/kg)																			
Arsenic	11 U	12 U	13 U	13 U	15 U	13 U	11 U	11 U	13 U	--	--	--	--	--	--	--	--	20	7
Barium	**78**	**66**	**120**	**170**	**150**	**120**	**65**	**94**	**130**	--	--	--	--	--	--	--	--	16,000[8]	NE
Cadmium	0.57 U	0.59 U	0.67 U	0.66 U	0.74 U	0.66 U	0.57 U	0.57 U	0.65 U	--	--	--	--	--	--	--	--	2.0	1.0
Chromium	**49**	**30**	**55**	**130**	**53**	**43**	**43**	**32**	**57**	--	--	--	--	--	--	--	--	2,000[9]	48[11]
Lead	5.7 U	5.9 U	6.7 U	**6.8**	7.4 U	6.6 U	5.7 U	5.7 U	6.5 U	--	--	--	--	--	--	--	--	250	50
Mercury	0.29 U	0.29 U	0.34 U	0.33 U	0.37 U	0.33 U	0.28 U	0.29 U	0.33 U	--	--	--	--	--	--	--	--	2.0	0.07 or DET
Selenium	11 U	12 U	13 U	13 U	15 U	13 U	11 U	11 U	13 U	--	--	--	--	--	--	--	--	400[8]	NE
Silver	1.1 U	1.2 U	1.3 U	1.3 U	1.5 U	1.3 U	1.1 U	1.1 U	1.3 U	--	--	--	--	--	--	--	--	400[8]	NE

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc., of Redmond, Washington.

[2] Sample ID = Area number - boring/test pit number - starting depth of sample [feet bgs] -end depth [feet bgs], Area 2D Boring 1 collected 8-9 feet bgs = 2D-B1-8-9.

[3] Washington State Department of Ecology (Ecology)-approved method NWTPH-HCID.

[4] VOCs were analyzed by EPA method 8260C. Other VOCs were analyzed but not detected.

[5] Polycyclic aromatic hydrocarbons (PAHs) and carcinogenic PAHs (cPAHs) were analyzed by U.S. Environmental Protection Agency (EPA) method 8270D/SIM.

[6] Resource Conservation Recovery Act (RCRA) metals analyzed by EPA 6000/7000 series method.

[7] MTCA Method A cleanup level for gasoline is 30 mg/kg if benzene is detected or if the sum of toluene, ethylbenzene and xylenes are equal to or greater than 1% of the total gasoline detection.

[8] MTCA Method B criteria represented because MTCA Method A cleanup level has not been established.

[9] MTCA Method A cleanup level for Trivalent Chromium.

[10] Guidance for Remediation of Petroleum Contaminated Sites (Publication 10-09-057) Ecology, October 2011; Summary Natural Background Soil Metals Concentrations in Washington State (Publication 94-115) dated October 1994; and Hazardous Waste Regulations 40 CFR Part 260.

[11] Chromium was not compared to the Reuse Criteria listed above for soils based on historic soil analytical results indicating chromium is not a prevalent chemical of concern on the UWT campus.

mg/kg = milligram per kilogram

MTCA = Model Toxics Control Act

N/A = not applicable

bgs = below ground surface

Qvi = Ice-contact deposit

DET = Detected at concentration greater than laboratory reporting limit

U = Analyte was not detected at or greater than the listed reporting limit

J = Estimated result by the analytical laboratory

TEF = Toxicity Equivalency Factor as defined in WAC 173-340-900 Table 708-2

Total Toxic Equivalent Concentration (TTEC) is the sum of each individual cPAH concentration multiplied by its corresponding TEF.

Bold font type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Bold font type and gray shading indicates that the detected concentration is greater than the respective MTCA cleanup level.

Dashed outline indicates the detected concentration is greater than the Reuse Criteria.

Table 2

Summary of Chemical Analytical Results[1] - Groundwater

Area 2D - Tacoma Paper Supply
Priority Development Areas - University of Washington Tacoma
Tacoma, Washington

Boring Identification	JS-MW3	JS-MW3S	JS-MW3S	Tap Water	MTCA Method A Groundwater Cleanup Level	MTCA Method B Groundwater Screening Levels Protective of Indoor Air [13]
Sample ID [2]	JS-MW3-130625	JS-MW3S-130913	JS-MW3S-140122	WATER-130924		
Sample Date	6/25/2013	9/13/2013	1/22/2014	9/24/2013		
Approximate Depth to Groundwater (feet btoc) [3]	36.52	18.81	18.85	N/A		
Approximate Elevation of Groundwater [4]	52.83	70.05		N/A		
Top of Well Screen Elevation (feet) [4]	50.97	77.36	77.36	N/A		
Bottom of Well Screen Elevation (feet) [4]	35.97	67.36	67.36	N/A		
Lithology At Well Screen	Outwash	Qvi	Qvi	N/A		
NWTPH-Gx[5] (µg/L)						
Gasoline-Range	--	100 U	100 U	100 U	800/1,000[10]	NE
NWTPH-Dx[6] (mg/L)						
Diesel-Range	--	**0.31**	--	0.26 U	0.5	NE
Lube Oil-Range	--	0.43 U	--	0.42 U	0.5	NE
VOCs[7] (µg/L)						
Trichloroethene (TCE)	0.20 U	0.20 U	0.20 U	0.20 U	5	1.5
Tetrachloroethene (PCE)	0.20 U	0.20 U	0.20 U	0.20 U	5	24
(cis) 1,2-Dichloroethene	0.20 U	0.20 U	0.20 U	0.20 U	16[11]	160
(trans) 1,2-Dichloroethene	0.20 U	0.20 U	0.20 U	0.20 U	160[11]	110
Vinyl Chloride	0.10 U	0.20 U	0.20 U	0.20 U	0.2	0.35
Bromodichloromethane	0.20 U	**0.98**	0.20 U	**2.2**	0.71[11]	1.8
Chloroform	0.20 U	**8.7**	**0.28**	**28**	1.41[11]	1.2
Carbon Disulfide	0.20 U	0.20 U	**0.25**	0.20 U	NE	400
Dibromochloromethane	0.20 U	**0.23**	0.20 U	**0.27**	0.52[11]	4.5
PAHs[8] (µg/L)						
Naphthalene	--	0.10 U	--	0.097 U	160	8.9
cPAHs[8] (µg/L)						
Benzo (a) anthracene (TEF 0.1)	--	0.010 U	--	0.0097 U	MTCA ULU cleanup level for the sum of all cPAHs is 0.1 µg/L	NE
Benzo (a) pyrene (TEF 1)	--	0.010 U	--	0.0097 U		
Benzo (b) fluoranthene (TEF 0.1)	--	0.010 U	--	0.0097 U		
Benzo (j,k) fluoranthene (TEF 0.1)	--	0.010 U	--	0.0097 U		
Chrysene (TEF 0.01)	--	0.010 U	--	0.0097 U		
Dibenz (a,h) anthracene (TEF 0.1)	--	0.010 U	--	0.0097 U		
Indeno (1,2,3-cd) pyrene (TEF 0.1)	--	0.010 U	--	0.0097 U		
Total TTEC of cPAHs (detect only)	--	N/A	--	N/A	0.1	NE
Total Metals[9] (µg/L)						
Arsenic	--	3.0 U	--	3.0 U	5	NE
Barium	--	**69**	--	25 U	3,200[11]	NE
Cadmium	--	4.0 U	--	4.0 U	5	NE
Chromium	--	**18**	--	10 U	50[12]	NE
Lead	--	**2.0**	--	3.4	15	NE
Mercury	--	0.50 U	--	0.50 U	2	NE
Selenium	--	5.0 U	--	5.0 U	80[11]	NE
Silver	--	10 U	--	10 U	80[11]	NE

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc. in Redmond, Washington.

[2] Sample ID = Area number - Boring number - Date (i.e., a water sample collected from JS-MW3 on June 25, 2013 = JS-MW3-130625) .

[3] Groundwater level was measured below the top of casing on November 8, 2013

[4] Based on survey completed by AHBL November 6, 2013. Horizontal datum - NAD 83/91 Washington State Plane - South Zone (City of Tacoma Horizontal Control Holding City Monument Numbers 411 and 414). Vertical datum NGVD 29 (brass monument at South 19th and Fawcett Avenue, Elevation 165.15).

[5] Washington State Department of Ecology (Ecology)-approved method NWTPH-Gx.

[6] Ecology-approved method NWTPH-Dx.

[7] Volatile organic compounds (VOCs) were analyzed by U.S. Environmental Protection Agency (EPA) method 8260C. Other VOCs were analyzed but not detected.

[8] Polycyclic Aromatic Hydrocarbons (PAHs) and carcinogenic PAHs (cPAHs) analyzed by EPA method 8270D/SIM.

[9] Metals analyzed by EPA 200.8 or 7470A method.

[10] MTCA Method A cleanup level for gasoline-range petroleum hydrocarbons is 800 µg/L if benzene is present and 1,000 µg/L if benzene is not present.

[11] MTCA Method B criteria represented because MTCA Method A cleanup level has not been established.

[12] MTCA Method A cleanup level for total chromium shown. Cleanup level for hexavalent chromium is 48 µg/L.

[13] MTCA Method B Indoor Air Screening Level from Washington State Deportment of Ecology Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action. Values updated as appropriate to incorporate recent toxicity data.

MTCA = Model Toxics Control Act

-- = Analyte or sample not analyzed. N/A = not applicable Qvi = Ice-contact deposit

µg/L = microgram per Liter mg/L = milligram per Liter Outwash = Advance Outwash deposit

U = Analyte was not detected at or greater than the listed reporting limit

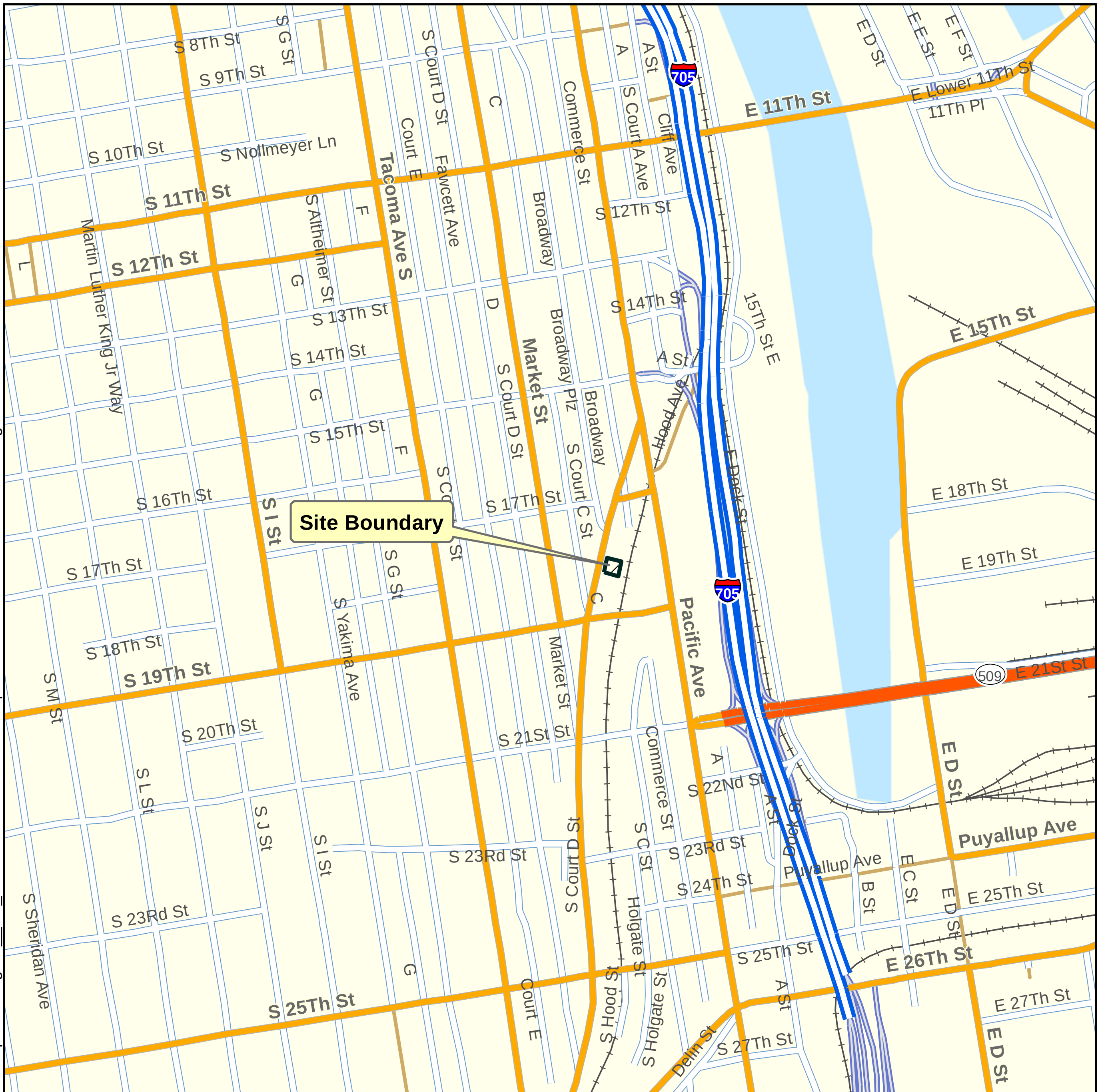
TEF = Toxicity Equivalency Factor as defined in WAC 173-340-900 Table 708-2

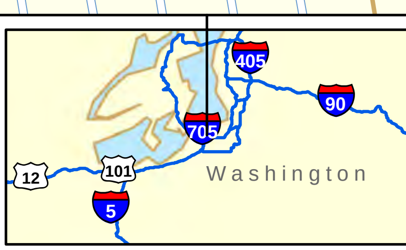
Total Toxic Equivalent Concentration (TTEC) is the sum of each individual cPAH concentration multiplied by its corresponding TEF.

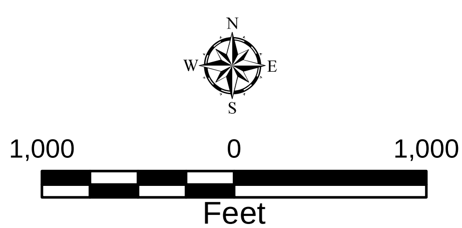
Bold font type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Bold font type and gray shading indicates analyte was detected at a concentration greater than the MTCA Method groundwater cleanup/criteria level.

Dashed outline indicates analyte was detected at a concentration greater than the MTCA Method B Indoor Air Screening Level.







Notes:
CPO = University of Washington Capital Project Office
UWT = University of Washington Tacoma
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
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Data Sources: ESRI Data & Maps

Projection: NAD 1983 UTM Zone 10N

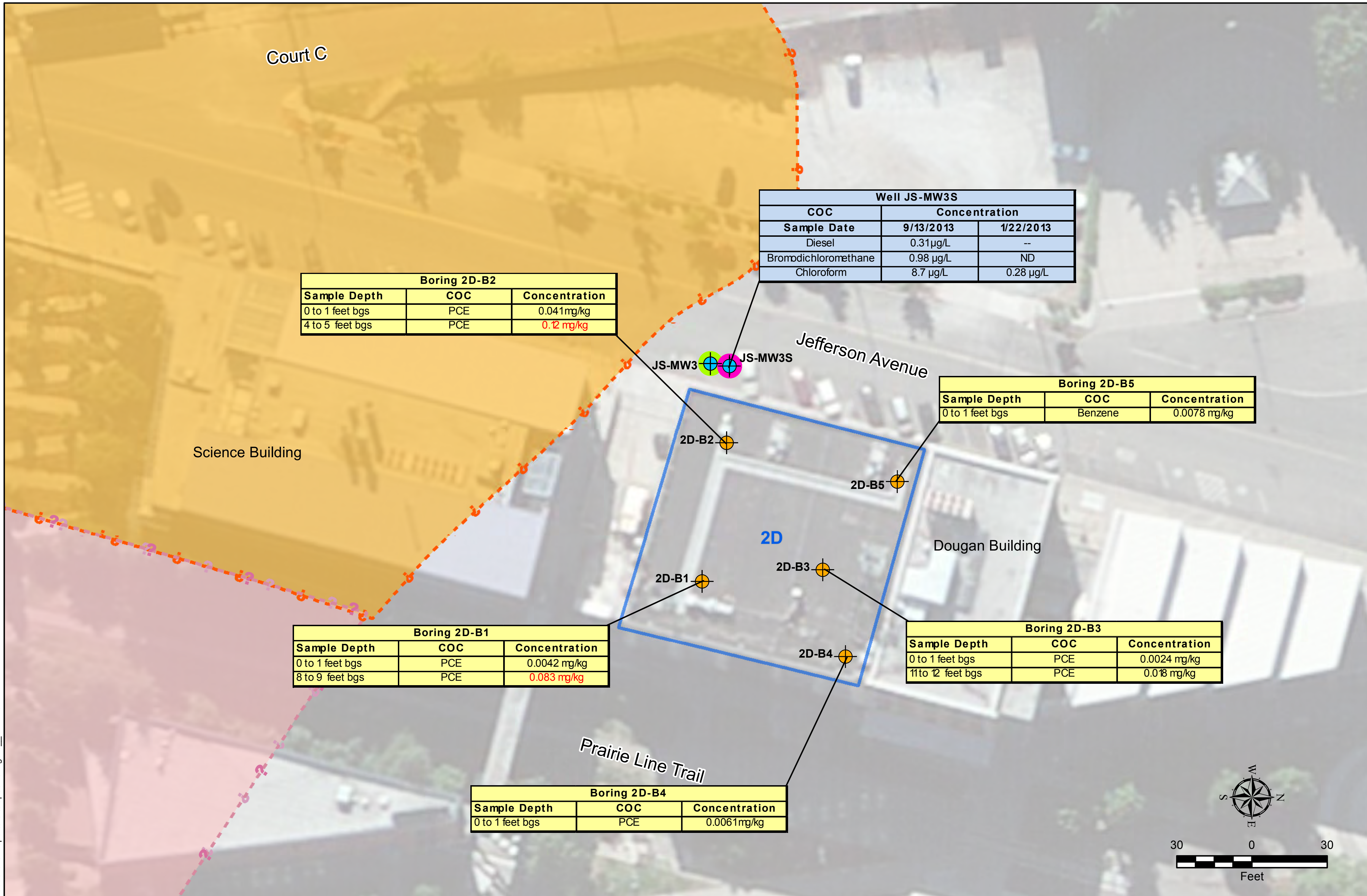
Vicinity Map

UWT Environmental Investigation
Priority Development Areas - CPO Project No. 204277
Tacoma, Washington

GEOENGINEERS

Figure 1

Office: TAC Path: \\tac\projects\0\0183085\GIS\Reports\SiteSpecific\Figure__2D_VM.mxd Map Revised: 19 December 2014 cgonzales



Well JS-MW3S		
COC	Concentration	
Sample Date	9/13/2013	1/22/2013
Diesel	0.31µg/L	--
Bromodichloromethane	0.98 µg/L	ND
Chloroform	8.7 µg/L	0.28 µg/L

Boring 2D-B2		
Sample Depth	COC	Concentration
0 to 1 feet bgs	PCE	0.041mg/kg
4 to 5 feet bgs	PCE	0.12 mg/kg

Boring 2D-B5		
Sample Depth	COC	Concentration
0 to 1 feet bgs	Benzene	0.0078 mg/kg

Boring 2D-B1		
Sample Depth	COC	Concentration
0 to 1 feet bgs	PCE	0.0042 mg/kg
8 to 9 feet bgs	PCE	0.083 mg/kg

Boring 2D-B3		
Sample Depth	COC	Concentration
0 to 1 feet bgs	PCE	0.0024 mg/kg
11 to 12 feet bgs	PCE	0.018 mg/kg

Boring 2D-B4		
Sample Depth	COC	Concentration
0 to 1 feet bgs	PCE	0.0061mg/kg

Soil Results*

Boring 2A-B7		
Sample Depth	COC	Concentration
2.5 to 3.5 feet bgs	Lead	200 mg/kg
2.5 to 3.5 feet bgs	cPAHs	0.64 mg/kg

Groundwater Results*

Well UG-MW13	
COC	Concentration
TCE	110 µg/L
PCE	1.4 µg/L

*Chemicals shown in red were detected at concentrations greater than the respective MTCA Method A cleanup levels.

Only analytical results of the chemicals of concern are shown if detected. Other chemicals that were analyzed and detected are not shown unless detected at concentrations greater than the respective MTCA cleanup levels.

Legend

Approximate Location of Priority Development Area 2D

Approximate Subsurface Location and Identification

Existing Monitoring Well

Direct Push Boring

Sonic Core Boring - Permanent New Monitoring Well

Lithology of Well Screen Interval

Ice-Contact Deposit (Shallow Aquifer)

Advance Outwash (Deep Aquifer)

Approximate Lateral Extent of TCE-Contaminated Groundwater Plume in Deep Aquifer

Approximate Lateral Extent of TCE-Contaminated Groundwater Plume in Not Determined Aquifer

Notes:
-- = Not sampled
UWT = University of Washington Tacoma
cPAHs concentrations shown as TTEC.
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

COC = Chemical of Concern
PDA = Priority Development Area
PCE = tetrachloroethene
TCE = trichloroethene
cPAH = Carcinogenic Polycyclic Aromatic Hydrocarbons
mg/kg = milligram per kilogram
µg/L = microgram per Liter
bgs = Below Ground Surface
DCE = dichloroethene
MCTA = Model Toxics Control Act
ULU = Unrestricted Land Use
ND = Not Detected

Soil MTCA Cleanup/Criteria Levels:
PCE = 0.05 mg/kg (Method A ULU)
TCE = 0.03 mg/kg (Method A ULU)
Benzene = 0.03 mg/kg (Method A ULU)
Vinyl Chloride = 0.67 mg/kg (Method B)
Lube Oil-Range Petroleum Hydrocarbons = 2,000 mg/kg (Method A ULU)
Diesel-Range Petroleum Hydrocarbons = 2,000 mg/kg (Method A ULU)
Gasoline-Range Petroleum Hydrocarbons = 100 mg/kg (Method A ULU)
cPAHs (TTEC) = 0.1 mg/kg (Method A ULU)
Lead = 250 mg/kg (Method A ULU)
Arsenic = 20 mg/kg (Method A ULU)
Cadmium = 2 mg/kg (Method A ULU)
Mercury = 2 mg/kg (Method A ULU)

Groundwater MTCA Cleanup/Criteria Levels:
PCE = 5 µg/L (Method A); 24 µg/L (Indoor Air)
TCE = 5 µg/L (Method A); 1.5 µg/L (Indoor Air)
cis-1,2-DCE= 16 µg/L (Method B); 160 µg/L (Indoor Air)
trans-1,2-DCE = 160 µg/L (Method B); 110 µg/L (Indoor Air)
1,1-DCA = 7.7 µg/L (Method B);11 µg/L (Indoor Air)
Vinyl Chloride = 0.2 µg/L (Method A); 0.35 µg/L (Indoor Air)
Benzene = 5 µg/L (Method A); 2.4 µg/L (Indoor Air)
Lube Oil-Range Petroleum Hydrocarbons = 0.5 mg/L (Method A)
Arsenic = 5 µg/L (Method A)
cPAHs= 0.1 µg/L (Method A)
Bromodichloromethane = 0.71 µg/L (Method B); 0.09 µg/L (Indoor Air)
Chloroform = 80 µg/L (Method B); 1.2 µg/L (Indoor Air)

Site Plan – PDA 2D/Tacoma Paper

UWT Environmental Investigation
Priority Development Areas - CPO Project No. 204277
Tacoma, Washington

GeoEngineers

Figure 2

Path: \\tac\projects\0\0183085\GIS\Reports\SiteSpecific\Figure__2D.mxd
Office: TAC

APPENDIX A
Report Limitations and Guidelines for Use

APPENDIX A
REPORT LIMITATIONS AND GUIDELINES FOR USE[1]

This appendix provides information to help you manage your risks with respect to the use of this report.

Environmental Services are Performed for Specific Purposes, Persons and Projects

This report has been prepared for use by University of Washington. This report is not intended for use by others, and the information contained herein is not applicable to other sites.

GeoEngineers structures our services to meet the specific needs of our clients. For example, an environmental site assessment study conducted for a property owner may not fulfill the needs of a prospective purchaser of the same property. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and project site. No one except University of Washington should rely on this environmental report without first conferring with GeoEngineers. This report should not be applied for any purpose or project except the one originally contemplated.

This Environmental Report is Based on a Unique Set of Project-Specific Factors

This report has been prepared for the Priority Development Areas (PDAs) Environmental Assessment Project at the UW – Tacoma (UWT) campus located in Tacoma, Washington. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, do not rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

If important changes are made after the date of this report, GeoEngineers should be given the opportunity to review our interpretations and recommendations and provide written modifications or confirmation, as appropriate.

Reliance Conditions for Third Parties

If a lending agency or other parties intend to place legal reliance on the product of our services, we require that those parties indicate in writing their acknowledgement that the scope of services provided, and the general conditions under which the services were rendered including the limitation of professional liability, are understood and accepted by them. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions.

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[1] Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

Environmental Regulations are Always Evolving

Some substances may be present in the site vicinity in quantities or under conditions that may have led, or may lead, to contamination of the subject site, but are not included in current local, state or federal regulatory definitions of hazardous substances or do not otherwise present current potential liability. GeoEngineers cannot be responsible if the standards for appropriate inquiry, or regulatory definitions of hazardous substance, change or if more stringent environmental standards are developed in the future.

Subsurface Conditions can Change

This environmental report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by manmade events such as construction on or adjacent to the site, by new releases of hazardous substances, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Always contact GeoEngineers before applying this report to determine if it is still applicable.

Topsoil

For the purposes of this report, we consider topsoil to consist of generally fine-grained soil with an appreciable amount of organic matter based on visual examination, and to be unsuitable for direct support of the proposed improvements. However, the organic content and other mineralogical and gradational characteristics used to evaluate the suitability of soil for use in landscaping and agricultural purposes was not determined, nor considered in our analyses. Therefore, the information and recommendations in this report, and our logs and descriptions should not be used as a basis for estimating the volume of topsoil available for such purposes.

Most Environmental Findings are Professional Opinions

Our interpretations of subsurface conditions are based on field observations and chemical analytical data from widely spaced sampling locations at the site. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ – sometimes significantly – from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

Do Not Redraw the Exploration Logs

Environmental scientists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in an environmental report should never be redrawn for inclusion in other design drawings. Only photographic or electronic reproduction is acceptable, but recognize that separating logs from the report can elevate risk.

Read These Provisions Closely

Some clients, design professionals and contractors may not recognize that the geoscience practices (geotechnical engineering, geology and environmental science) are far less exact than other engineering and natural science disciplines. This lack of understanding can create unrealistic expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory “limitations”

provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you are unclear how these "Report Limitations and Guidelines for Use" apply to your project or site.

Geotechnical, Geologic and Geoenvironmental Reports Should Not Be Interchanged

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually relate any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding a specific project.

Biological Pollutants

GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention, or assessment of the presence of Biological Pollutants in or around any structure. Accordingly, this report includes no interpretations, recommendations, findings, or conclusions for the purpose of detecting, preventing, assessing, or abating Biological Pollutants. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts.

PDA 2E – The Swiss Pub and Frederick Wild

Priority Development Area 2E
The Swiss and Frederick Wild Buildings
Environmental Subsurface Investigation

Environmental Subsurface Investigation Project
UW Capital Project Office Project No. 204277
1904 to 1916 Jefferson Avenue
Tacoma, Washington

for
University of Washington

December 19, 2014

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Priority Development Area 2E
The Swiss and Frederick Wild Buildings
Environmental Subsurface Investigation
UW Capital Project Office
Project No. 204277
1904 to 1916 Jefferson Avenue
Tacoma, Washington

File No. 0183-085-00

December 19, 2014

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Table of Contents

1.0 INTRODUCTION **1**

2.0 SITE HISTORICAL USE. **1**

3.0 CURRENT SITE FEATURES **2**

4.0 ENVIRONMENTAL SUBSURFACE EXPLORATIONS **2**

4.1. Historic Research and Magnetic Anomaly Findings 2
4.2. Soil Borings 2
4.3. Groundwater Sampling – Monitoring Wells 2

5.0 SOIL AND GROUNDWATER CONDITIONS **3**

5.1. Soil Conditions 3
5.2. Groundwater Conditions 3

6.0 CHEMICAL ANALYTICAL PROGRAM **4**

6.1. General 4
6.2. Criteria for Characterization of Soil and Groundwater 4
6.3. Soil 5
6.3.1. Petroleum Hydrocarbons 6
6.3.2. VOCs 6
6.3.3. PAHs 6
6.3.4. RCRA Metals 6
6.4. Groundwater 7
6.4.1. Petroleum Hydrocarbons 7
6.4.2. VOCs 7
6.4.3. PAHs 8
6.4.4. RCRA Metals 8

7.0 CONCLUSIONS **8**

7.1. Soil 8
7.2. Groundwater 8

8.0 PROPOSED DEVELOPMENT PLANS **9**

9.0 POTENTIAL IMPACTS AND MITIGATION MEASURES TO DESIGN AND CONSTRUCTION **9**

9.1. Potential UST 10
9.2. TCE-Contaminated Groundwater 10

10.0 LIMITATIONS **13**

11.0 REFERENCES **13**

LIST OF TABLES

Table 1. Summary of Chemical Analytical Results – Soil
Table 2. Summary of Chemical Analytical Results - Groundwater

LIST OF FIGURES

Figure 1. Vicinity Map
Figure 2. Site Plan – Area 2E/The Swiss and Frederick Wild Buildings
Figure 3. July 2013 Phase II ESA Boring Locations

APPENDICES

Appendix A. Report Limitations and Guidelines for Use

1.0 INTRODUCTION

This report presents the results of our environmental subsurface investigation completed for the University of Washington (UW) at The Swiss and Frederick Wild Buildings (Priority Development Area [PDA] – 2E) located on the UW Tacoma (UWT) campus from 1904 to 1916 Jefferson Avenue in Tacoma, Washington. The Swiss/Frederick Wild Buildings are herein referred to as the "site." The site is bound by Market Street to the west, South 19th Street to the north, Jefferson Avenue to the east and by The Rock Pizza Restaurant to the south. A Vicinity Map of the site is included as Figure 1. See Figure 2 for the layout of the site.

The subsurface investigation was completed under the UWT Environmental Subsurface Investigation Project, UW project number 204277. The site was identified as PDA 2E for this project. This report was completed as a subset of the larger investigation report titled "2013 Environmental Subsurface Investigation – University of Washington-Tacoma, Tacoma, Washington" dated December 19, 2014 to assist with development of the property. This report should be used in context with the overall subsurface investigation report. Boring logs, subsurface investigation methodologies and chemical analytical data packages are included in the larger investigation report.

It is important to recognize that this report provides general impacts and potential mitigation measures that may be employed in design and construction. Additional environmental investigations may be necessary prior to selection of the final mitigation measure. Cost estimates should be refined following additional investigation on the individual sites. The project team should contact UW Environmental Health & Safety (UW EH&S) to discuss the need for further investigations. UW EH&S is the liaison with the Washington State Department of Ecology (Ecology) for review and approval of mitigation measures.

2.0 SITE HISTORICAL USE.

Swiss Building. The Swiss building was constructed in 1918 and was utilized as a meeting hall for the Swiss Society and beer parlor until the 1960s when the building was converted to a tavern. Additionally, building permit records indicate that the Swiss property included a garage on the southern portion in 1937. This former garage area of the Swiss Building is approximately 2 feet higher in elevation than the rest of the building possibly indicating fill may be present. These records also indicate alterations were performed on the garage. An underground heating oil tank could be present near the building due to the building's age although this is not documented by a permit.

Frederick Wild Building. The Frederick Wild Building was constructed as a three-story building between 1896 and 1912. The upper floors contained the Jefferson Hotel which operated the shops below on the Market Street level including an auto school, bake shop, restaurant, paint store and records store.

3.0 CURRENT SITE FEATURES

Two three-story buildings (Swiss Building and Frederick Wild Building) are present on the site as shown on Figure 2. The buildings' first floors are accessible from Jefferson Avenue. The approximate elevation of the first floor is 100 feet. The buildings' second floors are accessible from Market Street. The approximate elevation of the second floor is Elevation 120 feet.

The first floor of the Swiss Building (1904 Jefferson Avenue) houses The Swiss Restaurant & Pub. The second and third floors house various commercial service businesses. The Frederick Wild building is a mixed-used commercial building that is currently vacant.

4.0 ENVIRONMENTAL SUBSURFACE EXPLORATIONS

Four monitoring wells were installed upgradient and downgradient of the site during this investigation. The investigation activities were completed in September 2013.

GeoEngineers performed a Phase II Environmental Site Assessment (ESA) within and adjacent to the Frederick Wild Building in July 2013 for UW during purchase of the property. The Phase II ESA consisted of magnetic/ground penetrating radar (M/GPR) survey, nine direct-push borings, one soil sample collected within a sump, and two groundwater samples collected from temporary wells. The chemical analytical results for the Phase II ESA are discussed in this report. The boring locations are shown on Figures 2 and 3.

4.1. Historic Research and Magnetic Anomaly Findings

Historic research results indicated the potential for USTs to be present at the site given the age of the two buildings and the source of heat typically used during the time period. While the recent and current use of the buildings is primarily commercial, the Frederick Wild Building served as a hotel, and the Swiss building functioned as a meeting hall and a tavern in the course of its history.

An M/GPR survey was performed in July 2013 to further investigate the presence of potential USTs in and adjacent to the Frederick Wild building during the Phase II ESA. An M/GPR survey was not completed within the Swiss Building. The survey identified three magnetic anomalies as shown on Figure 3. Two magnetic anomalies were located along the Jefferson Avenue sidewalk. One anomaly was observed in the interior of the building at 1914 Jefferson Avenue.

4.2. Soil Borings

Ten direct-push borings (B1 through B10) were completed at the site in July 2013. Eight of the borings were installed within the basement area of the Frederick Wild building. Two borings were collected outside the building in the areas of the detected magnetic anomalies on Jefferson Avenue. The maximum depth of the direct-push borings was approximately 12 feet below ground surface (bgs).

4.3. Groundwater Sampling – Monitoring Wells

Groundwater samples were collected from two temporary groundwater wells (borings B2 and B8) installed during the Phase II ESA. Groundwater samples were also collected from two pairs of monitoring wells located east of the site/downgradient (JS-MW6S and JS-MW6D) and two monitoring wells located west/upgradient of the site (UG-MW30S and UG-MW30D). The samples were collected between July and September 2013. The locations of the wells are shown on Figure 2.

The temporary wells installed inside the Frederick Wild building and two permanent off site wells (UG-MW30S and JS-MW6S) were screened in the shallow aquifer. Two permanent off site wells were also screened in the deep aquifer (UG-MW30D and JS-MW6D).

Table 2 shows the approximate well screen elevations and depths for groundwater sample collection.

5.0 SOIL AND GROUNDWATER CONDITIONS

5.1. Soil Conditions

Subsurface conditions consisted primarily of ice-contact deposits, silt layer and the advance outwash. The fill consists of fine to coarse sand and fine gravel (from below the surface to a depth of approximately 2 feet bgs. Native soil conditions underlying the fill consist of glacially consolidated ice-contact deposits. The ice-contact deposits consisted of silty gravel with sand in all nine borings. A layer of gray silt was observed beneath the ice-contact deposits in the monitoring wells completed during this investigation. Advance outwash, consisting of gravel with sand and silt or silt with sand was observed beneath the silt layer.

5.2. Groundwater Conditions

It appears that groundwater conditions observed consist of a shallow (ice-contact deposits) and deep aquifers (advance outwash) to the depths explored during this investigation. The shallow and deep aquifers appear to be separated by a silt layer located between the ice-contact deposits and advance outwash.

Groundwater within the shallow aquifer appears to be present within the sand and gravel seams the ice-contact deposits. The hydraulic connection of the sand seams within the shallow aquifer is unknown in and around the project site. Within the limited understanding provided by the two well pairs installed to the west and east of the site, groundwater within the deep aquifer appears to be continuous with interbeds of moist to wet silt at depth.

Groundwater depth of the shallow aquifer varied from 2.5 to approximately 4.5 feet bgs in the temporary wells. The estimated groundwater elevation on the site based on mapped groundwater elevation contour is approximately 105 feet on the west side of the site to approximately 95 feet on the east side of the site.

Groundwater depth of the deep aquifer ranges from approximately 6 to 19 feet bgs across the site between UG-MW30D and JS-MW6D. The estimated groundwater elevation on the site based on mapped groundwater elevation contour is approximately 95 feet on the west side of the site to approximately 85 feet on the east side of the site. The deep aquifer appears in a confined condition. Groundwater levels will vary depending on season, precipitation and other factors.

6.0 CHEMICAL ANALYTICAL PROGRAM

6.1. General

Soil and groundwater samples were submitted to OnSite Environmental, Inc., in Redmond, Washington for chemical analysis. The chemical analytical data are summarized in Tables 1 and 2. Chemicals that were not detected at or greater than the laboratory reporting limits in the analyzed samples are typically not included on the tables.

6.2. Criteria for Characterization of Soil and Groundwater

The following criteria were used to evaluate impacted and contaminated soil and groundwater.

- Tetrachloroethene (PCE), Trichloroethene (TCE) Impacted or Contaminated Soil
  - PCE, TCE and breakdown products at concentrations detected in the analyzed soil samples.
- Contaminated Soil
  - Petroleum hydrocarbons, carcinogenic polycyclic aromatic hydrocarbons (cPAHs), metals and volatile organic compounds (VOCs) detected at concentrations greater than the Model Toxics Control Act (MTCA) Method A Unrestricted Land Use (ULU) cleanup level or MTCA B screening level.
- Impacted Soil

  Some contaminants were detected at concentrations less than the respective MTCA cleanup levels. UWT may be able to reuse certain types of soil depending on the sampling results. UW EH&S must review the chemical analytical data to determine if reuse or disposal at an offsite facility is necessary. Soil reuse and disposal are subject to Ecology Guidance for Remediation of Petroleum Contaminated Sites (Ecology, 2011), solid waste regulations and disposal facility permit conditions. The criteria below is herein referred to as "Reuse Criteria."

  - Petroleum hydrocarbons, cPAHs and/or Lead

    The Ecology guidance indicates that soil with diesel- and/or lube oil-range petroleum hydrocarbons detected at concentrations less than 200 milligrams per kilogram (mg/kg) and/or gasoline-range petroleum hydrocarbons detected at concentrations less than 30 mg/kg are suitable for reuse as commercial fill at UWT campus with the following limitations:

    - placed above the highest water table,
    - not within 100 feet of a drinking water well,
    - not within wellhead protection area of public water supply,
    - not within wetlands or where surface water contact is possible, and
    - not within a surface water infiltration facility or septic drain field.

    If the concentrations exceed the above limits but are still less than respective MTCA cleanup levels the soil may be reused in road and bridge embankment construction, landfill daily cover or asphalt manufacturing with UW EH&S approval.

  - Arsenic, Cadmium, and/or Mercury

    Soil with concentrations of arsenic, cadmium and/or mercury above what is normally found in the natural background environment (Puget Sound Background levels - Ecology, 1994) is typically suitable for disposal at an inert waste landfill or a Department of Natural Resources (DNR) reclamation pit. UW EH&S approval is necessary.

    Soil at and near the UWT campus has been well documented to contain chromium at concentrations slightly above the natural background level and is not considered in the "Reuse Criteria."

- Contaminated Groundwater
  - Petroleum hydrocarbons, PAHs and metals detected at concentrations greater than the respective MTCA Method A groundwater cleanup levels. Method B criteria were used for comparison of specific compounds if Method A groundwater cleanup levels are not established for those compounds.
  - VOCs detected at concentrations greater than the respective MTCA Method A groundwater cleanup levels, and MTCA Method B groundwater screening levels protective of indoor air. The updated TCE/PCE screening levels were calculated using Equation 1 from Ecology's review draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action" dated October 2009 (Ecology, 2009) and Environmental Protection Agency's (EPA's) TCE and PCE toxicity factors updated in 2011 and available on EPA's online Integrated Risk Information System (IRIS). The other values were obtained from Ecology's review draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action."

6.3. Soil

Soil samples were collected from the soil borings during the Phase II ESA and this investigation. Samples were identified using the following identification system: A#-B#-start depth-end depth, where A# is the area designation number, B# is the boring and start depth-end depth is the depth interval in feet below the ground of specific sample (e.g., 2E-B1-5-6 was collected in Area 2E from boring B2 from 5 to 6 feet bgs).

Soil samples were submitted for chemical analysis based on the following criteria:

- Where field screening indicated the soil is impacted.
- Directly below potentially impacted soil to delineate the vertical extent.
- Where wet sand seams were encountered within the glacial drift.
- At the soil/groundwater interface if groundwater was encountered.
- At the top of confining units if encountered.

The soil samples were submitted for chemical analysis of petroleum hydrocarbon identification by Ecology-approved method NWTPH-HCID, VOCs by Environmental Protection Agency (EPA) method 8260C, polycyclic aromatic hydrocarbons (PAHs) by EPA method 8270DSIM, and Resource

Conservation and Recovery Act (RCRA) metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver) by EPA method 6000/7000 series.

6.3.1. Petroleum Hydrocarbons

Lube oil-range petroleum hydrocarbons were detected at a concentration greater than the MTCA Method A ULU cleanup level (2,000 mg/kg) in sump sample B9-SUMP with a concentration of 6,200 mg/kg. Lube oil-range petroleum hydrocarbons were detected at a concentration less than the MTCA Method A ULU cleanup level and the Ecology Reuse Criteria of 200 mg/kg in soil sample B10-0-1 (74 mg/kg). Lube oil-range petroleum hydrocarbons were not detected in the remaining analyzed soil samples.

Diesel-range petroleum hydrocarbons were detected at a concentration greater than the MTCA Method A ULU cleanup level (2,000 mg/kg) in the sump sample B9-SUMP with a concentration of 5,100 mg/kg. Diesel-range petroleum hydrocarbons were not detected in the remaining analyzed soil samples.

Gasoline-range petroleum hydrocarbons were not detected in the analyzed soil samples.

6.3.2. VOCs

VOCs were either not detected or were detected at concentrations less than the MTCA Method A ULU cleanup level in the analyzed soil samples.

6.3.3. PAHs

CPAHs were detected at concentrations (total toxicity equivalent concentration [TTEC]) greater than the MTCA Method A ULU cleanup level (0.1 mg/kg) in soil samples B2-0-1 (0.13 mg/kg), B5-0-1 (0.40 mg/kg), B7-0-1 (0.42 mg/kg), B9-SUMP (8.05 mg/kg) and B10-0-1 (1.22 mg/kg). CPAHs were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup level in the remaining analyzed soil samples.

PAHs were either not detected or were detected at concentrations less than the respective MTCA Method ULU cleanup level or Ecology Reuse Criteria in the analyzed soil samples.

6.3.4. RCRA Metals

Arsenic, cadmium, lead, and/or mercury were detected at concentrations greater than their respective MTCA Method A ULU cleanup levels in soil sample B9-SUMP and B10-0-1. Other metals were either not detected or were detected at concentrations less than the MTCA Method A ULU cleanup level in this sample. The analytical result and corresponding MTCA Method A ULU cleanup level for each metals exceedance in samples B9-SUMP and B10-0-1 are listed below with the actual concentrations in parenthesis.

- B9-SUMP
    - Arsenic MTCA A = 20 mg/kg (32 mg/kg)
    - Cadmium MTCA A = 2 mg/kg (10 mg/kg)
    - Lead MTCA A = 250 mg/kg (7,100 mg/kg)
    - Mercury MTCA A = 2 mg/kg (3.1 mg/kg)

- Sample B10-0-1
    - Lead MTCA A = 250 mg/kg (2,200 mg/kg)
    - Mercury MTCA A = 2 mg/kg (2.3 mg/kg)

Sample B10-01 and B9-SUMP were also analyzed for Toxicity Characteristic Leaching Procedure (TCLP) lead. TCLP lead was detected at concentration (16 milligrams per liter [mg/L]) greater than the hazardous waste criteria (5 mg/L) in soil sample B10-0-1 indicating the soil is characterized as a hazardous waste. TCLP lead was detected at concentration (2.4 mg/L) less than the hazardous waste criteria (5 mg/L) in the B9-SUMP soil sample. Other metals were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup level or Method B criteria in these samples.

Other RCRA metals were either not detected or were detected at concentrations less than the respective MTCA Method A cleanup levels, Method B ULU criteria, or the Reuse Criteria in the other analyzed soil samples.

6.4. Groundwater

Groundwater samples were collected from the two temporary wells within the Frederick Wild Building and two permanent monitoring well pairs upgradient and downgradient of the site for chemical analysis. The groundwater samples collected from the wells were identified using the following identification system: WELL-ID-yymmdd, where WELL-ID is the well identification number and yymmdd is the date when the sample was collected (e.g., UG-MW30S-130715 was collected from monitoring well UG-MW30S on July 15, 2013). All groundwater samples were submitted for chemical analysis of VOCs by EPA method 8260C. Select groundwater samples were submitted for chemical analysis of petroleum hydrocarbon identification by NTWPH-HCID, diesel- and lube oil-range petroleum hydrocarbons by NWTPH-Dx, gasoline-range petroleum hydrocarbons by NWTPH-Gx, PAHs by EPA method 8270DSIM.

The groundwater samples were submitted for chemical analysis of petroleum hydrocarbon identification by Ecology-approved method NWTPH-HCID, VOCs by Environmental Protection Agency (EPA) method 8260C, polycyclic aromatic hydrocarbons (PAHs) by EPA method 8270DSIM, and Resource Conservation and Recovery Act (RCRA) metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver) by EPA method 6000/7000 series, metals by EPA method 200.8 or 7470A. The chemical analytical data for groundwater are described below and summarized in Table 2.

6.4.1. Petroleum Hydrocarbons

Gasoline-, diesel- and lube oil-range petroleum hydrocarbons were either not detected or detected at concentrations less than the respective MTCA Method A groundwater cleanup levels in the analyzed groundwater samples.

6.4.2. VOCs

SHALLOW AQUIFER

TCE was detected at a concentration greater than the MTCA Method A groundwater cleanup level (5 micrograms per liter [µg/L]) in sample UG-MW30S-130715 (130 µg/L). TCE was detected at a concentration less than MTCA Method A cleanup level but greater than the MTCA Method B groundwater screening levels protective of indoor air (1.5 µg/L) in sample B2-W (2.1 µg/L). TCE was not detected in the other analyzed groundwater samples.

Other VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A cleanup levels or Method B criteria in the remaining analyzed groundwater samples.

DEEP AQUIFER

TCE was also detected at a concentration of 2.8 µg/L in groundwater sample JS-MW6D. This detected concentration of TCE is greater than the MTCA Method B groundwater screening levels protective of indoor air (1.5 µg/L) but less than the MTCA Method A ULU cleanup level (5 µg/L). TCE was either not detected or was detected at concentrations less than the respective MTCA cleanup levels in the remaining analyzed groundwater samples.

Other VOCs were not detected in any of the other analyzed groundwater samples.

6.4.3. PAHs

2-Methylnaphthalene was reported at 1.5 µg/L in groundwater sample B8-W. This detected result is equal to the MTCA Method B groundwater criteria (1.5 µg/L). Other PAHs or cPAHs were either not detected or were detected at concentrations less than the respective groundwater cleanup levels in the analyzed groundwater samples.

6.4.4. RCRA Metals

RCRA metals were either not detected or were detected at concentrations less than the respective MTCA Method A cleanup levels or Method B criteria in the analyzed groundwater samples.

7.0 CONCLUSIONS

Soil and groundwater samples were collected for chemical analysis to evaluate potential impacts to development.

7.1. Soil

Metals- and petroleum hydrocarbon-contaminated soil is limited in extent beneath the Frederick Wild Building to the areas of the sump location and the nearby shallow soil (0 to 1 feet bgs) in the area of boring B10. However, cPAHs-contaminated soil was present from the ground surface to 1 foot bgs throughout the entire southwestern portion of the building.

The soil conditions within the Swiss building are not known because sampling was not completed within the building. The elevation of the finished floor on the southern portion of the building is approximately 1 foot higher than the remainder of the building. This elevation difference could be an indication that fill was placed beneath the building during development. The conditions of the potential fill are not known.

7.2. Groundwater

TCE-contaminated groundwater is present in the shallow and deep aquifers on the site as shown on Figure 2. The estimated elevation of the shallow aquifer varies from approximately 105 feet on the west side of the site to approximately 95 feet on the east side of the site. The estimated elevation of the deep aquifer is between approximately 95 on the west side to 85 feet on the east side of the site.

The TCE appears to originate from an upgradient source based on the soil and groundwater chemical analytical results. PDA 2E is situated near the eastern downgradient portion of the Westerly Contaminant Groundwater Plume, which is comprised primarily of TCE. The identified historical property uses at the site are unlikely to be the source of TCE and PCE contamination based on information reviewed to date. However, the actual source is unknown at the time of this report.

8.0 PROPOSED DEVELOPMENT PLANS

We understand UWT plans to complete seismic upgrades to the existing buildings. The upgrades may require new footings and shear walls. A new elevator and utilities may also be included in the redevelopment. Improvements will also include tenant upgrades. The excavation is anticipated to be limited to Elevation 95 feet. It is anticipated minimal soil will be excavated from the site. The estimated amount of soil to be removed from the building is 750 tons.

9.0 POTENTIAL IMPACTS AND MITIGATION MEASURES TO DESIGN AND CONSTRUCTION

We recommend UW develop and implement appropriate administrative institutional controls to limit or prohibit activities that may result in exposure to hazardous substances remaining at the site. Potential impacts to the design and construction of the site are the following:

- Potential USTs.
- TCE-contaminated groundwater is present in the shallow and deep aquifers.
- Soil is contaminated and impacted with chemicals of concern (metals, petroleum hydrocarbons and cPAHs).

Potential long-term impacts include:

- Long-term disposal of underslab TCE-impacted groundwater.
- Continued maintenance of vapor intrusion mitigation system, if necessary.
- Potential periodic indoor air sampling to confirm the vapor intrusion mitigation system may be necessary to evaluate the system is operating properly, if necessary.
- TCE-contaminated or TCE-impacted soil may remain adjacent and beneath the building following construction activities. UW should develop and implement appropriate institutional controls to help prevent exposure to residual contamination.

The following sections describe potential impacts, mitigation measures and estimated costs to design and construction.

9.1. Potential UST

Three magnetic anomalies were identified in the Frederick Wild Building. A former UST may be present within the Swiss Building based on historical records. For budgeting purposes one UST removal was anticipated. However, the location of the UST is unknown. The estimated costs to remove the heating oil UST is $10,000 to $20,000.

9.2. TCE-Contaminated Groundwater

TCE was detected in groundwater at concentrations greater than the MTCA Method A groundwater cleanup level and/or updated MTCA Method B groundwater screening level protective of indoor air in the shallow and deep aquifers located on or near the site.

TCE-contaminated shallow aquifer groundwater may be encountered during construction based on the elevation of the groundwater of the shallow aquifer (Elevation 105 to 95 feet) and the position of the buildings (Elevation 95). Groundwater in the deep aquifer is anticipated to be at Elevation 85 to 95 feet. Therefore the deep aquifer may be encountered during construction. Mitigation measures include:

Additional Investigation. Further subsurface investigation may be necessary to evaluate the vertical and lateral limits of the TCE-impacted soil and/or groundwater at the site. Soil vapor sampling is recommended to evaluate if a potential vapor intrusion pathway exists. The estimated cost for soil vapor sampling and additional investigation is $20,000 to $30,000.

Vapor Mitigation. Vapor intrusion occurs when VOCs migrate from contaminated soil or groundwater into overlying buildings through openings in the foundation. The route VOCs take from a subsurface source to the air inside a building is referred to as the vapor intrusion pathway. The most common sources of soil vapor are VOCs including TCE and PCE, which may pose short-term (TCE only) and long-term (chronic) risks through inhalation of contaminated indoor air.

Groundwater and soil vapor concentrations are typically utilized as screening levels regarding the potential for vapor intrusion. TCE was detected at a concentration that exceeds the screening level for updated MTCA Method B groundwater screening level protective of indoor air in the groundwater samples collected from temporary well B2-W and monitoring well UG-MW30S and screened within the shallow aquifer. TCE-contaminated groundwater in the shallow aquifer may be present beneath the building as shown on Figure 2.

TCE-contaminated groundwater is present in the deep aquifer on the site based on TCE detections in groundwater in wells in the area. The TCE concentrations in the deep aquifer represent a lesser concern for vapor intrusion because the depth of the groundwater, the presence of the shallow aquifer and silt layer (confining to semi-confining) may preclude a contaminant pathway to the surface.

Soil vapor sampling was not completed as part of this investigation. Additional on-site characterization may be necessary to evaluate the vertical and lateral limits of the TCE-contaminated impacted soil vapors. Soil vapor sampling is recommended near the elevation of the proposed subgrade to evaluate if a potential vapor intrusion pathway exists. If a potential vapor intrusion pathway exists, then a vapor intrusion mitigation system may be necessary. Potential mitigation options to prevent vapor intrusion include:

- A passive vapor barrier beneath the building. Passive vapor barriers are typically used in combination with another mitigation option (venting or building pressurization). We recommend the vapor barrier be installed below the elevation of penetrations (pipes, etc.) that may be installed after the programing is identified in the future. Penetrating the vapor barrier following the construction will add to the cost of construction.
- Passive or active venting system beneath the building. The venting system may need to be combined with an underslab and perimeter drain to reduce the potential for shallow groundwater to enter the venting system.
- Depressurization or pressurization of subslab soil to prevent vapors from entering existing buildings.
- Pressurization of the building with building air circulation system.

The estimated cost for design and installation of indoor air mitigation system ranges between $5 per square foot to $12 per square foot of building space. The estimated costs for the vapor mitigation system for a building on the entire site varies between $57,500 and $138,000. Potential periodic indoor air sampling to confirm the vapor intrusion mitigation system may be necessary to evaluate the system is operating properly following construction of the building. The estimated cost for long-term monitoring is unknown.

Underslab/Footing Drainage. Full removal of the slab is not planned as part of this project, therefore it will be difficult to install an underslab/footing drainage system to be used to prevent water from entering into the vapor mitigation vent system. No underslab footing drain costs are assumed for this site.

Construction Water Management. Because it is unlikely that TCE-contaminated groundwater will be encountered during building renovation activities, additional monitoring or removal actions are not deemed necessary. No construction water management costs are assumed for this site.

Cross-Contamination. It does not appear the proposed renovations will cut through the silt layer that is a semi-confining to confining unit for the shallow and deep aquifers. TCE-contaminated groundwater also appears to be present in the shallow and deep aquifers.

Additional investigation would be necessary in order to evaluate the potential for cross-contamination between the two aquifers. This investigation could be completed in concurrence with the additional investigation to evaluate the lateral and vertical extent of the contamination. However, it appears that cross-contamination between the two aquifers is likely not warranted at this site. For budgeting purposes, additional construction cost is estimated to be between $5,750 and $34,500 if cross-contamination is identified as an impact.

Health and Safety. Workers who may be in contact with potentially contaminated soil or groundwater at a state-listed cleanup site have HAZWOPER training. The requirement is consistent with the Washington Administrative Code (WAC) 296-843-100, Hazardous Waste Operations, which indicates that on-site personnel are required to have current health and safety training in accordance with

Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response requirements in 29 CFR 1910.120. The rule also requires the earthwork contractor and other personnel who could potentially contact contaminated materials to develop and implement a written safety and health program for their employees involved in hazardous waste operations under 29 CFR 1910.120. The estimated cost for the contractor to be HAZWOPER trained and have appropriate liability insurance is roughly between $10,000 and $70,000 depending on the number of subcontractors that require training, and the contractor markup factor.

SOIL IS CONTAMINATED WITH CHEMICALS OF CONCERN

Contaminated soil (metals and cPAHs) and impacted soil (TCE, petroleum, metals and cPAHs) will likely be generated during construction activities. We recommend UW implement the following actions.

- Characterize Soil and Groundwater for Disposal. In-situ characterization or stockpiling and subsequent sampling will need to be performed on soil that is generated during construction in areas of TCE-impacted, metals-/cPAHs-contaminated and petroleum- and metals-/cPAHs-impacted soil. The estimate cost of the soil sampling for soil disposal is $10,000 to $15,000 based on the mass of soil to be excavated.

- PCE and TCE-Impacted and Contaminated Soil. When PCE and TCE and breakdown products are detected in soil, UW EH&S will work with Ecology on obtaining a "contained-in determination" for disposal of the waste. The source of the solvent contamination, the concentration of the solvents and a TCLP analytical test result will be used when evaluating if the soil is disposed as hazardous waste by UW EH&S at a RCRA permitted Subtitle C landfill or as a solid waste at a UW-approved Subtitle D landfill. Past experience has demonstrated that it is fairly likely that the "contained-in determination" will be granted, thus we based our cost estimates on this assumption.

  The estimated cost to transport and dispose (not including excavation and loading) soil at a Subtitle D landfill with a contained-in determination is $80 to $100 per ton. The typical cost for transportation and disposal (not including excavation and loading) of soil at a RCRA Subtitle C Landfill is $250 to $300 per ton. The cost estimates provided in this report assume disposal at a Subtitle D landfill.

  The estimated mass of TCE-contaminated and impacted soil is approximately 250 tons. The estimated cost for transportation and disposal of the TCE-contaminated and impacted soil is between $20,000 and $25,000.

- Lead and cPAHs-Contaminated Soil. CPAHs- and lead-contaminated soil is present in the southern portion of the site to a depth of 1 foot bgs. Soil was not sampled on the northern portion of the site. For budgeting purposes, we have assumed that the remaining soil generated on the site will be metal or cPAHs-contaminated soil. We have also assumed the soil in the area of boring B10-0-1 will not characterize as dangerous waste once the material has been excavated and stockpiled. The contaminated soil will be removed as necessary for construction and required by Ecology. CPAHs- and lead-contaminated soil will be disposed at an UW-approved RCRA permitted Subtitle D landfill. CPAHs- and metals-contaminated soil left in place shall be capped with a building and hardscape as required by Ecology. The estimated cost for transportation and disposal at a RCRA-subtitle D facility is $60 to $80 per ton. We estimate the mass of the lead and cPAHs-contaminated soil to be approximately 500 tons. The estimated cost for transportation and disposal is $30,000 to $40,000.

- **Health and Safety.** As discussed in the contaminated groundwater section, UW requires its earthwork contractor and other personnel who could potentially contact contaminated materials to comply with training requirements for handling soil and potentially groundwater on the site. The health and safety costs are not included as separate item in the soil, because the costs in the groundwater section will apply.

10.0 LIMITATIONS

This report has been prepared for use by the University of Washington for the Priority Development Area 2E – The Swiss and Frederick Wild Buildings located in Tacoma, Washington at the University of Washington Tacoma campus.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

Please refer to Appendix A titled “Report Limitations and Guidelines for Use” for additional information pertaining to use of this report.

11.0 REFERENCES

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Table 1

Summary of Chemical Analytical Results[1] - Soil

Area 2E - The Swiss and Frederick Wild Buildings

Priority Development Areas - University of Washington Tacoma

Tacoma, Washington

Boring	B1			B2		B3		B4	B5		B6	B7		B8		B9	B10		MTCA Method A ULU Cleanup Level	Reuse Criteria[14]
Sample Identification[2]	B1-0-1	B1-5-6	B1-6-7	B2-0-1	B2-5-6	B3-5-6	B3-7-8	B4-5-6	B5-0-1	B5-4-5	B6-0-1	B7-0-1	B7-5-6	B8-0-1	B8-5-6	B9-SUMP	B10-0-1	B10-3-4		
Sample Depth (feet bgs)	0 to 1	5 to 6	6 to 7	0 to 1	5 to 6	5 to 6	7 to 8	5 to 6	0 to 1	4 to 5	0 to 1	0 to 1	5 to 6	0 to 1	5 to 6	0 to 1	0 to 1	3 to 4		
Soil Type	Fill	Qvi	Qvi	Fill	Qvi	Qvi	Qvi	Qvi	Fill	Qvi	Fill	Fill	Qvi	Fill	Qvi	Fill	Fill	Qvi		
NWTPH-HCID[3] (mg/kg)																				
Gasoline-Range	24 U	24 U	--	24 U	--	23 U	22 U	22 U	24 U	--	23 U	24 U	24 U	23 U	24 U	640 U,U1	23 U	23 U	30/100[10]	30
Diesel-Range	59 U	60 U	--	59 U	--	57 U	55 U	56 U	59 U	--	58 U	60 U	59 U	58 U	61 U	DET	59 U	58 U	2,000	200
Lube Oil-Range	120 U	120 U	--	120 U	--	120 U	110 U	110 U	120 U	--	120 U	120 U	120 U	120 U	120 U	DET	DET	120 U	2,000	200
NWTPH-Dx[4] (mg/kg)																				
Diesel-Range Petroleum Hydrocarbons	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5,100	29 U	--	2,000	200
Lube Oil-Range Petroleum Hydrocarbons	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	6,200	74	--	2,000	200
VOCs[5] (mg/kg)																				
Tetrachloroethene (PCE)	0.00080 U	0.00098 U	0.00076 U	0.0010 U	0.00081 U	0.00081 U	0.00075 U	0.00087 U	0.00089 U	--	0.00079 U	0.0012 U	0.00076 U	0.00098 U	0.00079 U	0.0024 U	0.0015 U	0.00080 U	0.05	DET
Trichloroethene (TCE)	0.00080 U	0.00098 U	0.00076 U	0.0010 U	0.00081 U	0.00081 U	0.00075 U	0.00087 U	0.00089 U	--	0.00079 U	0.0012 U	0.00076 U	0.00098 U	0.00079 U	0.0024 U	0.0015 U	0.00080 U	0.03	DET
cis-1,2-Dichloroethene	0.00080 U	0.00098 U	0.00076 U	0.0010 U	0.00081 U	0.00081 U	0.00075 U	0.00087 U	0.00089 U	--	0.00079 U	0.0012 U	0.00076 U	0.00098 U	0.00079 U	0.0024 U	0.0015 U	0.00080 U	160[11]	DET
Trans-1,2-Dichloroethene	0.00080 U	0.00098 U	0.00076 U	0.0010 U	0.00081 U	0.00081 U	0.00075 U	0.00087 U	0.00089 U	--	0.00079 U	0.0012 U	0.00076 U	0.00098 U	0.00079 U	0.0024 U	0.0015 U	0.00080 U	1,600[11]	DET
Vinyl Chloride	0.0010 U	0.0013 U	0.00099 U	0.0010 U	0.0010 U	0.0011 U	0.00097 U	0.0011 U	0.0012 U	--	0.0010 U	0.0016 U	0.00076 U	0.0013 U	0.0010 U	0.0032 U	0.0020 U	0.0010 U	0.67[11]	DET
Benzene	0.00080 U	0.00098 U	0.00076 U	0.0010 U	0.00081 U	0.00081 U	0.00075 U	0.00087 U	0.00089 U	--	0.00079 U	0.0012 U	0.00076 U	0.00098 U	0.00079 U	0.0071	0.0015 U	0.00080 U	0.03	DET
Toluene	0.0080 U	0.0098 U	0.0076 U	0.010 U	0.0081 U	0.0081 U	0.0075 U	0.0087 U	0.0089 U	--	0.0079 U	0.012 U	0.0076 U	0.0098 U	0.0079 U	0.024 U	0.015 U	0.0080 U	7	NE
Ethylbenzene	0.00080 U	0.00098 U	0.00076 U	0.0010 U	0.00081 U	0.00081 U	0.00075 U	0.00087 U	0.00089 U	--	0.00079 U	0.011	0.00076 U	0.00098 U	0.00079 U	0.19 U	0.0015 U	0.00080 U	6	NE
Total Xylene[6]	0.0016 U	0.0020 U	0.0015 U	0.0020 U	0.0016 U	0.0016 U	0.0015 U	0.0017 U	0.0018 U	--	0.0016 U	0.0062	0.0015 U	0.0020 U	0.0016 U	0.39 U	0.0031 U	0.0016 U	9	NE
1,2,4-Trimethylbenzene	0.00080 U	0.00098 U	0.00076 U	0.0010 U	0.00081 U	0.00081 U	0.00075 U	0.00087 U	0.00089 U	--	0.00079 U	0.0025	0.00076 U	0.00098 U	0.00079 U	0.75	0.0015 U	0.00080 U	4,000[11]	NE
1,3,5-Trimethylbenzene	0.00080 U	0.00098 U	0.00076 U	0.0010 U	0.00081 U	0.00081 U	0.00075 U	0.00087 U	0.00089 U	--	0.00079 U	0.0012 U	0.00076 U	0.00098 U	0.00079 U	0.38	0.0015 U	0.00080 U	4,000[11]	NE
Acetone[7]	0.0040 U	0.0049 U	0.0038 U	0.0050 U	0.0040 U	0.0041 U	0.0037 U	0.0044 U	0.0044 U	--	0.0040 U	0.037 Y	0.0067	0.0049 U	0.0039 U	0.34 Y	0.013 Y	0.0040 U	8,000[11]	NE
n-Butylbenzene	0.00080 U	0.00098 U	0.00076 U	0.0010 U	0.00081 U	0.00081 U	0.00075 U	0.00087 U	0.00089 U	--	0.00079 U	0.0012 U	0.00076 U	0.00098 U	0.00079 U	1.2	0.0015 U	0.00080 U	NE	NE
n-Propylbenzene	0.00080 U	0.00098 U	0.00076 U	0.0010 U	0.00081 U	0.00081 U	0.00075 U	0.00087 U	0.00089 U	--	0.00079 U	0.0012 U	0.00076 U	0.00098 U	0.00079 U	0.27	0.0015 U	0.00080 U	NE	NE
p-Isopropyltoluene	0.00080 U	0.00098 U	0.00076 U	0.0010 U	0.00081 U	0.00081 U	0.00075 U	0.00087 U	0.00089 U	--	0.00079 U	0.0013	0.00076 U	0.00098 U	0.00079 U	1.8	0.0015 U	0.00080 U	NE	NE
Sec-Butylbenzene	0.00080 U	0.00098 U	0.00076 U	0.0010 U	0.00081 U	0.00081 U	0.00075 U	0.00087 U	0.00089 U	--	0.00079 U	0.0012 U	0.00076 U	0.00098 U	0.00079 U	1.4	0.0015 U	0.00080 U	NE	NE
Naphthalene	0.00080 U	0.00098 U	0.00076 U	0.0010 U	0.00081 U	0.00081 U	0.00075 U	0.00087 U	0.00089 U	--	0.00079 U	0.23	0.00076 U	0.00098 U	0.00079 U	1.2	0.0015 U	0.00080 U	5	NE
2-Butanone (MEK)	0.0040 U	0.0049 U	0.0038 U	0.0050 U	0.0040 U	0.0041 U	0.0037 U	0.0044 U	0.0044 U	--	0.0040 U	0.0061 U	0.0038 U	0.0049 U	0.0039 U	0.044	0.0077 U	0.0040 U	40,000[11]	NE
Isopropylbenzene (Cumene)	0.00080 U	0.00098 U	0.00076 U	0.0010 U	0.00081 U	0.00081 U	0.00075 U	0.00087 U	0.00089 U	--	0.00079 U	0.0022	0.00076 U	0.00098 U	0.00079 U	0.22	0.0015 U	0.00080 U	8,000[11]	NE
Carbon Disulfide	0.00080 U	0.00098 U	0.00076 U	0.0010 U	0.00081 U	0.00081 U	0.00075 U	0.00087 U	0.0018	--	0.0017	0.0012 U	0.00076 U	0.00098 U	0.00079 U	0.020	0.0015 U	0.00080 U	NE	NE
PAHs[8] (mg/kg)																				
1-Methylnaphthalene	0.0078 U	0.0080 U	--	0.010	0.0076 U	0.0076 U	0.0073 U	0.0074 U	0.018	0.0071 U	0.0077 U	0.12	0.0079 U	0.0077 U	0.0081 U	1.4	0.025	0.0078 U	NE	NE
2-Methylnaphthalene	0.0078 U	0.0080 U	--	0.0079 U	0.0076 U	0.0076 U	0.0073 U	0.0074 U	0.031	0.0071 U	0.0077 U	0.15	0.0079 U	0.0077 U	0.0081 U	2.3	0.026	0.0078 U	NE	NE
Acenaphthene	0.0078 U	0.0080 U	--	0.0079 U	0.0076 U	0.0076 U	0.0073 U	0.0074 U	0.037	0.0071 U	0.0077 U	0.28	0.0079 U	0.0077 U	0.0081 U	0.69	0.066	0.0078 U	NE	NE
Acenaphthylene	0.0078 U	0.0080 U	--	0.0079 U	0.0076 U	0.0076 U	0.0073 U	0.0074 U	0.11	0.0071 U	0.0077 U	0.0080 U	0.0079 U	0.0077 U	0.0081 U	1.5	0.090	0.0078 U	NE	NE
Anthracene	0.0078 U	0.0080 U	--	0.028	0.0076 U	0.0076 U	0.0073 U	0.0074 U	0.57	0.0071 U	0.0077 U	0.49	0.0079 U	0.0077 U	0.0081 U	2.9	0.28	0.0078 U	NE	NE
Benzo(ghi)perylene	0.0078 U	0.0080 U	--	0.070	0.0076 U	0.0076 U	0.0073 U	0.0074 U	0.41	0.0071 U	0.0077 U	0.13	0.0079 U	0.0077 U	0.0081 U	4.0	0.56	0.0078 U	NE	NE
Fluoranthene	0.0078 U	0.0080 U	--	0.13	0.0076 U	0.0076 U	0.0073 U	0.0074 U	2.3	0.0098	0.0077 U	0.68	0.0079 U	0.0077 U	0.0081 U	17	1.6	0.0078 U	3,200[11]	NE
Fluorene	0.0078 U	0.0080 U	--	0.0079 U	0.0076 U	0.0076 U	0.0073 U	0.0074 U	0.17	0.0071 U	0.0077 U	0.28	0.0079 U	0.0077 U	0.0081 U	2.6	0.085	0.0078 U	3,200[11]	NE
Naphthalene	0.0078 U	0.0080 U	--	0.016	0.0076 U	0.0076 U	0.0073 U	0.0074 U	0.077	0.0071 U	0.0077 U	0.095	0.0079 U	0.0077 U	0.0081 U	3.1	0.076	0.0078 U	5	NE
Phenanthrene	0.0078 U	0.0080 U	--	0.083	0.0076 U	0.0076 U	0.0073 U	0.0074 U	2.1	0.014	0.0077 U	1.3	0.0079 U	0.0077 U	0.0081 U	14	0.98	0.0078 U	NE	NE
Pyrene	0.0078 U	0.0080 U	--	0.15	0.0076 U	0.0076 U	0.0073 U	0.0074 U	1.9	0.010	0.0077 U	0.95	0.0079 U	0.0077 U	0.0081 U	15	1.7	0.0078 U	2,400[11]	NE
cPAHs[8] (mg/kg)																				
Benzo (a) anthracene (TEF 0.1)	0.0078 U	0.0080 U	--	0.079	0.0076 U	0.0076	0.0073 U	0.0074 U	1.1	0.0071 U	0.0077 U	0.39	0.0079 U	0.0077 U	0.0081 U	6.5	0.87	0.0078 U	MTCA ULU cleanup level for the sum of all cPAHs is 0.1 mg/kg	Reuse Criterai for the sum of all cPAHs is 0.1 mg/kg
Benzo (a) pyrene (TEF 1)	0.0078 U	0.0080 U	--	0.10	0.0076 U	0.0076 U	0.0073 U	0.0074 U	0.94	0.0071 U	0.0077 U	0.33	0.0079 U	0.0077 U	0.0081 U	6.0	0.94	0.0078 U		
Benzo (b) fluoranthene (TEF 0.1)	0.0078 U	0.0080 U	--	0.096	0.0076 U	0.0076 U	0.0073 U	0.0074 U	0.96	0.0071 U	0.0077 U	0.25	0.0079 U	0.0077 U	0.0081 U	7.3	0.85	0.0078 U		
Benzo (j,k) fluoranthene (TEF 0.1)	0.0078 U	0.0080 U	--	0.026	0.0076 U	0.0076 U	0.0073 U	0.0074 U	0.30	0.0071 U	0.0077 U	0.076	0.0079 U	0.0077 U	0.0081 U	2.1	0.34	0.0078 U		
Chrysene (TEF 0.01)	0.0078 U	0.0080 U	--	0.083	0.0076 U	0.0076 U	0.0073 U	0.0074 U	0.87	0.0071 U	0.0077 U	0.31	0.0079 U	0.0077 U	0.0081 U	5.6	0.85	0.0078 U		
Dibenz (a,h) anthracene (TEF 0.1)	0.0078 U	0.0080 U	--	0.014	0.0076 U	0.0076 U	0.0073 U	0.0074 U	0.13	0.0071 U	0.0077 U	0.025	0.0079 U	0.0077 U	0.0081 U	0.86	0.14	0.0078 U		
Indeno (1,2,3-cd) pyrene (TEF 0.1)	0.0078 U	0.0080 U	--	0.053	0.0076 U	0.0076 U	0.0073 U	0.0074 U	0.39	0.0071 U	0.0077 U	0.10	0.0079 U	0.0077 U	0.0081 U	3.2	0.48	0.0078 U		
Total TTEC of cPAHs (detect only)	N/A	N/A	N/A	0.13	N/A	0.00076	N/A	N/A	0.40	N/A	N/A	0.42	N/A	N/A	N/A	8.05	1.22	N/A	0.1	

Boring	B1			B2		B3		B4	B5		B6	B7		B8		B9	B10		MTCA Method A ULU Cleanup Level	Reuse Criteria[14]
Sample Identification[2]	B1-0-1	B1-5-6	B1-6-7	B2-0-1	B2-5-6	B3-5-6	B3-7-8	B4-5-6	B5-0-1	B5-4-5	B6-0-1	B7-0-1	B7-5-6	B8-0-1	B8-5-6	B9-SUMP	B10-0-1	B10-3-4		
Sample Depth (feet bgs)	0 to 1	5 to 6	6 to 7	0 to 1	5 to 6	5 to 6	7 to 8	5 to 6	0 to 1	4 to 5	0 to 1	0 to 1	5 to 6	0 to 1	5 to 6	0 to 1	0 to 1	3 to 4		
Soil Type	Fill	Qvi	Qvi	Fill	Qvi	Qvi	Qvi	Qvi	Fill	Qvi	Fill	Fill	Qvi	Fill	Qvi	Fill	Fill	Qvi		
Metals[9] (mg/kg)																				
Arsenic	12 U	12 U	--	12 U	--	11 U	11 U	11 U	12 U	--	12 U	12 U	12 U	12 U	12 U	**32**	12 U	12 U	20	7
Barium	**63**	**130**	--	**72**	--	**31**	**63**	**65**	**58**	--	**41**	**100**	**65**	**53**	**42**	**1,600**	**110**	**45**	16,000[11]	NE
Cadmium	0.59 U	0.60 U	--	0.59 U	--	0.57 U	0.55 U	0.56 U	0.59 U	--	0.58 U	0.60 U	0.59 U	0.58 U	0.61 U	**10**	0.59 U	0.58 U	2	1
Chromium	**32**	**28**	--	**51**	--	**26**	**48**	**28**	**42**	--	**35**	**35**	**47**	**34**	**40**	**190**	**47**	**34**	2,000[12]	48[15]
Lead	**16**	6.0 U	--	5.9 U	--	5.7 U	5.5 U	5.6 U	**14**	--	5.8 U	**36**	5.9 U	5.8 U	6.1 U	**7,100**	**2,200**	5.8 U	250	50
Selenium	12 U	12 U	--	12 U	--	11 U	11 U	11 U	12 U	--	12 U	12 U	12 U	12 U	12 U	23 U	12 U	12 U	400[11]	NE
Silver	1.2 U	1.2 U	--	1.2 U	--	1.1 U	1.1 U	1.1 U	1.2 U	--	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	**4.5**	1.2 U	1.2 U	400[11]	NE
Mercury	0.29 U	0.30 U	--	0.29 U	--	0.29 U	0.27 U	0.28 U	0.30 U	--	0.29 U	0.30 U	0.29 U	0.29 U	0.30 U	**3.1**	**2.3**	0.29 U	2	0.07 or DET
TCLP Lead (mg/L)	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**2.4**	**16**	--	5[13]	NE

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc., of Redmond, Washington.

[2] Sample ID = Area number - boring/test pit number - starting depth of sample [feet bgs] -end depth [feet bgs], Area 2E Boring 1 collected 5-6 feet bgs = 2E-B1-5-6.

[3] Washington State Department of Ecology (Ecology)-approved method NWTPH-HCID.

[4] Ecology-approved method NWTPH-Dx.

[5] Volatile organic compounds (VOCs) were analyzed by U.S. Environmental Protection Agency (EPA) method 8260B. Other VOCs were analyzed but not detected.

[6] Total xylenes consists of m,p- and o- xylenes. The higher detection limit is shown.

[7] Acetone is a common laboratory contaminant.

[8] Polycyclic aromatic hydrocarbons (PAHs) and carcinogenic PAHs (cPAHs) were analyzed by EPA method 8270D/SIM. Other PAHs were analyzed but not detected.

[9] Resource Conservation Recovery Act (RCRA) metals analyzed by EPA 6000/7000 series method.

[10] MTCA Method A cleanup level for gasoline is 30 mg/kg if benzene is detected or if the sum of toluene, ethylbenzene and xylenes are equal to or greater than 1% of the total gasoline detection.

[11] MTCA Method B criteria represented because MTCA Method A cleanup level has not been established.

[12] MTCA Method A cleanup level for Trivalent Chromium.

[13] Dangerous Waste Regulations - Chapter 173-303 WAC

[14] Guidance for Remediation of Petroleum Contaminated Sites (Publication 10-09-057) Ecology, October 2011; Summary Natural Background Soil Metals Concentrations in Washington State (Publication 94-115) dated October 1994; and Hazardous Waste Regulations 40 CFR Part 260.

[15] Chromium was not compared to the Reuse Criteria listed above for soils based on historic soil analytical results indicating chromium is not a prevalent chemical of concern on the UWT campus.

mg/kg = milligram per kilogram

-- = sample not analyzed

N/A = not applicable

Qvi = Ice-contact deposit

MTCA = Model Toxics Control Act

bgs = below ground surface

DET = Detected at concentrations greater than laboratory reporting limit

U = Analyte was not detected at or greater than the listed reporting limit

TEF = Toxicity Equivalency Factor as defined in WAC 173-340-900 Table 708-2

Total Toxic Equivalent Concentration (TTEC) is the sum of each individual cPAH concentration multiplied by its corresponding TEF.

Bold font type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Bold font type and gray shading indicates that the detected concentration is greater than the respective MTCA cleanup level.

Table 2

Summary of Chemical Analytical Results[1] - Groundwater

Area 2E - The Swiss and Frederick Wild Buildings
Priority Development Areas - University of Washington Tacoma
Tacoma, Washington

Boring Identification	JS-MW6D	JS-MW6S	UG-MW30D	UG-MW30S	B2-W	B8-W	MTCA Method A Groundwater Cleanup Level	MTCA Method B Groundwater Screening Levels Protective of Indoor Air [14]
Sample ID [2]	JS-MW6D-130912	JS-MW6S-130913	UG-MW30D-130712	UG-MW30S-130715	B2-W	B8-W		
Sample Date	9/13/2013	9/12/2013	7/12/2013	7/15/2013	7/15/2013	7/15/2013		
Approximate Depth to Groundwater (feet btoc) [3]	19.22	5.56	5.81	4.44	2.5	4.5		
Top of Well Screen Elevation (feet) [4]	77.32	93.65	85.44	114.1	N/A	N/A		
Bottom of Well Screen Elevation (feet) [4]	62.32	83.65	75.44	104.1	N/A	N/A		
Lithology At Well Screen	Outwash	Qvi	Outwash	Qvi	Qvi	Qvi		
Chemical								
NWTPH-HCID [5] (µg/L)								
Gasoline-Range	--	--	--	--	--	0.10 U	800/1,000[11]	NE
Diesel-Range	--	--	--	--	--	0.26 U	0.5	NE
Lube Oil-Range	--	--	--	--	--	0.42 U	0.5	NE
NWTPH-Gx [6] (µg/L)								
Gasoline-Range	100 U	100 U	100 U	100 U	--	--	800/1,000[11]	NE
NWTPH-Dx [7] (mg/L)								
Diesel-Range	260 U	270 U	270 U	260 U	--	--	0.5	NE
Lube Oil-Range	410 U	430 U	430 U	410 U	--	--	0.5	NE
VOCs [8] (µg/L)								
Trichloroethene (TCE)	**2.8**	0.20 U	0.20 U	**130**	**2.1**	0.20 U	5	1.5
Tetrachloroethene (PCE)	0.20 U	0.20 U	0.20 U	**1.1**	0.20 U	0.20 U	5	24
(cis) 1,2-Dichloroethene	0.20 U	0.20 U	0.20 U	1.0 U	0.20 U	0.20 U	16[12]	160
(trans) 1,2-Dichloroethene	0.20 U	0.20 U	0.20 U	1.0 U	0.20 U	0.20 U	160[12]	110
Vinyl Chloride	0.20 U	0.20 U	0.10 U	0.50 U	0.10 U	0.10 U	0.2	0.35
Benzene	0.20 U	**0.29**	0.20 U	1.0 U	**0.31**	0.20 U	5	2.4
Toluene	1.0 U	1.0 U	1.0 U	5.0 U	**4.2**	1.9	1,000	16,000
Ethylbenzene	0.20 U	0.20 U	0.20 U	1.0 U	**1.6**	0.82	700	2,800
Total Xylene [5]	0.40 U	0.40 U	0.40 U	2.0 U	**11.9**	5.5	1,000	290
1,2,4-Trimethylbenzene	0.20 U	0.20 U	0.20 U	1.0 U	**4.7**	2.4	NE	28
1,3,5-Trimethylbenzene	0.20 U	0.20 U	0.20 U	1.0 U	**1.1**	0.46	80[12]	NE
n-Propylbenzene	0.20 U	0.20 U	0.20 U	1.0 U	**0.80**	0.57	800[12]	2300
PAHs [9] (µg/L)								
Naphthalene	1.3 U	1.0 U	1.0 U	6.5 U	--	**2.8**	160	NE
2-Methylnaphthalene	0.095 U	0.10 U	0.095 U	0.095 U	--	**1.5**	1.5[12]	NE
1-Methylnaphthalene	0.095 U	0.10 U	0.095 U	0.095 U	--	**0.67**	NE	NE

Boring Identification	JS-MW6D	JS-MW6S	UG-MW30D	UG-MW30S	B2-W	B8-W	MTCA Method A Groundwater Cleanup Level	MTCA Method B Groundwater Screening Levels Protective of Indoor Air[14]
Sample ID[2]	JS-MW6D-130912	JS-MW6S-130913	UG-MW30D-130712	UG-MW30S-130715	B2-W	B8-W		
Sample Date	9/13/2013	9/12/2013	7/12/2013	7/15/2013	7/15/2013	7/15/2013		
Approximate Depth to Groundwater (feet btoc)[3]	19.22	5.56	5.81	4.44	2.5	4.5		
Top of Well Screen Elevation (feet)[4]	77.32	93.65	85.44	114.1	N/A	N/A		
Bottom of Well Screen Elevation (feet)[4]	62.32	83.65	75.44	104.1	N/A	N/A		
Lithology At Well Screen	Outwash	Qvi	Outwash	Qvi	Qvi	Qvi		
Chemical								
cPAHs[9] (µg/L)								
Benzo (a) anthracene (TEF 0.1)	0.0095 U	0.010 U	0.0095 U	**0.0095**	--	**0.011**	MTCA ULU cleanup level for the sum of all cPAHs is 0.1 µg/L	NE
Benzo (a) pyrene (TEF 1)	0.0095 U	0.010 U	0.0095 U	0.0095 U	--	0.010 U		
Benzo (b) fluoranthene (TEF 0.1)	0.0095 U	0.010 U	0.0095 U	0.0095 U	--	0.010 U		
Benzo (j,k) fluoranthene (TEF 0.1)	0.0095 U	0.010 U	0.0095 U	0.0095 U	--	0.010 U		
Chrysene (TEF 0.01)	0.0095 U	0.010 U	0.0095 U	0.0095 U	--	0.010 U		
Dibenz (a,h) anthracene (TEF 0.1)	0.0095 U	0.010 U	0.0095 U	0.0095 U	--	0.010 U		
Indeno (1,2,3-cd) pyrene (TEF 0.1)	0.0095 U	0.010 U	0.0095 U	0.0095 U	--	0.010 U		
Total TTEC of cPAHs (detect only)	N/A	N/A	N/A	**0.00095**	--	**0.0011**	0.1	NE
Total Metals[10] (µg/L)								
Arsenic	3.0 U	3.0 U	3.3 U	3.3 U	--	3.0 U	5	NE
Barium	25 U	**100**	--	--	--	--	3,200[12]	NE
Cadmium	4.0 U	4.0 U	4.4 U	4.4 U	--	4.0 U	5	NE
Chromium	10 U	**13**	11 U	11 U	--	10 U	50[13]	NE
Lead	1.0 U	**1.7**	1.1 U	1.1 U	--	1.0 U	15	NE
Mercury	0.50 U	0.50 U	0.50 U	0.50 U	--	0.50 U	2	NE
Selenium	5.0 U	5.0 U	--	--	--	--	80[12]	NE
Silver	10 U	10 U	--	--	--	--	80[12]	NE

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc. in Redmond, Washington.

[2] Sample ID = Area number - Boring number - Date (i.e., a water sample collected from UG-MW35 on January 22, 2014 = UG-MW35-140122).

[3] Groundwater level was measured below the top of casing.

[4] Based on survey completed by AHBL November 6, 2013. Horizontal datum - NAD 83/91 Washington State Plane - South Zone (City of Tacoma Horizontal Control Holding City Monument Numbers 411 and 414). Vertical datum NGVD 29 (brass monument at South 19th and Fawcett Avenue, Elevation 165.15).

[5] Washington State Department of Ecology (Ecology)-approved method NWTPH-HCID.

[6] Ecology-approved method NWTPH-Gx.

[7] Ecology-approved method NWTPH-Dx.

[8] Volatile organic compounds (VOCs) were analyzed by U.S. Environmental Protection Agency (EPA) method 8260C. Other VOCs were analyzed but not detected.

[9] Polycyclic Aromatic Hydrocarbons (PAHs) and carcinogenic PAHs (cPAHs) analyzed by EPA method 8270D/SIM.

[10] Metals analyzed by EPA 200.8 or 7470A method.

[11] MTCA Method A cleanup level for gasoline-range petroleum hydrocarbons is 800 µg/L if benzene is present and 1,000 µg/L if benzene is not present.

[12] MTCA Method B criteria represented because MTCA Method A cleanup level has not been established.

[13] MTCA Method A cleanup level for total chromium shown. Cleanup level for hexavalent chromium is 48 µg/L.

[14] MTCA Method B Indoor Air Screening Level from Washington State Deportment of Ecology Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action. Values updated as appropriate to incorporate recent toxicity data.

MTCA = Model Toxics Control Act

N/A = not applicable

Qvi = ice-contact deposits

-- = Analyte or sample not analyzed.

mg/L = milligram per Liter

Outwash = Advance Outwash

µg/L = microgram per Liter

U = Analyte was not detected at or greater than the listed reporting limit

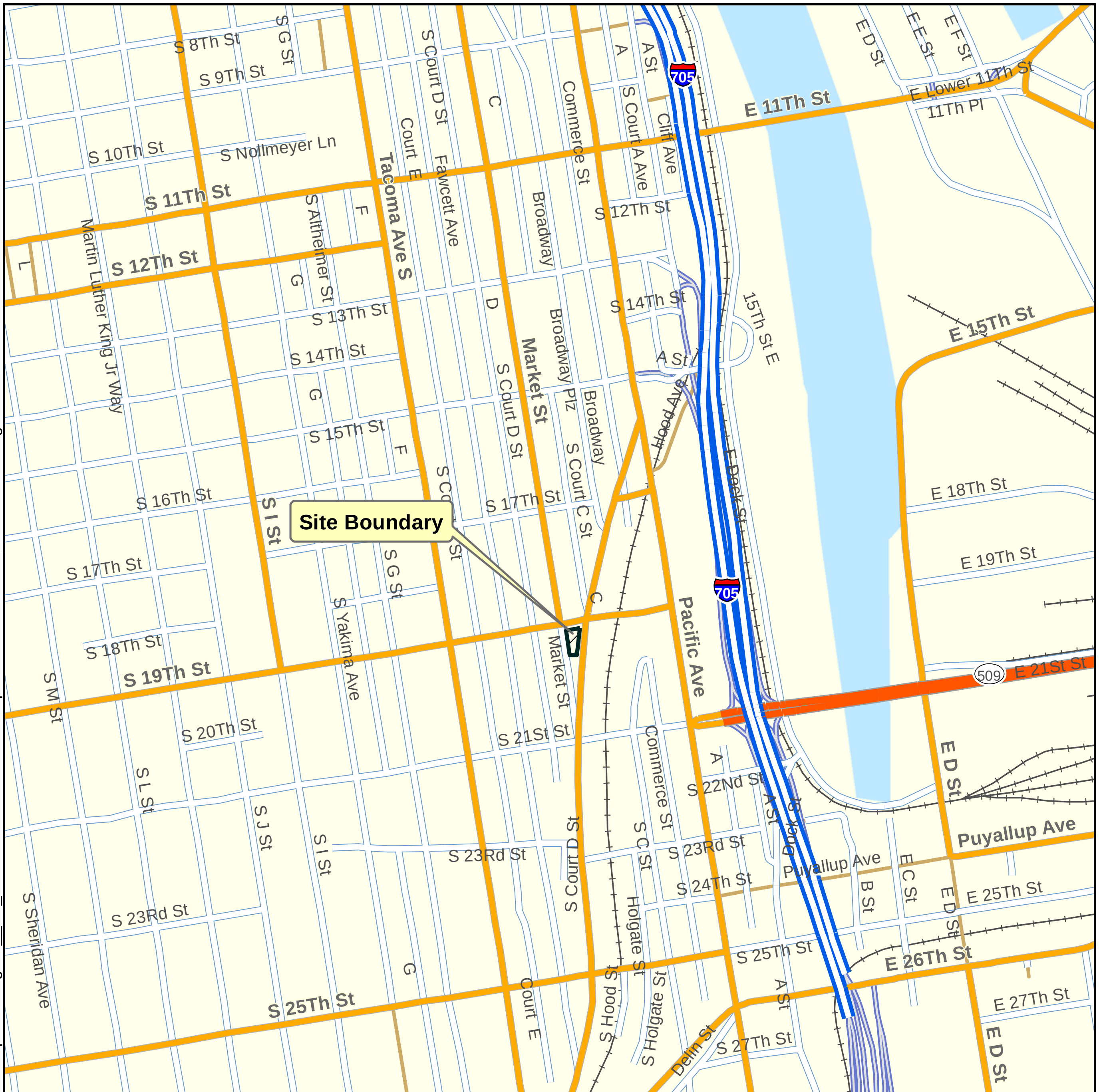
TEF = Toxicity Equivalency Factor as defined in WAC 173-340-900 Table 708-2

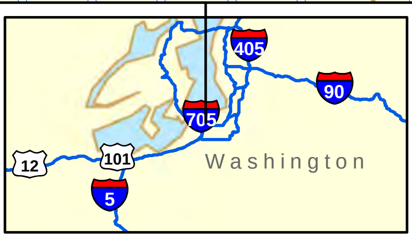
Total Toxic Equivalent Concentration (TTEC) is the sum of each individual cPAH concentration multiplied by its corresponding TEF.

Bold font type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Bold font type and gray shading indicates analyte is detected at a concentration greater than the MTCA Method groundwater cleanup/criteria level.

Dashed outline indicates analyte is detected at a concentration greater than the MTCA Method B Indoor Air Screening Level.





N
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1,000 0 1,000

Feet

Notes:
CPO = University of Washington Capital Project Office
UWT = University of Washington Tacoma
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
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Data Sources: ESRI Data & Maps

Projection: NAD 1983 UTM Zone 10N

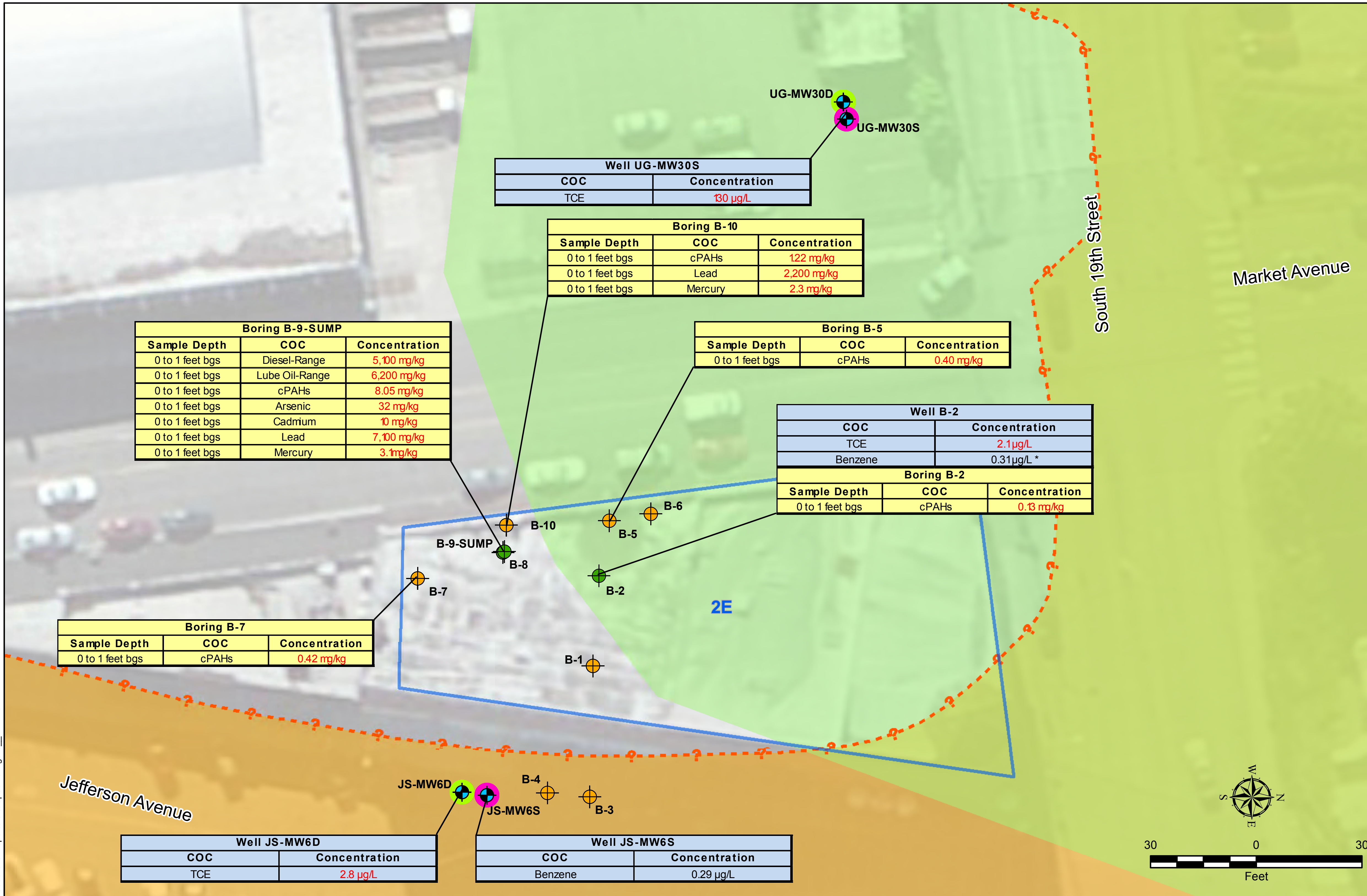
Vicinity Map

UWT Environmental Investigation
Priority Development Areas - CPO Project No. 204277
Tacoma, Washington

GeoEngineers

Figure 1

Office: TAC Path: \\tac\projects\0\0183085\GIS\Reports\SiteSpecific\Figure_2E_VM.mxd Map Revised: 19 December 2014 cgonzales



Well UG-MW30S	
COC	Concentration
TCE	130 µg/L

Boring B-10		
Sample Depth	COC	Concentration
0 to 1 feet bgs	cPAHs	1.22 mg/kg
0 to 1 feet bgs	Lead	2,200 mg/kg
0 to 1 feet bgs	Mercury	2.3 mg/kg

Boring B-9-SUMP		
Sample Depth	COC	Concentration
0 to 1 feet bgs	Diesel-Range	5,100 mg/kg
0 to 1 feet bgs	Lube Oil-Range	6,200 mg/kg
0 to 1 feet bgs	cPAHs	8.05 mg/kg
0 to 1 feet bgs	Arsenic	32 mg/kg
0 to 1 feet bgs	Cadmium	10 mg/kg
0 to 1 feet bgs	Lead	7,100 mg/kg
0 to 1 feet bgs	Mercury	3.1 mg/kg

Boring B-5		
Sample Depth	COC	Concentration
0 to 1 feet bgs	cPAHs	0.40 mg/kg

Well B-2	
COC	Concentration
TCE	2.1 µg/L
Benzene	0.31 µg/L *

Boring B-2		
Sample Depth	COC	Concentration
0 to 1 feet bgs	cPAHs	0.13 mg/kg

Boring B-7		
Sample Depth	COC	Concentration
0 to 1 feet bgs	cPAHs	0.42 mg/kg

Well JS-MW6D	
COC	Concentration
TCE	2.8 µg/L

Well JS-MW6S	
COC	Concentration
Benzene	0.29 µg/L

Soil Results*

Boring 2A-B7		
Sample Depth	COC	Concentration
2.5 to 3.5 feet bgs	Lead	200 mg/kg
2.5 to 3.5 feet bgs	cPAHs	0.64 mg/kg

Groundwater Results*

Well UG-MW13	
COC	Concentration
TCE	110 µg/L
PCE	1.4 µg/L

*Chemicals shown in red were detected at concentrations greater than the respective MTCA Method A cleanup levels.

Only analytical results of the chemicals of concern are shown if detected. Other chemicals that were analyzed and detected are not shown unless detected at concentrations greater than the respective MTCA cleanup levels.

Legend

Approximate Location of Priority Development Area 2E

Approximate Subsurface Location and Identification

Sonic Core Boring - Permanent New Monitoring Well

2013 Phase II ESA Borings

Direct Push Boring

Direct Push Boring with Temporary Well

Lithology of Well Screen Interval

Ice-Contact Deposit (Shallow Aquifer)

Advance Outwash (Deep Aquifer)

Approximate Lateral Extent of TCE Contaminated Groundwater in Shallow Aquifer

Approximate Lateral Extent of TCE Contaminated Groundwater in Deep Aquifer

Approximate Lateral Extent of TCE-Contaminated Groundwater Plume in Shallow and Deep Aquifers

Office: TAC Path: \\tac\projects\0\0183085\GIS\Reports\SiteSpecific\Figure__2E.mxd

Notes:
* Other petroleum related constituents were also detected. See Table 2
UWT = University of Washington Tacoma
cPAHs concentrations shown as TTEC.
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

COC = Chemical of Concern
PDA = Priority Development Area
PCE = tetrachloroethene
TCE = trichloroethene
cPAH = Carcinogenic Polycyclic Aromatic Hydrocarbons
mg/kg = milligram per kilogram
µg/L = microgram per Liter
bgs = Below Ground Surface
TTEC = Total Toxicity Equivalency Concentration
DCE = dichloroethene
MCTA = Model Toxics Control Act
ULU = Unrestricted Land Use

Soil MTCA Cleanup/Criteria Levels:
PCE = 0.05 mg/kg (Method A ULU)
TCE = 0.03 mg/kg (Method A ULU)
Benzene = 0.03 mg/kg (Method A ULU)
Vinyl Chloride = 0.67 mg/kg (Method B)
Lube Oil-Range Petroleum Hydrocarbons = 2,000 mg/kg (Method A ULU)
Diesel-Range Petroleum Hydrocarbons = 2,000 mg/kg (Method A ULU)
Gasoline-Range Petroleum Hydrocarbons = 100 mg/kg (Method A ULU)
cPAHs (TTEC) = 0.1 mg/kg (Method A ULU)
Lead = 250 mg/kg (Method A ULU)
Arsenic = 20 mg/kg (Method A ULU)
Cadmium = 2 mg/kg (Method A ULU)
Mercury = 2 mg/kg (Method A ULU)

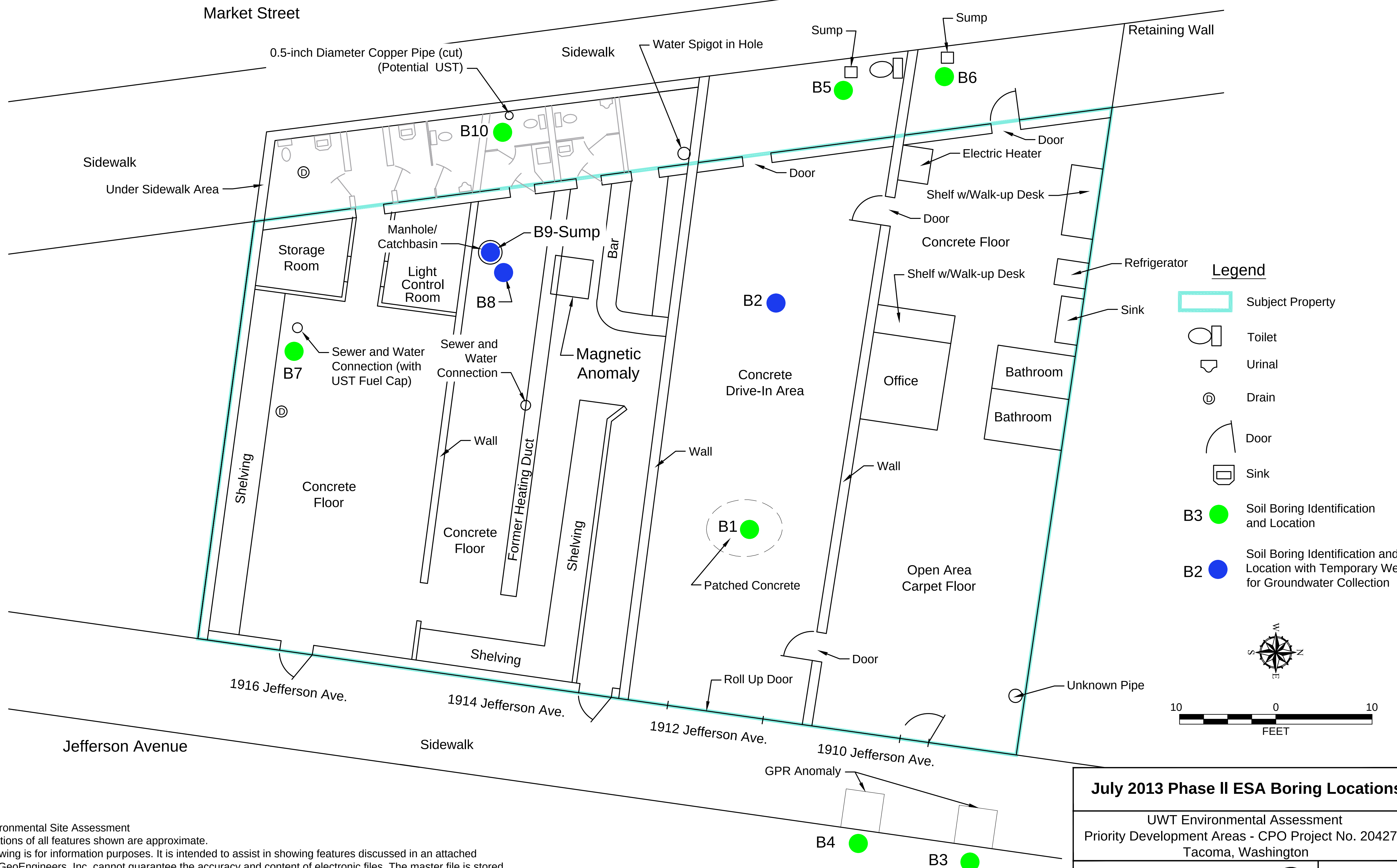
Groundwater MTCA Cleanup/Criteria Levels:
PCE = 5 µg/L (Method A); 24 µg/L (Indoor Air)
TCE = 5 µg/L (Method A); 1.5 µg/L (Indoor Air)
Vinyl Chloride = 0.2 µg/L (Method A); 0.35 µg/L (Indoor Air)
Benzene = 5 µg/L (Method A); 2.4 µg/L (Indoor Air)
Lube Oil-Range Petroleum Hydrocarbons = 0.5 mg/L (Method A)
Arsenic = 5 µg/L (Method A)
cPAHs= 0.1 µg/L (Method A)

Site Plan – PDA 2E/The Swiss Pub and Frederick Wild

UWT Environmental Investigation
Priority Development Areas - CPO Project No. 204277
Tacoma, Washington

GeoEngineers

Figure 2



Notes

ESA = Environmental Site Assessment

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Reference: Original sketch provided by Geoengineers staff on 7/10/2013.

July 2013 Phase II ESA Boring Locations

UWT Environmental Assessment
Priority Development Areas - CPO Project No. 204277
Tacoma, Washington

GEOENGINEERS

Figure 3

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APPENDIX A
Report Limitations and Guidelines for Use

APPENDIX A
REPORT LIMITATIONS AND GUIDELINES FOR USE[1]

This appendix provides information to help you manage your risks with respect to the use of this report.

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This report has been prepared for use by University of Washington. This report is not intended for use by others, and the information contained herein is not applicable to other sites.

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This Environmental Report is Based on a Unique Set of Project-Specific Factors

This report has been prepared for the Priority Development Areas (PDAs) Environmental Assessment Project at the UW – Tacoma (UWT) campus located in Tacoma, Washington. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, do not rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

If important changes are made after the date of this report, GeoEngineers should be given the opportunity to review our interpretations and recommendations and provide written modifications or confirmation, as appropriate.

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If a lending agency or other parties intend to place legal reliance on the product of our services, we require that those parties indicate in writing their acknowledgement that the scope of services provided, and the general conditions under which the services were rendered including the limitation of professional liability, are understood and accepted by them. This is to provide our firm with

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Some substances may be present in the site vicinity in quantities or under conditions that may have led, or may lead, to contamination of the subject site, but are not included in current local, state or federal regulatory definitions of hazardous substances or do not otherwise present current potential liability. GeoEngineers cannot be responsible if the standards for appropriate inquiry, or regulatory definitions of hazardous substance, change or if more stringent environmental standards are developed in the future.

Subsurface Conditions can Change

This environmental report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by manmade events such as construction on or adjacent to the site, by new releases of hazardous substances, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Always contact GeoEngineers before applying this report to determine if it is still applicable.

Topsoil

For the purposes of this report, we consider topsoil to consist of generally fine-grained soil with an appreciable amount of organic matter based on visual examination, and to be unsuitable for direct support of the proposed improvements. However, the organic content and other mineralogical and gradational characteristics used to evaluate the suitability of soil for use in landscaping and agricultural purposes was not determined, nor considered in our analyses. Therefore, the information and recommendations in this report, and our logs and descriptions should not be used as a basis for estimating the volume of topsoil available for such purposes.

Most Environmental Findings are Professional Opinions

Our interpretations of subsurface conditions are based on field observations and chemical analytical data from widely spaced sampling locations at the site. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ – sometimes significantly – from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

Do Not Redraw the Exploration Logs

Environmental scientists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in an environmental report should never be redrawn for inclusion in other design drawings. Only photographic or electronic reproduction is acceptable, but recognize that separating logs from the report can elevate risk.

Read These Provisions Closely

Some clients, design professionals and contractors may not recognize that the geoscience practices (geotechnical engineering, geology and environmental science) are far less exact than other engineering and natural science disciplines. This lack of understanding can create unrealistic expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory "limitations" provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you are unclear how these "Report Limitations and Guidelines for Use" apply to your project or site.

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The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually relate any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding a specific project.

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GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention, or assessment of the presence of Biological Pollutants in or around any structure. Accordingly, this report includes no interpretations, recommendations, findings, or conclusions for the purpose of detecting, preventing, assessing, or abating Biological Pollutants. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts.

PDA 2F – Tioga Building

Priority Development Area 2F
Tioga Building
Environmental Subsurface Investigation

UWT Environmental Investigation Project
UW Capital Project Office Project No. 204277
1901 Jefferson Avenue
Tacoma, Washington

for
University of Washington

October 10, 2014

GeoEngineers
Earth Science + Technology

Priority Development Area 2F
Tioga Building
Environmental Subsurface Investigation

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October 10, 2014

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Tioga Building
Environmental Subsurface Investigation
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Table of Contents

1.0 INTRODUCTION 1

2.0 SITE HISTORICAL USE 1

3.0 CURRENT SITE FEATURES 1

4.0 ENVIRONMENTAL SUBSURFACE EXPLORATIONS 2

4.1. Subsurface Borings 2
4.2. Sump Sampling 2
4.3. Groundwater Sampling 2

5.0 SITE GEOLOGY AND HYDROGEOLOGY 2

5.1. Surface Conditions 2
5.2. Soil Conditions 3
5.3. Groundwater Conditions 3

6.0 CHEMICAL ANALYTICAL PROGRAM AND ANALYTICAL RESULTS 3

6.1. General 3
6.2. Criteria for Characterization of Soil and Groundwater 3
6.3. Soil 5
6.3.1. Petroleum Hydrocarbon Identification 5
6.3.2. VOCs 5
6.3.3. PAHs 6
6.3.4. RCRA Metals 6
6.4. Sump Water 6
6.4.1. Petroleum Hydrocarbons 6
6.4.2. VOCs 7
6.4.3. PAHs 7
6.4.4. Total RCRA Metals 7
6.4.5. PCBs 7
6.5. Groundwater 7
6.5.1. Petroleum Hydrocarbons 8
6.5.2. VOCs 8
6.5.3. PAHs 8
6.5.4. Total RCRA Metals 8

7.0 CONCLUSIONS 8

7.1. Soil 8
7.2. Sump Water 8
7.3. Groundwater 9

8.0 PROPOSED DEVELOPMENT PLANS 9

9.0 POTENTIAL IMPACTS AND MITIGATION MEASURES TO DESIGN AND CONSTRUCTION 9

9.1. TCE-Contaminated Groundwater 10
9.2. Soil Contaminated with Chemicals of Concern 11

10.0 LIMITATIONS 12

11.0 REFERENCES 12

LIST OF TABLES

Table 1. Summary of Chemical Analytical Results – Soil
Table 2. Air and Groundwater Residential Risk-Based Concentrations

LIST OF FIGURES

Figure 1. Vicinity Map
Figure 2. Site Plan – Area 2F/Tioga

APPENDICES

Appendix A. Report Limitations and Guidelines for Use

1.0 INTRODUCTION

This report presents the results of our environmental subsurface investigation completed for the University of Washington (UW) at the Tioga Building (Priority Development Area [PDA] 2F) located on the UW Tacoma (UWT) campus at 1901 Jefferson Avenue in Tacoma, Washington. The Tioga Building is herein referred to as the "site." The site was identified as PDA 2F for this project. The site is bound by Jefferson Avenue to the west, South 19th Street stairs to the north, Prairie Line Trail to the east and the Tioga Library to the south. A Vicinity Map of the site is included as Figure 1. See Figure 2 for the layout of the site.

This subsurface investigation was completed under the UWT Environmental Assessment Project, UW project number 204277. This report was completed as a subset of the larger subsurface assessment report titled "Environmental Subsurface Investigation – University of Washington Tacoma, Tacoma, Washington" that is currently under development. This report should be used in context with the larger subsurface assessment report. Borings logs, subsurface investigation methodologies and chemical analytical data packages are included in the larger assessment report referenced above.

This report presents general impacts and potential mitigation measures that may be employed in design and construction. It is important to recognize that additional environmental investigations may be necessary prior to selection of the final mitigation measure. Mitigation measures and associated costs provided in this report will likely need refinement based on the results of the additional environmental investigations. The project team should contact UW Environmental Health & Safety (UW EH&S) to discuss the need for additional environmental investigations at this site. UW EH&S is the liaison with the Washington State Department of Ecology (Ecology) for review and approval of the mitigation measures.

2.0 SITE HISTORICAL USE

The Tioga Building was constructed in 1889 with the primary use as a storage warehouse for paper, cereal, grain and hay. Records from 1950 indicate an asbestos wholesaler was operating in the building. A rail spur with an elevated wood platform at the rear of the building was used as a means to provide materials and supplies to the building tenants. A review of the permit history did not identify the past uses or construction activities at the site.

3.0 CURRENT SITE FEATURES

The four-story building is situated within the site boundary. The first floor is accessible from the Prairie Line Trail and has an approximate elevation of 85 feet. The second floor has an approximate elevation of 100 feet and is accessible from Jefferson Avenue. The first floor occupied by a coffee shop and UWT for faculty and staff storage space. Various commercial businesses occupy the remainder of the building.

An underground sump was observed in the southwest portion of the building approximately 10 feet north of the elevator. Approximately 6 inches of water was observed within the sump. Three metal pipes were observed in the sump:

- One 4-inch pipe with two 2—inch stems. This pipe appeared to be closed system.
- Two 1-inch pipes entering from the north and south sides of the sump. These pipes appeared to be open on the end and may have been the source of water within the sump. The origin of the pipes is unknown.

4.0 ENVIRONMENTAL SUBSURFACE EXPLORATIONS

The environmental subsurface investigation activities completed at the site consisted of direct-push soil borings, hand augers and sump water sampling. Groundwater monitoring well installation and groundwater sampling were also completed in areas adjacent to the site. The subsurface investigation activities were completed between June and September 2013.

4.1. Subsurface Borings

Two soil borings were completed at the site on June 20 and September 11, 2013. One direct-push boring (2F-B1) was located on the western portion and one hand auger boring (2F-B2) was located on the eastern portion of the site. The borings ranged in depth between 3.25 and 4 feet below ground surface (bgs) when practical refusal was encountered.

4.2. Sump Sampling

A water sample was collected from the existing floor sump on June 20, 2013. The sump is approximately 3 feet deep and 3 feet in diameter. Approximately 1 foot of water was observed in the bottom of the sump.

4.3. Groundwater Sampling

Groundwater samples were collected from two upgradient off-site monitoring wells (JS-MW6S and JS-MW6D) and one crossgradient monitoring well (JS-MW4). The monitoring wells were sampled in September 2013.

The monitoring wells are screened in the shallow (ice-contact deposits) or deep aquifer (advance outwash). Monitoring well JS-MW6S is screened within the shallow aquifer. Monitoring wells JS-MW4 and JS-MW6D are screened within the deep aquifer. The locations of the wells are shown on Figure 2. Table 2 describes the approximate well screen elevations and depths.

5.0 SITE GEOLOGY AND HYDROGEOLOGY

5.1. Surface Conditions

The existing ground surface consists of a concrete slab at both boring locations. Two concrete slabs were observed in the area of 2F-B2 with the approximate thickness of the top slab at

2 inches and the lower slab at 3 inches. These slabs were vertically separated by approximately 4 inches of fill.

5.2. Soil Conditions

Subsurface conditions consist of fill, ice-contact deposits, silt layer and advance outwash. The fill consists of silt with sand and gravel and/or sand with silt and gravel from below the existing surface to 2 feet bgs.

Native soil conditions underlying the fill consist of glacially consolidated units (ice-contact deposits) comprised of silt with sand to sand with gravel and silt were observed at each subsurface exploration location.

5.3. Groundwater Conditions

It appears that groundwater conditions observed consist of a shallow aquifer (ice-contact deposits) and deep aquifer (advance outwash) to the depths explored during this investigation. The shallow and deep aquifers appear to be separated by the silt layer located between the ice-contact deposits and advance outwash.

Groundwater within the shallow aquifer appears to be present within the sand and gravel seams the ice-contact deposits. The hydraulic connection of the sand seams within the shallow aquifer is unknown in and around the project site. Groundwater within the deep aquifer appears to be continuous with interbeds of moist to wet silt at depth. The deep aquifer within the advance outwash appears to be under a confined condition.

Groundwater was encountered in the borings completed upgradient at the site. Depth to groundwater within the ice-contact deposits (shallow aquifer) was approximately 5.5 feet bgs (Elevation 96.29 feet) in the off-site monitoring well JS-MW6S located upgradient of the site. Depth to groundwater within the advance outwash (deep aquifer) ranged from approximately Elevation 53 feet north of the site (JS-MW4) and 83 feet southwest of the site (JS-MW6D) in the off-site monitoring wells. It should be noted that groundwater levels will vary depending on season, precipitation and other factors.

6.0 CHEMICAL ANALYTICAL PROGRAM AND ANALYTICAL RESULTS

6.1. General

Soil and groundwater samples were submitted to OnSite Environmental, Inc., in Redmond, Washington for chemical analysis. The chemical analytical data are summarized in Tables 1 and 2. Chemicals that were not detected at or greater than the laboratory reporting limits in the analyzed samples are typically not included on the tables.

6.2. Criteria for Characterization of Soil and Groundwater

The following criteria were used to evaluate impacted and contaminated soil and groundwater for disposal purposes.

- Contaminated Soil
  - Petroleum hydrocarbons, carcinogenic polycyclic aromatic hydrocarbons (cPAHs), metals and volatile organic compounds (VOCs) were detected at concentrations greater than the Model Toxics Control Act (MTCA) Method A Unrestricted Land Use (ULU) cleanup level or MTCA Method B screening level.
- Impacted Soil

  Some contaminants were detected at concentrations less than the respective MTCA cleanup levels. UWT may be able to reuse certain types of soil depending on the sampling results. UW EH&S must review the chemical analytical data to evaluate if reuse or disposal at an off-site facility is necessary. Soil reuse and disposal are subject to Ecology Guidance for Remediation of Petroleum Contaminated Sites (Ecology, 2011), solid waste regulations and disposal facility permit conditions. The criteria below is herein referred to as "Reuse Criteria."

  - **Petroleum hydrocarbons, cPAHs and/or Lead**

    The Ecology guidance indicates that soil with diesel- and/or lube oil-range petroleum hydrocarbons detected at concentrations less than 200 milligrams per kilogram (mg/kg) and/or gasoline-range petroleum hydrocarbons detected at concentrations less than 30 mg/kg are suitable for reuse as commercial fill at UWT campus with the following limitations:

    - placed above the highest water table,
    - not within 100 feet of a drinking water well,
    - not within wellhead protection area of public water supply,
    - not within wetlands or where surface water contact is possible, and
    - not within a surface water infiltration facility or septic drain field.

    If the concentrations exceed the above limits but are still less than respective MTCA cleanup levels, the soil may be reused in road and bridge embankment construction, landfill daily cover or asphalt manufacturing with UW EH&S approval.

  - **Arsenic, Cadmium, and/or Mercury**

    Soil with concentrations of arsenic, cadmium and/or mercury above what is normally found in the natural background environment (Puget Sound Background levels - Ecology, 1994) is typically suitable for disposal at an inert waste landfill or a Department of Natural Resources (DNR) reclamation pit. UW EH&S approval is necessary.

    Soil at and near the UWT campus has been well documented to contain chromium at concentrations slightly above the natural background level and is not considered in the "Reuse Criteria."

- Contaminated Groundwater
  - Petroleum hydrocarbons, PAHs and metals were detected at concentrations greater than the respective MTCA Method A groundwater cleanup levels. Method B criteria

were used for comparison of specific compounds if Method A groundwater cleanup levels are not established for those compounds.

- VOCs were detected at concentrations greater than the respective MTCA Method A groundwater cleanup levels, and MTCA Method B groundwater screening levels protective of indoor air. The updated Tetrachloroethene (PCE)/Trichloroethene (TCE) screening levels were calculated using Equation 1 from Ecology's review draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action" dated October 2009 (Ecology, 2009) and Environmental Protection Agency's (EPA's) PCE and TCE toxicity factors updated in 2011 and available on EPA's online Integrated Risk Information System (IRIS). The other values were obtained from Ecology's review draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action."

6.3. Soil

Four soil samples collected from the soil borings were submitted for chemical analysis. The soil samples collected from the subsurface explorations were identified using the following identification system: A#-B#-start depth-end depth, where A# is the area designation number, B# is the boring and start depth-end depth is the depth interval in feet below the ground of specific sample (e.g., 2F-B1-0-1 was collected in Area 2F from boring B1 from 0 to 1 foot bgs).

Soil samples were submitted for chemical analysis based on the following:

- Where field screening indicated the soil is impacted.
- Directly below potentially impacted soil to delineate the vertical extent.
- Where wet sand seams were encountered in the ice-contact deposit.

The chemical analytical data for soil are described below and summarized in Table 1. The soil samples were submitted for chemical analysis of petroleum hydrocarbon identification by Ecology-approved method NWPTH-HCID with appropriate follow up of gasoline-range petroleum hydrocarbons by Ecology-approved method NWTPH-Gx and/or diesel- and lube oil-range petroleum hydrocarbons by Ecology-approved method NWTPH-Dx; VOCs by EPA method 8260C, polycyclic aromatic hydrocarbons (PAHs) by EPA method 8270DSIM, Resource Conservation and Recovery Act (RCRA) metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver) by EPA method 6000/7000 series.

6.3.1. Petroleum Hydrocarbon Identification

Gasoline-, diesel- and lube oil-range petroleum hydrocarbons were not detected in the analyzed soil samples.

6.3.2. VOCs

VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels or Method B ULU criteria in the analyzed soil samples.

6.3.3. PAHs

CPAHs were detected at a concentration greater than the MTCA Method A ULU cleanup level (Total Toxic Equivalent Concentration [TTEC] = 0.1 mg/kg) in soil sample 2F-B2-0-0.5 (TTEC = 0.12 mg/kg). CPAHs were either not detected or were detected at concentrations less than the MTCA Method ULU cleanup level in the remaining analyzed soil samples.

PAHs were either not detected or were detected at concentrations less than the respective MTCA Method A ULU or Method B ULU criteria in the analyzed soil samples.

6.3.4. RCRA Metals

LEAD

Lead was detected at concentrations greater than the Reuse Criteria (50 mg/kg) but less than the MTCA Method A ULU cleanup level (250 mg/kg) in the following soil samples with the concentrations detected identified in parenthesis.

- 2F-B1-0-1 (100 mg/kg)
- 2F-B2-0-0.5 (130 mg/kg)

Lead was either not detected or was detected at concentrations less than the Reuse Criteria and the MTCA Method A ULU cleanup level in the remaining analyzed soil samples.

MERCURY

Mercury was detected at concentrations greater than the Reuse Criteria (0.07 mg/kg), but less than the MTCA Method A ULU cleanup level (2 mg/kg) in soil sample 2F-B2-0-0.5 (0.30 mg/kg). Mercury was not detected in the remaining analyzed soil samples.

OTHER RCRA METALS

Other RCRA metals were either not detected or were detected at concentrations less than the respective MTCA Method A ULU cleanup levels, Method B ULU criteria or the Reuse Criteria in the analyzed soil samples.

6.4. Sump Water

A water sample was collected from the sump for chemical analysis. The chemical analytical data for the sump water are described below and summarized in Table 2. The sump water sample was submitted for chemical analysis of gasoline-range petroleum hydrocarbons by Ecology-approved method NWTPH-Gx, and diesel- and lube oil-range petroleum hydrocarbons by Ecology-approved method NWTPH-Dx, VOCs by EPA method 8260C, and PAHs by EPA method 8270DSIM, total RCRA metals by EPA method 200.8 or 7470A, and polychlorinated biphenyls (PCBs) by EPA Method 8082A.

6.4.1. Petroleum Hydrocarbons

Lube oil-range petroleum hydrocarbons were detected at a concentration greater than the MTCA Method A groundwater cleanup level (0.5 milligrams per liter [mg/L]) in sump water sample 2F-SUMP (2.2 mg/L).

Gasoline- and diesel-range petroleum hydrocarbons were not detected in the sump water sample.

6.4.2. VOCs

VOCs were not detected in the sump water sample.

6.4.3. PAHs

PAHs and cPAHs were not detected in the sump water sample.

6.4.4. Total RCRA Metals

ARSENIC

Arsenic was detected at a concentration greater than the MTCA Method A groundwater cleanup level (5 µg/L) in sump water sample 2F-SUMP (160 µg/L).

CADMIUM

Cadmium was detected at a concentration greater than the MTCA Method A groundwater cleanup level (5 µg/L) in sump water sample 2F-SUMP (16 µg/L).

TOTAL CHROMIUM

Total chromium was detected at a concentration greater than the MTCA Method A groundwater cleanup level (50 µg/L) in sump water sample 2F-SUMP (80 µg/L).

LEAD

Lead was detected at a concentration greater than the MTCA Method A groundwater cleanup level (15 µg/L) in sump water sample 2F-SUMP (5,700 µg/L).

MERCURY

Mercury was detected at concentration greater than the MTCA Method A groundwater cleanup level (2 µg/L) in sump water sample 2F-SUMP (2.5 µg/L).

OTHER RCRA METALS

Other RCRA metals were either not detected or were detected at concentrations less than the respective MTCA Method B criteria in sump water sample 2F-SUMP.

6.4.5. PCBs

PCBs were not detected in the sump water sample.

6.5. Groundwater

Groundwater samples were collected from the four off-site monitoring wells for chemical analysis. The groundwater samples collected from the crossgradient and upgradient monitoring wells were identified using the following identification system: WELL-ID-yymmdd, where WELL-ID is the well identification number and yymmdd is the date when the sample was collected (e.g., JS-MW4-130912 was collected from monitoring well JS-MW4 on September 12, 2013).

The groundwater samples were submitted for chemical analysis of gasoline-range petroleum hydrocarbons by Ecology-approved method NWTPH-Gx, and diesel- and lube oil-range petroleum hydrocarbons by Ecology-approved method NWTPH-Dx, VOCs by EPA method 8260C, PAHs by EPA method 8270DSIM and total RCRA metals by EPA method 200.8 or 7470A. The chemical analytical data for the groundwater are described below and summarized in Table 2.

6.5.1. Petroleum Hydrocarbons

Gasoline-, diesel- and lube oil-range petroleum hydrocarbons were not detected in the analyzed groundwater samples.

6.5.2. VOCs

TCE was detected at concentrations less than the MTCA Method A groundwater cleanup level (5 µg/L) but greater than the MTCA Method B groundwater screening level protective of indoor air (1.5 µg/L) in the following groundwater samples collected from the deep aquifer with the concentrations detected identified in parenthesis.

- JS-MW4D-130919 (2.5 µg/L)
- JS-MW6D-130912 (2.8 µg/L)

Other VOCs were either not detected or were detected at concentrations less than the respective MTCA Method A groundwater cleanup level, MTCA Method B criteria or the MTCA Method B groundwater screening levels protective of indoor air in the analyzed groundwater samples.

6.5.3. PAHs

PAHs and cPAHs were not detected in the analyzed groundwater samples.

6.5.4. Total RCRA Metals

Total RCRA metals were either not detected or were detected at concentrations less than the respective MTCA Method A cleanup levels or the Method B criteria in the analyzed groundwater samples.

7.0 CONCLUSIONS

7.1. Soil

Soil at the site appears to be contaminated with cPAHs at boring location 2F-B2 from below the existing concrete slab to approximately 0.5 feet bgs. Soil is also impacted with PAHs and cPAHs from approximately 2.5 to 3.5 feet bgs in boring 2F-B2. Soil at the site also appears to be impacted with lead and mercury from beneath the existing concrete to approximately 1 foot bgs.

7.2. Sump Water

Lube oil-range petroleum hydrocarbons, arsenic, cadmium, chromium lead and mercury were detected at concentrations greater than the MTCA method A groundwater cleanup level in the sump water. The water stored within the sump was removed by UW and disposed at an appropriately permitted facility. Two open pipes were observed inside the sump following removal of the water. The source of the water within the sump is unknown. However, if the source is located within the building, additional impacted soil and/or water may be present on the site.

7.3. Groundwater

TCE was detected in the groundwater samples collected within the deep aquifer at concentrations greater than the MTCA Method B groundwater screening level protective of indoor air but less than the MTCA Method A groundwater cleanup level in the off-site monitoring wells. The TCE-contaminated groundwater appears to extend beneath the site within the deep aquifer. The MTCA Method B groundwater screening level protective of indoor air provides a screening level for concentrations of chemicals of concern in groundwater that may cause potential vapor intrusion issues.

Groundwater elevation within the deep aquifer beneath the site is estimated to range between 60 to 70 feet; that is approximately 15 to 25 feet lower in elevation than the base of the existing building.

TCE appears to originate from an upgradient source based on the soil and groundwater chemical analytical results. PDA 2F is situated between the Westerly Contaminant Groundwater Plume and Easterly Contaminant Groundwater Plume which is comprised primarily of TCE. The identified historical property uses at the site are unlikely to be the source of TCE and PCE contamination based on information reviewed to date. However, the actual source is unknown at the time of this report.

8.0 PROPOSED DEVELOPMENT PLANS

We understand UWT plans to complete tenant improvements on the existing structure. The development may include excavation activities for utilities. Excavations below 80 feet are not anticipated during the future improvement activities. For budgeting purposes we estimated 500 tons of soil will be generated at the site. The actual quantity may be different based on the actual construction plans.

9.0 POTENTIAL IMPACTS AND MITIGATION MEASURES TO DESIGN AND CONSTRUCTION

We recommend UW develop and implement appropriate administrative institutional controls to limit or prohibit activities that may result in exposure to hazardous substances remaining at the site. Potential impacts to the design and construction of the site include the following:

- TCE-contaminated groundwater may be present in the deep aquifer beneath the entire site.
- Soil is contaminated and impacted with chemicals of concern (metals and cPAHs).

Potential long-term impacts include:

- Long-term disposal of TCE-impacted groundwater from the underslab/perimeter footing drains.
- Continued maintenance of vapor intrusion mitigation system, if necessary.
- Potential periodic indoor air sampling to confirm the vapor intrusion mitigation system may be necessary to evaluate the system is operating properly, if necessary.

- UW should develop and implement appropriate institutional controls to help prevent exposure to residual contamination.

The following sections describe potential impacts, mitigation measures and estimated costs to design and construction.

9.1. TCE-Contaminated Groundwater

TCE was detected in groundwater at concentrations greater than the MTCA Method A Groundwater cleanup level and/or updated MTCA Method B groundwater screening level protective of indoor air in the deep aquifer wells located upgradient and crossgradient of the site.

Based on the elevation of the groundwater of the deep aquifer (estimated elevation 60 feet to 70 feet) and the anticipated excavation of utilities (80 feet), the TCE-contaminated deep aquifer groundwater is not anticipated to be encountered during construction. TCE-contaminated shallow groundwater is not anticipated to be present beneath the building based on the groundwater analytical results in monitoring wells in the area. Mitigation measures include:

Additional Investigation. Further subsurface investigation is necessary to evaluate the vertical and lateral limits of the TCE-contaminated groundwater in the deep aquifer and potentially in the shallow aquifer at the site. Soil vapor sampling will likely be required by Ecology to evaluate if a potential vapor intrusion pathway exists (see discussion below). The estimated cost for soil vapor sampling and additional investigation is $20,000 to $30,000.

Vapor Mitigation. Vapor intrusion occurs when VOCs migrate from contaminated soil or groundwater into overlying buildings through openings in the foundation. The route VOCs take from a subsurface source to the air inside a building is referred to as the vapor intrusion pathway. The most common sources of soil vapor are VOCs including TCE and PCE, which may pose short-term (TCE only) and long-term (chronic) risks through inhalation of contaminated indoor air.

Groundwater and soil vapor concentrations are typically utilized as screening levels regarding the potential for vapor intrusion. The potential for vapor intrusion to be an issue is based on the distance between the building and the depth to the groundwater table (vapors dissipate with distance) and the concentration of chemicals of concern in the groundwater.

TCE-contaminated groundwater is anticipated to be present in the deep aquifer at concentrations greater than the updated MTCA Method B groundwater screening level protective of indoor air based on TCE concentrations in adjacent wells (JS-MW4 and JS-MW6D). The TCE concentrations in the deep aquifer represent a lesser concern for vapor intrusion because the depth of the groundwater, the presence of the shallow aquifer and silt layer (confining to semi-confining) may preclude a vapor contaminant pathway to the surface. It is our opinion that vapor intrusion is a low risk at this site based on the above factors. However TCE-impacted vapors may enter the building through the elevator shaft based on the design of the elevator (i.e., if the elevator jackhole extends into the deep aquifer). Soil vapor or indoor air sampling may be necessary to evaluate the potential for vapor intrusion.

If a potential vapor intrusion pathway exists, then a vapor intrusion mitigation system may be necessary. Potential mitigation options to prevent vapor intrusion include:

- A passive vapor barrier beneath the building. Passive vapor barriers are typically used in combination with another mitigation option (venting or building pressurization). We recommend the vapor barrier be installed below the elevation of penetrations (pipes, etc.) that may be installed after the programing is identified in the future. Penetrating the vapor barrier following the construction will add to the cost of construction.
- Passive or active venting system beneath the building. The venting system may need to be combined with an underslab and perimeter drain to reduce the potential for shallow groundwater to enter the venting system.
- Depressurization or pressurization of subslab soil to prevent vapors from entering existing buildings.
- Pressurization of the building with building air circulation system.

The estimated cost for design and installation of indoor air mitigation system ranges between $5 per square foot and $12 per square foot of building space. The estimated cost for the vapor mitigation system for a building on the entire site ranges from $25,000 to $60,000. Potential periodic indoor air sampling to confirm the vapor intrusion mitigation system may be necessary to evaluate the system is operating properly following construction of the building. The estimated cost for long-term monitoring is unknown.

9.2. Soil Contaminated with Chemicals of Concern

Contaminated soil (cPAHs) and impacted soil (metals and cPAHs) will likely be generated during construction activities. We recommend UW implement the following actions.

- **Characterize Soil and Groundwater for Disposal.** In-situ characterization or stockpiling and subsequent sampling will need to be performed on soil that is generated during construction in areas of cPAHs-contaminated and metals/cPAHs-impacted soil. The estimated cost of the soil sampling for soil disposal is $10,000 to $15,000 based on the mass of soil to be excavated.
- **CPAHs-Contaminated Soil.** CPAHs-contaminated soil is present in the eastern portion of the site to a depth of 1 foot bgs. The contaminated soil will be removed as necessary for construction and Ecology requirements. CPAHs-contaminated soil will be disposed at an UW-approved permitted Subtitle D landfill. CPAHs-contaminated soil left in place shall be capped with a building or hardscape as required by Ecology. The estimated cost for transportation and disposal at a RCRA-Subtitle D facility is $60 to $80 per ton. We estimate the mass of the lead and cPAHs-contaminated soil to be approximately 250 tons. The estimated cost for transportation and disposal of 250 tons is $15,000 to $20,000.
- **Metals- and cPAHs-Impacted Soil.** Metals- and cPAHs-impacted soil are present at a depth of approximately 2.5 feet bgs on the site. For budgeting purposes, we assumed the transportation and disposal of cPAHs- and metal-impacted soil is $30 to $50 per ton. We estimate the mass of the metals- and cPAHs-impacted soil to be 250 tons. The estimated cost for transportation and disposal of 250 tons is $7,500 to 12,500.
- **Health and Safety.** Workers who may be in contact with potentially contaminated soil or groundwater at a state-listed cleanup site are required to have HAZWOPER training. The requirement is consistent with the Washington Administrative Code (WAC) 296-843-100,

Hazardous Waste Operations, which indicates that on-site personnel are required to have current health and safety training in accordance with Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response requirements in 29 CFR 1910.120. The rule also requires the earthwork contractor and other personnel who could potentially contact contaminated materials to develop and implement a written safety and health program for their employees involved in hazardous waste operations under 29 CFR 1910.120. The estimated cost for the contractor to be HAZWOPER trained and have appropriate liability insurance is roughly between $10,000 and $70,000 depending on the number of subcontractors that require training, and the contractor markup factor.

10.0 LIMITATIONS

This report has been prepared for use by the University of Washington for the Priority Development Area 2F located in Tacoma, Washington at the University of Washington Tacoma campus.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

Please refer to Appendix A titled "Report Limitations and Guidelines for Use" for additional information pertaining to use of this report.

11.0 REFERENCES

Ecology, 2009 Washington State Department of Ecology. Draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action" dated October 2009.

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GeoEngineers, Inc., Sampling and Analysis and Quality Assurance Project Plan Addendum, UWT Environmental Investigation - CPO Project No. 204277 and 204286, South 17th Street to South 21st Street and South Tacoma Avenue to Pacific Avenue, Tacoma, Washington dated October 23, 2013.

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Table 1

Summary of Chemical Analytical Results[1] - Soil

PDA 2F - Tioga Building

University of Washington Tacoma Priority Development Areas

Tacoma, Washington

Boring/Test Pit	2F-B1	2F-B2			MTCA Method A ULU Cleanup Level	Reuse Criteria [10]
Sample Identification [2]	2F-B1-0-1	2F-B2-0-0.5	2F-B2-1-2.5	2F-B2-2.5-3.25		
Sample Depth (feet bgs)	0 to 1	0 to 0.5	1 to 2.5	2.5 to 3.25		
Soil Type	Fill	Fill	Fill	Qvi		
NWTPH-HCID [3] (mg/kg)						
Gasoline-Range	23 U	23 U	23 U	22 U	30/100[7]	30
Diesel-Range	57 U	58 U	54 U	56 U	2,000	200
Lube Oil-Range	110 U	120 U	110 U	110 U	2,000	200
VOCs[4] (mg/kg)						
Tetrachloroethene (PCE)	0.0010 U	0.0013 U	0.00087 U	0.00076 U	0.05	DET
Trichloroethene (TCE)	0.0010 U	0.0013 U	0.00087 U	0.00076 U	0.03	DET
cis-1,2-Dichloroethene	0.0010 U	0.0013 U	0.00087 U	0.00076 U	160[8]	DET
Trans-1,2-Dichloroethene	0.0010 U	0.0013 U	0.00087 U	0.00076 U	1,600[8]	DET
Vinyl Chloride	0.0010 U	0.0013 U	0.00087 U	0.00076 U	0.67[8]	DET
PAHs[5] (mg/kg)						
1-Methylnaphthalene	0.0076 U	**0.044**	0.0072 U	0.0074 U	35[8]	NE
2-Methylnaphthalene	0.0076 U	**0.031**	0.0072 U	0.0074 U	320[8]	NE
Acenaphthene	0.0076 U	**0.012**	0.0072 U	0.0074 U	4,800[8]	NE
Acenaphthylene	0.0076 U	**0.0095**	0.0072 U	0.0074 U	NE	NE
Anthracene	0.0076 U	**0.027**	0.0072 U	0.0074 U	24,000[8]	NE
Benzo[g,h,i]perylene	0.0076 U	**0.072**	0.0072 U	0.0074 U	NE	NE
Fluoranthene	0.0076 U	**0.20**	0.0072 U	**0.019**	3,200[8]	NE
Fluorene	0.0076 U	**0.016**	0.0072 U	0.0074 U	3,200[8]	NE
Naphthalene	0.0076 U	**0.031**	0.0072 U	0.0074 U	5	5
Phenanthrene	0.0076 U	**0.22**	0.0072 U	**0.022**	NE	NE
Pyrene	0.0076 U	**0.19**	0.0072 U	**0.018**	2,400[8]	NE
Carcinogenic PAHs [5] (mg/kg)						
Benzo (a) anthracene (TEF 0.1)	0.0076 U	**0.069**	0.0072 U	0.0074 U	MTCA ULU cleanup level for the sum of all cPAHs is 0.1 mg/kg	Reuse Criteria for the sum of all cPAHs is 0.1 mg/kg
Benzo (a) pyrene (TEF 1)	0.0076 U	**0.094**	0.0072 U	0.0074 U		
Benzo (b) fluoranthene (TEF 0.1)	0.0076 U	**0.11**	0.0072 U	**0.0077**		
Benzo (J,k) fluoranthene (TEF 0.1)	0.0076 U	**0.033**	0.0072 U	0.0074 U		
Chrysene (TEF 0.01)	0.0076 U	**0.10**	0.0072 U	**0.0094**		
Dibenz (a,h) anthracene (TEF 0.1)	0.0076 U	**0.020**	0.0072 U	0.0074 U		
Indeno (1,2,3-cd) pyrene (TEF 0.1)	0.0076 U	**0.061**	0.0072 U	0.0074 U		
Total TTEC of cPAHs (detect only)	N/A	**0.12**	N/A	**0.0009**	0.1	0.1
Metals [6] (mg/kg)						
Arsenic	11 U	12 U	11 U	11 U	20	7
Barium	**91**	**220**	**83**	**84**	16,000[8]	NE
Cadmium	0.57 U	0.58 U	0.54 U	0.56 U	2.0	1.0
Chromium	**52**	**45**	**43**	**40**	2,000 [9]	48[11]
Lead	**100**	**130**	**8.8**	5.6 U	250	50
Mercury	0.28 U	**0.30**	0.27 U	0.28 U	2.0	0.07 or DET
Selenium	11 U	12 U	11 U	11 U	400[8]	NE
Silver	1.1 U	**2.2**	1.1 U	1.1 U	400[8]	NE

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc., of Redmond, Washington.

[2] Sample ID = Area number - boring/test pit number - starting depth of sample [feet bgs] -end depth [feet bgs], Area 2F Boring 1 collected 0-1 feet bgs = 2F-B1-0-1.

[3] Washington State Department of Ecology (Ecology)-approved method NWTPH-HCID.

[4] VOCs were analyzed by EPA method 8260B. Other VOCs were analyzed but not detected.

[5] Polycyclic aromatic hydrocarbons (PAHs) and carcinogenic PAHs (cPAHs) were analyzed by U.S. Environmental Protection Agency (EPA) method 8270D/SIM.

[6] Resource Conservation Recovery Act (RCRA) metals analyzed by EPA 6000/7000 series method.

[7] MTCA Method A cleanup level for gasoline is 30 mg/kg if benzene is detected or if the sum of toluene, ethylbenzene and xylenes are equal to or greater than 1% of the total gasoline detection.

[8] MTCA Method B criteria represented because MTCA Method A cleanup level has not been established.

[9] MTCA Method A cleanup level for Trivalent Chromium.

[10] Guidance for Remediation of Petroleum Contaminated Sites (Publication 10-09-057) Ecology, October 2011; Summary Natural Background Soil Metals Concentrations in Washington State (Publication 94-115) dated October 1994; and Hazardous Waste Regulations 40 CFR Part 260.

[11] Chromium was not compared to the Reuse Criteria listed above for soils based on historic soil analytical results indicating chromium is not a prevalent chemical of concern on the UWT campus.

-- = sample not analyzed

N/A = not applicable

mg/kg = milligram per kilogram

Qvi = Ice-contact deposit

MTCA = Model Toxics Control Act

DET = Detected greater than laboratory reporting limits

U = Analyte was not detected at or greater than the listed reporting limit

TEF = Toxicity Equivalency Factor as defined in WAC 173-340-900 Table 708-2

Total Toxic Equivalent Concentration (TTEC) is the sum of each individual cPAH concentration multiplied by its corresponding TEF.

Bold font type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Bold font type and gray shading indicates that the detected concentration is greater than the respective MTCA cleanup level.

Dashed outline indicates the value is greater than the Reuse Criteria.

Table 2

Summary of Chemical Analytical Results[1] - Groundwater

PDA 2F - Tioga Building

University of Washington Tacoma Priority Development Areas

Tacoma, Washington

Sample Location	JS-MW4	JS-MW6D	JS-MW6S	UG-MW2R	Floor Sump	MTCA Method A Groundwater Cleanup Level	MTCA Method B Groundwater Criteria	MTCA Method B Groundwater Screening Levels Protective of Indoor Air [13]
Sample ID [2]	JS-MW4D-130919	JS-MW6D-130913	JS-MW6S-130912	UG-MW2R-130715	2F-SUMP			
Sample Date	9/19/2013	9/13/2013	9/12/2013	7/15/2013	6/20/2013			
Approximate Depth to Groundwater (feet btoc) [3]	40.18	19.22	5.56	16.56	N/A			
Elevation of Groundwater Level [4]	53.48	82.77	96.29	81.34	N/A			
Top of Well Screen Elevation (feet) [4]	43	77	94	83	N/A			
(feet) [4]	53	62	84	62	N/A			
Lithology At Well Screen	Advance Outwash	Advance Outwash	Qvi	Qvi	N/A			
Chemical								
NWTPH-Gx [5] (µg/L)								
Gasoline-Range	100 U	100 U	100 U	100 U	100 U	800/1,000 [11]	NE	NE
NWTPH-Dx [6] (mg/L)								
Diesel-Range	0.26 U	0.26 U	0.27 U	0.29 U	0.76 U	0.5	NE	NE
Lube Oil-Range	0.42 U	0.41 U	0.43 U	0.46 U	**2.2**	0.5	NE	NE
VOCs [7] (µg/L)								
Benzene	0.20 U	0.20 U	**0.29**	0.20 U	0.20 U	5	0.54	1.5
Trichloroethene (TCE)	**2.5**	**2.8**	0.20 U	0.20 U	0.20 U	5	0.54	1.5
Tetrachloroethene (PCE)	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	5	21	24
(cis) 1,2-Dichloroethene	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	NE	16	160
(trans) 1,2-Dichloroethene	0.20 U	0.20 U	0.20 U	0.20 U	0.20 U	NE	160	130
Vinyl Chloride	0.20 U	0.20 U	0.20 U	0.10 U	0.10 U	0.2	0.029	0.35
cPAHs [8] (µg/L)								
Benzo (a) anthracene (TEF 0.1)	0.0095 U	0.0095 U	0.010 U	--	0.0099 U	MTCA ULU cleanup level for the sum of all cPAHs is 0.1 µg/L	MTCA ULU B criteria level for the sum of all cPAHs is 0.012 µg/L	NE
Benzo (a) pyrene (TEF 1)	0.0095 U	0.0095 U	0.010 U	--	0.0099 U			NE
Benzo (b) fluoranthene (TEF 0.1)	0.0095 U	0.0095 U	0.010 U	--	0.0099 U			NE
Benzo (j,k) fluoranthene (TEF 0.1)	0.0095 U	0.0095 U	0.010 U	--	0.0099 U			NE
Chrysene (TEF 0.01)	0.0095 U	0.0095 U	0.010 U	--	0.0099 U			NE
Dibenz (a,h) anthracene (TEF 0.1)	0.0095 U	0.0095 U	0.010 U	--	0.0099 U			NE
Indeno (1,2,3-cd) pyrene (TEF 0.1)	0.0095 U	0.0095 U	0.010 U	--	0.0099 U			NE
Total TTEC of cPAHs (detect only)	N/A	N/A	N/A	--	N/A	0.1	0.012	NE
Total Metals [9] (µg/L)								
Arsenic	3.0 U	3.0 U	3.0 U	--	**160**	5	0.058	NE
Barium	25 U	25 U	**100**	--	**440**	NE	NE	NE
Cadmium	4.0 U	4.0 U	4.0 U	--	**16**	5	16	NE
Chromium	10 U	10 U	**13**	--	**80**	50 [12]	NE	NE
Lead	**1.3**	1.0 U	**1.7**	--	**5,700**	15	NE	NE
Mercury	0.50 U	0.50 U	0.50 U	--	**2.5**	2	NE	NE
Selenium	5.0 U	5.0 U	5.0 U	--	5.6 U	NE	NE	NE
Silver	10 U	10 U	10 U	--	11 U	2	NE	NE
PCBs [10] (µg/L)								
All Aroclors	--	--	--	--	0.094 U, X	0.1	0.04	NE

Notes:

[1] Chemical analysis performed by OnSite Environmental, Inc. in Redmond, Washington.

[2] Sample ID = Boring number - Water sample (i.e., B10-W was a water sample collected from boring B10) or Sample ID =Monitoring well identification number (i.e., monitoring well TP-MW1).

[3] Groundwater level was measured below the existing building floor.

[4] Based on survey completed by AHBL November 6, 2013. Horizontal datum - NAD 83/91 Washington State Plane - South Zone (City of Tacoma Horizontal Control Holding City Monument Numbers 411 and 414). Vertical datum NGVD 29 (brass monument at South 19th and Fawcett Avenue, Elevation 165.15).

[5] Washington State Department of Ecology (Ecology)-approved method NWTPH-Gx.

[6] Ecology-approved method NWTPH-Dx.

[7] Volatile organic compounds (VOCs) were analyzed by EPA method 8260C. Other VOCs were analyzed but not detected.

[8] Polycyclic Aromatic Hydrocarbons (PAHs) analyzed by EPA method 8270D/SIM. Other PAHs were analyzed but not detected.

[9] Metals analyzed by EPA 200.8 or 7470A method.

[10] Polychlorinated biphenyls analyzed by EPA method 8082. All aroclors were not detected, highest reporting limit presented.

[11] MTCA Method A cleanup level for gasoline-range petroleum hydrocarbons is 800 µg/L if benzene is present and 1,000 µg/L if benzene is not present.

[12] MTCA Method A cleanup level for total chromium shown. Cleanup level for hexavalent chromium is 48 µg/L.

[13] MTCA Method B groundwater screening level based on protection of indoor air. Values calculated using Method B air cleanup levels from Ecology's "CLARC Master Spreadsheet.xls" dated May 2014 and Equation 1 from Ecology's 2009 draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action."

MTCA = Model Toxics Control Act

DET = Detected greater than laboratory reporting limits

-- = sample not analyzed.

Qvi = Ice-contact deposit

µg/L = microgram per Liter

cPAHs = carcinogenic PAHs

mg/L = milligram per Liter

NE = Not established

TEF = Toxicity Equivalency Factor as defined in WAC 173-340-900 Table 708-2

Total Toxic Equivalent Concentration (TTEC) is the sum of each individual cPAH concentration multiplied by its corresponding TEF.

U = Analyte was not detected at or greater than the listed reporting limit.

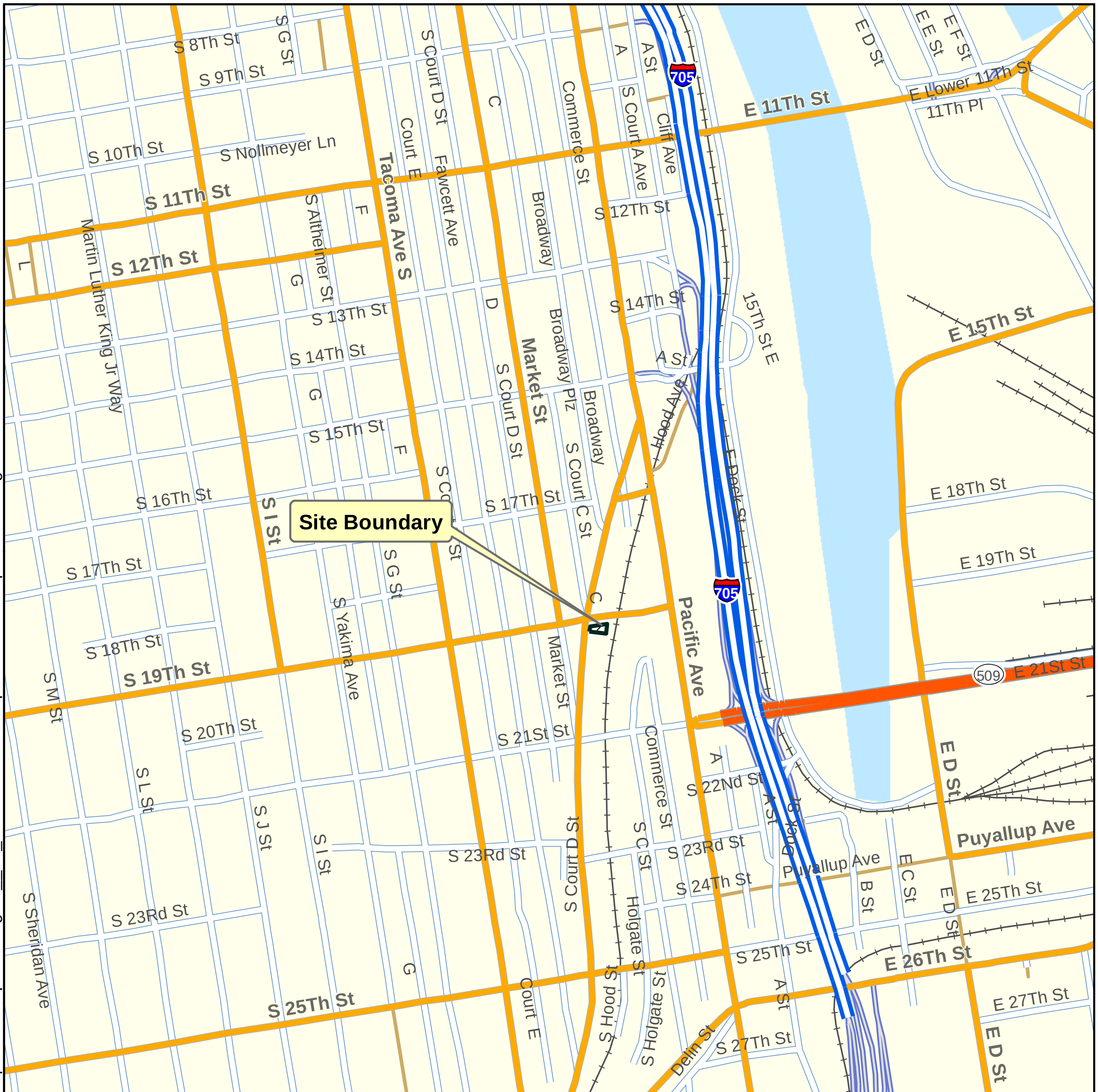
X = Sample extract treated with a mercury cleanup procedure

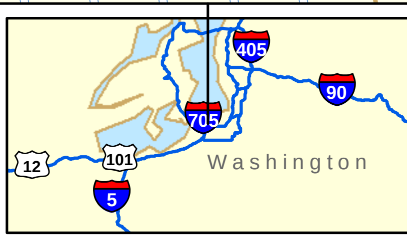
Italics = The listed reporting limit is greater than the applicable cleanup level.

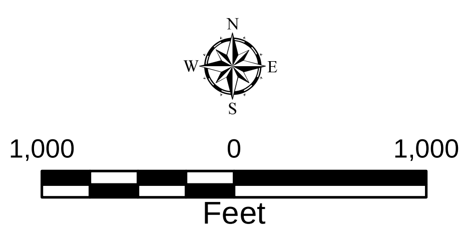
Bold type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Bold type and gray shading indicates analyte is detected at a concentration greater than the MTCA Method groundwater cleanup level/criteria.

Dashed outline indicates analyte is detected at a concentration greater than the MTCA Method B Indoor Air Screening Level.







Notes:
CPO = University of Washington Capital Project Office
UWT = University of Washington Tacoma
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
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Data Sources: ESRI Data & Maps

Projection: NAD 1983 UTM Zone 10N

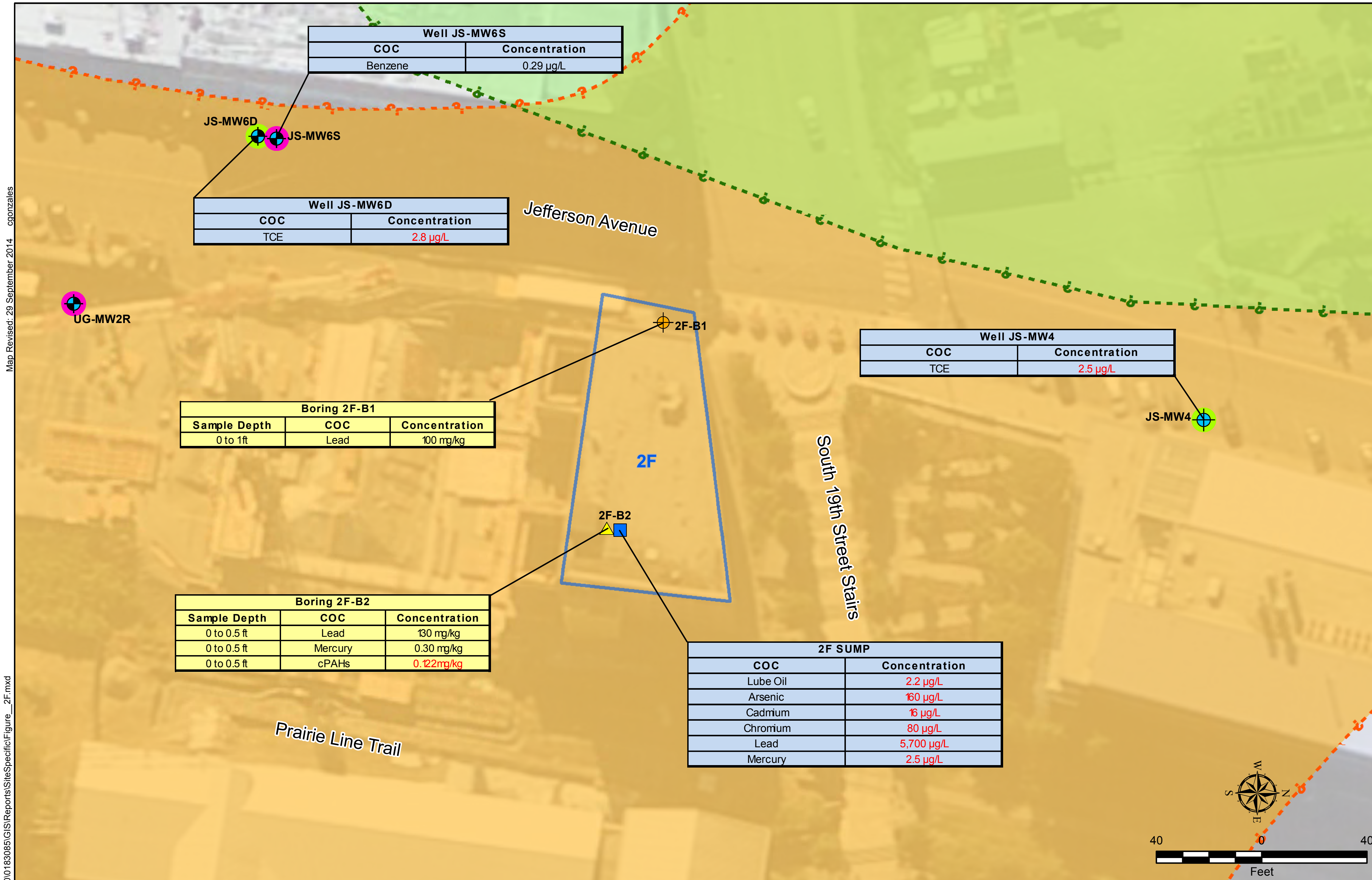
Vicinity Map

UWT Environmental Assessment
Priority Development Areas - CPO Project No. 204277
Tacoma, Washington

GeoEngineers

Figure 1

Office: TAC Path: W:\Tacoma\Projects\0\0183085\GIS\Reports\SiteSpecific\Figure__2F_VM.mxd Map Revised: 29 April 2014 cgonzales



Well JS-MW6S	
COC	Concentration
Benzene	0.29 µg/L

Well JS-MW6D	
COC	Concentration
TCE	2.8 µg/L

Boring 2F-B1		
Sample Depth	COC	Concentration
0 to 1ft	Lead	100 mg/kg

Boring 2F-B2		
Sample Depth	COC	Concentration
0 to 0.5 ft	Lead	130 mg/kg
0 to 0.5 ft	Mercury	0.30 mg/kg
0 to 0.5 ft	cPAHs	0.122mg/kg

Well JS-MW4	
COC	Concentration
TCE	2.5 µg/L

2F SUMP	
COC	Concentration
Lube Oil	2.2 µg/L
Arsenic	160 µg/L
Cadmium	16 µg/L
Chromium	80 µg/L
Lead	5,700 µg/L
Mercury	2.5 µg/L

Soil Results*

Boring 2A-B7		
Sample Depth	COC	Concentration
2.5 to 3.5 feet bgs	Lead	200 mg/kg
2.5 to 3.5 feet bgs	cPAHs	0.64 mg/kg

Groundwater Results*

Well UG-MW13	
COC	Concentration
TCE	110 µg/L
PCE	14 µg/L

*Chemicals shown in red were detected at concentrations greater than the respective MTCA Method A cleanup levels.

Only analytical results of the chemicals of concern are shown if detected. Other chemicals that were analyzed and detected are not shown unless detected at concentrations greater than the respective MTCA cleanup levels.

Legend

Approximate Location of Priority Development Area 2F

Approximate Subsurface Location and Identification

Direct Push Boring

Hand Auger Boring

Sump

Lithology of Well Screen Interval

Ice-Contact Deposit (Shallow Aquifer)

Advance Outwash (Deep Aquifer)

Approximate Lateral Extent of TCE Contaminated Groundwater in Shallow Aquifer

Approximate Lateral Extent of TCE Contaminated Groundwater in Deep Aquifer

Approximate Lateral Extent of TCE-Contaminated Groundwater Plume in Shallow and Deep Aquifer

Notes:
cPAHs concentrations shown as TTEC.
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet
COC = Chemical of Concern
UWT = University of Washington Tacoma
PDA = Priority Development Area
PCE = tetrachloroethene
TCE = trichloroethene
cPAH = Carcinogenic Polycyclic Aromatic Hydrocarbons
mg/kg = milligram per kilogram
µg/L = microgram per Liter
bgs = Below Ground Surface
TTEC = Total Toxicity Equivalency Concentration

MTCA Cleanup Levels

Soil:
PCE = 0.05 mg/kg (Method A ULU)
TCE = 0.03 mg/kg (Method A ULU)
Benzene = 0.03 mg/kg (Method A ULU)
Vinyl Chloride = 0.67 mg/kg (Method B)
Lube Oil-Range Petroleum Hydrocarbons = 2,000 mg/kg (Method A ULU)
Diesel-Range Petroleum Hydrocarbons = 2,000 mg/kg (Method A ULU)
Gasoline-Range Petroleum Hydrocarbons = 100 mg/kg (Method A ULU)
cPAHs (TTEC) = 0.1 mg/kg (Method A ULU)
Lead = 250 mg/kg (Method A ULU)
Arsenic = 20 mg/kg (Method A ULU)
Cadmium = 2 mg/kg (Method A ULU)
Mercury = 2 mg/kg (Method A ULU)

Groundwater:
PCE = 5 µg/L (Method A); 24 µg/L (Indoor Air)
TCE = 5 µg/L (Method A); 1.5 µg/L (Indoor Air)
(cis) 1,2 DCE= 16 µg/L (Method B); 160 µg/L (Indoor Air)
(trans) 1,2 DCE = 160 µg/L (Method B); 130 µg/L (Indoor Air)
1,1 DCA = 7.68 µg/L (Method ;130 µg/L (Indoor Air)
Vinyl Chloride = 0.2 µg/L (Method A); 0.35 µg/L (Indoor Air)
Benzene = 5 µg/L (Method A); 2.4 µg/L (Indoor Air)
Lube Oil-Range Petroleum Hydrocarbons = 0.5 mg/L (Method A)
Arsenic = 5 µg/L (Method A)
cPAHs= 0.1 µg/L (Method A)

Site Plan – PDA 2F/Tioga Building

UWT Environmental Assessment
Priority Development Areas - CPO Project No. 204277
Tacoma, Washington

GEOENGINEERS

Figure 2

Map Revised: 29 September 2014 cgonzales
Office: TAC Path: W:\Tacoma\Projects\0\0183085\GIS\Reports\SiteSpecific\Figure__2F.mxd

APPENDIX A
Report Limitations and Guidelines for Use

APPENDIX A
REPORT LIMITATIONS AND GUIDELINES FOR USE[1]

This appendix provides information to help you manage your risks with respect to the use of this report.

Environmental Services are Performed for Specific Purposes, Persons and Projects

This report has been prepared for use by University of Washington. This report is not intended for use by others, and the information contained herein is not applicable to other sites.

GeoEngineers structures our services to meet the specific needs of our clients. For example, an environmental site assessment study conducted for a property owner may not fulfill the needs of a prospective purchaser of the same property. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and project site. No one except University of Washington should rely on this environmental report without first conferring with GeoEngineers. This report should not be applied for any purpose or project except the one originally contemplated.

This Environmental Report is Based on a Unique Set of Project-Specific Factors

This report has been prepared for the University of Washington at the Priority Development Area 2F, Environmental Assessment Project at the UW – Tacoma (UWT) campus located in Tacoma, Washington. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, do not rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

If important changes are made after the date of this report, GeoEngineers should be given the opportunity to review our interpretations and recommendations and provide written modifications or confirmation, as appropriate.

Reliance Conditions for Third Parties

If a lending agency or other parties intend to place legal reliance on the product of our services, we require that those parties indicate in writing their acknowledgement that the scope of services provided, and the general conditions under which the services were rendered including the

[1] Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

limitation of professional liability, are understood and accepted by them. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions.

Environmental Regulations are Always Evolving

Some substances may be present in the site vicinity in quantities or under conditions that may have led, or may lead, to contamination of the subject site, but are not included in current local, state or federal regulatory definitions of hazardous substances or do not otherwise present current potential liability. GeoEngineers cannot be responsible if the standards for appropriate inquiry, or regulatory definitions of hazardous substance, change or if more stringent environmental standards are developed in the future.

Subsurface Conditions can Change

This environmental report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by manmade events such as construction on or adjacent to the site, by new releases of hazardous substances, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Always contact GeoEngineers before applying this report to determine if it is still applicable.

Topsoil

For the purposes of this report, we consider topsoil to consist of generally fine-grained soil with an appreciable amount of organic matter based on visual examination, and to be unsuitable for direct support of the proposed improvements. However, the organic content and other mineralogical and gradational characteristics used to evaluate the suitability of soil for use in landscaping and agricultural purposes was not determined, nor considered in our analyses. Therefore, the information and recommendations in this report, and our logs and descriptions should not be used as a basis for estimating the volume of topsoil available for such purposes.

Most Environmental Findings are Professional Opinions

Our interpretations of subsurface conditions are based on field observations and chemical analytical data from widely spaced sampling locations at the site. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ – sometimes significantly – from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

Do Not Redraw the Exploration Logs

Environmental scientists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in an environmental report should never be redrawn for inclusion in other design drawings. Only photographic or electronic reproduction is acceptable, but recognize that separating logs from the report can elevate risk.

Read These Provisions Closely

Some clients, design professionals and contractors may not recognize that the geoscience practices (geotechnical engineering, geology and environmental science) are far less exact than other engineering and natural science disciplines. This lack of understanding can create unrealistic expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory "limitations" provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you are unclear how these "Report Limitations and Guidelines for Use" apply to your project or site.

Geotechnical, Geologic and Geoenvironmental Reports Should Not Be Interchanged

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually relate any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding a specific project.

Biological Pollutants

GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention, or assessment of the presence of Biological Pollutants in or around any structure. Accordingly, this report includes no interpretations, recommendations, findings, or conclusions for the purpose of detecting, preventing, assessing, or abating Biological Pollutants. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts.

APPENDIX B
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APPENDIX C
GPR Survey Results

Global Geophysics
P. O. Box 2229
Redmond, WA 98073-2229
Tel: 425-890-4321
Fax: 360-805-0259

July 24, 2013 Our ref: 103-0417.000

GeoEngineers, Inc.
1101 Fawcett Avenue, Suite 200
Tacoma, WA, 98402

Attention: Ms. Tricia DeOme

RE: REPORT FOR UST AND UTILITY LOCATE FOR THE UNIVERSITY OF WASHINGTON IN TACOMA JEFFERSON STREET SITE, TACOMA, WA

This letter report presents the results of the geophysical survey performed by Global Geophysics in June and July, 2013 for the University of Washington in Tacoma, Tacoma, WA. The objectives of the studies are to locate underground storage tank.

METHODOLOGY, INSTRUMENTATION AND FIELD PROCEDURES

Electromagnetics was the primary technique for this project, and ground penetrating radar was used in the areas where interference with EM61 were present..

Time Domain Electromagnetic (TDEM)

The time-domain electromagnetic system is capable of detecting buried metal objects. It transmits a pulsed electromagnetic field into the ground, which induces eddy currents in buried metallic objects. These eddy currents generate secondary electromagnetic fields that are detected by the system. The time duration or decay rate, of the secondary EM field is related to the electrical conductivity characteristics of the buried object.

A four-channel (gate) high sensitivity metal detector, Geonics EM61 Mk2A, was used to collect the data along the same traverses 2.5 ft apart. The low channel number (1) represents anomalies produced by shallow objects and the high channel number (4) represents anomalies produced by deeper objects. The data was stored digitally and downloaded after the survey for analysis and mapping

Ground Penetrating Radar

The GPR method uses electromagnetic pulses, emitted at regular intervals by an antenna to map subsurface features. The electromagnetic pulses are reflected where changes in electrical properties of materials occur such as changes in lithology or where underground UST are present. The reflected electromagnetic energy is received by an antenna, converted into an electrical signal, and recorded on the GPR unit. The data is recorded and viewed in real time on a graphical display that depicts a continuous profile or cross-section image of the subsurface directly beneath the path of the antenna.

The depth of penetration of the GPR signal varies according to antenna frequency and the conductivity of the subsurface material. The depth of subsurface penetration with GPR decreases with an increase in the frequency of the antenna and an increase in soil conductivity. Low frequency antennas (50 to 500 MHz) provide the best compromise between obtaining good subsurface penetration and resolution.

The data at this site were collected using Geophysical Survey Systems, Inc. (GSSI) SIR 3000 GPR system with an antenna having center frequency of 200 MHz. The data were digitally recorded for post processing.

RESULTS

The EM61 data were processed and presented in the Appendix A. There are three categories of Em anomalies:

- The areas with high EM response (greater than 1000 mV) and lateral sizes greater than 2.5 ft are interpreted as possible UST or large metal objects.
- The areas with EM response less than 1000 mV are interpreted as scattered metal objects
- The linear EM anomalies are interpreted as buried metal pipes.

The GPR data was reviewed and didn’t suggest other findings.

LIMITATIONS

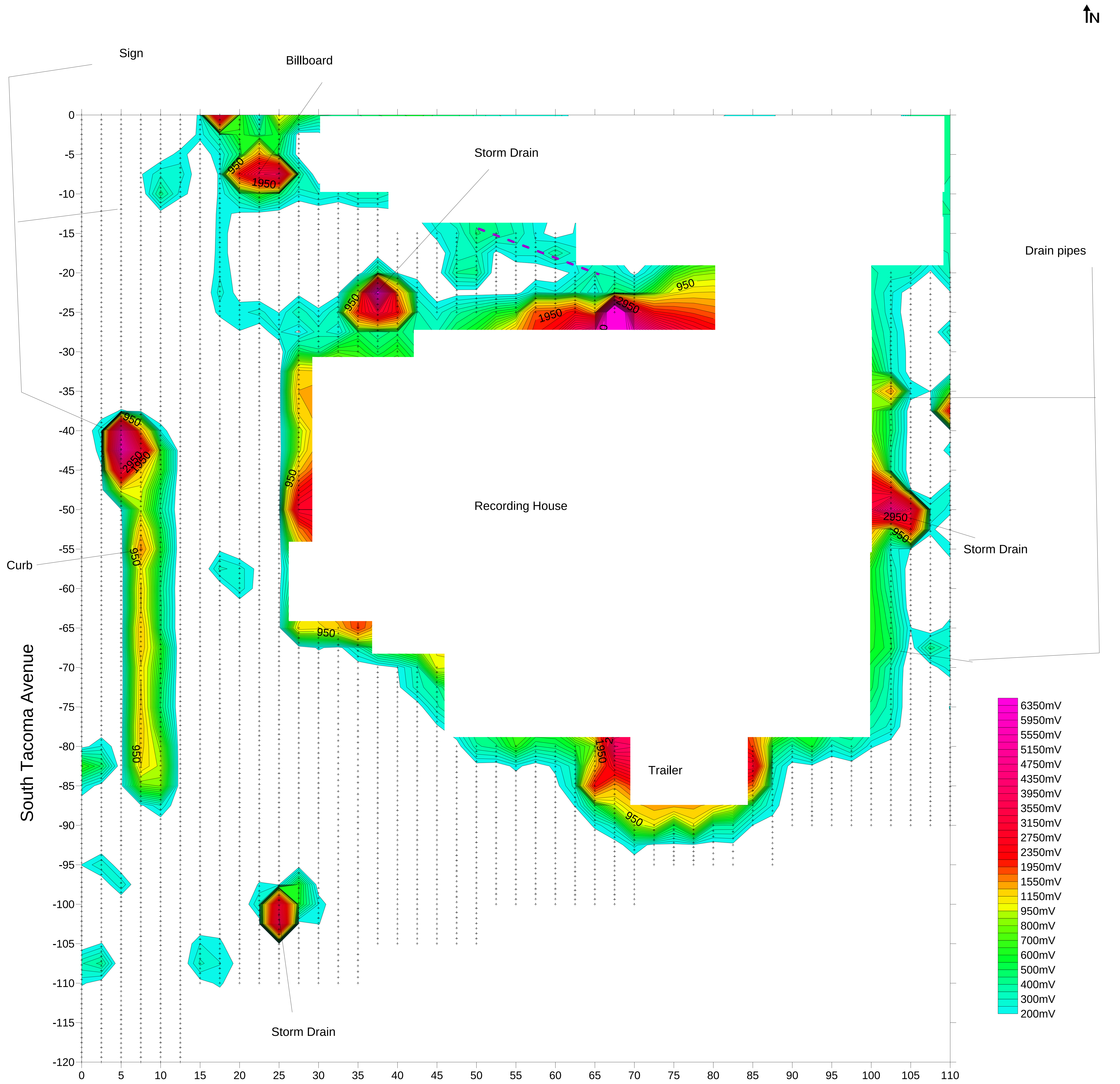
Global Geophysics's services are conducted in a manner consistent with the level of care and skill ordinarily exercised by other members of the geophysical community currently practicing under similar conditions subject to the time limits and financial and physical constraints applicable to the services. EM and ground penetrating radar (GPR) are remote sensing geophysical methods that may not detect all subsurface objects. Furthermore, it is possible that geophysical anomalies that are interpreted to be USTs may upon intrusive sampling prove to be misinterpreted.

If you have any questions or require additional information, please contact us at 425-890-4321.

Sincerely,

Global Geophysics

John Liu, Ph.D.
Principal Geophysicist



Legend:

0 ft 10 ft 20 ft

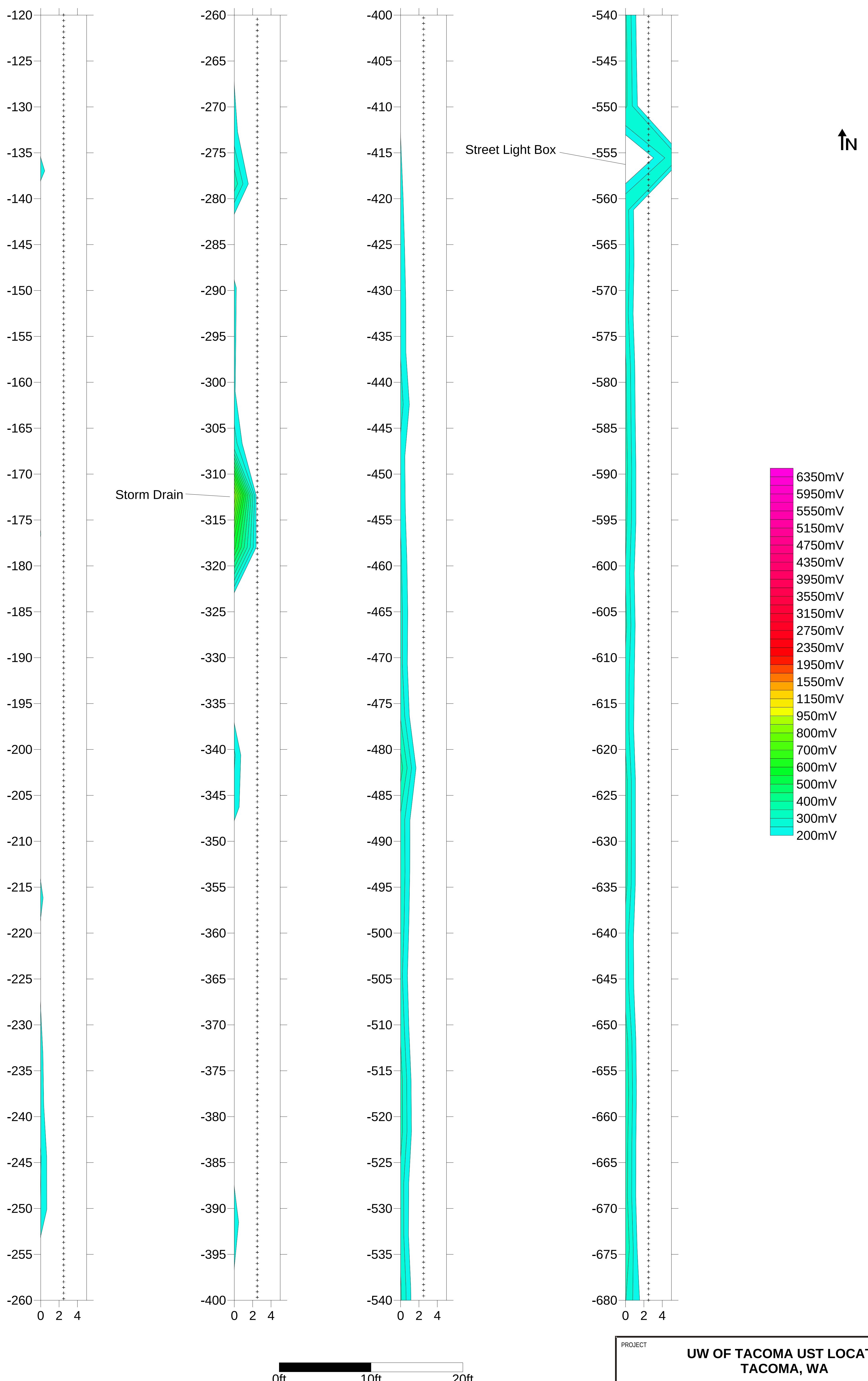
– – – Interpreted buried metallic utilities

PROJECT
UW OF TACOMA UST LOCATE
TACOMA, WA

TITLE
UPTON (AREA 1A)
EM DATA CONTOUR PLAN

Global Geophysics
P.O.BOX 2229
REDMOND, WA 98073-2229
Tel: 425-890-4321

PROJECT NO.: 103-0417.000		FILE No.	
DESIGN	--	SCALE AS SHOWN	REV.
CADD	JL	**FIGURE**	
CHECK	JL		
REVIEW	--		



Legend:

Interpreted buried metallic utilities

PROJECT

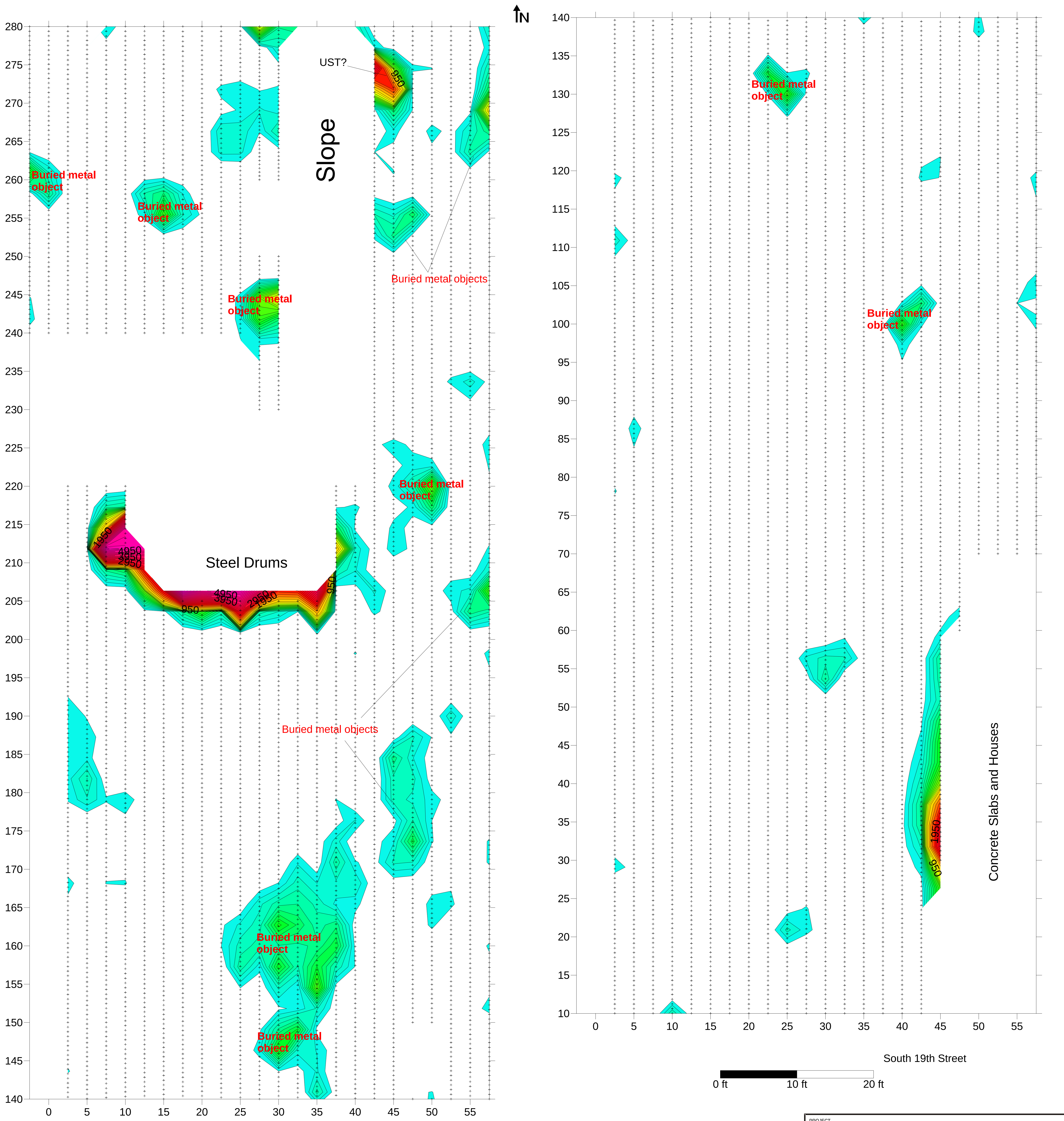
UW OF TACOMA UST LOCATE
TACOMA, WA

TITLE

SIDEWALK SW OF UPTON (AREA 1A)
EM DATA CONTOUR PLAN

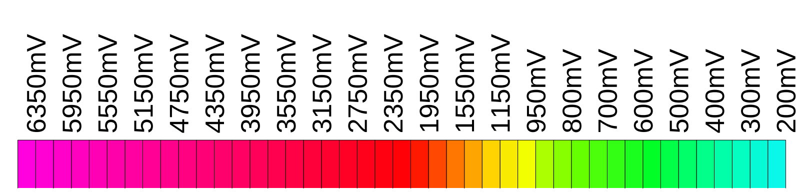
Global Geophysics
P.O.BOX 2229
REDMOND, WA 98073-2229
Tel: 425-890-4321

PROJECT NO.: 103-0417.000		FILE No.	
DESIGN	--	SCALE AS SHOWN	REV.
CADD	JL	**FIGURE**	
CHECK	JL		
REVIEW	--		



Legend:

Interpreted buried metallic utilities

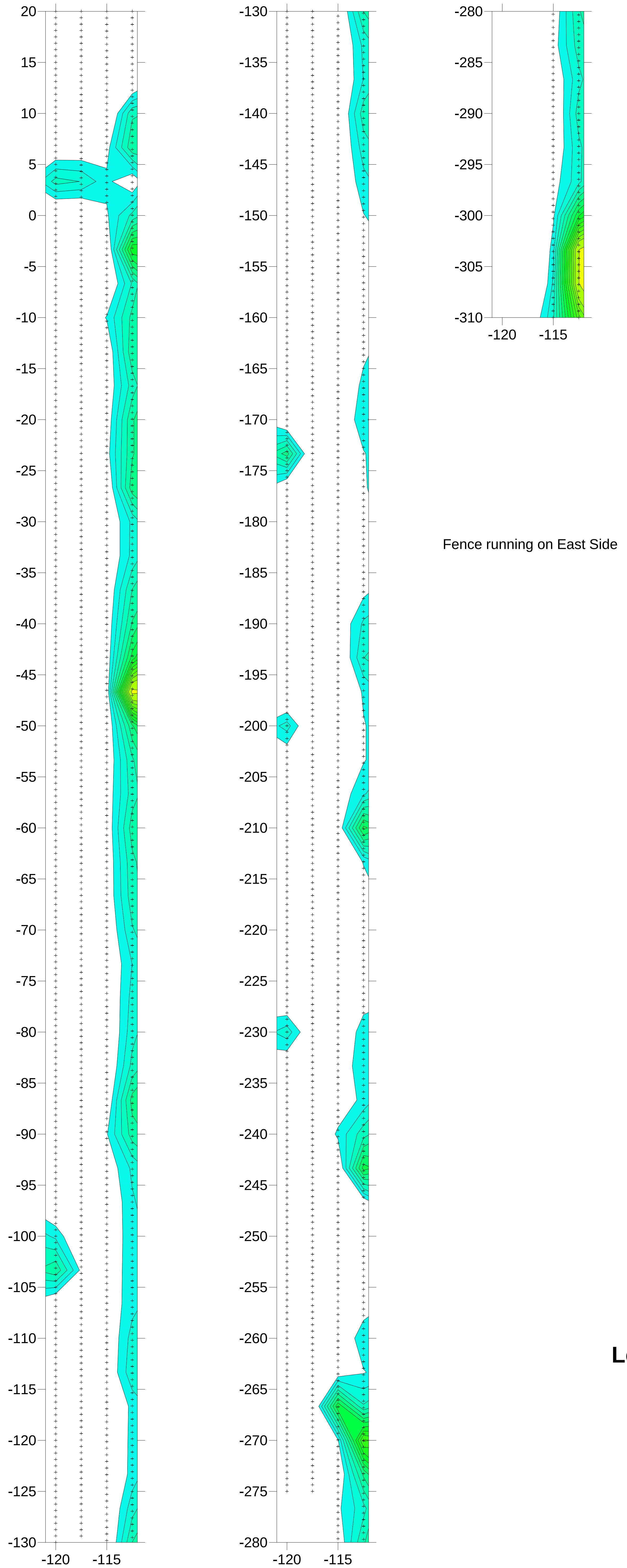


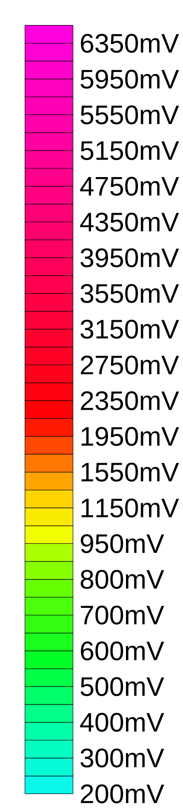
PROJECT
UW OF TACOMA UST LOCATE
TACOMA, WA

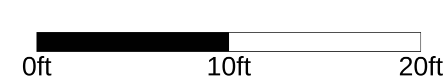
TITLE
FAR SOUTH OF UPTON
(EAST+MIDDLE, AREA 1B)
EM DATA CONTOUR PLAN

Global Geophysics
P.O.BOX 2229
REDMOND, WA 98073-2229
Tel: 425-890-4321

PROJECT NO.	103-0417.000	FILE No.	
DESIGN	--	SCALE	AS SHOWN
CADD	JL	REV.	
CHECK	JL	**FIGURE**	
REVIEW	--		



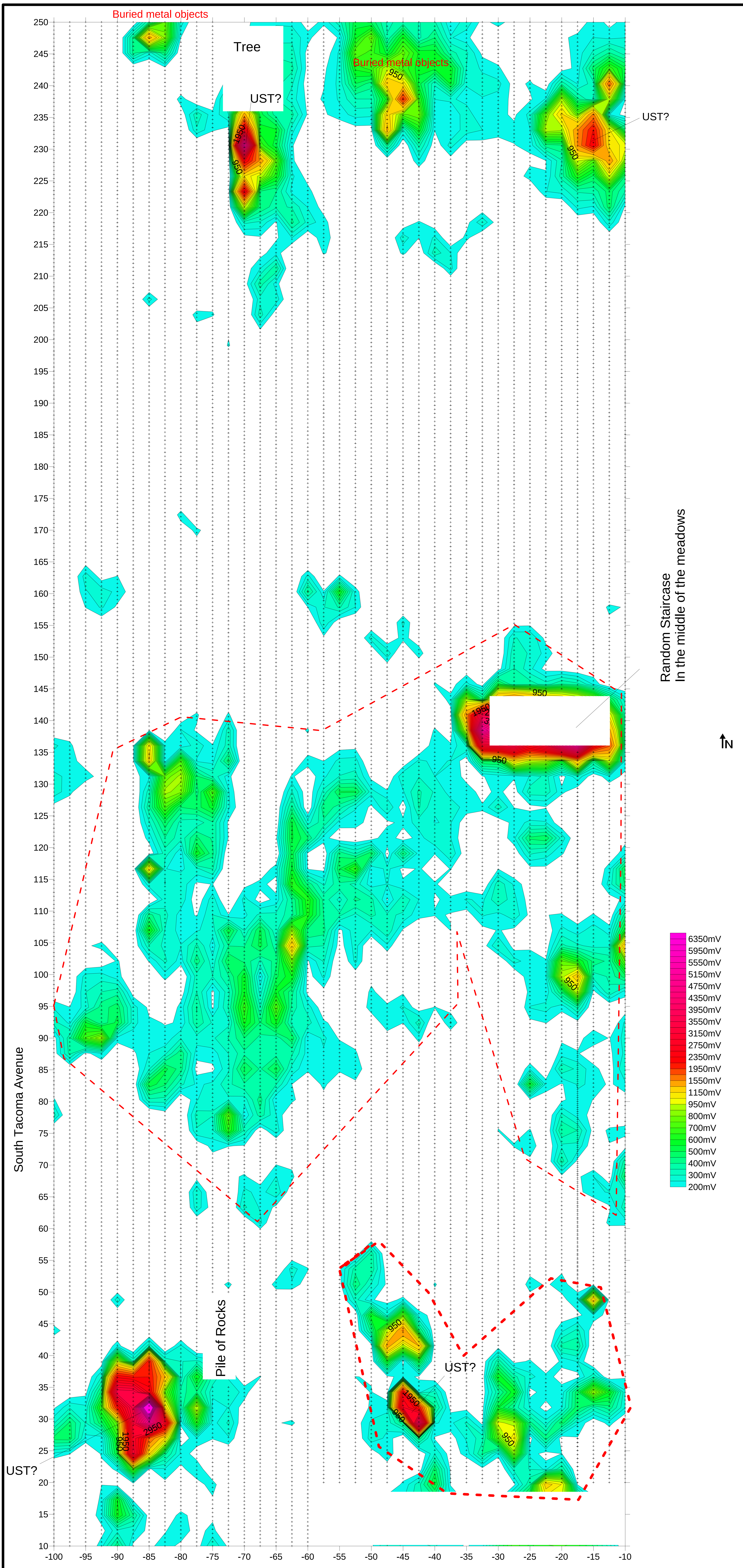




Legend:

– – – Interpreted buried metallic utilities

PROJECT	UW OF TACOMA UST LOCATE TACOMA, WA		
TITLE	VACANT LOT FAR S OF UPTON (WEST, AREA 1B) EM DATA CONTOUR PLAN		
Global Geophysics P.O.BOX 2229 REDMOND, WA 98073-2229 Tel: 425-890-4321	PROJECT NO.: 103-0417.000		FILE No.
	DESIGN	--	SCALE AS SHOWN REV.
	CADD	JL	FIGURE
	CHECK	JL	
	REVIEW	--	



0ft 10ft 20ft

Legend:

Interpreted buried metallic utilities

Area of buried metal objects

PROJECT

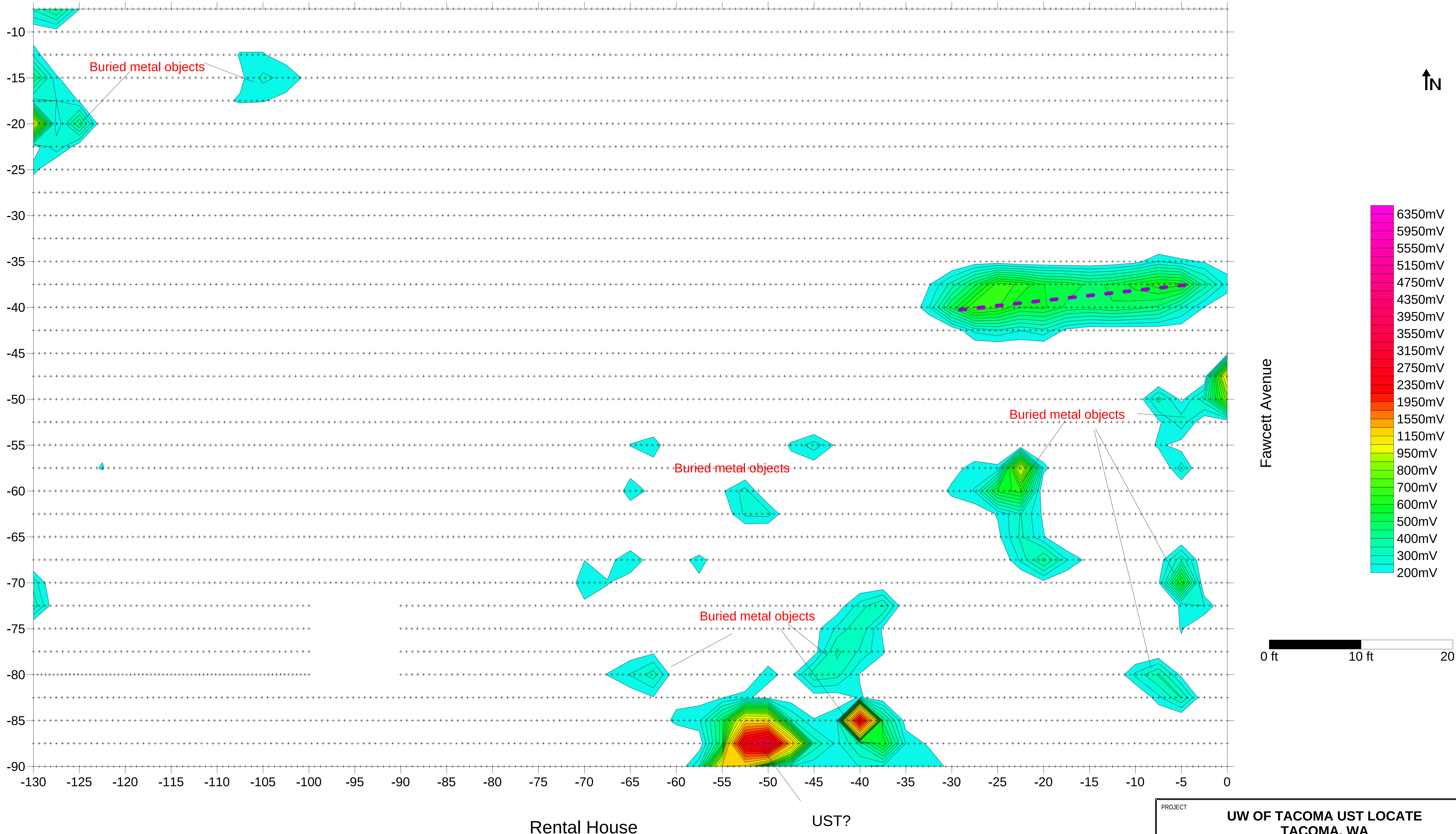
UW OF TACOMA UST LOCATE
TACOMA, WA

TITLE

VACANT LOT SOUTH OF UPTON
(IMMEDIATE, AREA 1B)
EM DATA CONTOUR PLAN

Global Geophysics
P.O.BOX 2229
REDMOND, WA 98073-2229
Tel: 425-890-4321

PROJECT NO.: 103-0417.000		FILE No.	
DESIGN	--	SCALE AS SHOWN	REV.
CADD	JL		
CHECK	JL	**FIGURE**	
REVIEW	--		



Legend:

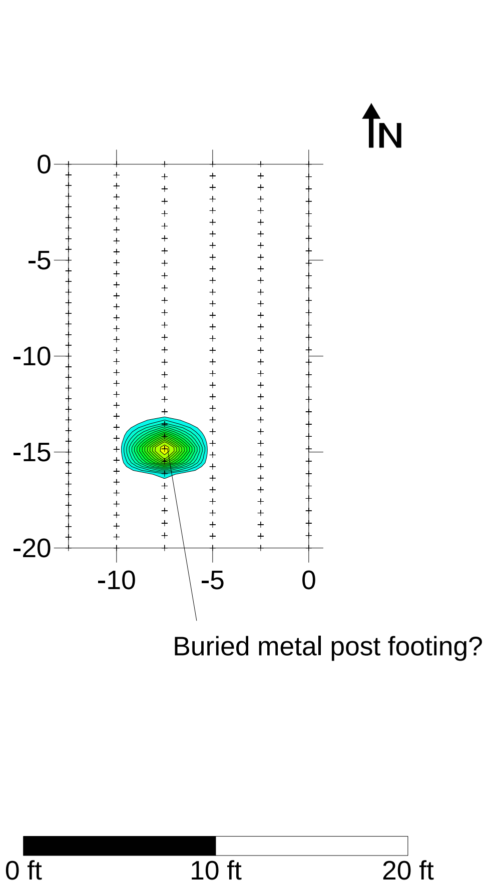
Interpreted buried metallic utilities

PROJECT
UW OF TACOMA UST LOCATE
TACOMA, WA

TITLE
VACANT LOT NORTH of RENTAL HOUSE
(AREA 1C)
EM DATA CONTOUR PLAN

Global Geophysics
P.O.BOX 2229
REDMOND, WA 98073-2229
Tel: 425-890-4321

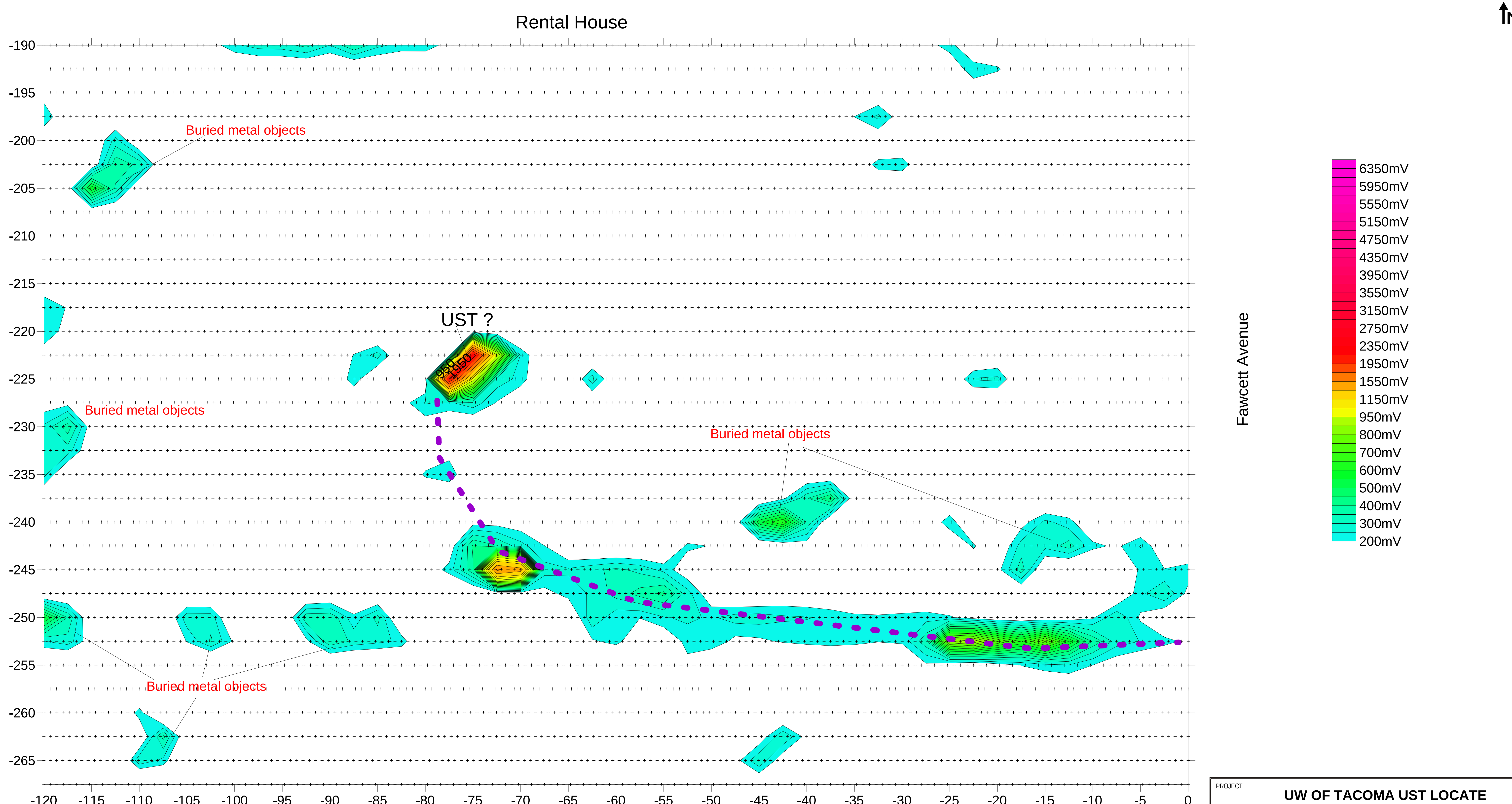
PROJECT NO.: 103-0417.000		FILE No.	
DESIGN	--	SCALE AS SHOWN	REV.
CADD	JL	**FIGURE**	
CHECK	JL		
REVIEW	--		



Legend:

Interpreted buried metallic utilities

PROJECT	UW OF TACOMA UST LOCATE TACOMA, WA		
TITLE	VACANT LOT WEST OF RENTAL HOUSE (AREA 1C) EM DATA CONTOUR PLAN		
Global Geophysics P.O.BOX 2229 REDMOND, WA 98073-2229 Tel: 425-890-4321	PROJECT NO.: 103-0417.000		FILE No.
	DESIGN	--	SCALE AS SHOWN REV.
	CADD	JL	FIGURE
	CHECK	JL	
	REVIEW	--	



0 ft 10 ft 20 ft

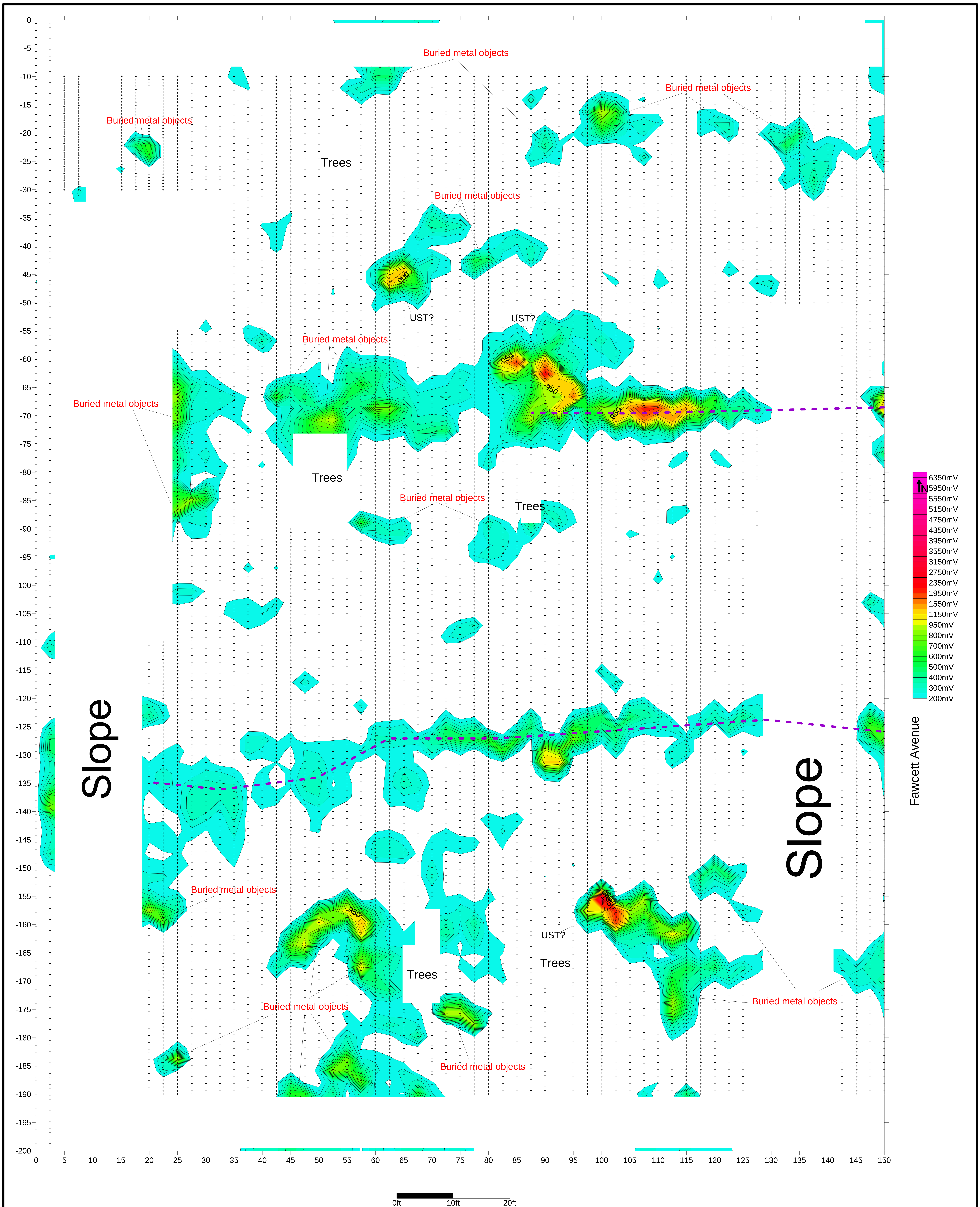
Legend:

- - - Interpreted buried metallic utilities

PROJECT	UW OF TACOMA UST LOCATE TACOMA, WA
TITLE	VACANT LOT SOUTH of RENTAL HOUSE (AREA 1C) EM DATA CONTOUR PLAN

Global Geophysics
P.O.BOX 2229
REDMOND, WA 98073-2229
Tel: 425-890-4321

PROJECT NO.: 103-0417.000		FILE No.	
DESIGN	--	SCALE AS SHOWN	REV.
CADD	JL	FIGURE	
CHECK	JL		
REVIEW	--		



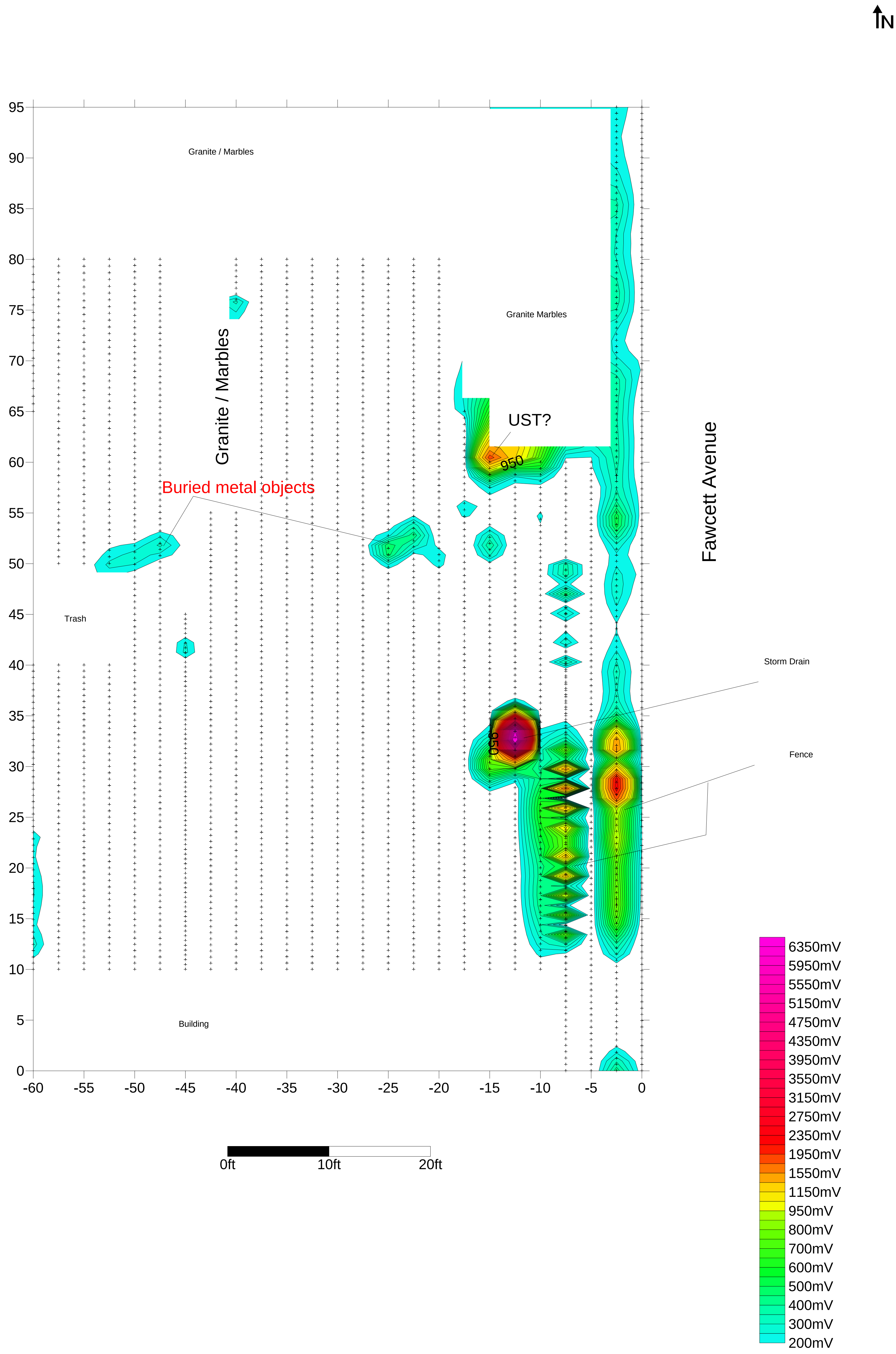
Legend:

Interpreted buried metallic utilities

PROJECT	**UW OF TACOMA UST LOCATE** **TACOMA, WA**
TITLE	**VACANT LOT N OF RAS (AREA 1D)** **EM DATA CONTOUR PLAN**

Global Geophysics
P.O.BOX 2229
REDMOND, WA 98073-2229
Tel: 425-890-4321

PROJECT NO.: 103-0417.000		FILE No.	
DESIGN	--	SCALE AS SHOWN	REV.
CADD	JL	**FIGURE**	
CHECK	JL		
REVIEW	--		



Legend:

Interpreted buried metallic utilities

PROJECT

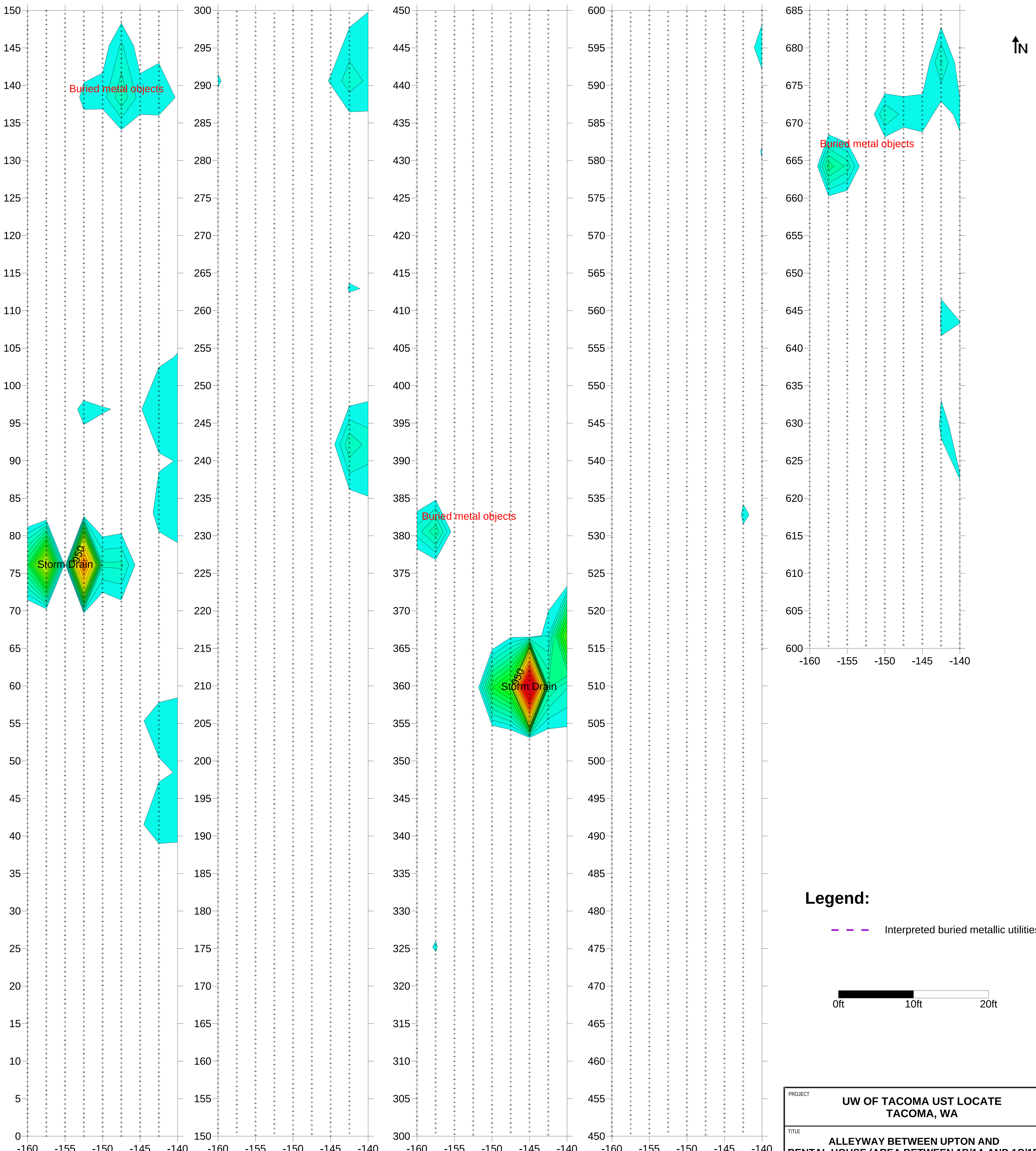
UW OF TACOMA UST LOCATE
TACOMA, WA

TITLE

RAS LOT (AREA 1D)
EM DATA CONTOUR PLAN

Global Geophysics
P.O.BOX 2229
REDMOND, WA 98073-2229
Tel: 425-890-4321

PROJECT NO.: 103-0417.000		FILE No.	
DESIGN	--	SCALE AS SHOWN	REV.
CADD	JL	**FIGURE**	
CHECK	JL		
REVIEW	--		



PROJECT

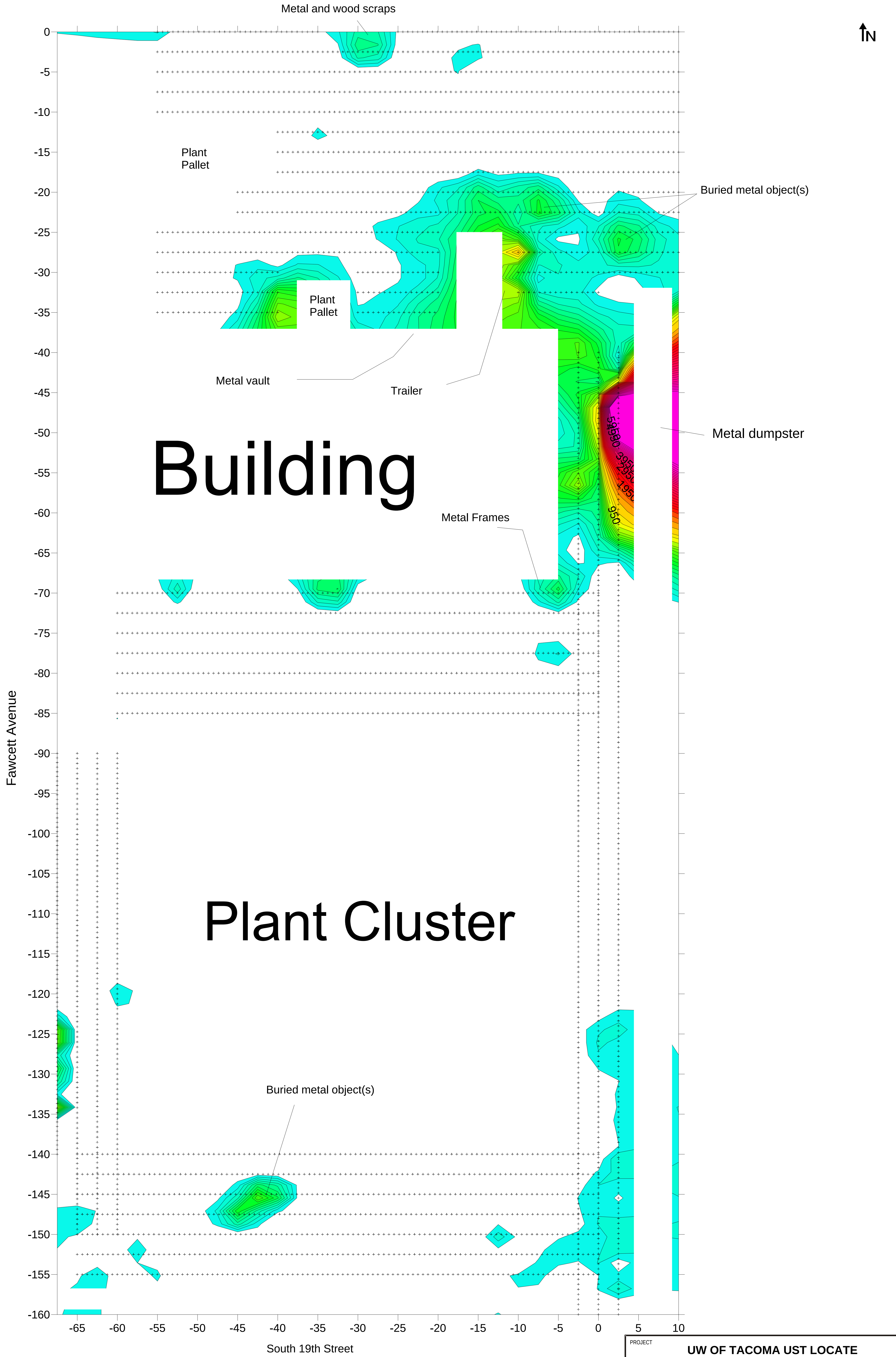
UW OF TACOMA UST LOCATE
TACOMA, WA

TITLE

ALLEYWAY BETWEEN UPTON AND RENTAL HOUSE (AREA BETWEEN 1B/1A AND 1C/1D) EM DATA CONTOUR PLAN

Global Geophysics
P.O.BOX 2229
REDMOND, WA 98073-2229
Tel: 425-890-4321

PROJECT NO.: 103-0417.000		FILE No.	
DESIGN	--	SCALE AS SHOWN	REV.
CADD	JL	FIGURE	
CHECK	JL		
REVIEW	--		



Legend:

Interpreted buried metallic utilities

PROJECT

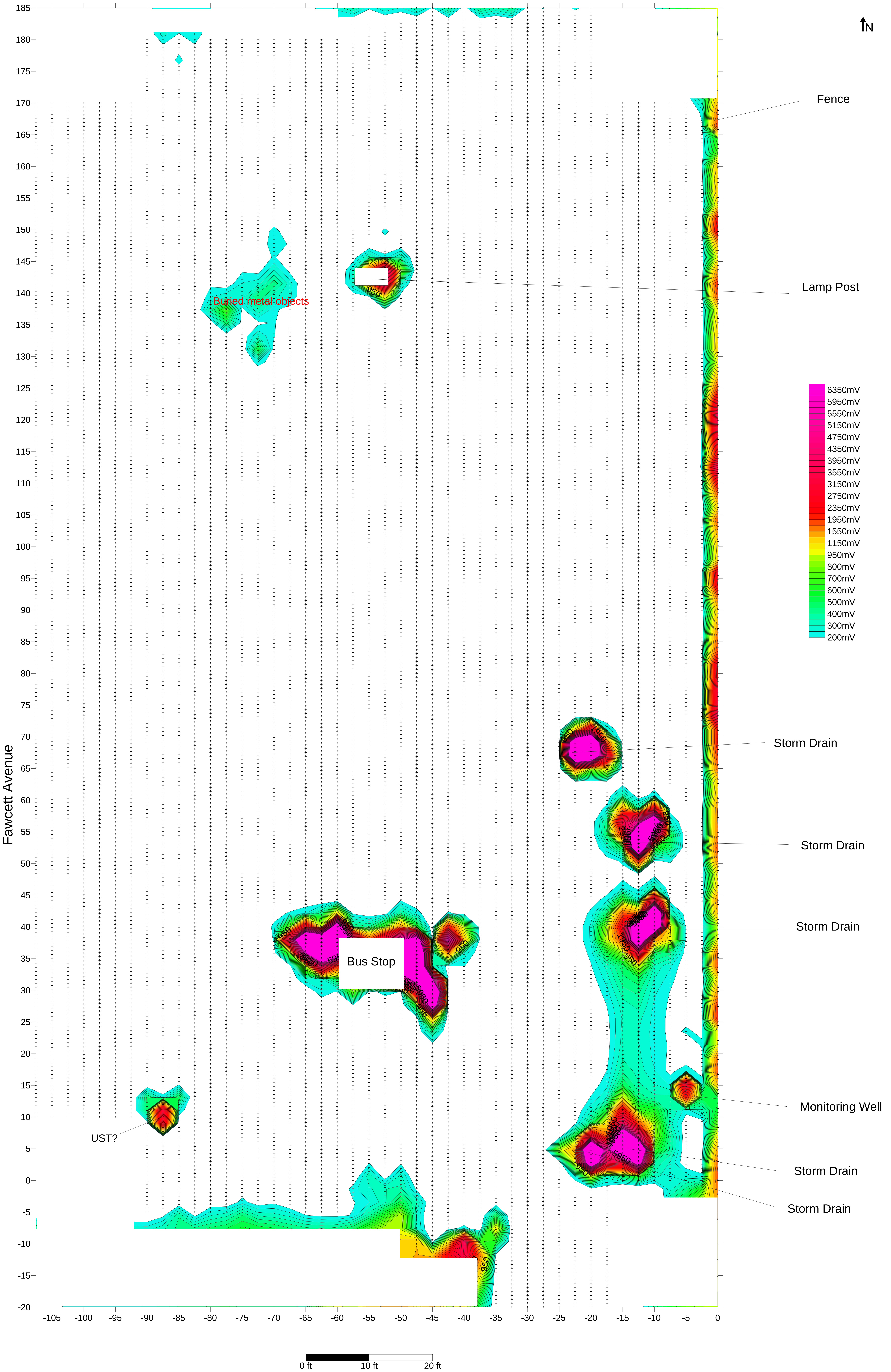
UW OF TACOMA UST LOCATE
TACOMA, WA

TITLE

STROM (AREA 1E)
EM DATA CONTOUR PLAN

Global Geophysics
P.O.BOX 2229
REDMOND, WA 98073-2229
Tel: 425-890-4321

PROJECT NO.: 103-0417.000		FILE No.	
DESIGN	--	SCALE AS SHOWN	REV.
CADD	JL	**FIGURE**	
CHECK	JL		
REVIEW	--		



Legend:

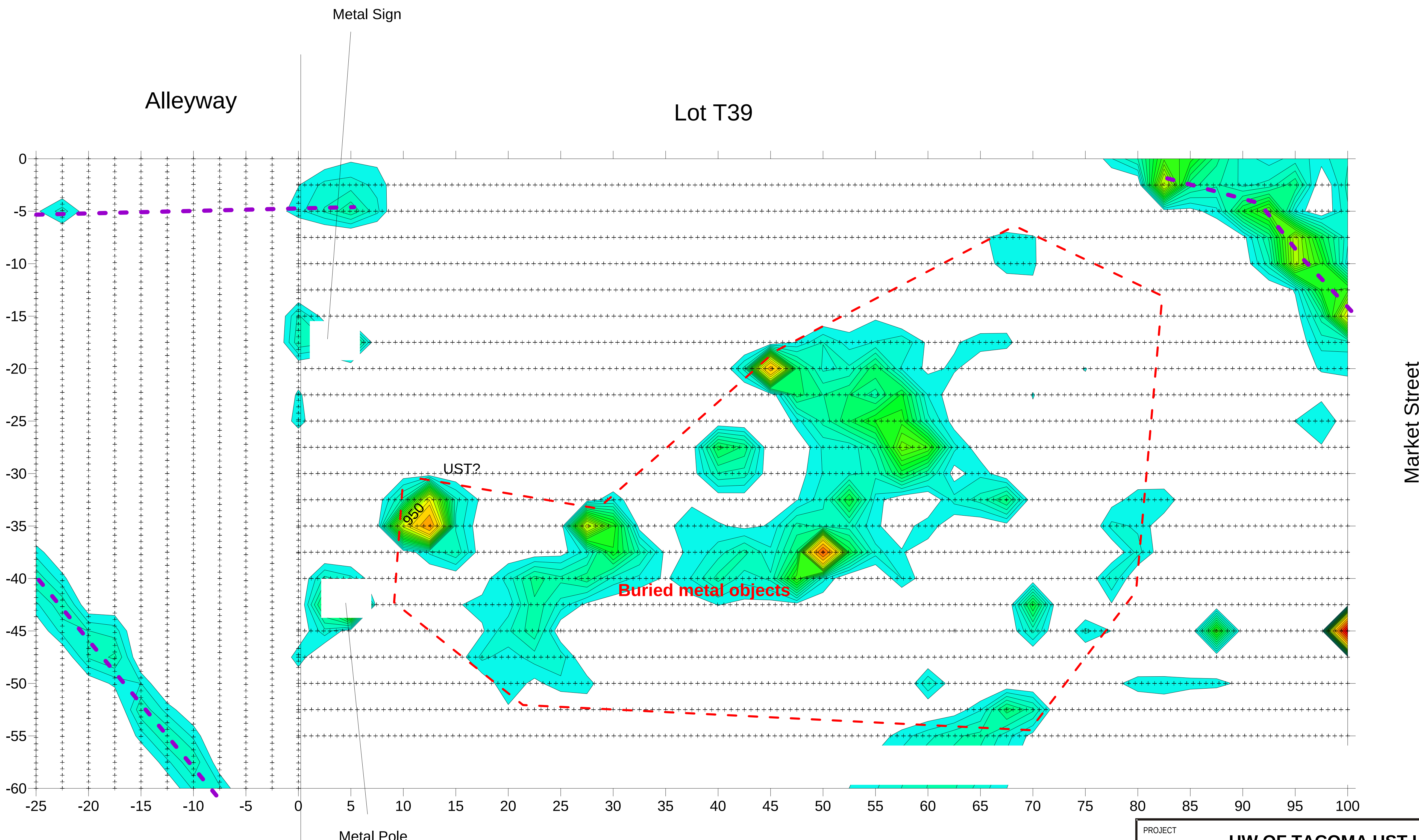
Interpreted buried metallic utilities

PROJECT
UW OF TACOMA UST LOCATE
TACOMA, WA

TITLE
LOT T47 AND T48 (AREA 1F)
EM DATA CONTOUR PLAN

Global Geophysics
P.O.BOX 2229
REDMOND, WA 98073-2229
Tel: 425-890-4321

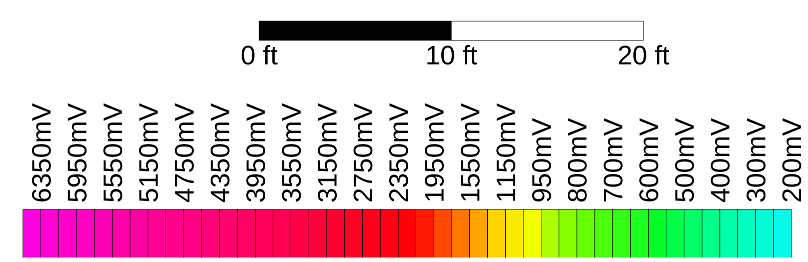
PROJECT NO.: 103-0417.000
FILE No.
DESIGN --
CADD JL
CHECK JL
REVIEW --
SCALE AS SHOWN
REV.
FIGURE



Legend:

Interpreted buried metallic utilities

Interpreted approximate area of the buried metal objects



PROJECT

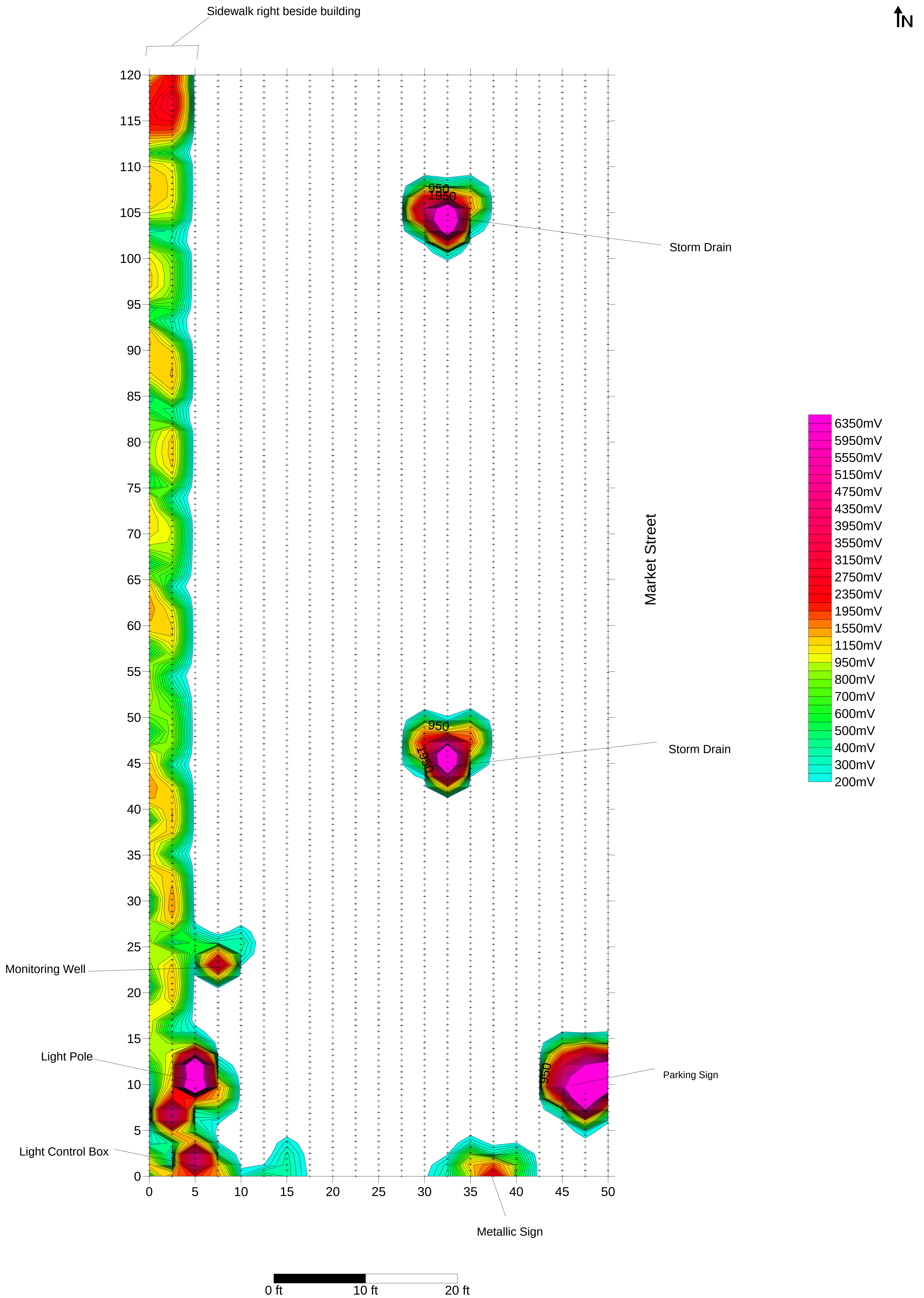
UW OF TACOMA UST LOCATE
TACOMA, WA

TITLE

ALLEYWAY AND LOT T39 (AREA 1G)
EM DATA CONTOUR PLAN

Global Geophysics
P.O.BOX 2229
REDMOND, WA 98073-2229
Tel: 425-890-4321

PROJECT NO.: 103-0417.000		FILE No.	
DESIGN	--	SCALE AS SHOWN	REV.
CADD	JL	**FIGURE**	
CHECK	JL		
REVIEW	--		



Legend:

Interpreted buried metallic utilities

PROJECT

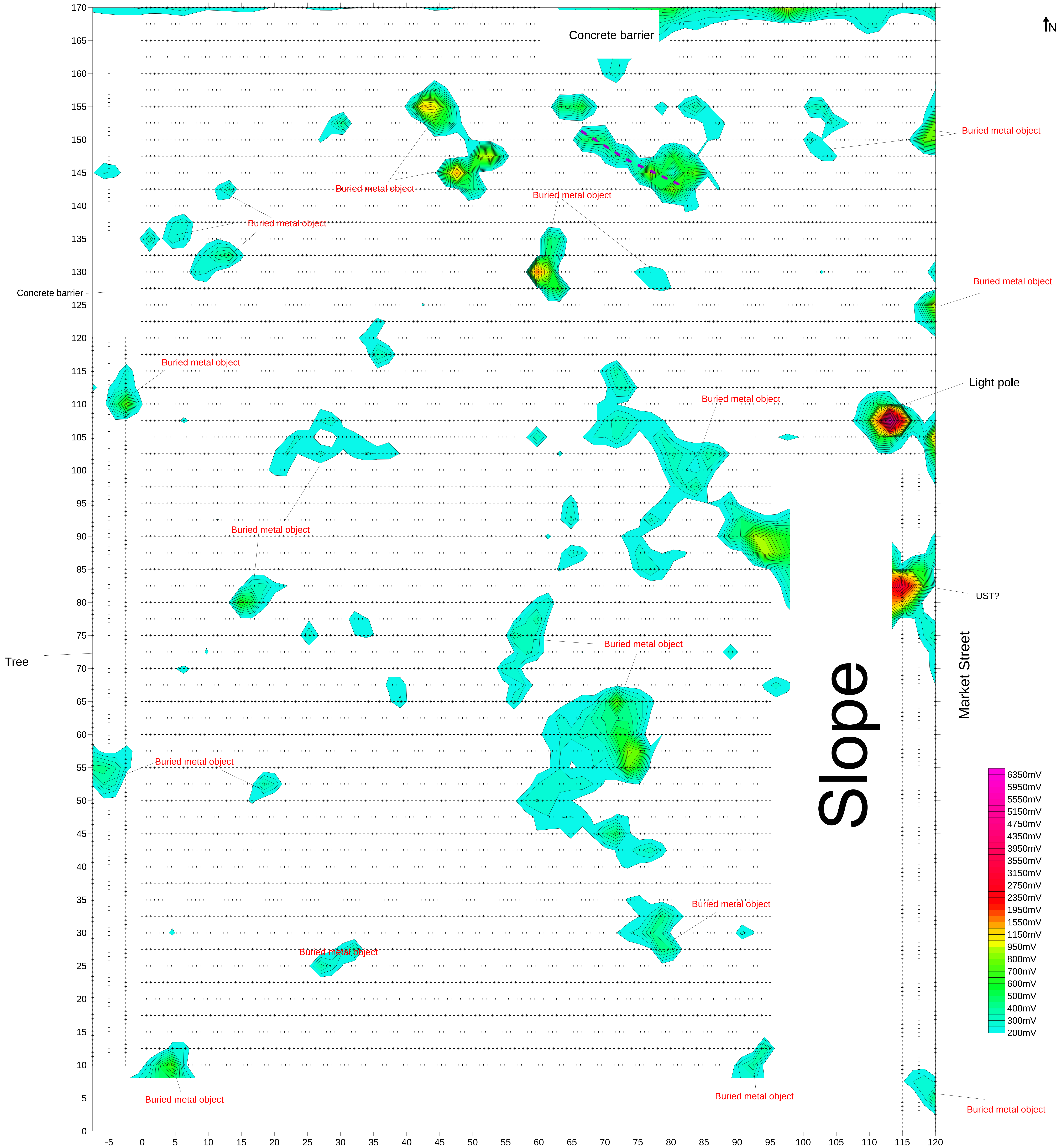
UW OF TACOMA UST LOCATE
TACOMA, WA

TITLE

LOT T40 (AREA 1G)
EM DATA CONTOUR PLAN

Global Geophysics
P.O.BOX 2229
REDMOND, WA 98073-2229
Tel: 425-890-4321

PROJECT NO.: 103-0417.000			FILE No.	
DESIGN	--		SCALE AS SHOWN	REV.
CADD	JL		**FIGURE**	
CHECK	JL			
REVIEW	--			



0ft 10ft 20ft

Legend:

Interpreted buried metallic utilities

PROJECT

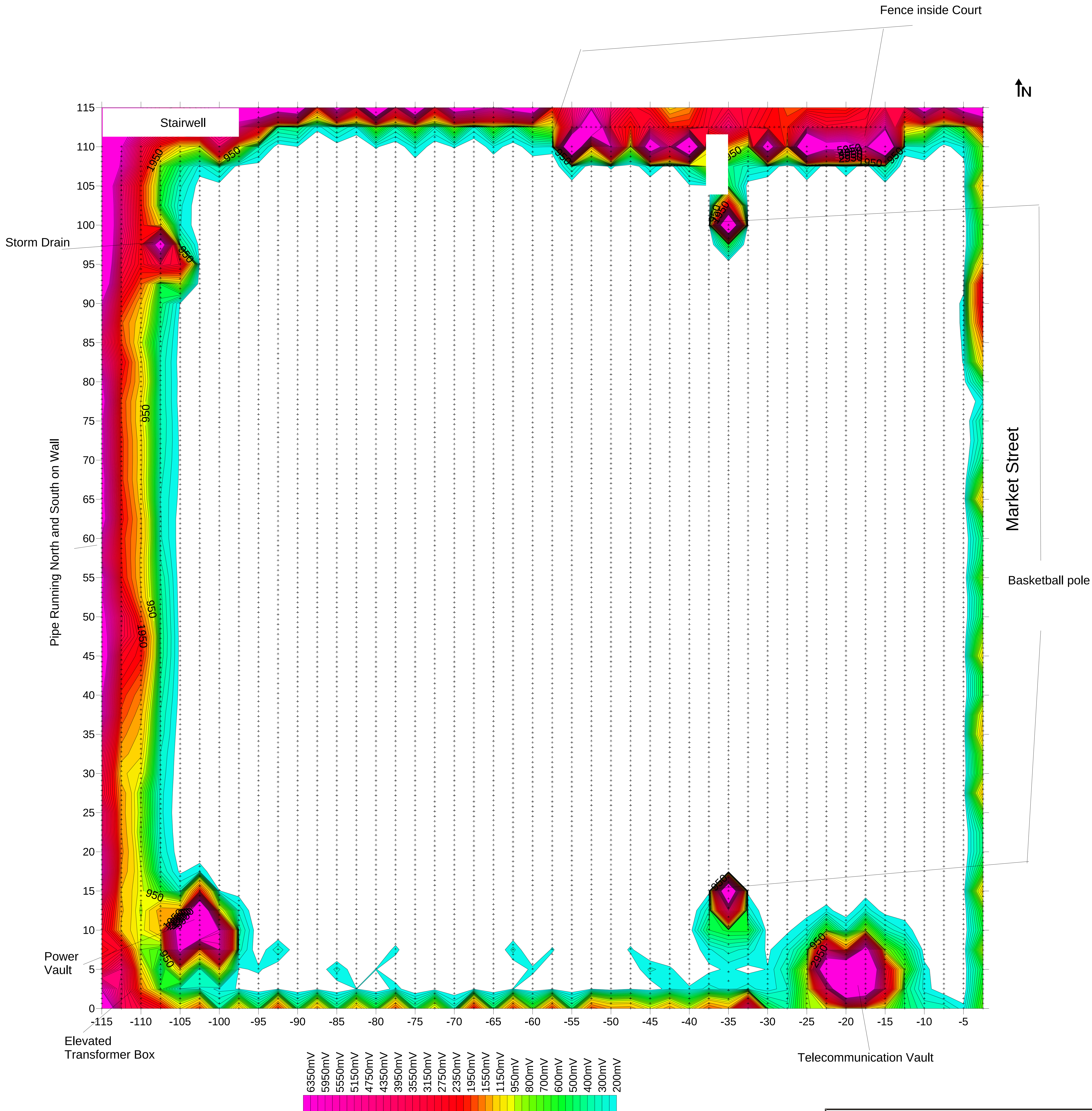
UW OF TACOMA UST LOCATE
TACOMA, WA

TITLE

VACANT LOT BETWEEN T40 AND
COURTYARD (AREA 1G)
EM DATA CONTOUR PLAN

Global Geophysics
P.O.BOX 2229
REDMOND, WA 98073-2229
Tel: 425-890-4321

PROJECT NO.: 103-0417.000	FILE No.	
DESIGN: --	SCALE: AS SHOWN	REV.
CADD: JL		
CHECK: JL	FIGURE	
REVIEW: --		



0 ft 10 ft 20 ft

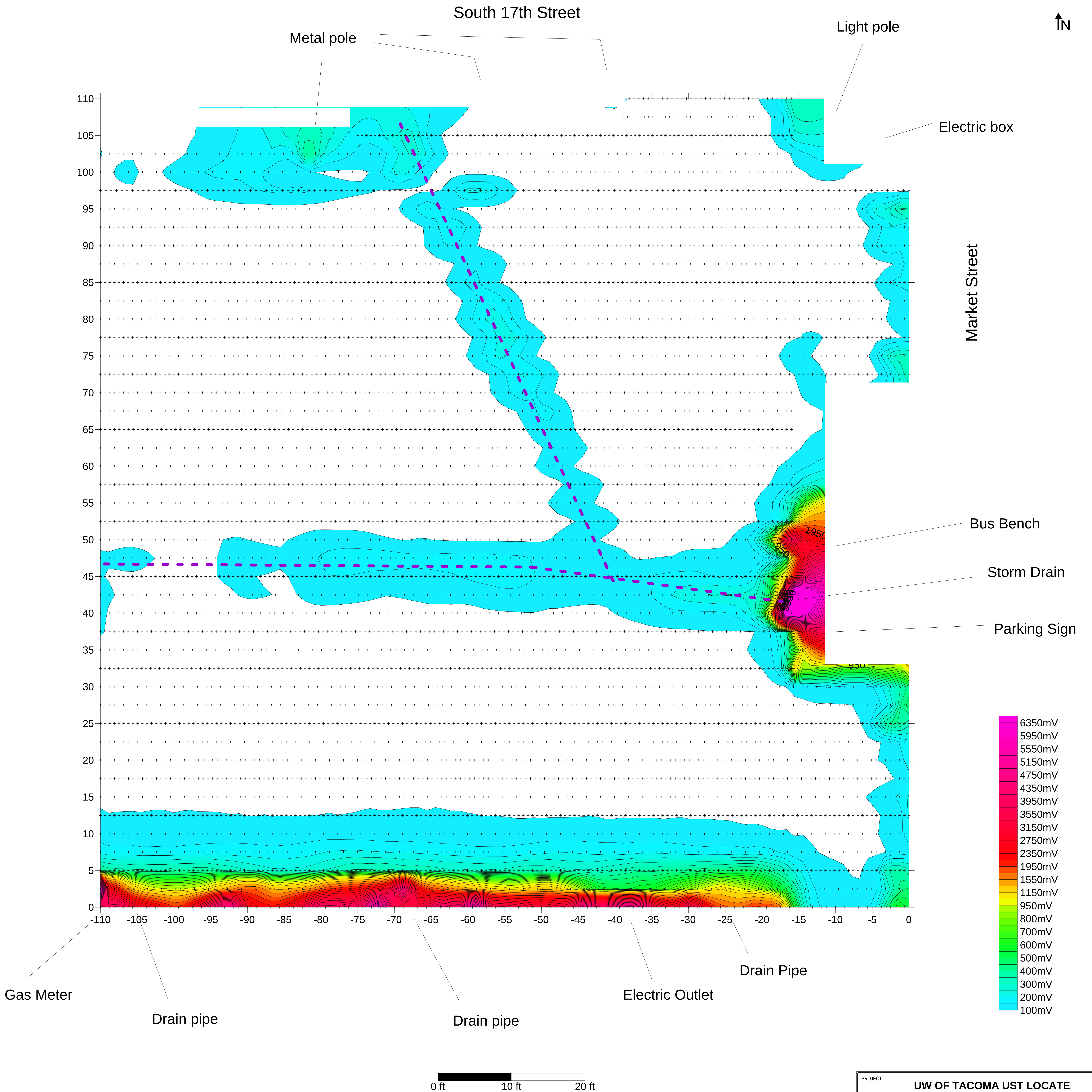
Legend:

– – – Interpreted buried metallic utilities

PROJECT	UW OF TACOMA UST LOCATE TACOMA, WA
TITLE	LONGSHOREMAN COURTYARD (AREA 1H) EM DATA CONTOUR PLAN

Global Geophysics
P.O.BOX 2229
REDMOND, WA 98073-2229
Tel: 425-890-4321

PROJECT NO.: 103-0417.000		FILE No.
DESIGN	--	SCALE AS SHOWN REV.
CADD	JL	FIGURE
CHECK	JL	
REVIEW	--	



Legend:

- - - Interpreted buried metallic utilities

PROJECT	UW OF TACOMA UST LOCATE TACOMA, WA
TITLE	LOT T44 (AREA 1H) EM DATA CONTOUR PLAN

Global Geophysics
P.O.BOX 2229
REDMOND, WA 98073-2229
Tel: 425-890-4321

PROJECT NO.: 103-0417.000		FILE No.	
DESIGN	--	SCALE AS SHOWN	REV.
CADD	JL	FIGURE	
CHECK	JL		
REVIEW	--		

0ft 10ft 20ft

Legend:

Interpreted buried metallic utilities

PROJECT

UW OF TACOMA UST LOCATE
TACOMA, WA

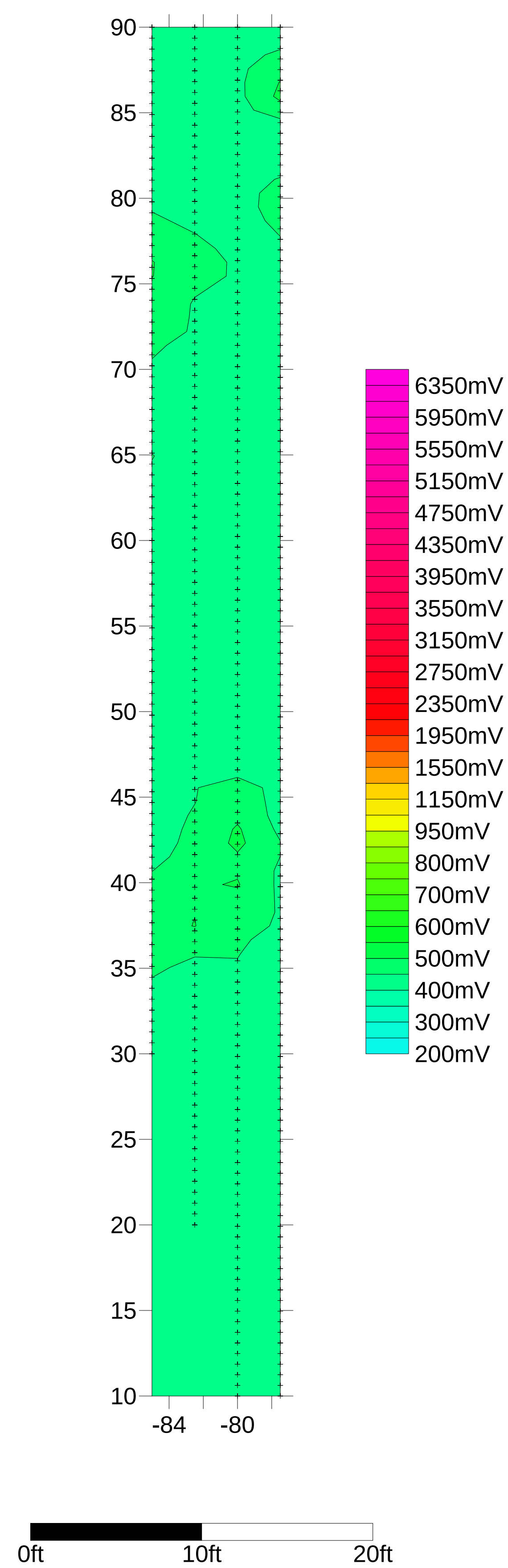
TITLE

FORMER LAYOWN YARD - MAIN (AREA 2A)
EM DATA CONTOUR PLAN

Global Geophysics
P.O.BOX 2229
REDMOND, WA 98073-2229
Tel: 425-890-4321

PROJECT NO.: 103-0417.000			FILE No.	
DESIGN	--		SCALE AS SHOWN	REV.
CADD	JL		**FIGURE**	
CHECK	JL			
REVIEW	--			

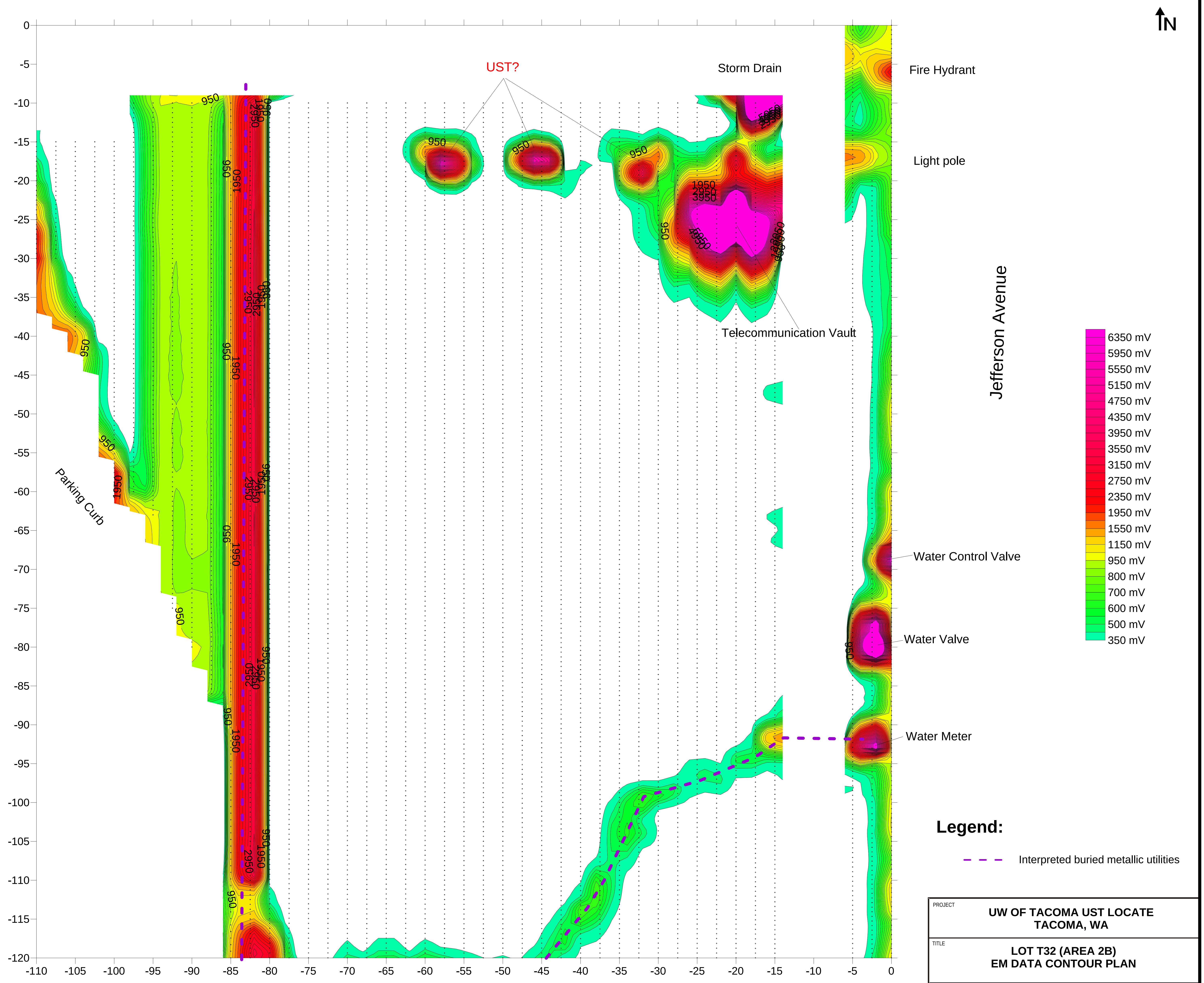
N



Legend:

– – – Interpreted buried metallic utilities

PROJECT	UW OF TACOMA UST LOCATE TACOMA, WA			
TITLE	FORMER LAYDOWN YARD - RAMP (AREA 2A) EM DATA CONTOUR PLAN			
Global Geophysics 16651 White Mountain Road SE Monroe, WA, 98272 Tel: 425-890-4321	PROJECT NO.: 103-0417.000		FILE No.	
	DESIGN	--	SCALE AS SHOWN	REV.
	CADD	JL	FIGURE	
	CHECK	JL		
	REVIEW	--		

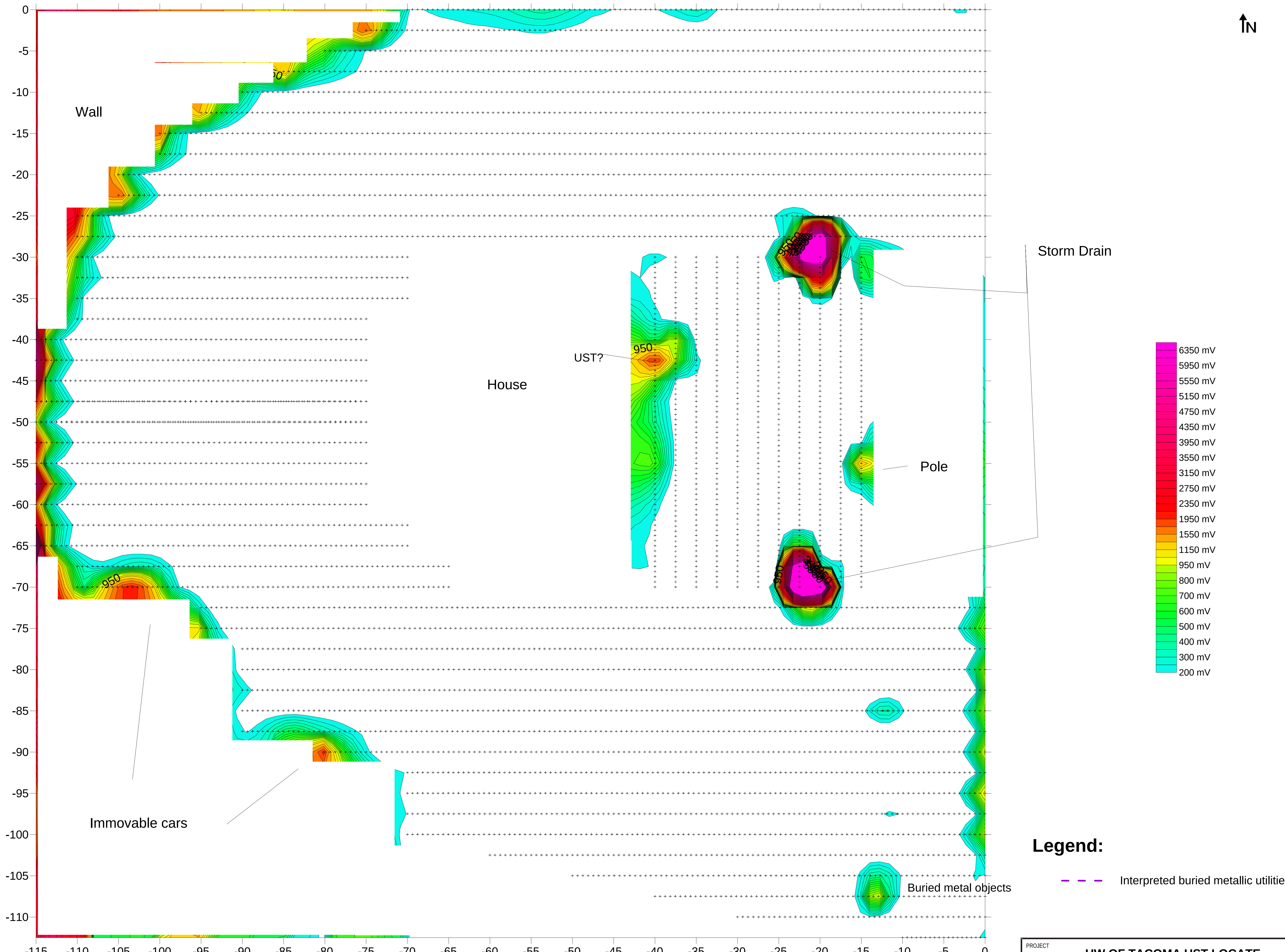


PROJECT
UW OF TACOMA UST LOCATE
TACOMA, WA

TITLE
LOT T32 (AREA 2B)
EM DATA CONTOUR PLAN

Global Geophysics
P.O.BOX 2229
REDMOND, WA 98073-2229
Tel: 425-890-4321

PROJECT NO.: 103-0417.000		FILE No.	
DESIGN	--	SCALE AS SHOWN	REV.
CADD	JL		
CHECK	JL	**FIGURE**	
REVIEW	--		



Legend:

Interpreted buried metallic utilities

PROJECT

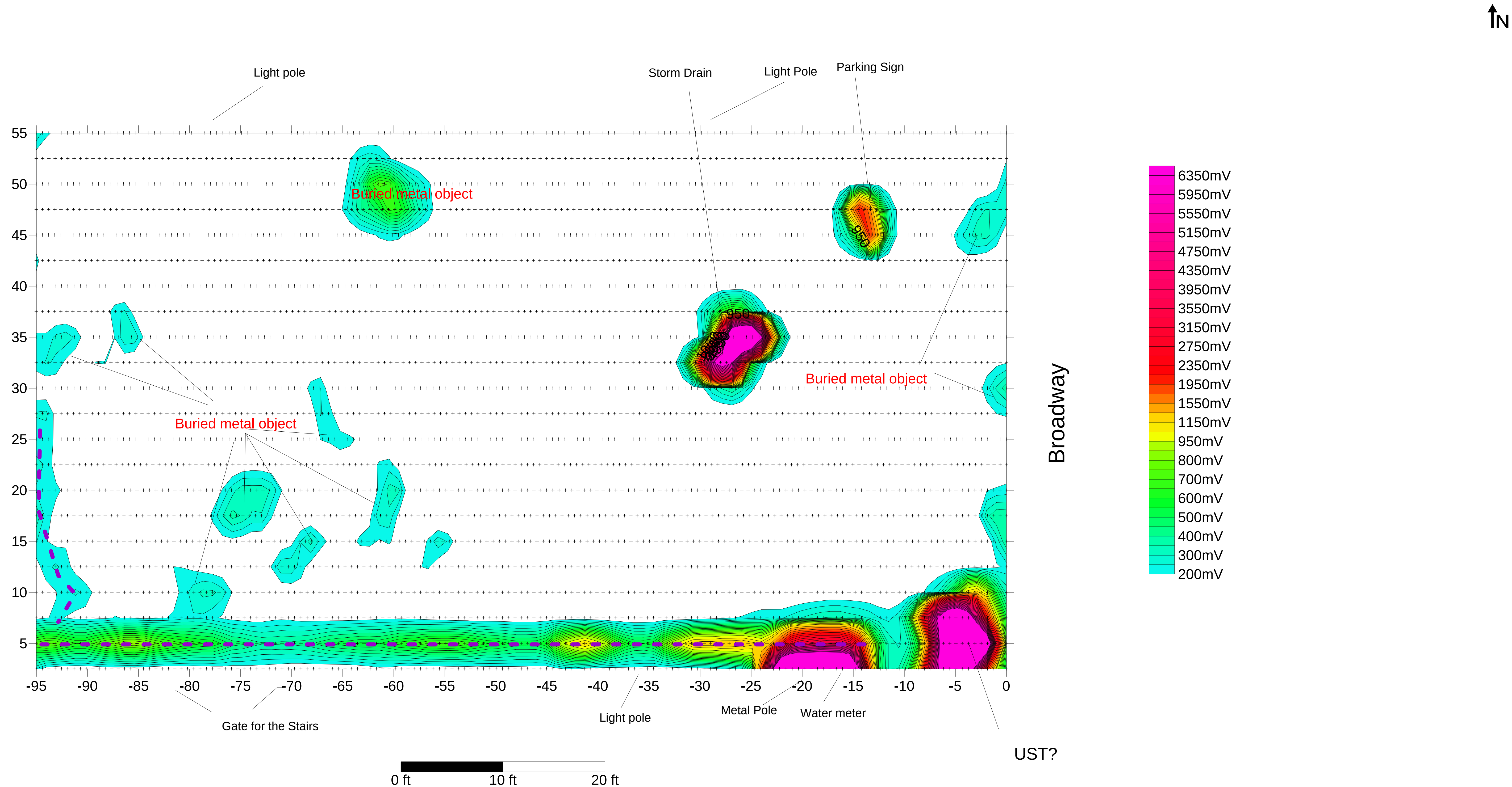
UW OF TACOMA UST LOCATE
TACOMA, WA

TITLE

LOT T33 (AREA 2B)
EM DATA CONTOUR PLAN

Global Geophysics
P.O.BOX 2229
REDMOND, WA 98073-2229
Tel: 425-890-4321

PROJECT NO.: 103-6417.000		FILE No.
DESIGN	--	SCALE AS SHOWN REV.
CADD	JL	
CHECK	JL	**FIGURE**
REVIEW	--	



Legend:

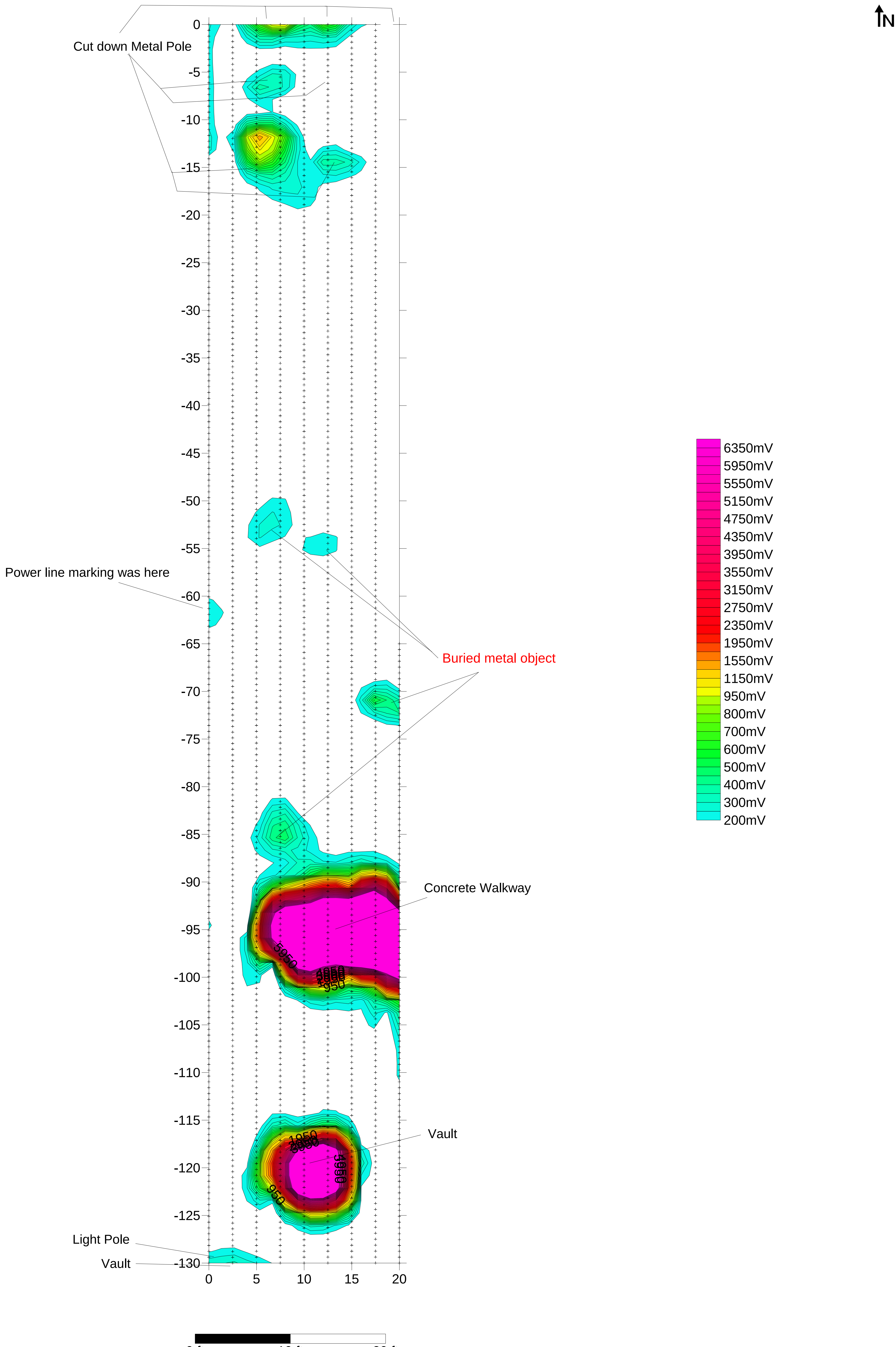
– – – Interpreted buried metallic utilities

PROJECT
UW OF TACOMA UST LOCATE
TACOMA, WA

TITLE
LOT T34 LOWER AREA (AREA 2C)
EM DATA CONTOUR PLAN

Global Geophysics
P.O.BOX 2229
REDMOND, WA 98073-2229
Tel: 425-890-4321

PROJECT NO.: 103-0417.000		FILE No.	
DESIGN	--	SCALE AS SHOWN	REV.
CADD	JL	FIGURE	
CHECK	JL		
REVIEW	--		



Legend:

Interpreted buried metallic utilities

PROJECT	UW OF TACOMA UST LOCATE TACOMA, WA
TITLE	LOT T34 UPPER AREA (AREA 2C) EM DATA CONTOUR PLAN

Global Geophysics
P.O.BOX 2229
REDMOND, WA 98073-2229
Tel: 425-890-4321

PROJECT NO.: 103-0417.000		FILE No.	
DESIGN	--	SCALE AS SHOWN	REV.
CADD	JL	FIGURE	
CHECK	JL		
REVIEW	--		

APPENDIX D
Field Program and Boring Logs

FIELD EXPLORATION PROGRAM

General

Subsurface conditions were explored by completing soil borings, groundwater monitoring and a test pit at the site to evaluate the potential presence of petroleum hydrocarbons, VOCs, metals and PAHs in soil and groundwater at the site between June 10, 2013 and January 22, 2014.

A representative of GeoEngineers selected the locations for subsurface explorations, observed and classified the soils encountered and prepared a detailed log of each subsurface exploration. The soils were classified according to the system described in Figure D-1. The test pit and boring logs are presented in Figures D-2 through A-90.

Field Screening Methods

Soil samples obtained from the test pit and boring locations were field screened for indications of petroleum hydrocarbons and VOCs. Field screening results were recorded on the test pit and boring logs. Field screening results were used as a general guideline to delineate areas of possible contamination and potential samples to be submitted to the lab. The following screening methods were used: 1) visual screening, 2) water sheen screening and 3) headspace vapor screening. Visual screening and water sheen screening are qualitative methods; therefore, precision, accuracy and detection limits are not quantified for these methods. Headspace vapor screening is a semi-quantitative method; however, precision and accuracy will not be quantified for this method. Instrument accuracy and detection limits are described below. Field screening results are property and location specific. The results vary with temperature, moisture content, soil type and type of contaminant. Field screening consisted of the following:

- Visual Screening. The soil was observed for indications of petroleum impacts, including unusual color, stains and/or odor indicative of possible contamination.
- Water Sheen Screening. A portion of the soil sample was placed in a pan containing distilled water. The water surface was observed for signs of sheen. The following sheen classifications were used for this project:

No Sheen (NS)	No visible sheen on the water surface.
Slight Sheen (SS)	Light, colorless, dull sheen; spread is irregular, not rapid; sheen dissipates rapidly.
Moderate Sheen (MS)	Light to heavy sheen; may have some color/iridescence; spread is irregular to flowing, may be rapid; few remaining areas of no sheen on the water surface.
Heavy Sheen (HS)	Heavy sheen with color/iridescence; spread is rapid; entire water surface may be covered with sheen.

- **Headspace Vapor Screening.** A portion of the soil sample was placed in a plastic bag. Ambient air was captured in the bag. The bag was sealed and then shaken gently to expose the soil to the air trapped in the bag. The bag remained closed for approximately 5 minutes at ambient temperature before the headspace vapors were measured. Vapors present within the sample bag's headspace were measured by inserting the probe of a photoionization detector (PID) in a small opening in the bag. The maximum measured value and the ambient air temperature were recorded on the field log for each sample.

  The monitoring instrument was calibrated, as described in the following section. The PID measures the concentration of organic vapors ionizable by a 10.6 electron volt (eV) lamp in parts per million (ppm). The PID was calibrated to 100 ppm isobutylene. The PID quantifies organic vapor concentrations in the range between 0.1 ppm and 2,000 ppm (isobutylene equivalent) with an accuracy of 1 ppm between 0 ppm and 100 ppm.

Soil Sampling

Test Pit

A rubber-tired backhoe was used to complete the test pit. Soil samples were obtained from the stockpile of soil generated during excavation. During excavation, a representative of GeoEngineers examined the soil and performed field screening tests. The test pit was backfilled with the material removed during excavation and tamped with the backhoe bucket.

Selected soil samples were obtained in glass jars (supplied by the analytical laboratory), labeled and stored in a cooler with ice pending delivery to the laboratory. VOC and gasoline-range petroleum hydrocarbons samples were collected first, directly from the stockpile using the 5035A sampling method. Following the VOC sample collection, the remaining soil was placed the remaining sample containers provided by the analytical laboratory. All sampling equipment was decontaminated between samples using an Alconox soap wash and distilled water rinse.

Direct-Push Borings

Soil samples were obtained continuously using direct-push drilling equipment. Soil samples were obtained using a 5-foot-long core sampler with acetate liner. The sampler was driven into the soil using a pneumatic hammer. Upon retrieval, the sampler was opened, and a GeoEngineers representative examined the soil and performed field screening tests.

Selected soil samples were obtained in glass jars (supplied by the analytical laboratory), labeled and stored in a cooler with ice pending delivery to the laboratory. VOC and gasoline-range petroleum hydrocarbons samples will be collected first, directly from the sample sleeve using the 5035A sampling method. Following the VOC sample collection, the remaining soil was placed in the remaining sample containers provided by the analytical laboratory. All sampling equipment was decontaminated between samples using an Alconox soap wash and distilled water rinse.

Rotosonic Core Borings

Soil samples were collected continuously using sonic drilling equipment with a 4-inch diameter, 10-foot-long core barrel sampler. The sampler was advanced into the soil using a rotary and vibratory drilling head. Upon retrieval, the sampler extruded the recovered soil into sample bags. Soil core temperatures will be monitored using an infrared thermometer and noted on the lithologic log immediately after the sample is extruded to quantify the potential for volatilization of VOCs during drilling. If the soil temperature exceeded 40 degrees Celsius the rate of drilling was decreased. After the temperature is recorded, the sample bags were cut open to allow access to the recovered soil for collecting samples for chemical analyses and lithologic logging.

Selected soil samples were obtained in glass jars (supplied by the analytical laboratory), labeled and stored in a cooler with ice pending delivery to the laboratory. VOC and gasoline-range petroleum hydrocarbons samples were collected first, directly from the sample bag using the 5035A sampling method. Following the VOC sample collection, the remaining soil was placed in the remaining sample containers provided by the analytical laboratory.

Groundwater Monitoring Well Installation

Drilling and construction of the monitoring wells was conducted by a Washington State licensed driller in accordance with the Minimum Standards for Construction and Maintenance of Wells (Chapter 173-160 Washington Administrative Code [WAC]; Ecology, 2006). Installation of the monitoring wells was observed by a GeoEngineers representative who maintained a detailed log of the materials and depths of the wells.

A single 8-inch steel casing was used in the shallow aquifer wells as the boring was terminated in the semi-confining to confining silt unit below the ice-contact deposits. The drilling casing was telescoped in deep borings (deep aquifer) to minimize potential cross contamination between the ice-contact deposits and advance outwash units. The following methodology was implemented.

- An 8-inch steel casing was driven through the ice-contact deposits unit just into the semi-confining to confining silt unit at the base of the ice-contact deposits in the wells installed in the deep aquifer. When groundwater was observed to be present within the ice-contact deposits unit so the 8-inch casing was terminated at the confining silt unit to seal the 8-inch casing and allow for telescoping further down using a smaller diameter steel casing into the glacial advance outwash unit. The 8-inch casing was lifted approximately 1 foot and the boreholes were filled with at least 3 feet of bentonite. The bentonite was hydrated with potable water and let sit for at least 1-hour. Water within the casing was removed via a bailer or pump. The 6-inch casing was placed inside the 8-inch casing to seal off the groundwater within the ice-contact deposits water-bearing unit. The inner 6-inch casing continued to be driven until the desired water-bearing unit was located.

The wells were constructed using 2-inch-diameter, flush-threaded Schedule 40 polyvinyl chloride (PVC) casing with machine-slotted PVC screen (0.010 inch). Following placement of the well screen and casing in the borehole, a sand pack was installed around the well screen. Sand pack material consisted of commercially prepared 10-20 silica sand.

A minimum of a 1-foot-thick bentonite seal was placed above the sand pack. A mix of neat cement and bentonite was used from the 2 feet bgs to 10-feet bgs per City of Tacoma requirements. The surface of each well was completed with a concrete seal and surface pad extending from the top of neat cement/bentonite mix to slightly above the ground surface. Steel flush-mount monuments were cemented in place.

Monitoring Well Development

The monitoring wells were developed to stabilize the filter pack and formation materials surrounding the well screens and to establish the hydraulic connection between the well screens and the surrounding soil. The wells were developed using an inertial pump with a check valve and surge block. The wells were gently surged and purged with the surge block starting at the bottom of the well screen interval. Surging continued to the top of the well screen interval. After the well screen intervals were surged, the surge block was removed. The wells continued to be purged until a minimum of five casing volumes of water was removed and turbidity of the discharged water was relatively low. The goal of well development is to reduce the turbidity content of the water to less than 25 nephelometric turbidity units (NTU). The removal rate and volume of groundwater removed was recorded during well development procedures. Water that was removed from the well during well development activities was stored at the UW laydown yard facility on Court E in a temporary storage tank, pending off-site disposal. Depths to water in the monitoring wells were measured prior to development.

Low-Flow Sampling

Groundwater samples were obtained using low-flow/low-turbidity sampling techniques to minimize the suspension of particulates in the samples. Groundwater samples were obtained from monitoring wells using a decontaminated bladder pump with dedicated bladder and flexible, dedicated vinyl tubing. Groundwater samples collected form the temporary monitoring wells installed in the direct-push borings were collected using a peristaltic pump with new, disposal tubing. Groundwater was pumped at approximately 0.5 liters per minute from the approximate midpoint of the screened interval. A water quality measuring system with a flow-through-cell was used to monitor the following water quality parameters during purging: electrical conductivity, dissolved oxygen, pH, salinity, total dissolved solids, turbidity, oxidation-reduction potential and temperature. Ambient groundwater conditions were assumed to have been reached once these parameters varied by less than 10 percent on three consecutive measurements. All field measurements were documented on the field logs.

After well purging, the flow-through-cell was disconnected and the groundwater sample was collected in laboratory-prepared containers. The groundwater sample was placed into a cooler with ice and logged on the chain-of-custody record using the procedures described in the project SAP. Purge water was stored at the UW laydown yard facility on Court E in a temporary storage tank, pending off-site disposal.

Snap Shot Water Level Measurement Protocol

Two teams of field personnel were deployed to collect the water level measurements from the selected wells in the prescribed amount of time during each quarterly sampling event. At each well an electronic water level indicator was used to measure the depth to groundwater below the top of the monitoring well PVC casing (i.e., top of casing). The depth to groundwater measurements collected during each snapshot were converted to groundwater elevations using the surveyed elevation of the top of casing at each monitoring well. The time and depth to groundwater measurement was recorded on field forms.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% RETAINED ON NO. 200 SIEVE	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS
				SP	POORLY-GRADED SANDS, GRAVELLY SAND
	MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
	AC	Asphalt Concrete
	CC	Cement Concrete
	CR	Crushed Rock/ Quarry Spalls
	TS	Topsoil/ Forest Duff/Sod

Groundwater Contact

Measured groundwater level in exploration, well, or piezometer

Measured free product in well or piezometer

Graphic Log Contact

Distinct contact between soil strata or geologic units

Approximate location of soil strata change within a geologic soil unit

Material Description Contact

Distinct contact between soil strata or geologic units

Approximate location of soil strata change within a geologic soil unit

Sampler Symbol Descriptions

2.4-inch I.D. split barrel

Standard Penetration Test (SPT)

Shelby tube

Piston

Direct-Push

Bulk or grab

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

A "P" indicates sampler pushed using the weight of the drill rig.

Laboratory / Field Tests

%F	Percent fines
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
OC	Organic content
PM	Permeability or hydraulic conductivity
PI	Plasticity index
PP	Pocket penetrometer
PPM	Parts per million
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
VS	Vane shear

Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen
NT	Not Tested

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

KEY TO EXPLORATION LOGS

GEOENGINEERS

FIGURE D-1

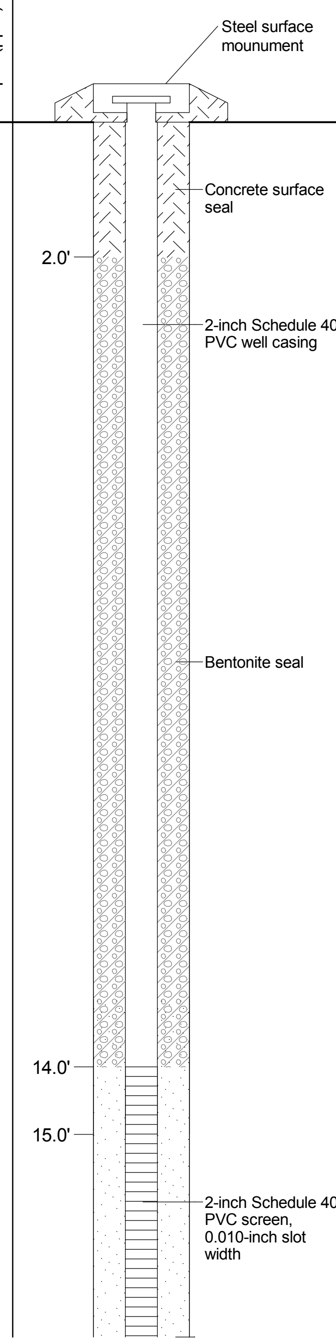
Drilled — Start: 8/28/2013, End: 8/28/2013	Total Depth (ft): 35	Logged By: JCD Checked By: TSD	Driller: Holt Drilling	Drilling Method: Rotosonic
Hammer Data: N/A	Drilling Equipment: Geoprobe 8140 LC	A 2 (in) well was installed on 8/28/2013 to a depth of 30 (ft).		
Surface Elevation (ft): 79.84 Vertical Datum: NGVD 1929	Top of Casing Elevation (ft): 79.45	Groundwater		
Easting (X): 1159169.442 Northing (Y): 702471.527367	Horizontal Datum: WA State Plane,South Harn	Date Measured: 11/8/2013	Depth to Water (ft): 17.13	Elevation (ft): 62.32

Notes: Elevation based on survey completed by AHBL on 11/6/13

FIELD DATA

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0									No recovery		
75	5											
70	10		60			CR-MW15-10-11 CA			SM-ML	Brown to gray silty fine sand to fine sandy silt with fine to coarse sand and gravel (moist) (cemented) (Ice-Contact Deposits)		
				22							NS	<1
						CR-MW15-12-13 CA			SM	Brown to gray silty fine to coarse sand (moist) (cemented) (Ice-Contact Deposits)		
				25					SM-ML	Brown to gray silty fine sand to fine sandy silt with medium to coarse sand and gravel (moist) (cemented) (Ice-Contact Deposits)		
						CR-MW15-14-15 CA			ML	Brown to gray silt with fine sand and occasional medium to coarse sand and gravel (moist) (cemented) (Silt)		
65	15		60						SM-ML	Brown to gray silty fine sand to fine sandy silt with medium to coarse sand and gravel (moist) (Transition Zone)	NS	<1
							▼		SP-SM	Brown fine to medium sand with silt and coarse sand to gravel (moist) (Transition Zone)		

WELL LOG



Notes: See Figure A-1 for explanation of symbols

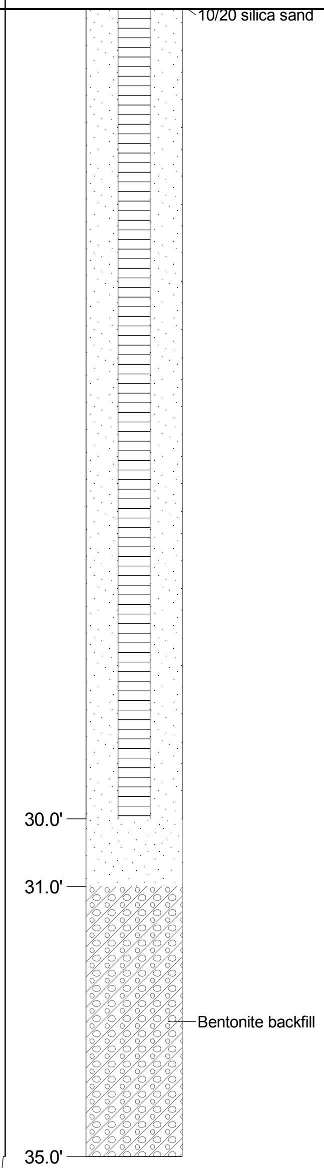
Log of Monitoring Well CR-MW15

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Sample Name / Testing	Group Classification	Material Description	Sheen	Headspace Vapor (ppm)
			28	CR-MW15-18-19 CA	SM	Brown silty sand with occasional gravel (moist) (Transition Zone)		
60	20	60		CR-MW15-19.5-20 CA	SP	Gray fine to medium sand with coarse sand to gravel, trace silt (wet) (Advance Outwash)	HS	1457
								54.1
			32	CR-MW15-21-22 CA	SM-ML	Brown to gray silty fine sand to fine sandy silt with medium to coarse sand and gravel (moist) (Advance Outwash)		2.3
					GM	Brown to gray silty fine gravel with fine to coarse sand (moist to wet) (Advance Outwash)		
			28	CR-MW15-23.5-24 CA				
55	25	60			GM	Brown to gray silty gravel with fine to coarse sand (wet) (Advance Outwash)	NS	<1
				CR-MW15-29-30 CA				
50	30	60			SM	Brown to gray silty fine to medium sand with coarse sand and gravel (wet) (Advance Outwash)	NS	<1
					GW-GM	Brown fine to coarse gravel with silt and fine to coarse sand (wet) (Advance Outwash)		
				CR-MW15-32-33 CA			NS	<1
					SP-SM	Brown to gray fine to coarse sand with silt and occasional fine gravel (wet) (Advance Outwash)		
45	35			CR-MW15-34-35 CA			NS	<1

WELL LOG



Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well CR-MW15 (continued)

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-2
Sheet 2 of 2

Drilled	Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
	8/27/2013	8/27/2013	32.5	JCD	TSD	Holt Drilling	Rotosonic

Hammer Data	N/A	Drilling Equipment	Geoprobe 8140 LC
Surface Elevation (ft)	63.36	Top of Casing Elevation (ft)	64.71
Vertical Datum	NGVD 1929		
Easting (X)	1159252.75209	Horizontal Datum	WA State Plane,South Harn
Northing (Y)	702660.014156		

A 2 (in) well was installed on 8/27/2013 to a depth of 30 (ft).

Groundwater

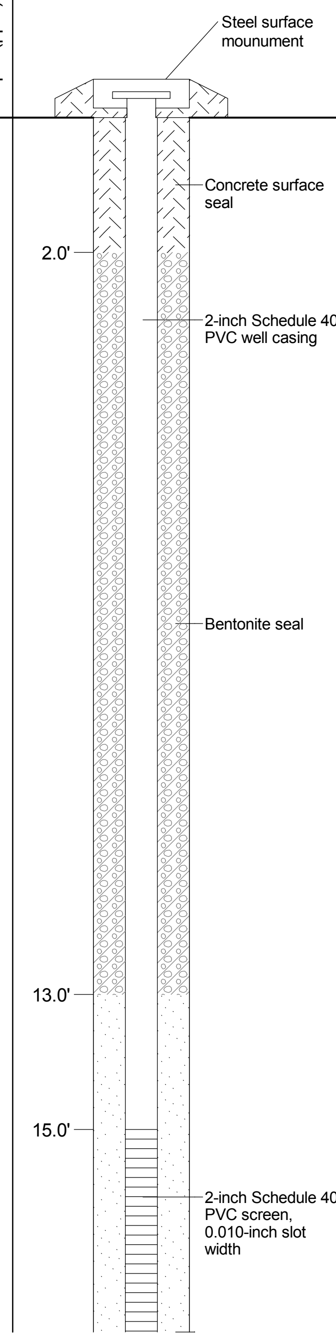
Date Measured	Depth to Water (ft)	Elevation (ft)
11/8/2013	16.45	48.26

Notes: Elevation based on survey completed by AHBL on 11/6/13

FIELD DATA

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Collected Sample / Sample Name	Water Level	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0						No recovery		
60									
	5								
55		48	24	CR-MW16-9-10 CA		GM	Brown to gray silty fine gravel with sand (moist) (Fill)	NS	<1
						GP-GM	Brown fine to coarse gravel with silt and sand (moist) (Fill)		
	10			CR-MW16-10-11 CA		GM	Gray silty fine to coarse gravel with sand (moist) (Fill)		<1
						GP-GM	Brown to gray fine to coarse gravel with silt and sand, with occasional cobbles (moist) (Fill/Recessional Outwash)		
		30	23						<1
50			27			SM	Brown silty fine to coarse sand with gravel (moist) (Fill/Recessional Outwash)		
	15	60		CR-MW16-15-16 CA		SP-SM	Brown to gray fine to coarse sand with silt and gravel (moist) (Fill/Recessional Outwash)	NS	
					▼	SM	Gray silty fine sand with medium to coarse sand (moist) (Fill/Recessional Outwash)		
						SP-SM	Brown fine to medium sand with silt and coarse sand and gravel (moist) (Fill/Recessional Outwash)		
			38			SM	Brown to gray silty fine to coarse sand with gravel		<1

WELL LOG



Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well CR-MW16

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	WELL LOG
45						CR-MW16-18-19 CA				(moist to wet) (cemented) (Ice-Contact Deposits)			10/20 silica sand
				41						Becomes moist			
	20		60	24		CR-MW16-20-21 CA				Mottled gray and brown silty fine to medium sand with coarse sand and gravel (moist to wet)		<1	
40									GM	Brown silty gravel with fine to coarse sand (wet) (Ice-Contact Deposits)			
				23		CR-MW16-24-25 CA					NS	<1	
	25		60							Becomes gray			
						CR-MW16-26-27 CA			SM	Brown to gray silty fine sand (moist) (cemented) (Silt)	NS		
35						CR-MW16-28-29 CA							
	30		30	28		CR-MW16-30-31 CA				Grades to brown (moist)		<1	30.0'
											NS		31.0'
				33									Bentonite backfill
													32.5'

Notes: See Figure A-1 for explanation of symbols

Tacoma: Date:12/18/14 Path:C:\USERS\KJANC\DESKTOP\01830850\0.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Log of Monitoring Well CR-MW16 (continued)

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-3
Sheet 2 of 2

Drilled	Start: 8/27/2013	End: 8/27/2013	
Total Depth (ft)	30		
Logged By	JCD	Checked By	TSD
Driller	Holt Drilling	Drilling Method	Rotosonic
Hammer Data	N/A	Drilling Equipment	Geoprobe 8140 LC
Surface Elevation (ft)	64.32	Top of Casing Elevation (ft)	64.11
Vertical Datum	NGVD 1929		
Easting (X)	1159293.70711	Horizontal Datum	WA State Plane,South Harn
Northing (Y)	702613.401608		

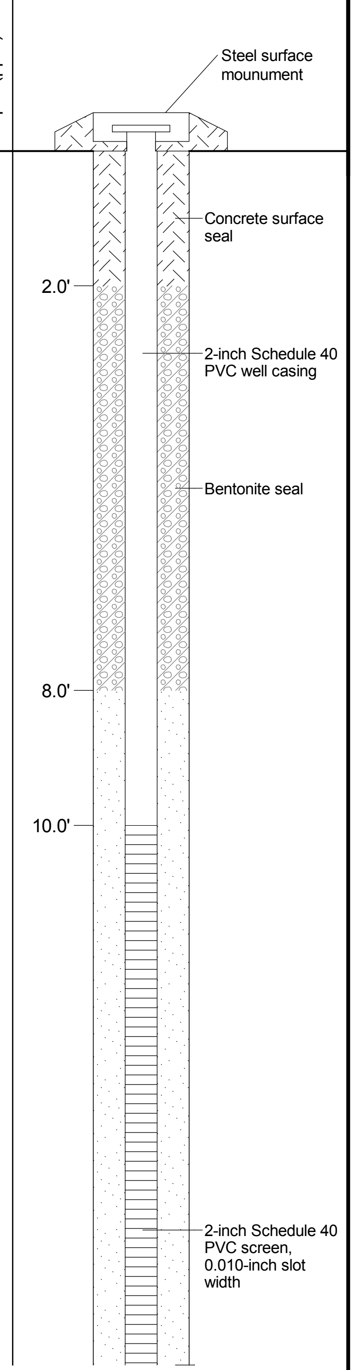
A 2 (in) well was installed on 8/27/2013 to a depth of 25 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
11/8/2013	18.57	45.54

Notes: Elevation based on survey completed by AHBL on 11/6/13

FIELD DATA / WELL LOG

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Collected Sample / Sample Name	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0					No recovery		
60	5							
55	10	30			SM	Brown to gray silty fine sand with medium to coarse sand and gravel (moist) (Fill)	NS	<1
			30.1	CR-MW17-11-12 CA				
			56.5			Becomes gray		
		30					NS	<1
					GP-GM	Brown fine to coarse gravel with silt and sand (moist) (Recessional Outwash/Fill)		
50	15	60	66.2	CR-MW17-15-16 CA			NS	<1
				CR-MW17-17-18 CA		Brown fine gravel with occasional medium to coarse sand (moist)		



Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well CR-MW17

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

WELL LOG

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Sample Name	Group Classification	Material Description	Sheen	Headspace Vapor (ppm)	Well Log
			71.5				NS	<1	10/20 silica sand
45				CR-MW17-19-20 CA	SM	Brown to gray silty fine to coarse sand with gravel (moist) (cemented) (Ice-Contact Deposits)			
	20	60		CR-MW17-20-21 CA	SP-SM	Brown to gray fine to coarse sand with silt and gravel (wet) (non-cemented) (Ice-Contact Deposits)			
			28.2	CR-MW17-21-21.5 CA					
						Cobbles up to 4-inches in diameter			
				CR-MW17-23-24 CA					
40						Becomes gray	NS	<1	
	25	60	21.3	CR-MW17-25-26 CA					25.0'
					ML	Gray silt with fine sand; stratified to laminated with green staining (dry to moist) (Silt)			26.0'
				CR-MW17-27-28 CA					
				CR-MW17-28-28.5 CA	SM	Gray silty fine sand (moist to wet) (Transition Zone)			Bentonite backfill
					ML	Gray silt with fine sand (dry to moist) (Advance Outwash/Transition Zone)			
35				CR-MW17-29-30 CA					
	30								30.0'

Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well CR-MW17 (continued)

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-4
Sheet 2 of 2

Drilled	Start 9/4/2013	End 9/4/2013	Total Depth (ft) 25	Logged By JCD / Checked By TSD	Driller Holt Drilling	Drilling Method Rotosonic

Hammer Data	N/A	Drilling Equipment	Geoprobe 8140 LC
Surface Elevation (ft) / Vertical Datum	89.36 / NGVD29	Top of Casing Elevation (ft)	88.86
Easting (X) / Northing (Y)	1158971.6868 / 703355.072314	Horizontal Datum	WA State Plane,South Harn

A 2 (in) well was installed on 9/4/2013 to a depth of 22 (ft).

Groundwater

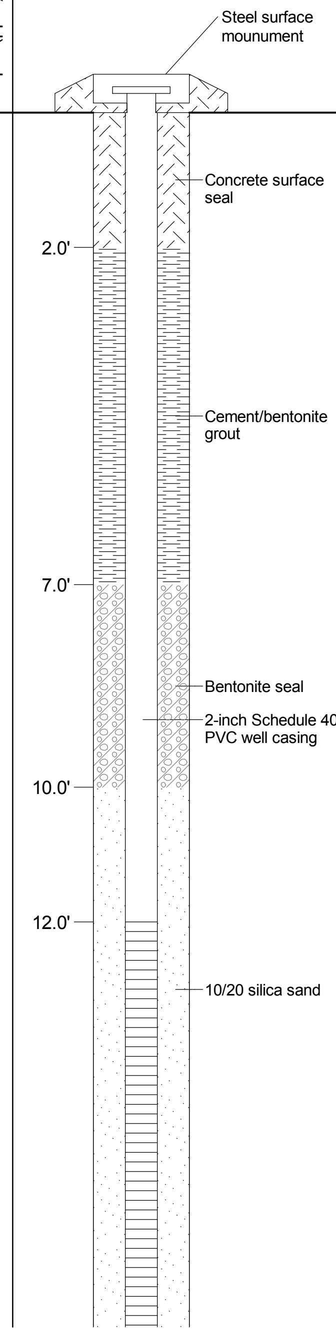
Date Measured	Depth to Water (ft)	Elevation (ft)
11/8/2013	18.81	70.05

Notes: Elevation based on survey completed by AHBL on 11/6/13

FIELD DATA

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Collected Sample / Sample Name	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0				Unknown	Vaccuumed to 7 feet		
85	5							
	7	36			SM	Brown silty fine sand with occasional medium to coarse sand (moist) (Ice-Contact Deposits)		
				JS-MW3S-8-9 CA			NS	<1
80			33					
	10	60			GM	Brown to gray silty fine to coarse gravel with sand and cobbles (moist) (Ice-Contact Deposits)		
				JS-MW3S-10.5-11.5 CA			NS	<1
	12			JS-MW3S-12-12.5 CA	SP-SM	Brown to gray fine sand with silt, medium to coarse sand and fine gravel (moist) (Ice-Contact Deposits)		
			25	JS-MW3S-13-14 CA				
75	14				SM	Brown to gray silty fine sand (moist) (Ice-Contact Deposits)	NS	<1
	15	60				Becomes moist to wet and occasionally laminated with silty fine sand		
			23					
							NS	<1

WELL LOG



Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well JS-MW3S

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	WELL LOG
70				21		JS-MW3S-18-19 CA	▼						
	20		60										2-inch Schedule 40 PVC screen, 0.010-inch slot width
						JS-MW3S-21-22 CA							22.0'
									ML	Brown to gray silt with fine sand (moist) (Silt)			22.5'
65													Bentonite backfill
	25					JS-MW3S-24-25 CA							25.0'

Notes: See Figure A-1 for explanation of symbols

Tacoma: Date:12/18/14 Path:C:\USERS\KJANC\DESKTOP\018308500.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Log of Monitoring Well JS-MW3S (continued)

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-5
Sheet 2 of 2

Drilled	Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
	9/5/2013	9/5/2013	55	JCD	TSD	Holt Drilling	Rotosonic

Hammer Data	N/A	Drilling Equipment	Geoprobe 8140 LC
Surface Elevation (ft) / Vertical Datum	94.21 / NGVD29	Top of Casing Elevation (ft)	93.66
Easting (X) / Northing (Y)	1158864.61717 / 703210.750304	Horizontal Datum	WA State Plane,South Harn

A 2 (in) well was installed on 9/5/2013 to a depth of 53 (ft).

Groundwater

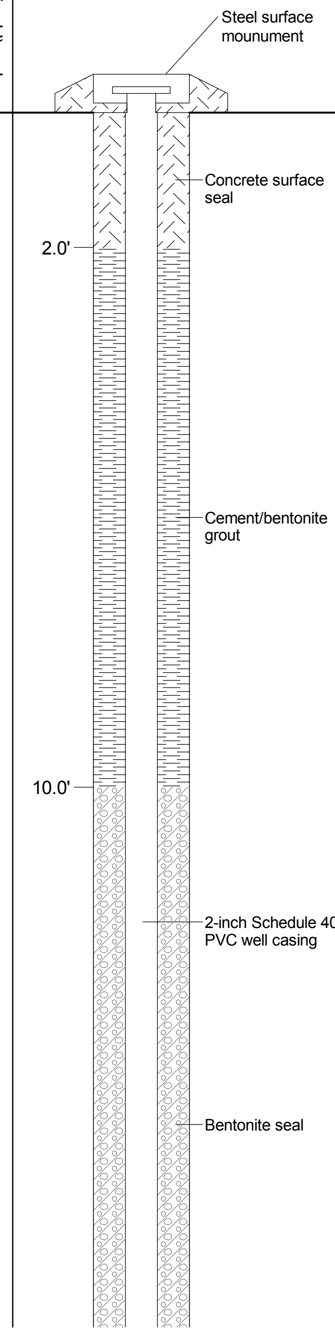
Date Measured	Depth to Water (ft)	Elevation (ft)
11/8/2013	40.18	53.48

Notes: Elevation based on survey completed by AHBL on 11/6/13

FIELD DATA

Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Group Classification	Material Description	Sheen	Headspace Vapor (ppm)
0						Unknown	Vacuumed to 7 feet		
7		36	25		JS-MW4D-7-8 CA	SM	Brown to gray silty fine sand with medium to coarse sand and fine gravel (moist) (Ice-Contact Deposits)	NS	<1
9		60	33		JS-MW4D-9-10 CA	SP-SM	Brown to gray fine sand with silt and medium to coarse sand to fine gravel (moist) (Ice-Contact Deposits)	NS	<1
13					JS-MW4D-13-14 CA				
14		35			JS-MW4D-14-15 CA	GM	Brown to gray silty fine to coarse gravel with fine to coarse sandand cobbles (moist) (Ice-Contact Deposits)	NS	<1
15		60	36				With occasional cobbles		
17						SP	Brown to gray fine to coarse sand with occasional gravel and occasional silt (moist) (Ice-Contact Deposits)	NS	<1

Elevation (feet): 90, 85, 80



Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well JS-MW4

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Sample Name / Testing	Water Level	Group Classification	Material Description	Sheen	Headspace Vapor (ppm)
				JS-MW4D-18-19 CA		GP	Brown to gray gravel with fine to coarse sand and silt (moist) (Ice-Contact Deposits)		
75			47						
	20	60	32			SP-SM	Brown to gray fine to medium sand with silt and coarse sand to fine gravel (moist) (Ice-Contact Deposits)	NS	<1
			43	JS-MW4D-22-23 CA				NS	<1
						SP-SM	Brown to gray fine sand with silt (moist) (Ice-Contact Deposits)		
70			55						
	25	60				GM	Brown/gray silty fine gravel with fine to medium sand (moist) (Ice-Contact Deposits)	NS	<1
			61	JS-MW4D-27-28		SP-SM	Brown to gray fine sand with silt and occasional medium to coarse sand (moist) (cemented) (Ice-Contact Deposits)		
								NS	<1
65			64	JS-MW4D-29-29.3 CA		SP	Brown to gray fine sand, trace silt (moist) (Ice-Contact Deposits)		
				JS-MW4D-29.5-30 CA		SP-SM	Brown to gray fine sand with silt and medium to coarse sand (moist) (Ice-Contact Deposits)		
	30	60							
						ML	Brown silt with fine sand (moist) (cemented) (Silt)		
			23	JS-MW4D-31-32 CA				NS	<1
				JS-MW4D-32-32.3 CA					
						SM	Brown silty fine sand with trace coarse sand and occasional gravel (moist) (Transition Zone)		
60			25			ML	Brown silt with fine sand with fine sand laminations (moist) (Transition Zone)	NS	<1
	35	60							
			24	JS-MW4D-36-37 CA					
				JS-MW4D-37-38 CA		SP	Brown to gray fine to medium sand, trace silt (moist) (Transition Zone)		<1
			26			SP-SM	Brown to gray fine to coarse sand with silt and occasional gravel (moist) (Transition Zone)	NS	
				JS-MW4D-38.5-39.5 CA		ML	Brown to gray silt with fine sand and occasional medium to coarse sand with fine to medium sand laminations; iron staining (moist) (Transition Zone)		
55									
	40	60			▼	SP	Brown to gray fine to medium sand with coarse sand to fine gravel (moist) (Advance		

Notes: See Figure A-1 for explanation of symbols

Tacoma: Date:12/18/14 Path:C:\USERS\KJANC\DESKTOP\018308500.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Log of Monitoring Well JS-MW4 (continued)

GeoEngineers

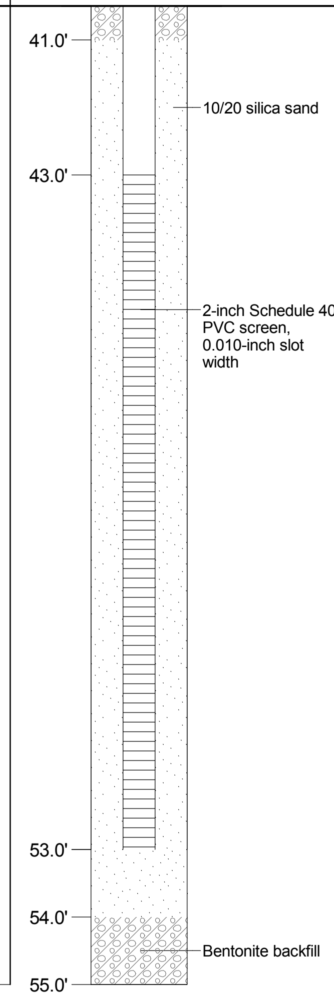
Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-6
Sheet 2 of 3

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Sample Name / Testing	Group Classification	Material Description	Sheen	Headspace Vapor (ppm)
			25	JS-MW4D-40.5-41		Outwash) Silt laminations from 40.5 to 41 feet	NS	
								<1
			28	JS-MW4D-43-44 CA				
50						Brown to gray fine to medium sand with coarse sand (moist to wet) (Advance Outwash)		
	45	60						<1
				JS-MW4D-44.5-46 CA		Silty fine sandy seam (wet) (Advance Outwash)		
			23					
						Grades to fine sand with silt		
			24			Grades to medium sand with silt Grades to fine sand with silt	NS	<1
45				JS-MW4D-49-50 CA				
	50	60						
						Grades to with medium sand and gravel		
			25				NS	<1
				JS-MW4D-53-54 CA	SM	Brown to gray silty fine sand (moist to wet) (Advance Outwash)		
40					GM	Brown to gray silty gravel with fine to coarse sand (moist to wet) (Advance Outwash)		
			23					<1
	55							

The boring was drilled with 8-inch conductor casing to 31 feet bgs. Two feet of bentonite chips were placed and hydrated for an hour. The boring was then drilled to 55 feet bgs with 6-inch casing telescoped through the 8-inch casing.

WELL LOG



Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well JS-MW4 (continued)

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-6
Sheet 3 of 3

Drilled	Start 8/29/2013	End 8/29/2013	Total Depth (ft) 40	Logged By JCD / Checked By TSD	Driller Holt Drilling	Drilling Method Rotosonic

Hammer Data	N/A	Drilling Equipment	Geoprobe 8140 LC	A 2 (in) well was installed on 8/25/2013 to a depth of 37 (ft).
Surface Elevation (ft) / Vertical Datum	105.03 / NGVD29	Top of Casing Elevation (ft)	104.67	
Easting (X) / Northing (Y)	1158851.37593 / 702700.283161	Horizontal Datum	WA State Plane,South Harn	

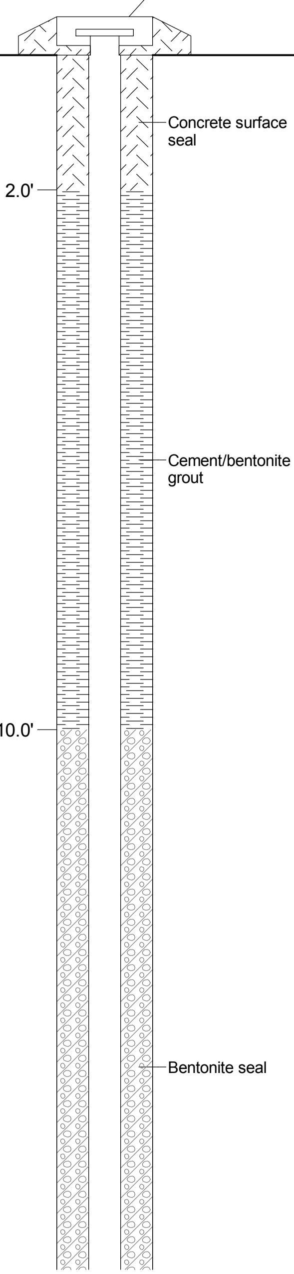
Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)
11/8/2013	21.87	82.80

Notes: Elevation based on survey completed by AHBL on 11/6/13

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Sample Name	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0				Unknown	Vacuumed 8 feet		
100	5							
		84			SP-SM	Brown to gray fine to medium sand with silt (moist) (Fill)	NS	<1
			21	JS-MW5-9-10 CA				
95	10			JS-MW5-10-11 CA CA	ML	Brown fine sandy silt with sand and occasional gravel; iron staining (moist) (cemented) (Ice-Contact Deposits)		
			23		GM	Gray silty fine gravel with sand (moist) (cemented) (Ice-Contact Deposits)		
			27	JS-MW5-14-15 CA				
90	15	60		JS-MW5-15-15.5 CA	SM	Brown silty fine sand seam (moist) (Ice-Contact Deposits)	NS	<1
					GM	Brown to gray silty gravel with medium to coarse sand (moist) (cemented) (Ice-Contact Deposits)		
			29	JS-MW5-16-17 CA				

WELL LOG



Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well JS-MW5

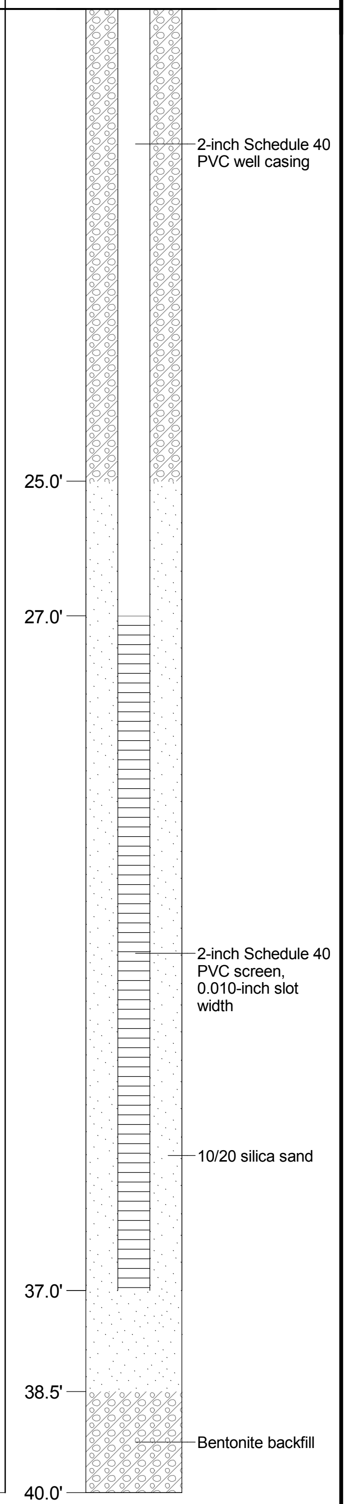
GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-7
Sheet 1 of 2

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Sample Name	Group Classification	Material Description	Sheen	Headspace Vapor (ppm)
			32					
					GP-GM	Gray fine to coarse gravel with silt and sand and occasional cobbles (moist to wet) (cemented) (Ice-Contact Deposits)		
85	20	60	51			Grades to with occasional gravel	NS	<1
			12		SM	Gray silty fine to coarse sand with occasional fine gravel (moist) (cemented) (Silt)		
				JS-MW5-22-23 CA		Grades to with gravel		
					GM	Brown silty gravel with fine to coarse sand (moist) (cemented) (Transition Zone)		
			21	JS-MW5-24-25 CA				
80	25	60					NS	<1
					GP-GM	Brown gravel with silt, fine to coarse sand and occasional cobbles (moist to wet) (Transition Zone)		
			33					
					BLDR	Boulder at least 6 inches in diameter (Advance Outwash)		
				JS-MW5-29-30 CA	SP	Gray/brown coarse sand with fine sand, gravel and occasional silt (wet) (Advance Outwash)		
75	30	60	35				NS	<1
			32					
				JS-MW5-34-35 CA				
70	35	60			GP	Gray fine gravel (wet) (Advance Outwash)	NS	<1
					GP-GM	Gray/brown fine to coarse gravel with silt, fine to coarse sand and occasional cobbles (wet) (Advance Outwash)		
				JS-MW5-37-38 CA				
				JS-MW5-38-39 CA				
				JS-MW5-39-40 CA			NS	<1
	40							

WELL LOG



Notes: See Figure A-1 for explanation of symbols

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Log of Monitoring Well JS-MW5 (continued)

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled	Start 9/3/2013	End 9/3/2013	Total Depth (ft) 19	Logged By JCD / Checked By TSD	Driller Holt Drilling	Drilling Method Rotosonic

Hammer Data	N/A	Drilling Equipment	Geoprobe 8140 LC
Surface Elevation (ft) / Vertical Datum	102.15 / NGVD29	Top of Casing Elevation (ft)	101.85
Easting (X) / Northing (Y)	1158822.93508 / 702834.761492	Horizontal Datum	WA State Plane,South Harn

A 2 (in) well was installed on 9/3/2013 to a depth of 18.5 (ft).

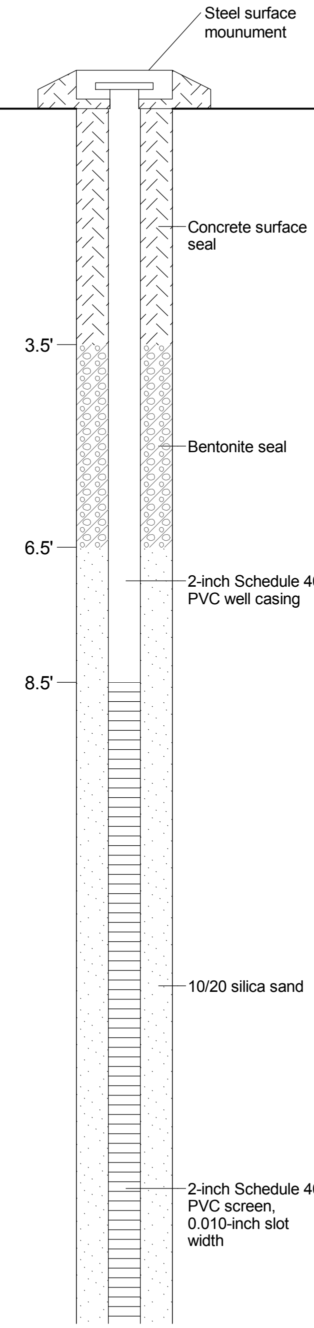
Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)
11/8/2013	5.56	96.29

Notes: Elevation based on survey completed by AHBL on 11/6/13

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Sample Name	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0				Unknown	Vacuumed to 7 feet		
100								
	5							
95					SM-ML	Brown to gray silty fine sand to fine sandy silt with medium to coarse sand and gravel (moist) (Ice-Contact Deposits)	NS	<1
		30						
	10		30	JS-MW6S-10-11 CA	SM	Brown to gray silty fine sand with medium to coarse sand and gravel (moist) (Ice-Contact Deposits)		
90		30	48				NS	<1
			35					
				JS-MW6S-14-15 CA		Becomes moist to wet		
	15	48	23					
				JS-MW6S-16-17 CA			NS	<1
85				JS-MW6S-17-17.5 CA	SP-SM	Brown to gray fine to coarse sand with silt and gravel (moist to wet) (cemented) (Ice-Contact Deposits)		
					SM			

WELL LOG



Notes: See Figure A-1 for explanation of symbols

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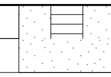
Log of Monitoring Well JS-MW6S

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
				35		JS-MW6S-18-19 CA				Brown to gray silty fine sand with medium to coarse sand and gravel (moist) (cemented) (Ice-Contact Deposits)	NS	<1

WELL LOG



Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well JS-MW6S (continued)

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled	Start 8/30/2013	End 8/30/2013	Total Depth (ft) 50	Logged By JCD / Checked By TSD	Driller Holt Drilling	Drilling Method Rotosonic

Hammer Data	N/A	Drilling Equipment	Geoprobe 8140 LC
Surface Elevation (ft) / Vertical Datum	102.32 / NGVD29	Top of Casing Elevation (ft)	101.99
Easting (X) / Northing (Y)	1158822.071 / 702827.688397	Horizontal Datum	WA State Plane,South Harn

A 2 (in) well was installed on 8/30/2013 to a depth of 40 (ft).

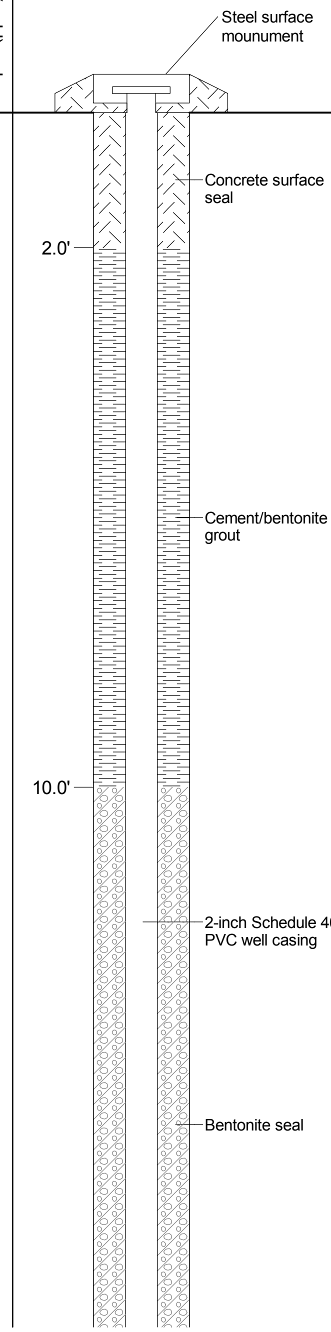
Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)
11/8/2013	19.22	82.77

Notes: Elevation based on survey completed by AHBL on 11/6/13

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0								Unknown	Vacuumed to 8 feet and cleared to 10 feet		
100												
	5											
95												
	10		36	23					GM	Gray silty fine to coarse gravel with sand and occasional cobbles (moist) (Ice-Contact Deposits)		
						JS-MW6D-11-12 CA						
90												
			24	25						Becomes moist to wet		
	15		60	27						Grades to with cobbles		
						JS-MW6D-16-17 CA						
85												
									ML	Gray fine sandy silt with occasional medium to		

WELL LOG



Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well JS-MW6D

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

WELL LOG

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Sample Name	Group Classification	Material Description	Well Log
				JS-MW6D-18-19 CA		coarse sand and occasional fine gravel (moist) (cemented) (Silt)	
	20	60	22		GP-GM	Brown gravel with silt, fine to coarse sand, and occcasional cobbles (moist) (Advance Outwash)	
				JS-MW6D-20.5-21.5 CA	SP-SM	Brown to gray fine to coarse sand with silt, gravel and occasional cobbles (moist to wet) (Advance Outwash)	
80					GP-GM	Brown to gray gravel with silt, fine to coarse sand and occasional cobbles (moist to wet) (Advance Outwash)	
			23				23.0'
				JS-MW6D-24-25 CA			
	25	60	35		SP	Brown fine to coarse sand with gravel and occasional silt (moist to wet) (Advance Outwash)	25.0'
75							
				JS-MW6D-27.5-28 CA		Fine to coarse sand with silt	
				JS-MW6D-29-29.5 CA			
	30	60	28			Silty fine to coarse sand seam from 29 to 29.4 feet Color change to brown to gray	
70			32				
				JS-MW6D-33-34 CA			
	35	36	27				2-inch Schedule 40 PVC screen, 0.010-inch slot width
65					GP	Brown to gray gravel with fine to coarse sand and occasional cobbles and occasional silt (wet) (Advance Outwash)	
			25				10/20 silica sand
				JS-MW6D-39-40 CA			
	40	120			SP-SM	Brown fine sand with silt (wet) (Advance	40.0'

Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well JS-MW6D (continued)

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-9
Sheet 2 of 3

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	WELL LOG
										Outwash)			41.0'
60									GP	Brown to gray gravel with fine to coarse sand and occasional silt and cobbles (wet) (Advance Outwash)			
	45								SP	Brown fine to coarse sand with gravel and trace silt (wet) (Advance Outwash)			Bentonite backfill
						JS-MW6D-46-47 CA							
55									GM	Brown to gray silty gravel with fine to coarse sand (wet) (Advance Outwash)			
						JS-MW6D-48-49 CA							
	50												50.0'

The boring was drilled with 8-inch conductor casing to 20 feet bgs. Three feet of bentonite chips were placed and hydrated for an hour.
The boring was then drilled to 50 feet bgs with 6-inch casing telescoped through the 8-inch casing

Notes: See Figure A-1 for explanation of symbols

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Log of Monitoring Well JS-MW6D (continued)

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled	Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
	9/3/2013	9/3/2013	25	JCD	TSD	Holt Drilling	Rotosonic

Hammer Data	N/A	Drilling Equipment	Geoprobe 8140 LC
Surface Elevation (ft)	Undetermined	Top of Casing Elevation (ft)	
Vertical Datum	N/A		
Easting (X)	1158863.86238	Horizontal Datum	WA State Plane,South Harn
Northing (Y)	703213.33783		

A 2 (in) well was installed on 9/4/2013 to a depth of 16 (ft).

Groundwater

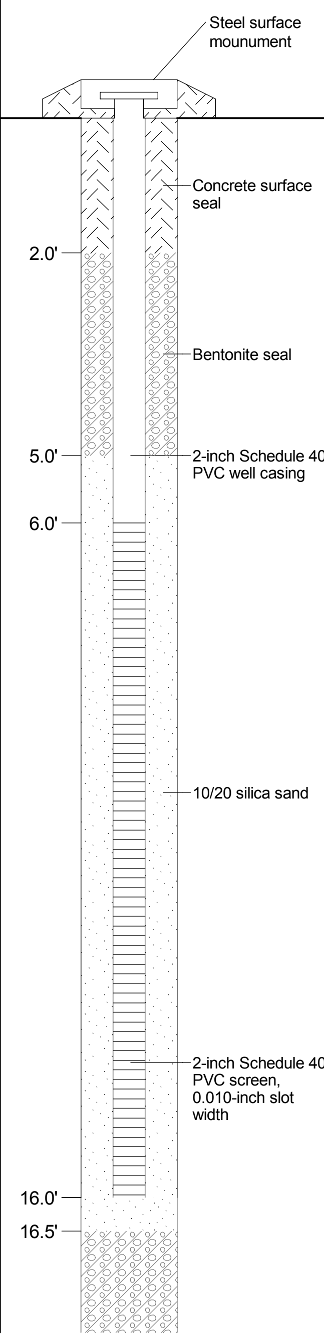
Date Measured	Depth to Water (ft)	Elevation (ft)

Notes: Well Decommissioned

FIELD DATA

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Sample Name / Testing	Water Level	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0					Unknown	Vacuumed to 7 feet		
		12		JS-MW7-7-8 CA		SM	Brown to gray silty fine sand with medium to coarse sand and gravel (moist) (Ice-Contact Deposits)		
		24	35	JS-MW7-8-9 CA			Light brown silty fine sand; iron staining (moist)	NS	<1
	10	60	29				Grades to with medium to coarse sand		
				JS-MW7-11-12 CA			Brown to gray silty fine to coarse sand with occasional gravel (moist) (Ice-Contact Deposits)		
			41			ML	Brown fine sandy silt with occasional medium to coarse sand; iron staining (moist) (cemented) (Silt)	NS	<1
				JS-MW7-13-14 CA					
						GM	Brown to gray silty fine to coarse gravel with fine to coarse sand (moist) (Transition Zone)		
	15	60	34					NS	<1
			45						

WELL LOG



Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well JS-MW7

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-10
Sheet 1 of 2

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	WELL LOG
				68		JS-MW7-18-19 CA			GP-GM	Brown to gray fine to coarse gravel with silt and fine to coarse sand (moist) (Transition Zone)		<1	
											NS		
	20		60	71							NS	<1	Bentonite backfill
						JS-MW7-22-23 CA							
				67								<1	
	25			47		JS-MW7-24-25 CA				Brown to gray fine to medium sand with silt and occasional coarse sand to fine gravel (moist) (Transition Zone)	NS	<1	25.0'

Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well JS-MW7 (continued)

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-10
Sheet 2 of 2

Drilled — Start: 9/12/2013; End: 9/12/2013	Total Depth (ft): 13	Logged By: JCD; Checked By: TSD	Driller: Holt Drilling; Drilling Method: Rotosonic
Hammer Data: N/A	Drilling Equipment: Geoprobe 8140 LC	A 2 (in) well was installed on 9/12/2013 to a depth of 12 (ft).	
Surface Elevation (ft): 97.00; Vertical Datum: NGVD29	Top of Casing Elevation (ft): 96.75		
Easting (X): 1158863.792; Northing (Y): 703216.486608	Horizontal Datum: WA State Plane,South Harn		

Groundwater

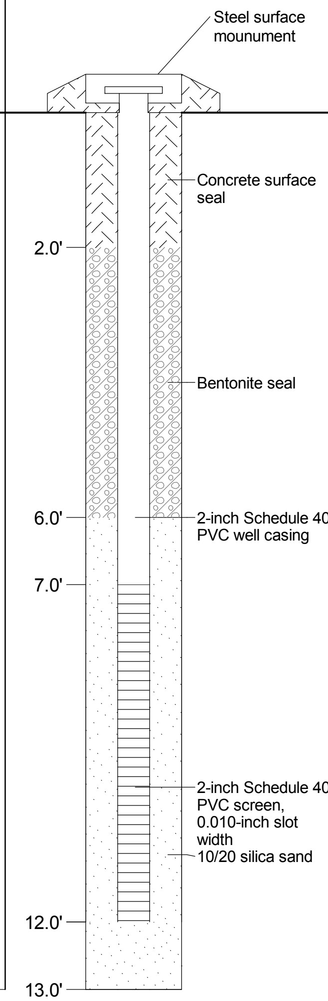
Date Measured	Depth to Water (ft)	Elevation (ft)
11/8/2013	11.02	85.73

Notes: Elevation based on survey completed by AHBL on 11/6/13

FIELD DATA

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Sample Name / Testing	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0	60	23	JS-MW7A-0-1 CA	SP-SM	Dark brown fine to medium sand with silt, coarse sand and occasional organics (moist) (Fill)		<1
				JS-MW7A-1-2 CA	ML	Brown silt with fine sand; iron staining (moist) (Fill)		
95			23		SM	Brown silty fine to medium sand with coarse sand (moist) (Fill)	NS	<1
				JS-MW7A-3-4 CA				
			25		SP-SM	Brown to gray fine to medium sand with silt and occasional coarse sand (moist) (Ice-Contact Deposits)	NS	
	5	24		JS-MW7A-5-6 CA				
			31					
					SM	Brown to gray silty fine sand with medium to coarse sand and gravel (moist) (cemented) (Ice-Contact Deposits)		
90		36					NS	<1
			25					
	10	36	26				NS	<1
85			28		ML	Brown to gray fine sandy silt with occasional medium to coarse sand; iron staining (moist) (cemented) (Silt)	NS	

WELL LOG



Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well JS-MW7A

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-11
Sheet 1 of 1

Drilled	Start: 9/17/2013	End: 9/17/2013	Total Depth (ft)	22	Logged By: PSD / Checked By: TSD	Driller	Holt Drilling	Drilling Method	Rotosonic

Hammer Data	N/A	Drilling Equipment	Geoprobe 8140LS Track	A 2 (in) well was installed on 9/17/2013 to a depth of 18 (ft).
Surface Elevation (ft) / Vertical Datum	171.45 / NGVD29	Top of Casing Elevation (ft)	171.18	
Easting (X) / Northing (Y)	1158296.944 / 1158296.944	Horizontal Datum	WA State Plane,South Harn	

Groundwater

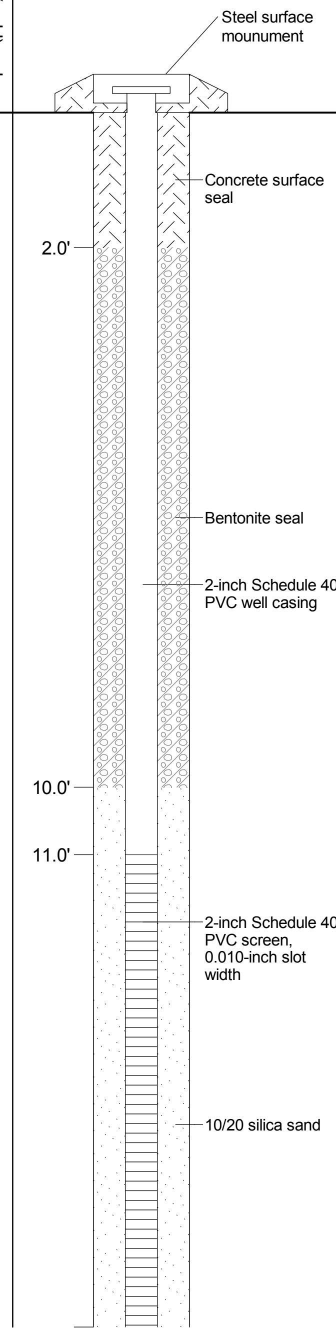
Date Measured	Depth to Water (ft)	Elevation (ft)
11/8/2013	10.55	160.63

Notes: Elevation based on survey completed by AHBL on 11/6/13

FIELD DATA

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Sample Name / Testing	Water Level	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0	60	24.3	UG-MW23-0-2 CA		SM	Brown silty sand (moist) (Topsoil)	NS	
170						SM	Red/brown silty sand with occasional gravel (moist) (Fill)		
				UG-MW23-2-3 CA		SM	Light brown silty sand (moist) (Ice-Contact Deposits)	NS	
						SM	Brown silty sand with gravel (moist) (Ice-Contact Deposits)		
			32.1	UG-MW23-4-5 CA		ML	Brown silt with sand and gravel (moist) (cemented) (Silt)	NS	
	5	60				SM	Brown silty sand with gravel (moist) (Advance Outwash)	NS	
165			24.5	UG-MW23-6-7 CA					
			23.2	UG-MW23-9-10 CA					
	10	60			▼	SP-SM	Brown fine sand with silt and occasional gravel (moist) (Advance Outwash)	SS	
160			21.3					SS	
				UG-MW23-12-13 CA			Wet at 12 feet		
								SS	
	15	42							
155				UG-MW23-16-17 CA			Increased gravel content from 16 to 17 feet		
				UG-MW23-17.5-18.5					

WELL LOG



Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well UG-MW23

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	WELL LOG
			42			CA							18.0'
						UG-MW23-18.5-19 CA			SM	Brown silty sand (moist to wet) (Advance Outwash)			18.5'
						UG-MW23-19-20 CA			SP-SM	Brown fine to medium sand with silt and gravel (moist to wet) (Advance Outwash)			
	20					UG-MW23-20-20.5 CA			SM	Brown silty sand (moist to wet) (Advance Outwash)			Bentonite backfill
150						UG-MW23-20.5-21.5 CA							
						UG-MW23-21.5-22 CA							22.0'

Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well UG-MW23 (continued)

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled	Start 6/27/2013	End 6/28/2013	Total Depth (ft)	100	Logged By JCD / Checked By TSD	Driller	Cascade Drilling	Drilling Method	Rotosonic

Hammer Data	N/A	Drilling Equipment	Terrasonic 150 CC Truck Rig
Surface Elevation (ft) / Vertical Datum	197.08 / NGVD29	Top of Casing Elevation (ft)	196.80
Easting (X) / Northing (Y)	1158091.38667 / 703003.771559	Horizontal Datum	WA State Plane,South Harn

A 2 (in) well was installed on 6/28/2013 to a depth of 80 (ft).

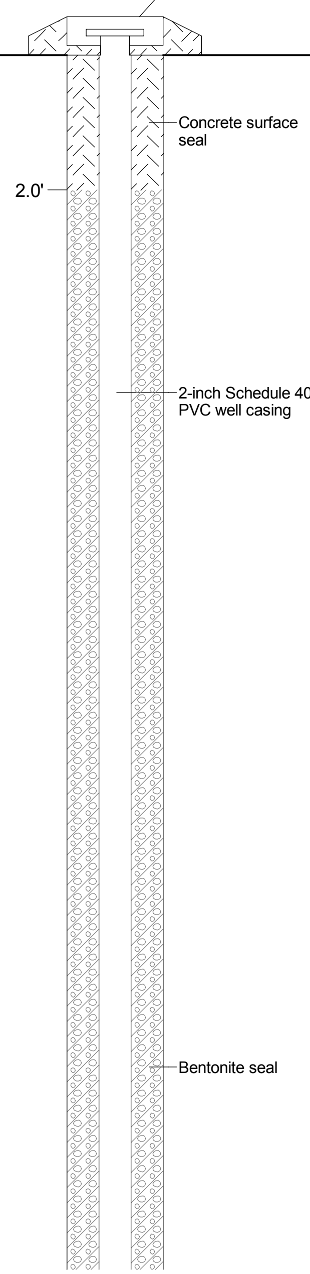
Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)
11/8/2013	31.33	165.75

Notes: Elevation based on survey completed by AHBL on 11/6/13

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Collected Sample / Sample Name	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0	120			SM	Dark brown silty sand with gravel (moist) (Fill)	NS	<1
195			26.0		SM	Brown to gray silty fine to medium sand with coarse sand to gravel; iron staining (moist) (Ice-Contact Deposits)	NS	<1
	5		20.1				NS	<1
190			19.9				NS	<1
				UG-MW24-9-10 CA				
	10	120	20.3				NS	<1
					SM-ML	Brown to gray silty fine to medium sand to fine to medium sandy silt with coarse sand to fine gravel (moist) (Ice-Contact Deposits)		
185				UG-MW24-12-13 CA		Brown and gray mottling from 12 to 12.5 feet		
			20.3				NS	<1
	15							
180			41.5				NS	<1

WELL LOG



Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well UG-MW24

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-13
Sheet 1 of 5

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	WELL LOG
				41.7					SP-SM	Gray fine to coarse sand with silt (moist to dry) (Ice-Contact Deposits)	NS	<1	
	20		60	40.6							NS		
									SP-SM	Brown to red fine to medium sand with silt and coarse sand to fine gravel (moist) (Ice-Contact Deposits)			
175													
									SM	Brown to red silty sand with gravel (moist) (Ice-Contact Deposits)			
	25		60	41.5							NS	<1	
									GW-GM	Brown to gray fine to coarse gravel with silt and fine to coarse sand (moist to wet) (Ice-Contact Deposits)			
170						UG-MW24-27-28 CA							2-inch Schedule 40 PVC well casing
				51.2						Becomes moist	NS		
	30		120	63.5						Becomes moist to wet	NS		
							▼						
165				47.9							NS		
										Becomes wet			
									SM	Brown to gray silty fine to medium sand (moist) (Silt)			
	35			28.5					SM	Brown to gray silty fine sand with gravel and occasional cobbles (moist) (Transition Zone)	NS	2.0	Bentonite seal
160				31.4							NS		
	40		120	41.2		UG-MW24-40-41			GW-GM	Gray to brown fine to coarse gravel with silt and	NS		

Notes: See Figure A-1 for explanation of symbols

Tacoma: Date:12/18/14 Path:C:\USERS\KJANC\DESKTOP\018308500.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

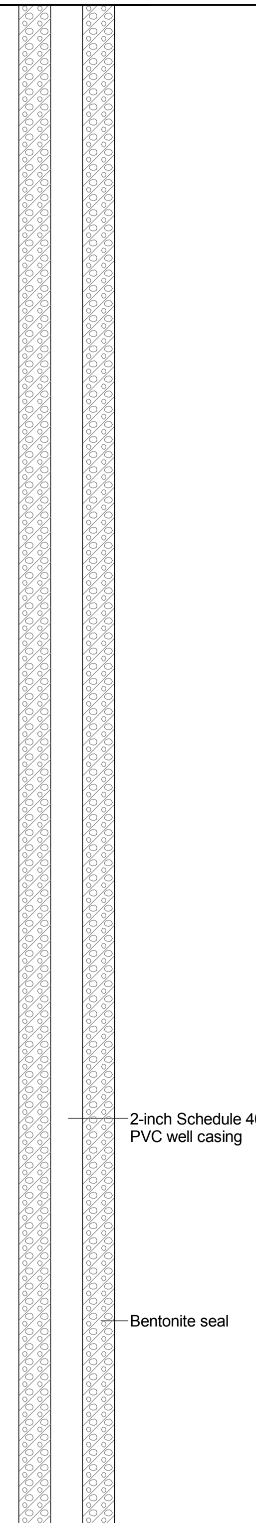
Log of Monitoring Well UG-MW24 (continued)

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

WELL LOG

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Sample Name	Group Classification	Material Description	Sheen	Headspace Vapor (ppm)
				CA		fine to coarse sand (moist to wet) (Transition Zone)		
					CL	Green clay with gravel and occasional fine to coarse sand (moist) (Transition Zone)		
155			22.1		GW-GM	Gray fine to coarse gravel with silt and fine to coarse sand (moist to wet) (Transition Zone)		
			24.1			Fine to medium sand seam from 44.5 to 44.8 feet	NS	3.7
	45							
						Fine to medium sand seam from 46.3 to 46.5 feet		
150			24.8					
	50	60	25.8			Wet from approximately 50 to 51 feet	NS	3.1
145			20.5				NS	
					SP-SM	Gray fine to medium sand with silt and coarse sand to gravel (moist to wet) (Transition Zone)		
				UG-MW24-54-55 CA				
	55		25.6				NS	3.5
					GP-GM	Gray gravel with silt and fine to coarse sand (wet) (Advance Outwash)		
140					GP	Gray gravel with fine to coarse sand (wet) (Advance Outwash)		
			29.5				NS	
					GW-GM	Gray fine to coarse gravel with silt and fine to coarse sand (wet) (Advance Outwash)		
	60	60	19.5				NS	2.2
135			14.1					



Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well UG-MW24 (continued)

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	65		60	14.2							NS	1.6
130				14.2							NS	
				14.5							NS	1.8
	70		96									
									SP-SM	Gray fine to medium sand with silt and coarse sand to gravel (wet) (Advance Outwash)		
125				20.2		UG-MW24-72-73 CA						
									GW-GM	Gray fine to coarse gravel with silt and fine to coarse sand (wet) (Advance Outwash)		
				19.0							NS	1.6
	75											
120				22.4								
				21.8		UG-MW24-79-80 CA						
	80		96	19.9						Brown silty gravel with fine to coarse sand (moist to wet)	NS	2.5
										Becomes brown to gray		
115									GM	Gray silty fine to coarse gravel with fine to coarse sand (moist to wet) (Advance Outwash)		
				22.5								
	85			23.1							NS	4.6

WELL LOG

63.0'

65.0' — 10/20 silica sand

2-inch Schedule 40 PVC screen, 0.010-inch slot width

80.0'

81.0'

Bentonite seal

Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well UG-MW24 (continued)

GEOENGINEERS

Project: UWT 2013 Environmental Investigation

Project Location: Tacoma, Washington

Project Number: 0183-085-00

Figure D-13
Sheet 4 of 5

Depth (feet)	Recovered (in)	Temperature (°C)	Sample Name	Group Classification	Material Description	Sheen	Headspace Vapor (ppm)
90	120	20.1		SM	Brown to gray silty fine to coarse sand with gravel (wet) (Advance Outwash)	NS	4.2
		20.5		GW-GM	Brown to gray fine to coarse gravel with silt and fine to coarse sand (wet) (Advance Outwash)	NS	
95		21.2				NS	4.8
		22.5				NS	
100			UG-MW24-99-100 CA				

Elevation (feet): 110, 105, 100

WELL LOG: Bentonite seal; 100.0'

The boring was drilled to 25 feet feet. 8-inch conductor casing was placed to 15 feet bgs. Fifteen feet of bentonite chips were placed and hydrated for an hour.
The boring was then drilled to 100 feet bgs with 6-inch casing telescoped through the 8-inch casing.

Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well UG-MW24 (continued)

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled	Start 8/23/2013	End 8/23/2013	Total Depth (ft)	22	Logged By JCD	Checked By TSD	Driller	Holt Drilling	Drilling Method	Rotosonic

Hammer Data	N/A	Drilling Equipment	Geoprobe 8140 LC	A 2 (in) well was installed on 8/23/2013 to a depth of 18 (ft).
Surface Elevation (ft) / Vertical Datum	203.08 / NGVD29	Top of Casing Elevation (ft)	202.60	
Easting (X) / Northing (Y)	1158024.18855 / 703329.739777	Horizontal Datum	WA State Plane,South Harn	

Groundwater

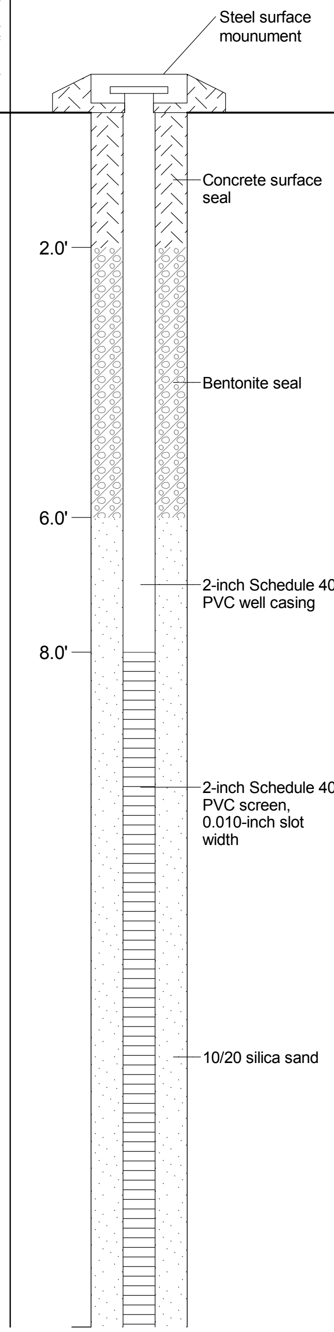
Date Measured	Depth to Water (ft)	Elevation (ft)
11/8/2013	2.07	200.53

Notes: Elevation based on survey completed by AHBL on 11/6/13

FIELD DATA

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Sample Name	Group Classification	Material Description	Sheen	Headspace Vapor (ppm)
	0	60			SP-SM	Brown fine to coarse sand with silt and occasional gravel and scattered organics (moist) (Fill)	NS	
			25.7	UG-MW25S-1-2 CA				<1
					SM	Brown silty fine to medium sand with gravel and scattered organics (moist) (Fill)		
200				UG-MW25S-3-4 CA	GM	Brown to gray silty fine gravel with sand and cobbles (moist) (cemented) (Ice-Contact Deposits)	NS	
			26.5					
	5	18						
			31.4					
		18				Fine to medium sand seam from 6.6 to 7 feet		
195		24	31.7	UG-MW25S-7.5-8.5 CA			NS	
	10	12	18.2	UG-MW25S-10-11 CA		Moist to wet soils from 10 to 11 feet		<1
		24		UG-MW25S-11-12 CA				
						Becomes gray		
190		24	27.5				NS	
						Grades to occasional medium sand to gravel		
	15	60	19.5	UG-MW25S-15-16 CA		Gray silty fine to coarse sand to fine to coarse sandy silt with gravel (moist) (Ice-Contact Deposits)		<1
						Becomes moist to wet from 17.5 to 18.5 feet		

WELL LOG



Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well UG-MW25S

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	WELL LOG
											NS		18.0'
				29.7		UG-MW25S-19-20 CA			ML	Gray silt with sand (moist) (cemented) (Silt)			19.0'
	20		24	25.3					SP-SM	Brown fine to coarse sand with silt and gravel (moist) (Advance Outwash)	NS	<1	Bentonite backfill
													22.0'

Notes: See Figure A-1 for explanation of symbols

Tacoma: Date:12/18/14 Path:C:\USERS\KJANC\DESKTOP\018308500.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Log of Monitoring Well UG-MW25S (continued)

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-14
Sheet 2 of 2

Drilled	Start 8/22/2013	End 8/23/2013	Total Depth (ft)	55	Logged By JCD Checked By TSD	Driller	Holt Drilling	Drilling Method	Rotosonic

Hammer Data	N/A	Drilling Equipment	Geoprobe 8140 LC
Surface Elevation (ft) / Vertical Datum	202.64 / NGVD29	Top of Casing Elevation (ft)	202.05
Easting (X) / Northing (Y)	1158021.77892 / 703343.987834	Horizontal Datum	WA State Plane,South Harn

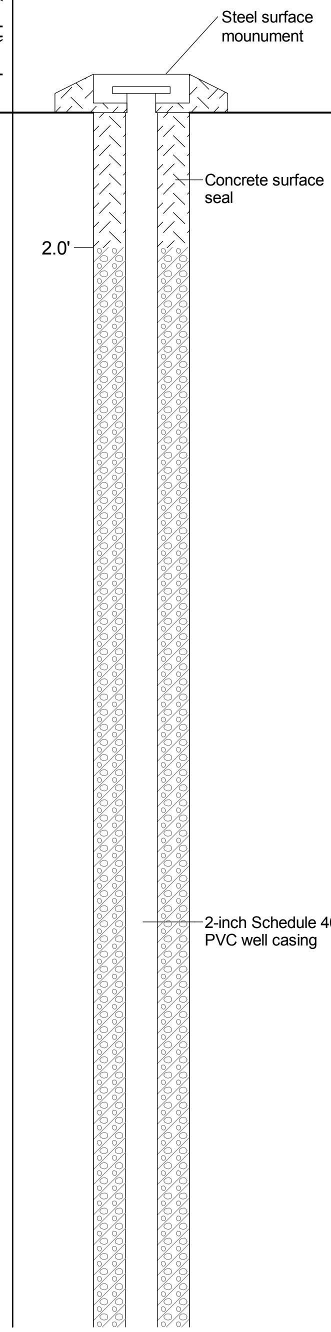
A 2 (in) well was installed on 8/23/2013 to a depth of 55 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
11/8/2013	36.73	165.32

Notes: Elevation based on survey completed by AHBL on 11/6/13

FIELD DATA / WELL LOG

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Sample Name	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0	60			SM	Brown to gray silty fine to coarse sand with occasional fine to coarse gravel (moist) (Fill)		
			32.5	UG-MW25D-1-2 CA				<1
200					SM-ML	Brown to gray silty fine to medium sand to fine to medium sand with silt and occasional coarse sand to fine gravel; oxidation staining (moist) (cemented) (Ice-Contact Deposits)		
				UG-MW25D-2.5-3.5 CA				
			57.3					
	5	60			GM	Light gray silty fine gravel with sand and cobbles (moist) (Ice-Contact Deposits)		
			44.2	UG-MW25D-6-7 CA				
195								
			67.3				NS	<1
	10	60	52.5			With increased gravel	NS	
			42.5					
190				UG-MW25D-12-13 CA		Becomes moist to wet		
			40.2	UG-MW25D-13-14 CA			NS	
	15	60	43.5					<1
			25.5					
185			25.2	UG-MW25D-17-18 CA		Fine to medium sand seam from 17.2 to 17.3 feet	NS	



Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well UG-MW25D

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-15
Sheet 1 of 3

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Sample Name	Water Level	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	WELL LOG
				UG-MW25D-18-19 CA						
						ML	Gray silt with sand (dry to moist) (cemented) (Silt)			
	20	11	34.9			Unknown	No recovery from 20 to 24 feet	NS	<1	
			42.5					NS		
180										Bentonite seal
		18								
			67.3	UG-MW25D-24-25 CA		SP-SM	Brown to gray fine to medium sand with silt and coarse sand to gravel (moist) (Advance Outwash)		30	
	25	12								
							Brown to gray fine to coarse sand with silt (moist) (Advance Outwash)			
		24						NS		2-inch Schedule 40 PVC well casing
			36.9						<1	
175										
	30	36	69.1			SP-SM	Brown to gray fine to coarse sand with silt and gravel (moist) (Advance Outwash)	NS		
170										
		24						NS		Bentonite seal
			64.5	UG-MW25D-34-35 CA					<1	
	35	24						NS		
						GP-GM	Gray to brown fine to coarse gravel with silt and fine to coarse sand (moist) (Advance Outwash)			
					▼					
			27.0	UG-MW25D-37-38 CA						
165										
		24					Becomes wet		<1	
			23.0							
	40	60	24.5					NS	<1	

Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well UG-MW25D (continued)

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-15
Sheet 2 of 3

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	WELL LOG
									GM	Gray/brown silty fine gravel with sand (wet)			
160						UG-MW25D-42-43 CA							
				20.0		UG-MW25D-43-44 CA					NS		43.0'
	45		60									<1	45.0'
										Becomes brown to red			2-inch Schedule 40 PVC screen, 0.010-inch slot width
155													
				23.7		UG-MW25D-48-48.5 CA					NS		
						UG-MW25D-48.5-49 CA			GP-GM	Gray fine to coarse gravel with silt, coarse sand and cobbles (moist to wet)			
	50		60								NS	<1	
				24.7						Grades to with fine to coarse sand	NS		10/20 silica sand
150													
						UG-MW25D-54-55 CA						<1	
	55												55.0'

The boring was drilled with 8-inch conductor casing to 26 feet bgs. The casing was withdrawn to 23 feet bgs and 5 feet of bentonite chips were placed and hydrated for an hour.
The boring was then drilled to 55 feet bgs with 6-inch casing telescoped through the 8-inch casing.

Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well UG-MW25D (continued)

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled	Start 9/11/2013	End 9/11/2013	Total Depth (ft) 25	Logged By JCD/BB Checked By TSD	Driller Holt Drilling	Drilling Method Rotosonic

Hammer Data	N/A	Drilling Equipment	Geoprobe 8140 LC
Surface Elevation (ft) / Vertical Datum	202.62 / NGVD29	Top of Casing Elevation (ft)	202.18
Easting (X) / Northing (Y)	1158001.84606 / 703487.379365	Horizontal Datum	WA State Plane,South Harn

A 2 (in) well was installed on 9/11/2013 to a depth of 17 (ft).

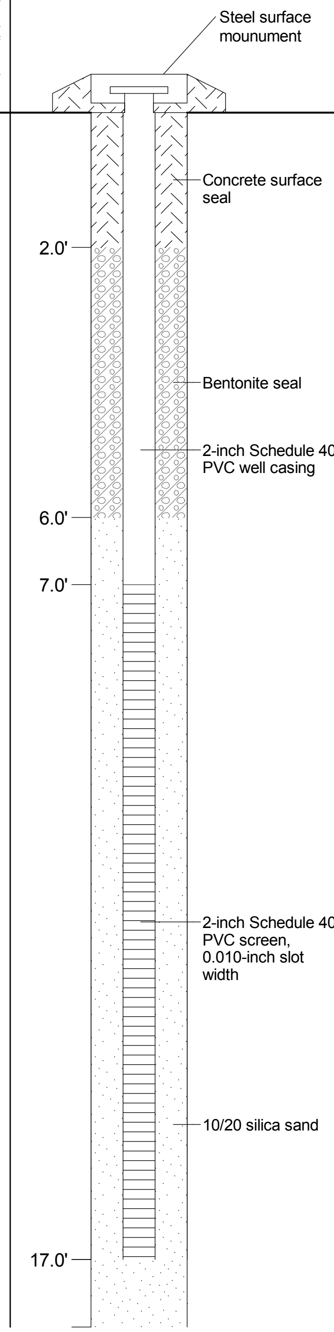
Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)
11/8/2013	-0.25	202.43

Notes: Elevation based on survey completed by AHBL on 11/6/13

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Sample Name / Testing	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0	60		UG-MW26-0-1 CA	SM	Dark brown to black silty fine to coarse sand with gravel and scattered organics (roots) (moist) (Fill)		
			21		SP-SM	Brown to gray fine sand with medium to coarse sand and silt and occasional fine gravel (moist) (Ice-Contact Deposits)	NS	<1
200				UG-MW26-2-3 CA				
	5	60	55		SM	Gray silty fine sand with medium to coarse sand and occasional gravel (moist to wet) (cemented) (Ice-Contact Deposits)	NS	
				UG-MW26-6-6.3 CA		Fine to medium sand seam from 6 to 6.3 feet		
			23	UG-MW26-6.5-7.5 CA				<1
195								
			25				NS	
	10	60		UG-MW26-10-11 CA				<1
			28				NS	
190						Becomes brown to gray		
			35					
	15	60		UG-MW26-15-16 CA				<1
							NS	
			32		ML	Gray sandy silt with occasional gravel (moist to dry) (cemented) (Silt)		
185								

WELL LOG



Notes: See Figure A-1 for explanation of symbols

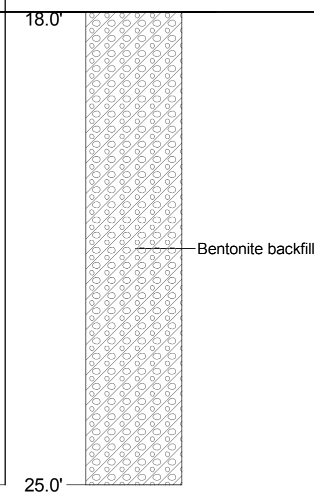
Log of Monitoring Well UG-MW26

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

WELL LOG

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
				56		UG-MW26-19-20 CA					NS	<1
	20		36						SP-SM	Brown fine to coarse sand with silt and gravel (moist) (Advance Outwash)		
180						UG-MW26-23-24 CA						
						UG-MW26-24-25 CA			SP	Brown fine to medium sand with occasional silt (moist to wet) (Advance Outwash)		
	25											



Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well UG-MW26 (continued)

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-16
Sheet 2 of 2

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	6/26/2013	6/27/2013	55.6	AMW / TSD	Cascade Drilling	Rotosonic

Hammer Data	N/A	Drilling Equipment	Terrasonic 150 CC Truck Rig
Surface Elevation (ft)	149.28	Top of Casing Elevation (ft)	148.68
Vertical Datum	NGVD29		
Easting (X)	1158496.12746	Horizontal Datum	WA State Plane,South Harn
Northing (Y)	703212.719634		

DOE Well I.D.: BIJ 674
A 2 (in) well was installed on 6/27/2013 to a depth of 55.6 (ft).

Groundwater

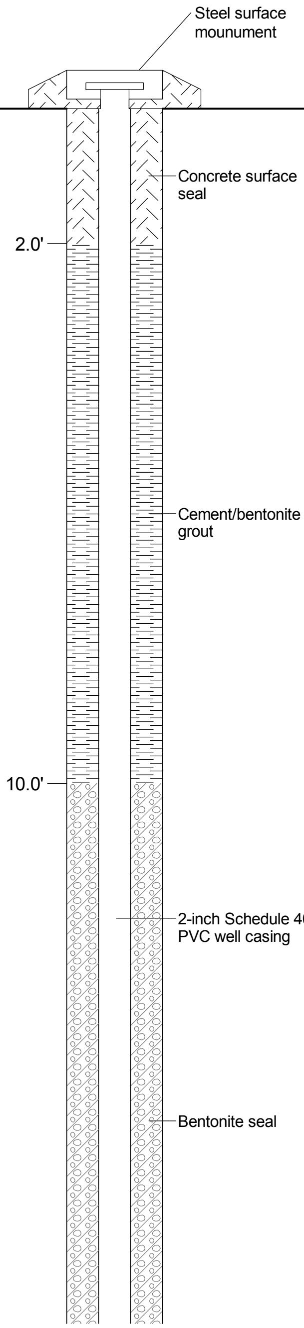
Date Measured	Depth to Water (ft)	Elevation (ft)
11/8/2013	23.16	125.52

Notes: Elevation based on survey completed by AHBL on 11/6/13

FIELD DATA

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Collected Sample / Sample Name	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0	60			AC	Asphalt		
					SP-SM	Mottled orange and brown fine to coarse sand with silt and gravel, trace organics (roots) (moist) (Fill)		
			27.5				NS	<1
					SM	Light brown silty fine to medium sand with occasional gravel and cobbles (moist) (Ice-Contact Deposits)	NS	
			52.7					
							NS	<1
			54.5					
145						Becomes silty fine to coarse sand with gravel (moist)		
							NS	<1
	5	60	44.1					
			35.7					<1
							NS	
			34.0					
							NS	
			33.4					
140							NS	<1
			43.4					
	10	120			GP-GM	Brown fine to coarse gravel with silt and sand (moist) (Ice-Contact Deposits)		
			38.3					
					GM	Brown silty fine to coarse gravel with sand and occasional cobble (moist) (Ice-Contact Deposits)	NS	<1
			41.7					
							NS	
			43.3					
135							NS	<1
	15		38.9					
				UG-MW27-16-17 CA		Becomes moist to wet		
			34.4			6 inch cobbles	NS	

WELL LOG



Notes: See Figure A-1 for explanation of symbols

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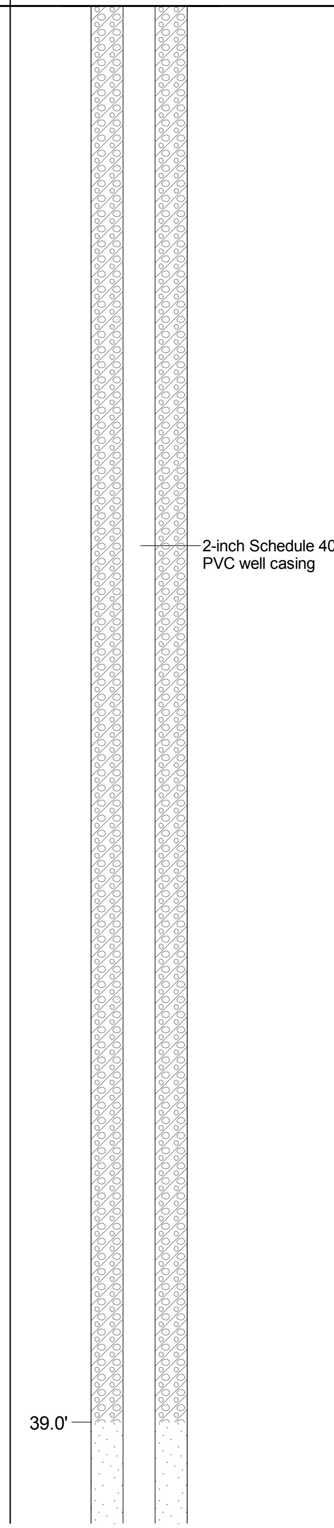
Log of Monitoring Well UG-MW27

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

WELL LOG

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
				32.9						Becomes dark gray to brown	NS	<1
130				35.1								
	20		60	38.3					SM	Brown and gray mottled silty fine to coarse sand with gravel (moist) (Ice-Contact Deposits)	NS	
				31.4							NS	<1
										Becomes gray	NS	
				30.7			▼					
											NS	
125												
	25		60	26.4	↕	UG-MW27-25-26 CA				Brown silty fine to coarse sand with gravel (wet)	NS	
				24.9					ML	Gray fine sandy silt, poorly laminated (moist) (cemented) (Silt)		
											NS	<1
				30.2								
				21.5							NS	
120												
	30		120	23.2	↕	UG-MW27-30-31 CA					NS	
				23.4							NS	<1
				26.8							NS	
115									SM	Gray silty fine sand (moist) (Advance Outwash)		
	35			23.8						½ cm pieces of carbonized wood observed throughout soil unit	NS	
											NS	<1
				22.4								
											NS	
110												
				22.8							NS	<1
	40		120	21.3	↕	UG-MW27-40-42						



Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well UG-MW27 (continued)

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Sample Name	Material Description	Sheen	Headspace Vapor (ppm)
						NS	
			21.4				<1
						NS	
105						NS	
			21.0				
	45			UG-MW27-45-47	Very consistent with above		
						NS	
						NS	
						NS	
100						NS	<1
	50	67.2	19.2			NS	
			20.7				
						NS	
			19.5				<1
				UG-MW27-53-55		NS	
95				UG-MW27-54-55 CA			<1
						NS	
	55						

The boring was drilled with 8-inch conductor casing to 27 feet bgs. Three feet of bentonite chips were placed and hydrated for an hour.
The boring was then drilled to 55 feet bgs with 6-inch casing telescoped through the 8-inch casing.

WELL LOG

- 40.6'
- 10/20 silica sand
- 2-inch Schedule 40 PVC screen, 0.010-inch slot width
- 55.6'
- 55.6'

Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well UG-MW27 (continued)

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled	Start 6/24/2013	End 6/25/2013	Total Depth (ft) 46.5	Logged By BEL/AMW Checked By CAJ	Driller Holt Drilling	Drilling Method Sonic

Hammer Data	NA	Drilling Equipment	Terrasonic 150 CC Track Rig
Surface Elevation (ft) / Vertical Datum	151.80 / NGVD29	Top of Casing Elevation (ft)	151.14
Easting (X) / Northing (Y)	1158471.71998 / 703398.786784	Horizontal Datum	WA State Plane,South Harn

DOE Well I.D.: BIJ 671
A 2 (in) well was installed on 6/26/2013 to a depth of 24.3 (ft).

Groundwater

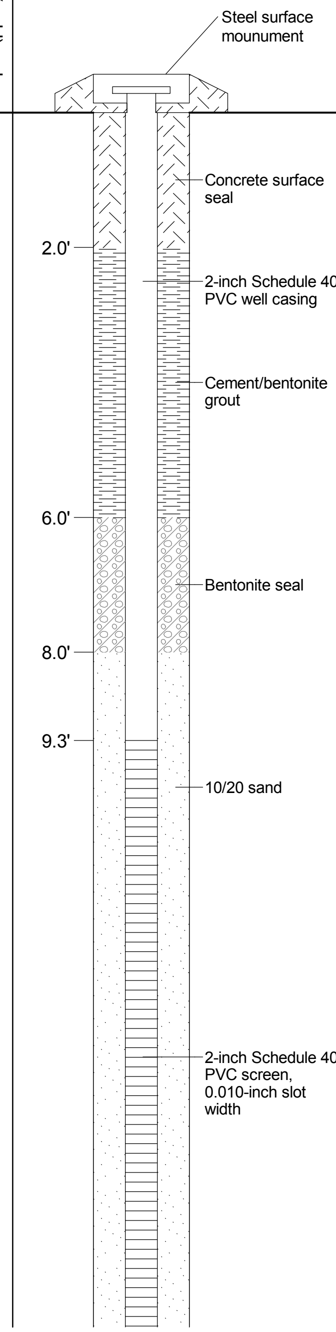
Date Measured	Depth to Water (ft)	Elevation (ft)
11/8/2013	18.62	132.52

Notes: Elevation based on survey completed by AHBL on 11/6/13

FIELD DATA

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0	60		AC	2 inches asphalt		
			27	GM	Brown silty fine to coarse gravel with sand, occasional brick (medium dense, moist) (fill)	NS	
150			32	ML	Orange brown silt with sand, occasional gravel (medium dense, moist) (fill)		
				SM	Gray/brown silty fine to coarse sand with gravel (very dense, moist) (Ice-Contact Deposits)		
			35			NS	3.9
	5	60					
145			29			NS	
			28		Grades to occasional cobbles	NS	<1
	10	60					
140			30			NS	
			28				
				GP-GM	Brown/gray fine to coarse gravel with silt and sand, occasional cobbles (very dense, moist) (Ice-Contact Deposits)	NS	
						NS	
	15	60		GM	Gray silty fine to coarse gravel with sand, occasional cobbles (very dense, moist) (Ice-Contact Deposits)		
135			61			NS	
			58			NS	

WELL LOG



Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well UG-MW28

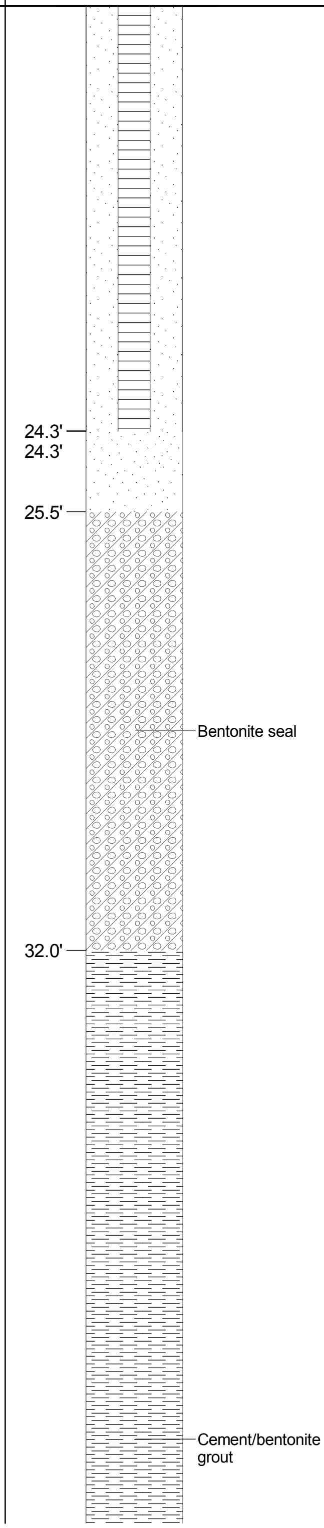
GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-18
Sheet 1 of 3

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
				53							NS	1.5
							▼					
	20		60							Grades to dense		
				42							NS	1.3
130									SM	Gray silty fine to coarse sand with gravel (dense, wet) (Ice-Contact Deposits)		
				27		UG-MW28-23-24 CA					NS	1.7
									ML	Brown/gray silt, occasional sand (hard, moist) (Silt)		
	25		60									
											NS	
125						UG-MW28-27-28 CA					NS	
									SP-SM	Gray fine to medium sand with silt (dense, moist) (Transition Zone)		
				27							NS	2.1
	30		60						ML	Gray sandy silt (hard, moist) (Transition Zone)		
				19							NS	2.0
120				18								
										Grades to with sand	NS	
				18								
									SM	Gray silty fine to medium sand (dense, wet) (Advance Outwash)		
	35		60									
115				18							NS	1.8
				19							NS	
						UG-MW28-39-40 CA					NS	
	40		60									

WELL LOG



Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well UG-MW28 (continued)

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
				15							NS	
110												
				15							NS	1.8
				16								
				17							NS	
	45		18									

WELL LOG

46.5'

The boring was drilled with 8-inch conductor casing to 26 feet bgs. Two feet of bentonite was placed and hydrated from 24 to 26 feet bgs.

The boring was then drilled to 46.5 feet bgs with 6-inch casing telescoped through the 8-inch casing.

Notes: See Figure A-1 for explanation of symbols

Tacoma: Date:12/18/14 Path:C:\USERS\KJANC\DESKTOP\018308500.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Log of Monitoring Well UG-MW28 (continued)

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-18
Sheet 3 of 3

Drilled	Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
	6/26/2013	6/26/2013	21	AMW	TSD	Holt Drilling	Sonic

Hammer Data	NA	Drilling Equipment	Terrasonic 150 CC Truck Rig
Surface Elevation (ft) / Vertical Datum	149.40 / NGVD29	Top of Casing Elevation (ft)	149.04
Easting (X) / Northing (Y)	1158440.5819 / 703647.855336	Horizontal Datum	WA State Plane,South Harn

DOE Well I.D.: BIJ 673
A 2 (in) well was installed on 6/26/2013 to a depth of 19.4 (ft).

Groundwater

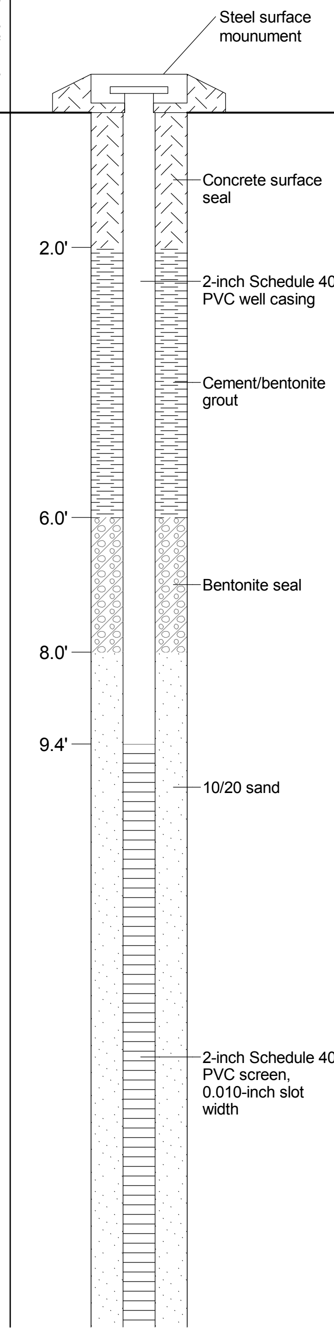
Date Measured	Depth to Water (ft)	Elevation (ft)
11/8/2013	11.11	137.93

Notes: Elevation based on survey completed by AHBL on 11/6/13

FIELD DATA

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name	Water Level	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0	60					AC	Asphalt		
			24				SP	Light brown fine to medium sand with gravel, trace silt (moist) (Fill)		
									NS	
			28							<1
							SM	Light brown silty fine to coarse sand with gravel (moist) (Ice-Contact Deposits)	NS	
			29							
145									NS	<1
	5	60	30							
									NS	
			36				SP	Light brown fine to coarse sand with gravel, trace silt (wet) (Ice-Contact Deposits)		<1
							SM	Gray silty fine to medium sand with occasional gravel (moist) (Ice-Contact Deposits)		
			32						NS	
			34						NS	<1
140			42				GM	Brown silty fine to coarse gravel with sand (moist) (Ice-Contact Deposits)		
									NS	
	10	60	72				GP	Brown fine to coarse gravel with sand, trace silt, occasional cobbles (moist) (Ice-Contact Deposits)	NS	
			32							<1
						▼			NS	
							GM	Gray to brown silty fine to coarse gravel with sand and occasional cobbles (moist) (Ice-Contact Deposits)		
			39							
									NS	
			47							
135									NS	<1
	15	72	57						NS	
			50							4.7
							SM	Light brown silty fine to coarse sand with gravel and occasional cobbles (wet) (Ice-Contact Deposits)	NS	
			53							

WELL LOG



Notes: See Figure A-1 for explanation of symbols

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Log of Monitoring Well UG-MW29S

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-19
Sheet 1 of 2

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	WELL LOG
											NS	<1	
130				55					ML	Light brown with orange mottling fine sandy silt, moderately laminated (moist) (Silt)	NS		19.4'
	20									Becomes gray	NS	<1	
				68									21.0'

Notes: See Figure A-1 for explanation of symbols

Tacoma: Date:12/18/14 Path:C:\USERS\KJANC\DESKTOP\018308500.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Log of Monitoring Well UG-MW29S (continued)

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-19
Sheet 2 of 2

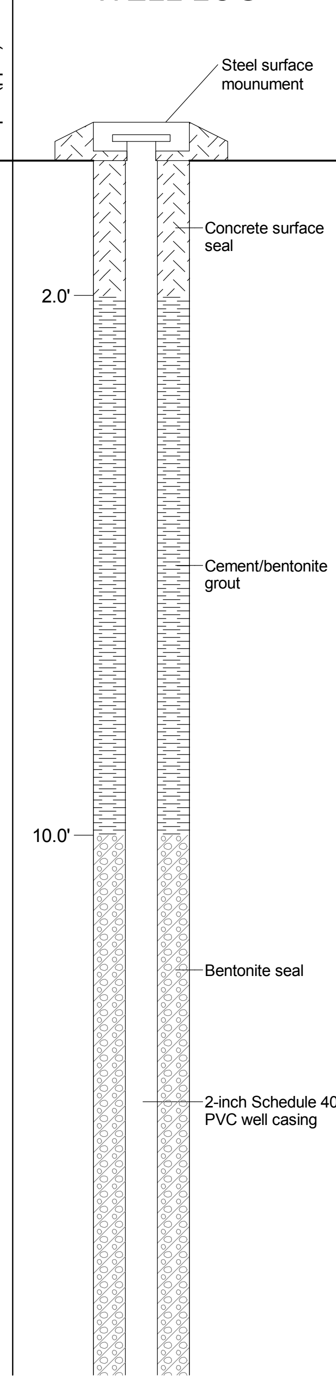
Drilled	Start 6/26/2013	End 6/26/2013	Total Depth (ft) 46.5	Logged By BEL/AMW Checked By CAJ	Driller Holt Drilling	Drilling Method Sonic

Hammer Data	NA	Drilling Equipment	Terrasonic 150 CC Track Rig	DOE Well I.D.: BIJ 672 A 2 (in) well was installed on 6/26/2013 to a depth of 37.9 (ft).
Surface Elevation (ft) Vertical Datum	149.61 NGVD29	Top of Casing Elevation (ft)	149.26	Groundwater
Easting (X) Northing (Y)	1158441.78684 703640.73133	Horizontal Datum	WA State Plane,South Harn	Date Measured 11/8/2013; Depth to Water (ft) 19.81; Elevation (ft) 129.45

Notes: Elevation based on survey completed by AHBL on 11/6/13

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Collected Sample / Sample Name	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0	60			AC	4 inches asphalt		
					SP-SM	Brown fine to coarse sand with silt and gravel (medium dense, moist) (Fill)		
					SM	Brown/gray silty fine to coarse sand with gravel (very dense, moist) (Ice-Contact Deposits)		
			37				NS	
145			32				NS	6.1
	5	60						
							NS	4.4
				UG-MW29D-7-7.5 CA	SP-SM	Brown/gray fine to coarse sand with silt and gravel (very dense, wet) (Ice-Contact Deposits)	NS	
			23		SM	Brown/gray silty fine to coarse sand with gravel (very dense, moist) (Ice-Contact Deposits)	NS	
140			37	UG-MW29D-9-9.5 CA			NS	4.8
							NS	
	10	60			GM	Brown/gray silty fine to coarse gravel with sand (very dense, moist) (Ice-Contact Deposits)		7.7
			30				NS	
			40					
			41					
135								8.3
							NS	
	15	60						
							NS	
			34					
				UG-MW29D-17-18 CA	SM	Brown silty fine to coarse sand with gravel (very dense, wet) (Ice-Contact Deposits)		

WELL LOG



Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well UG-MW29D

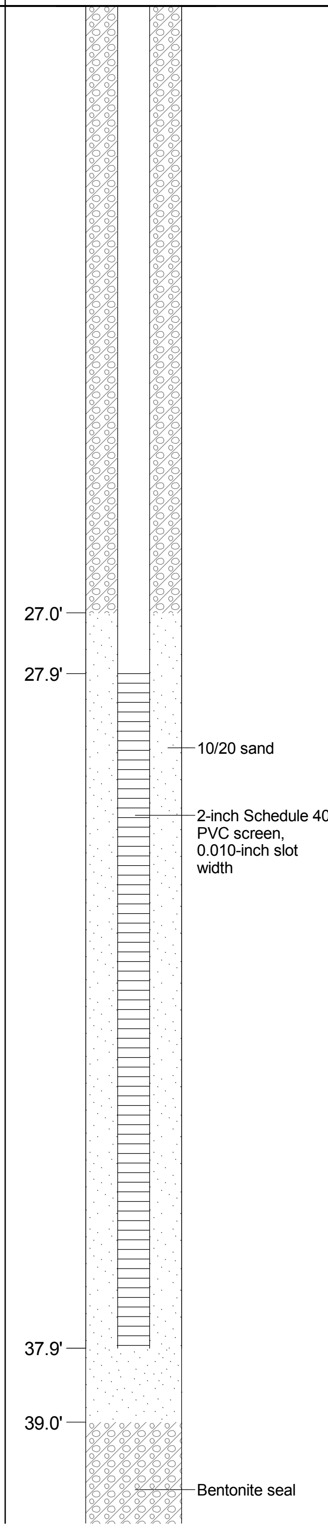
GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-20
Sheet 1 of 3

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Sample Name	Water Level	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
			30			GM	Gray silty fine to coarse gravel with sand, occasional cobble (very dense, wet) (Ice-Contact Deposits)		
130			29					NS	
	20	12		UG-MW29D-20-20.5 CA	▼	SM	Brown silty fine sand (medium dense, wet) (Ice-Contact Deposits)		
		12	28					NS	<1
		96	21	UG-MW29D-22-23 CA		ML	Gray silt, occasional sand (very stiff, moist) (Silt)	NS	
125			23			SM	Dark gray silty fine to medium sand, trace organics (organic matter) (medium dense, moist) (Transition Zone)		
	25					SP	Brown fine to medium sand with trace silt (medium dense, moist) (Transition Zone)		
			22						
						ML	Gray silt, occasional sand (very stiff, moist) (Transition Zone)	NS	
			23			SP-SM	Gray fine to medium sand with silt (dense, moist) (Advance Outwash)		<1
120	30	60							
			29					NS	
							Grades to wet		<1
115				UG-MW29D-34.5-35 CA				NS	
	35	60					Grades to medium dense	NS	
			18						
			20	UG-MW29D-37.5-38 CA				NS	
						ML	Gray silt, occasional sand (very stiff, moist)		
			19					NS	
110	40	60				SP-SM	Gray fine to medium sand with silt (medium dense, moist)		

WELL LOG



Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well UG-MW29D (continued)

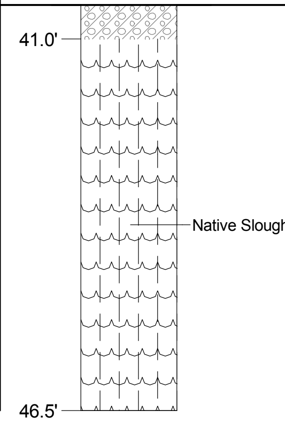
GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
											NS	
				20							NS	<1
105									ML/SM	Interbedded gray silt, occasional sand and gray silty fine sand (hard, moist)	NS	
	45		18									

The boring was drilled with 8-inch conductor casing to 22 feet bgs. Two feet of bentonite chips was placed and hydrated from 20 to 22 feet bgs and hydrated for an hour.
The boring was then drilled to 46.5 feet bgs with 6-inch casing telescoped through the 8-inch casing.

WELL LOG



Notes: See Figure A-1 for explanation of symbols

Tacoma: Date:12/18/14 Path:C:\USERS\KJANCI\DESKTOP\018308500.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Log of Monitoring Well UG-MW29D (continued)

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-20
Sheet 3 of 3

Drilled	Start 7/2/2013	End 7/2/2013	Total Depth (ft) 20	Logged By TSD / Checked By TSD	Driller Cascade Drilling	Drilling Method Rotosonic

Hammer Data	N/A	Drilling Equipment	Terrasonic 150 CC Truck Rig
Surface Elevation (ft) / Vertical Datum	123.10 / NGVD29	Top of Casing Elevation (ft)	122.70
Easting (X) / Northing (Y)	1158631.50939 / 702936.763278	Horizontal Datum	WA State Plane,South Harn

A 2 (in) well was installed on 7/2/2013 to a depth of 19 (ft).

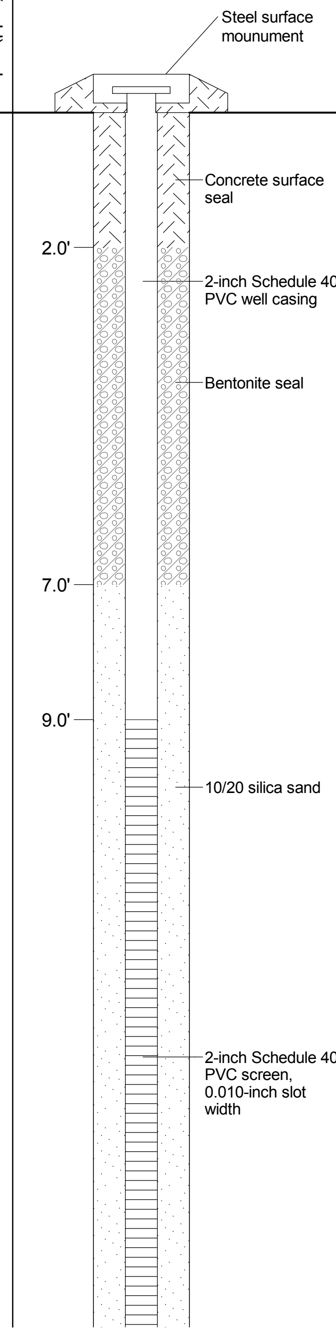
Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
11/8/2013	4.44	118.26

Notes: Elevation based on survey completed by AHBL on 11/6/13

FIELD DATA

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Collected Sample / Sample Name	Water Level	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0	60				AC	Asphalt		
			32.1			SP	Brown fine to coarse sand with gravel, trace silt (moist) (Fill)		
						GM	Brown silty fine to coarse gravel with fine to coarse sand and cobbles (moist) (Ice-Contact Deposits)		2.1
			36.6						
120									
			37.7						
					▼		Becomes gray to brown		<1
	5	60	41.2						
			44.1						<1
115			38.2						
							Becomes brown with increased sand content		
			25.6	UG-MW30S-9-10 CA		SP-SM	Brown fine to coarse sand with silt and gravel (wet) (Ice-Contact Deposits)		
	10	60							<1
						SP-SM	Brown fine to coarse sand with silt and gravel, with occasional cobbles (wet) (Ice-Contact Deposits)		
			25.1	UG-MW30S-11-12 CA					
						SM	Brown silty fine to coarse sand with gravel (wet) (Ice-Contact Deposits)		<1
110			28.2						
				UG-MW30S-13-14 CA		GM	Gray to brown silty fine to coarse gravel with fine to coarse sand (moist) (Ice-Contact Deposits)		<1
			21.3						
	15	60							<1
			32.2						
						SP	Brown medium to coarse sand with fine to coarse gravel, trace silt to fine sand, cobble at 16 feet (wet) (Ice-Contact Deposits)		
			76.1						
				UG-MW30S-17.5-18.5					

WELL LOG



Notes: See Figure A-1 for explanation of symbols

Tacoma: Date:12/18/14 Path:C:\USERS\KJANC\DESKTOP\018308500.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Log of Monitoring Well UG-MW30S

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	WELL LOG
105				25.1		CA						<1	
									SM	Brown to gray silty fine sand withoccasional fine gravel (moist) (Ice-Contact Deposits)			19.0'
	20			32.1		UG-MW30S-19-20 CA						<1	20.0'

Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well UG-MW30S (continued)

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled	Start: 7/1/2013	End: 7/1/2013	Total Depth (ft): 55	Logged By: AMW / Checked By: TSD	Driller: Cascade Drilling; Drilling Method: Rotosonic
Hammer Data	N/A	Drilling Equipment	Terrasonic 150 CC Truck Rig	DOE Well I.D.: BIJ 676. A 2 (in) well was installed on 7/2/2013 to a depth of 47.8 (ft).	
Surface Elevation (ft) / Vertical Datum	123.24 / NGVD29	Top of Casing Elevation (ft)	122.94		
Easting (X) / Northing (Y)	1158626.65631 / 702935.869182	Horizontal Datum	WA State Plane,South Harn		

Groundwater

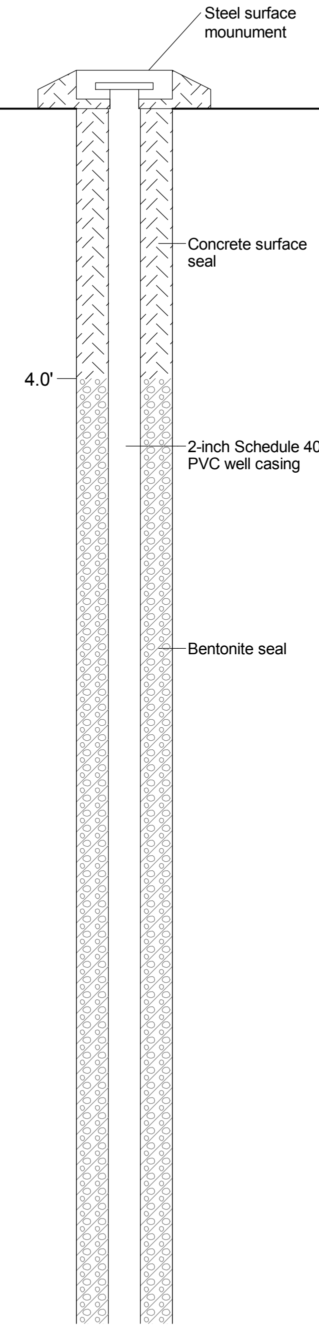
Date Measured	Depth to Water (ft)	Elevation (ft)
11/8/2013	5.81	117.13

Notes: Elevation based on survey completed by AHBL on 11/6/13

FIELD DATA

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name	Water Level	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0	48					AC	Asphalt		
			33.0				SP-SM	Light brown fine to coarse sand with gravel and silt (moist) (Fill)		
							GM	Gray to brown silty fine to coarse gravel with sand (moist) (Ice-Contact Deposits)	NS	<1
			31.7							
			37.5						NS	
120										
		24	30.1						NS	1.2
			33.4							
	5							Becomes gray	NS	
						▼				
		48							NS	
			36.1							
									NS	2.1
115			24.2						NS	
			22.1					Becomes brown	NS	3.1
	10	60	23.7	↕	UG-MW30D-10-11.5 CA		SP-SM	Brown fine to coarse sand with gravel and silt (moist) (Ice-Contact Deposits)	NS	
			27.6						NS	2.3
							SM	Brown silty fine to coarse sand with gravel (moist) (Ice-Contact Deposits)		
			38.0							
									NS	
110							GM	Gray silty fine to coarse gravel with sand (moist) (Ice-Contact Deposits)		
			42.2							
									NS	4.8
	15	48	33.9						NS	
			19.3							
									NS	
										5.3
			26.9							

WELL LOG



Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well UG-MW30D

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Collected Sample / Sample Name	Group Classification	Material Description	Sheen	Headspace Vapor (ppm)
105							NS	
			22.4					
							NS	5.9
	20	60	36.6			Gray to brown silty fine to coarse gravel with sand (moist)	NS	
			40.3					
							NS	
			43.1					5.3
							NS	
100								
			42.3					
							NS	
	25	60	40.5			Becomes more brown than gray		
							NS	
			29.4					5.5
						Cobbles	NS	
			30.0					
95								
			34.6				NS	
				UG-MW30D-29-30 CA				3.9
	30	60	32.4		ML	Gray fine sandy silt (moist) (Silt)	NS	
			34.8					
							NS	
								2.1
90							NS	
			32.9					
							NS	
	35	60	34.2	UG-MW29D 35-36 CA				
			32.0				NS	
								2.2
							NS	
85					SM	Gray fine silty sand (wet) (Advance Outwash)		
			31.7					
							NS	
	40	120	31.2		SP-SM	Gray fine sand with silt, micaceous (wet)		1.7

WELL LOG

37.0'

37.8'

2-inch Schedule 40 PVC screen, 0.010-inch slot width

Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well UG-MW30D (continued)

GEOENGINEERS

Project: UWT 2013 Environmental Investigation

Project Location: Tacoma, Washington

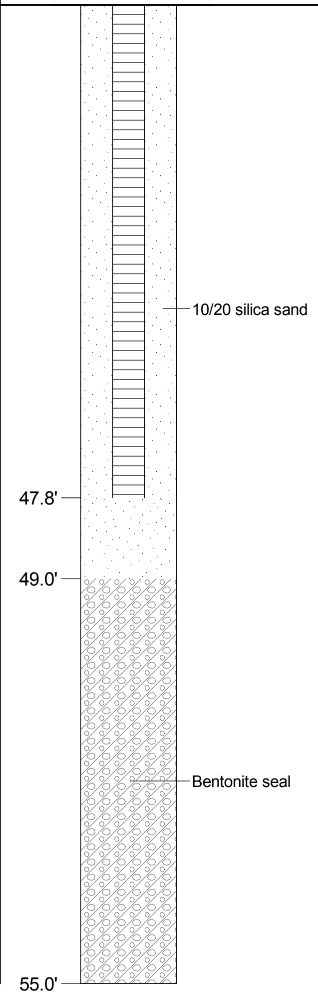
Project Number: 0183-085-00

Figure D-22

Sheet 2 of 3

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Sample Name	Group Classification	Material Description	Sheen	Headspace Vapor (ppm)
						(Advance Outwash)	NS	<1
			27.9	UG-MW29D 42.5-45			NS	
80			27.4					
			21.2				NS	<1
	45		29.3				NS	
			29.4	UG-MW29D 47-48 CA			NS	
75			40.7		ML	Gray fine sandy silt, laminated, micaceous (moist) (Advance Outwash/Lawton Clay?)	NS	<1
	50	60	32.3				NS	
			29.0				NS	
			28.6	UG-MW29D 52-53 CA				<1
70			22.7				NS	
							NS	
	55		22.9				NS	

WELL LOG



The boring was drilled with 8-inch conductor casing to 32 feet bgs. The casing was withdrawn to 31 feet bgs and 5 feet of bentonite chips were placed and hydrated for an hour.
The boring was then drilled to 55 feet bgs with 6-inch casing telescoped through the 8-inch casing.

Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well UG-MW30D (continued)

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-22
Sheet 3 of 3

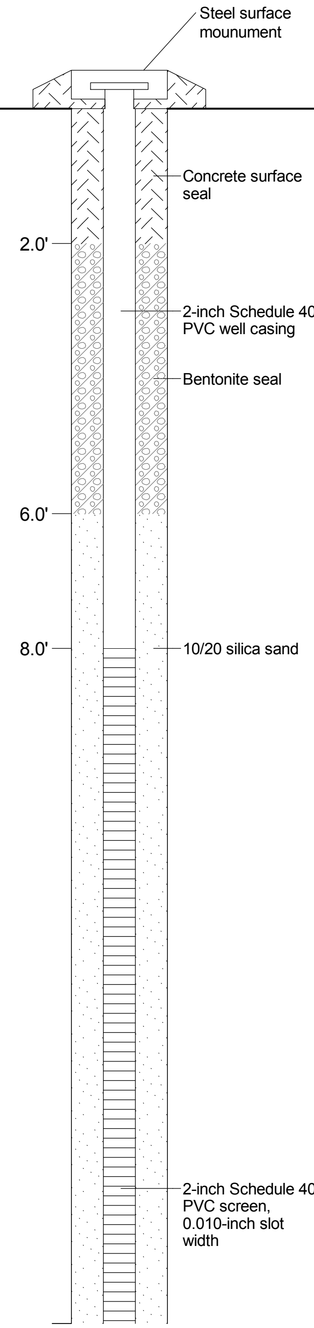
Drilled — Start: 8/26/2013; End: 8/26/2013	Total Depth (ft): 35	Logged By: JCD; Checked By: TSD	Driller: Holt Drilling; Drilling Method: Rotosonic
Hammer Data: N/A	Drilling Equipment: Geoprobe 8140 LC	A 2 (in) well was installed on 8/26/2013 to a depth of 18 (ft).	
Surface Elevation (ft): 143.35; Vertical Datum: NGVD29	Top of Casing Elevation (ft): 142.92	Groundwater — Date Measured: 11/8/2013; Depth to Water (ft): 5.20; Elevation (ft): 137.72	
Easting (X): 1158535.90019; Northing (Y): 703090.123632	Horizontal Datum: WA State Plane,South Harn		

Notes: Elevation based on survey completed by AHBL on 11/6/13

FIELD DATA

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Sample Name	Water Level	Group Classification	MATERIAL DESCRIPTION
	0	30	22.3			SM-ML	Brown to gray silty fine sand to fine sandy silt with medium sand to gravel (moist) (Fill)
				UG-MW31-0.5-1 CA			
		30	58.4				
140							
			42.5	UG-MW31-4-5 CA		SM	Brown to gray silty fine sand with medium to coarse sand and fine gravel (moist) (Fill)
	5	24			▼	SM	Brown to gray silty fine sand with medium to coarse sand and gravel (moist) (cemented) (Ice-Contact Deposits)
			35.3	UG-MW31-6-7 CA			
		36					
135							
			38.3			GM	Brown silty fine to coarse gravel with fine to coarse sand (moist) (cemented) (Ice-Contact Deposits)
	10	60					
				UG-MW31-11-12 CA			Grades to with cobbles from 11.5 to 13 feet
			38.7				
130			54.2			SM	Brown to gray silty fine to medium sand with coarse sand to gravel (moist) (Ice-Contact Deposits)
	15	60	38.2	UG-MW31-15-16 CA		SM-ML	Brown to gray silty fine sand to fine sandy silty with medium to coarse sand and gravel with cobbles (moist) (cemented) (Ice-Contact Deposits)
				UG-MW31-16.5-17 CA			
			38.5				
						SM-ML	Brown to gray silty fine sand to fine sandy silt with medium to coarse sand and gravel

WELL LOG



Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well UG-MW31

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Sample Name	Group Classification	MATERIAL DESCRIPTION
125						(moist) (cemented) (Ice-Contact Deposits)
					GP-GM	Brown to gray gravel with silt and fine to coarse sand (moist) (cemented) (Ice-Contact Deposits)
	20	60		UG-MW31-20-21 CA	GP-GM	Brown to gray fine gravel with silt and sand (moist to wet) (cemented) (Silt)
					GP	Brown fine to coarse gravel with fine to coarse sand and occasional silt (wet) (Advance Outwash)
				UG-MW31-22-23 CA		Becomes moist to wet
120			20.5			
	25	60				
			26.5		GM	Brown/gray silty gravel with fine to coarse sand (moist) (Advance Outwash)
115						
			27.5		SP	Gray medium sand with trace silt (wet) (Advance Outwash)
				UG-MW31-29.5-30 CA		
	30	60			GP-GM	Brown fine gravel with silt and fine sand (wet) (Advance Outwash)
			28.3	UG-MW31-32-33 CA		
110						Grades to coarse gravel
			29.2			
	35					

WELL LOG

18.0'
19.0'
Bentonite backfill
35.0'

Notes: See Figure A-1 for explanation of symbols

Tacoma: Date:12/18/14 Path:C:\USERS\KJANCI\DESKTOP\018308500.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Log of Monitoring Well UG-MW31 (continued)

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-23
Sheet 2 of 2

Drilled	Start: 9/18/2013	End: 9/18/2013	Total Depth (ft): 15	Logged By: JCD Checked By: TSD	Driller: Holt Drilling	Drilling Method: Rotosonic
Hammer Data	N/A	Drilling Equipment	Geoprobe 8140 LC		
Surface Elevation (ft) Vertical Datum	160.38 NGVD29	Top of Casing Elevation (ft)	159.88		
Easting (X) Northing (Y)	1158356.11249 703300.284096	Horizontal Datum	WA State Plane,South Harn		

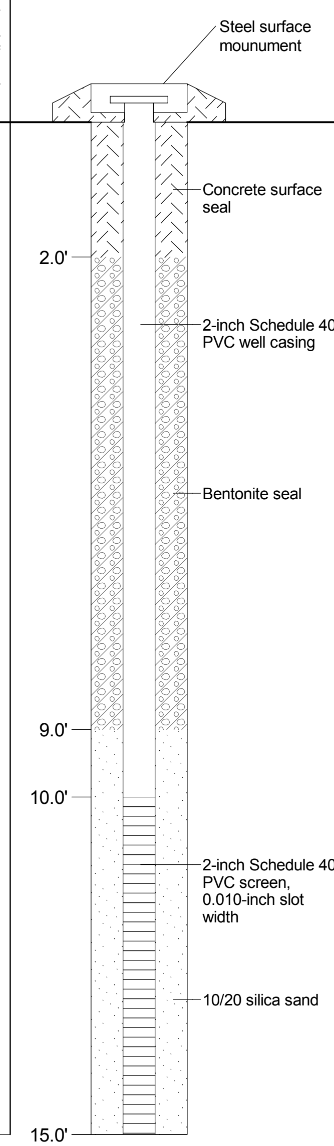
A 2 (in) well was installed on 9/12/2013 to a depth of 15 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
11/8/2013	6.91	152.97

Notes: Elevation based on survey completed by AHBL on 11/6/13

FIELD DATA / WELL LOG

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Sample Name	Water Level	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
160	0	30	28	UG-MW32-1-2 CA		SP-SM	Brown to gray fine sand with medium to coarse sand and silt and occasional gravel (moist) (Ice-Contact Deposits)		
		48	47	UG-MW32-3.5-4.5 CA		SM	Brown to gray silty fine to medium sand with medium to coarse gravel (moist) (cemented) (Ice-Contact Deposits)		
155	5		35						
						GM	Brown to gray silty gravel with fine to coarse sand (moist) (cemented) (Ice-Contact Deposits)		
		30	45	UG-MW32-7-8 CA	▼	SP-SM	Brown to gray fine to coarse sand with silt and gravel (moist) (Ice-Contact Deposits)		
				UG-MW32-8-9 CA		SP	Brown to gray fine to medium sand with occasional coarse sand to gravel (wet) (Ice-Contact Deposits)		
150	10	60		UG-MW32-12-13 CA		SM	Brown silty fine to coarse sand with gravel (wet) (Ice-Contact Deposits)		
				UG-MW32-14-15 CA		SP-SM	Gray fine to coarse sand with silt and gravel (moist) (cemented) (Silt)		
	15								



Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well UG-MW32

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-24
Sheet 1 of 1

Drilled	Start 9/18/2013	End 9/18/2013	Total Depth (ft) 15	Logged By PSD / Checked By TSD	Driller Holt Drilling	Drilling Method Rotosonic

Hammer Data	N/A	Drilling Equipment	Geoprobe 8140 LC
Surface Elevation (ft) / Vertical Datum	183.91 / NGVD29	Top of Casing Elevation (ft)	183.57
Easting (X) / Northing (Y)	1158146.62862 / 703453.409272	Horizontal Datum	WA State Plane,South Harn

A 2 (in) well was installed on 9/18/2013 to a depth of 11.5 (ft).

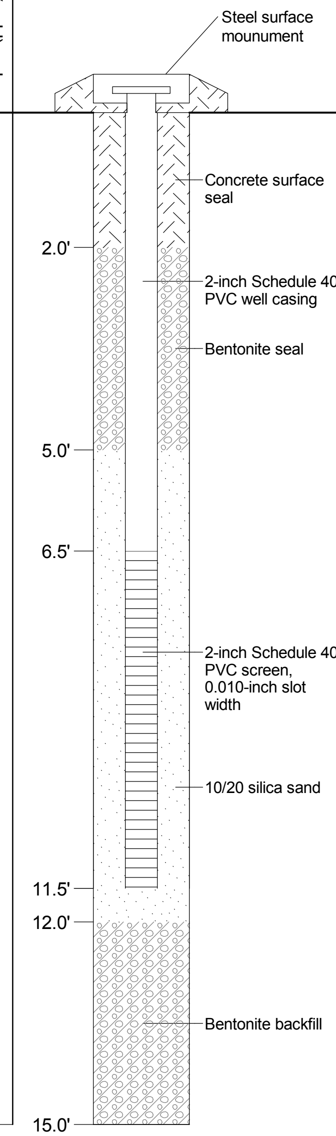
Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
11/8/2013	6.61	176.96

Notes: Elevation based on survey completed by AHBL on 11/6/13

FIELD DATA

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Sample Name / Testing	Water Level	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0	60		UG-MW33-0-1 CA		SM	Dark brown silty sand with gravel (moist) (Topsoil) (Fill)		
						SM	Red brown silty sand with gravel (moist) (Fill)	NS	<1
						SP-SM	Light brown fine to coarse sand with silt and gravel (moist) (Glacial Drift)		
			25.2	UG-MW33-2-3 CA				NS	<1
180									
	5	60	31.3						
				UG-MW33-6-7 CA	▼			NS	<1
			25.1				Becomes wet		
				UG-MW33-8-9 CA				NS	<1
175									
	10	60	23.2			SM	Brown sandy silt with occasional fine gravel (moist) (cemented) (Silt)		
				UG-MW33-11-12 CA				NS	<1
				UG-MW33-12-12.5 CA		SP	Gray fine to coarse sand with gravel and occasional silt (moist) (Advance Outwash)	NS	<1
				UG-MW33-13-12.5 CA					
170				UG-MW33-13-14 CA					
	15			UG-MW33-14-15 CA					

WELL LOG



Notes: See Figure A-1 for explanation of symbols

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Log of Monitoring Well UG-MW33

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-25
Sheet 1 of 1

Drilled	Start 9/6/2013	End 9/6/2013	Total Depth (ft) 35	Logged By JCD / Checked By TSD	Driller Holt Drilling	Drilling Method Rotosonic

Hammer Data	N/A	Drilling Equipment	Geoprobe 8140 LC
Surface Elevation (ft) / Vertical Datum	142.23 / NGVD29	Top of Casing Elevation (ft)	142.03
Easting (X) / Northing (Y)	1158533.69605 / 703309.089169	Horizontal Datum	WA State Plane,South Harn

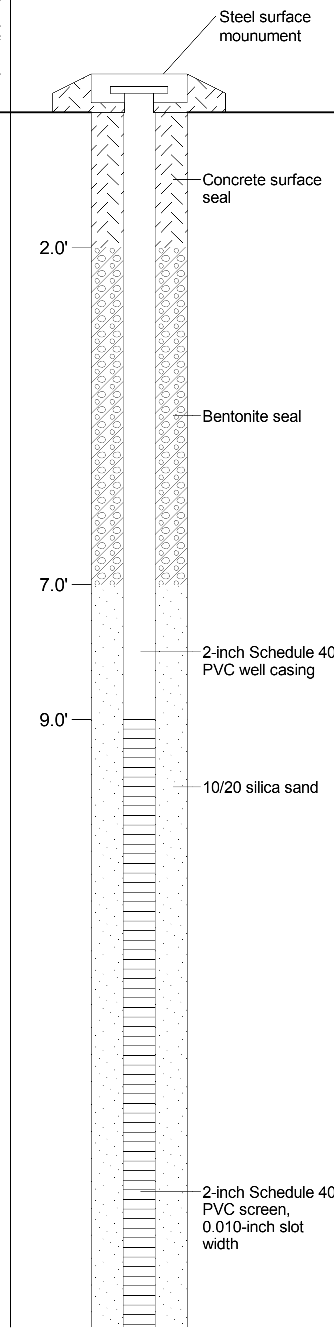
A 2 (in) well was installed on 9/6/2013 to a depth of 19 (ft).

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
11/8/2013	16.71	125.32

Notes: Elevation based on survey completed by AHBL on 11/6/13

FIELD DATA / WELL LOG

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Sample Name	Water Level	Group Classification	MATERIAL DESCRIPTION
	0	30	15			SP-SM	Dark brown fine sand with silt and gravel (moist) (Topsoil)
140				UG-MW34-1-2 CA		SM	Brown to gray silty fine sand with occasional medium sand to fine gravel (dry) (Ice-Contact Deposits)
		30	21				
	5	60	35	UG-MW34-5-6 CA		SP-SM	Brown to gray fine to coarse sand with silt and gravel and cobbles (moist) (Ice-Contact Deposits)
135			37				
			48				
	10	60					Cobble at 10 feet Grades to with medium to coarse sand and gravel, becomes moist to wet
			32	UG-MW34-11-12 CA			
130							
			58				Grades to with occasional cobbles, becomes moist
				UG-MW34-14-15 CA			
	15	60	43	UG-MW34-15-16 CA		SM	Brown to gray silty fine sand with medium to coarse sand and fine gravel; occasional iron staining (moist) (Ice-Contact Deposits)
					▼		
125			42				



Notes: See Figure A-1 for explanation of symbols

Tacoma: Date:12/18/14 Path:C:\USERS\KJANC\DESKTOP\01830850O.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Log of Monitoring Well UG-MW34

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	WELL LOG
										Grades to silty fine sand			19.0'
				35									
	20		60	23		UG-MW34-20-21 CA			ML	Brown fine sandy silt (moist) (Silt)			20.0'
									SM	Brown silty fine sand (moist) (Tranisition Zone)			
120				24									Bentonite backfill
									ML	Brown fine sandy silt (moist) (Tranisiton Zone)			
				25		UG-MW34-24-25 CA			SM	Brown silty fine sand (moist) (Advance Outwash)			
	25		60	45									
										Becomes gray			
115													
				23									
	30		60			UG-MW34-30-31 CA							Bentonite backfill
				24									
110													
						UG-MW34-34-35 CA							
	35												35.0'

Notes: See Figure A-1 for explanation of symbols

Tacoma: Date:12/18/14 Path:C:\USERS\KJANC\DESKTOP\01830850\0.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Log of Monitoring Well UG-MW34 (continued)

GEOENGINEERS

Project:	UWT 2013 Environmental Investigation
Project Location:	Tacoma, Washington
Project Number:	0183-085-00

Drilled	Start 9/18/2013	End 9/18/2013	Total Depth (ft) 20	Logged By PSD / Checked By TSD	Driller Holt Drilling	Drilling Method Rotosonic

Hammer Data	N/A	Drilling Equipment	Geoprobe 8140 LC
Surface Elevation (ft) / Vertical Datum	181.91 / NGVD29	Top of Casing Elevation (ft)	181.60
Easting (X) / Northing (Y)	1158185.73234 / 703163.604943	Horizontal Datum	WA State Plane,South Harn

A 2 (in) well was installed on 9/18/2013 to a depth of 12.5 (ft).

Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)
11/8/2013	8.39	173.21

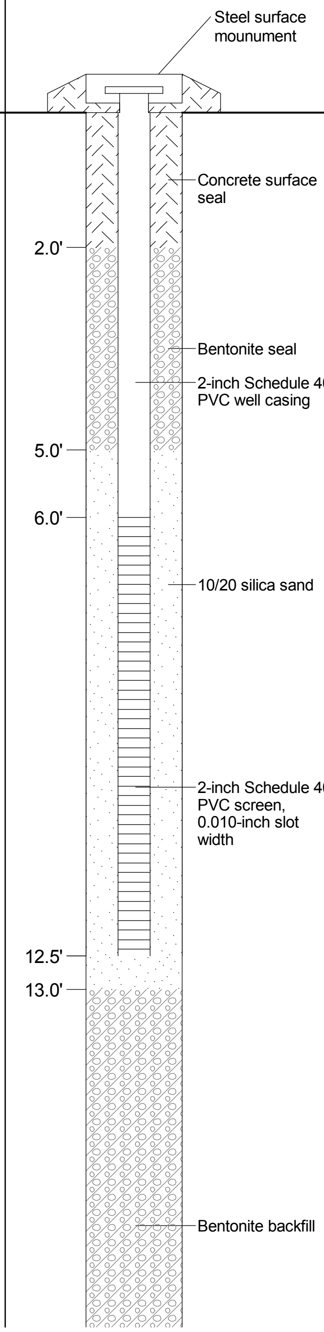
Notes: Elevation based on survey completed by AHBL on 11/6/13

FIELD DATA

Depth (feet)	Recovered (in)	Temperature (°C)	Sample Name / Testing	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
0	36	17.1	UG-MW35-0-2 CA	SM	Brown silty fine to coarse sand with coarse gravel (moist) (Topsoil)	NS	<1
				SM	Red to brown silty fine to coarse sand with fine gravel (moist) (Fill)		<1
	24	24.2				NS	<1
		21.2	UG-MW35-4-5 CA	SM	Red to brown silty fine to coarse sand with gravel (moist) (Fill)		
5							1.9
	48	25.6	UG-MW35-5.5-6 CA	SP-SM	Gray to brown fine to coarse sand with silt and gravel (moist) (cemented) (Ice-Contact Deposits)	NS	
		41	UG-MW35-7-8 CA			NS	1.1
10	60						
					Becomes wet with increased fine sand content		
		36.8	UG-MW35-11.5-12.5 CA			NS	3.5
		24.5	UG-MW35-13-13.5 CA; UG-MW35-13.5-14 CA	SM	Brown silty sand with occasional gravel (moist) (cemented) (Silt)		
				GP	Brown fine to coarse gravel with fine to coarse sand and occasional silt (moist to wet) (Advance Outwash)		
15	48	26.5	UG-MW35-15-16 CA				
			UG-MW35-16-17 CA	GP-GM	Red/brown gravel with silt and sand (moist to wet) (Advance Outwash)		
				GP	Gray fine to coarse gravel with sand and occasional silt (wet) (Advance Outwash)		

Elevation (feet): 180, 175, 170, 165

WELL LOG



Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well UG-MW35

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-27
Sheet 1 of 2

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	WELL LOG
				24		UG-MW35-18-19 CA					NS	<1	
						UG-MW35-19-19.5 CA			GM	Gray silty gravel with fine to coarse sand (moist) (Advance Outwash)			
	20			22		UG-MW35-19.5-20 CA			GP	Gray fine to coarse gravel with sand and occasional silt (wet) (Advance Outwash)	NS	<1	20.0'

Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well UG-MW35 (continued)

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-27
Sheet 2 of 2

Drilled	Start 9/18/2013	End 9/18/2013	Total Depth (ft)	14	Logged By PSD, Checked By TSD	Driller	Holt Drilling	Drilling Method	Rotosonic

Hammer Data	N/A	Drilling Equipment	Geoprobe 8140 LC
Surface Elevation (ft) / Vertical Datum	180.57 / NGVD29	Top of Casing Elevation (ft)	180.24
Easting (X) / Northing (Y)	1158175.50408 / 703308.784248	Horizontal Datum	WA State Plane,South Harn

A 2 (in) well was installed on 9/18/2013 to a depth of 11 (ft).

Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)
11/8/2013	8.22	172.02

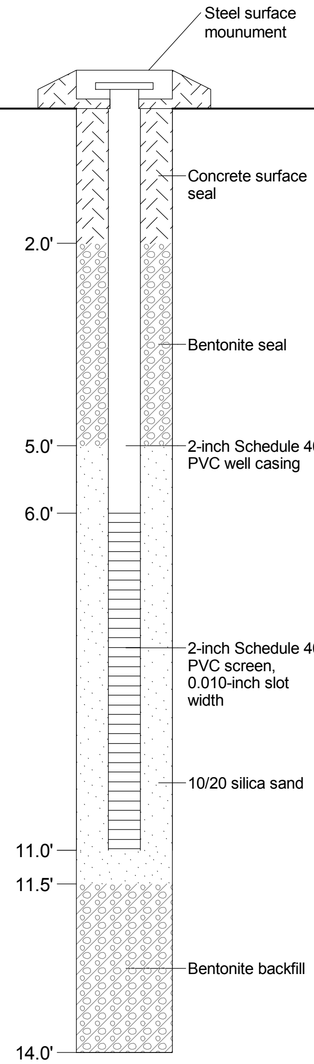
Notes: Elevation based on survey completed by AHBL on 11/6/13

FIELD DATA

Depth (feet)	Recovered (in)	Temperature (°C)	Sample Name / Testing	Group Classification	Material Description
0	60	18	UG-MW36-0-1 CA	SM	Dark brown silty fine to coarse sand with gravel (moist) (Topsoil)
			UG-MW36-1-3 CA	GP-GM	Brown gravel with silt and fine to coarse sand and debris (wire) (Fill)
			UG-MW36-4-5 CA	SP-SM	Brown fine to coarse sand with silt and fine to coarse gravel (moist to dry) (cemented) (Ice-Contact Deposits)
5	60	24.1	UG-MW36-6-7 CA		
		21.3	UG-MW36-8-9 CA		Increased moisture content
10	48		UG-MW36-10.5-11 CA		
			UG-MW36-11-11.5 CA	SM	Brown silty fine to coarse sand with occasional gravel (moist) (Silt)
			UG-MW36-12-12.5 CA	SP-SM	Brown fine to coarse sand with silt and gravel (dry) (Silt)
			UG-MW36-12.5-13 CA	SM	Brown silty fine to coarse sand (moist) (Transition Zone)
			UG-MW36-13-14 CA	SP	Dark gray fine to medium sand with coarse sand and fine to coarse gravel and occasional silt (wet) (Advance Outwash)

Elevation (feet): 180, 175, 170

WELL LOG



Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well UG-MW36

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled	Start 9/19/2013	End 9/19/2013	Total Depth (ft) 20	Logged By PSD, Checked By TSD	Driller Holt Drilling	Drilling Method Rotosonic

Hammer Data	N/A	Drilling Equipment	Geoprobe 8140 LC	A 2 (in) well was installed on 9/19/2013 to a depth of 14 (ft).
Surface Elevation (ft) / Vertical Datum	197.78 / NGVD29	Top of Casing Elevation (ft)	197.29	
Easting (X) / Northing (Y)	1158055.83846 / 703157.682314	Horizontal Datum	WA State Plane,South Harn	

Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)
11/8/2013	1.51	195.78

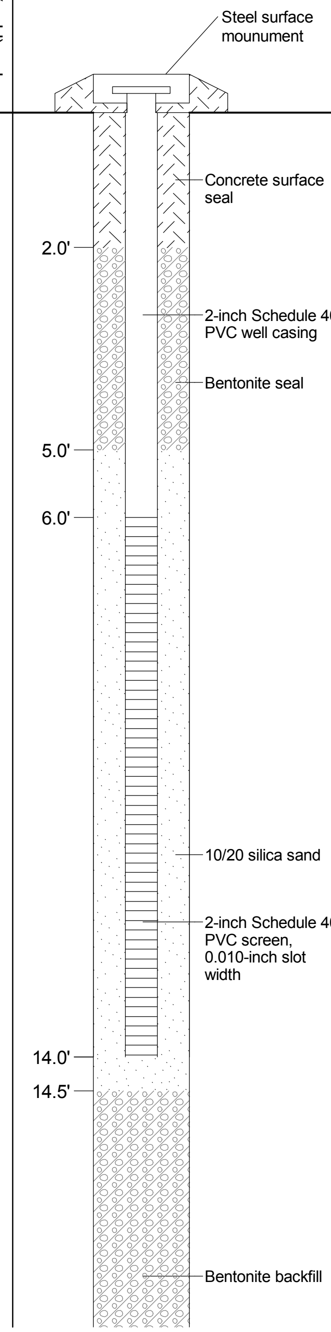
Notes: Elevation based on survey completed by AHBL on 11/6/13

FIELD DATA

Depth (feet)	Recovered (in)	Sample Name / Testing	Group Classification	Material Description
0	54	UG-MW37-0-1 CA	GP	Brown fine to coarse gravel with fine to coarse sand (moist)
		UG-MW37-1-2 CA	SP	Red to brown sand with silt and occasional gravel (moist to wet) (Weathered Drift/Fill)
		UG-MW37-3-4 CA	SP-SM	Brown fine to coarse sand with silt and fine to coarse gravel (moist) (cemented) (Ice-Contact Deposits)
5	42	UG-MW37-5.5-6.5 CA		
		UG-MW37-7-8 CA		Decreased gravel content
	24	UG-MW37-9-10 CA		
10	15			
	42	UG-MW37-11-12 CA		
		UG-MW37-13-14 CA		
		UG-MW37-14-15 CA	ML	Gray sandy silt with occasional gravel (moist) (Silt)
15	24	UG-MW37-15-16 CA		
		UG-MW37-16-17 CA	SP	Brown fine to coarse sand with occasional fine to coarse gravel (moist) (Advance Outwash)
	36			

Elevation (feet): 195, 190, 185, 180

WELL LOG



Notes: See Figure A-1 for explanation of symbols

Tacoma: Date:12/18/14 Path:C:\USERS\KJANC\DESKTOP\018308500.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Log of Monitoring Well UG-MW37

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	WELL LOG
						UG-MW37-18-19 CA			SP	Brown medium to coarse sand with fine to coarse gravel (moist) (Advance Outwash)			
	20												20.0'

Notes: See Figure A-1 for explanation of symbols

Tacoma: Date:12/18/14 Path:C:\USERS\KJANC\DESKTOP\01830850.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Log of Monitoring Well UG-MW37 (continued)

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled	Start	End	Total Depth (ft)	Logged By / Checked By	Driller	Drilling Method
	9/16/2013	9/16/2013	25	JCD / TSD	Holt Drilling	Rotosonic

Hammer Data	N/A	Drilling Equipment	Geoprobe 8140 LC
Surface Elevation (ft) / Vertical Datum	193.60 / NGVD29	Top of Casing Elevation (ft)	193.17
Easting (X) / Northing (Y)	1158127.32594 / 702837.689538	Horizontal Datum	WA State Plane,South Harn

A 2 (in) well was installed on 9/16/2013 to a depth of 15 (ft).

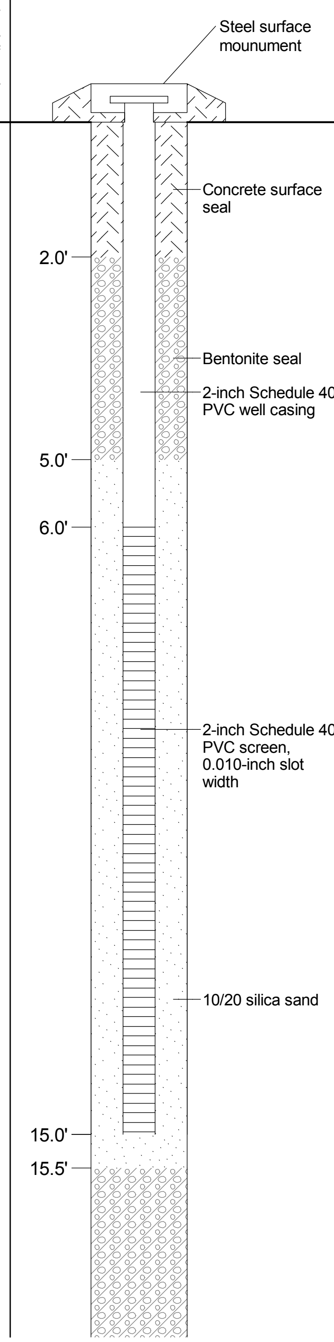
Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
11/8/2013	9.31	183.86

Notes: Elevation based on survey completed by AHBL on 11/6/13

FIELD DATA

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Sample Name	Water Level	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0	60	27	UG-MW38S-0.5-1.5 CA		SP-SM	Dark brown to black fine to coarse sand with silt and gravel and scattered organics (roots) (moist) (Fill)	NS	<1
			30	UG-MW38S-2-3 CA		SM	Brown to orange silty fine sand with medium sand and scattered charcoal debris (moist) (Fill)		
190									
							Becomes brown to gray	NS	<1
							Oxidation staining		
	5	60	57	UG-MW38S-5-6 CA		SP-SM	Brown fine sand with silt, medium sand and occasional gravel (moist) (Ice-Contact Deposits)		
			49			SM	Brown to gray silty fine sand with medium to coarse sand and occasional gravel (moist) (cemented) (Ice-Contact Deposits)	NS	<1
185									
			32	UG-MW38S-9-10 CA	▼				
	10	30				SP-SM	Gray fine sand with silt and medium to coarse sand (moist to wet) (cemented) (Ice-Contact Deposits)		
			44	UG-MW38S-11-12 CA					
								NS	<1
		30							
180									
				UG-MW38S-13.5-14 CA			Gray fine sand laminations from 13.5 to 14 feet		
	15	60					Wet		
				UG-MW38S-16-16.5 CA				NS	<1
						SM	Brown silty fine to coarse sand with gravel (moist) (Silt)		
				UG-MW38S-17-18 CA		SP-SM	Brown fine to coarse sand with silt and gravel (moist) (Advance Outwash)		

WELL LOG



Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well UG-MW38S

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	WELL LOG
175													
	20		30	78					SP-SM	Brown fine to coarse sand with silt and gravel (moist) (Advance Outwash)	NS	<1	Bentonite backfill
170			30			UG-MW38S-24-25 CA			SM	Brown silty fine to coarse sand with gravel (moist) (Advance Outwash)	NS	<1	
	25												25.0'

Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well UG-MW38S (continued)

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled	Start 9/16/2013	End 9/17/2013	Total Depth (ft) 55	Logged By JCD/PSD Checked By TSD	Driller Holt Drilling	Drilling Method Rotosonic

Hammer Data	N/A	Drilling Equipment	Geoprobe 8140 LC	A 2 (in) well was installed on 9/17/2013 to a depth of 51 (ft).
Surface Elevation (ft) Vertical Datum	192.91 NGVD29	Top of Casing Elevation (ft)	192.47	
Easting (X) Northing (Y)	1158130.47536 702825.450244	Horizontal Datum	WA State Plane,South Harn	

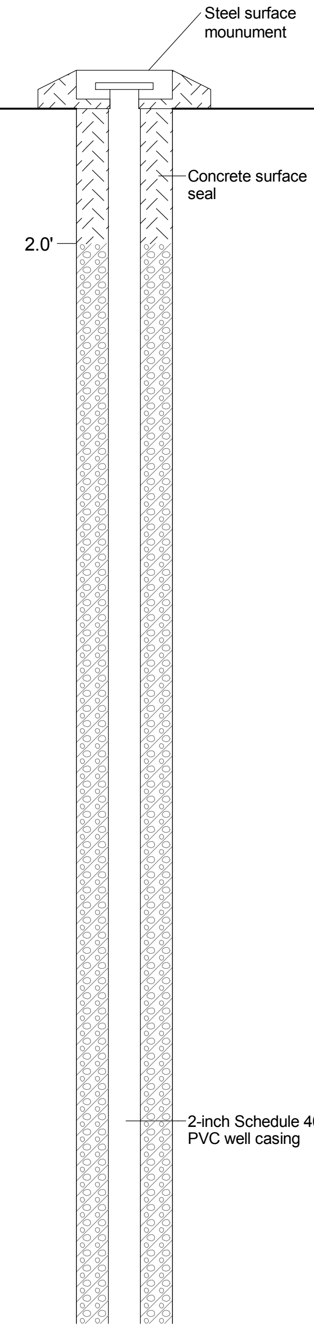
Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)
11/8/2013	26.11	166.36

Notes: Elevation based on survey completed by AHBL on 11/6/13

FIELD DATA / WELL LOG

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Sample Name	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0	60			SP-SM	Dark brown fine to coarse sand with silt and gravel and occasional cobbles (moist) (Fill)		
			35	UG-MW38D-1-2 CA				
190					SP-SM	Brown to gray fine sand with medium to coarse sand with silt and gravel (moist) (Ice-Contact Deposits)	NS	<1
			40	UG-MW38D-3.5-4.5 CA				
	5	60		UG-MW38D-5-6 CA	SM	Brown to gray silty fine to coarse sand with gravel (moist to wet) (Ice-Contact Deposits)	NS	<1
			35	UG-MW38D-6-7 CA	SP-SM	Brown to gray fine sand with silt and gravel and cobbles (moist) (cemented) (Ice-Contact Deposits)		
185							NS	
	10	60	40	UG-MW38D-10-11 CA		Becomes gray	NS	<1
						Grades to with gravel and increased moisture		
180								
			56	UG-MW38D-14-15 CA		Becomes brown to gray		<1
	15	60		UG-MW38D-15.5-16 CA	SM	Gray silty fine to coarse sand with medium to coarse sand to gravel (moist) (Silt)	NS	
					SP-SM	Red brown fine to coarse sand with silt and gravel (moist) (Transition Zone)		
			0					<1
175					SP	Brown fine to coarse sand with gravel (moist)		



Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well UG-MW38D

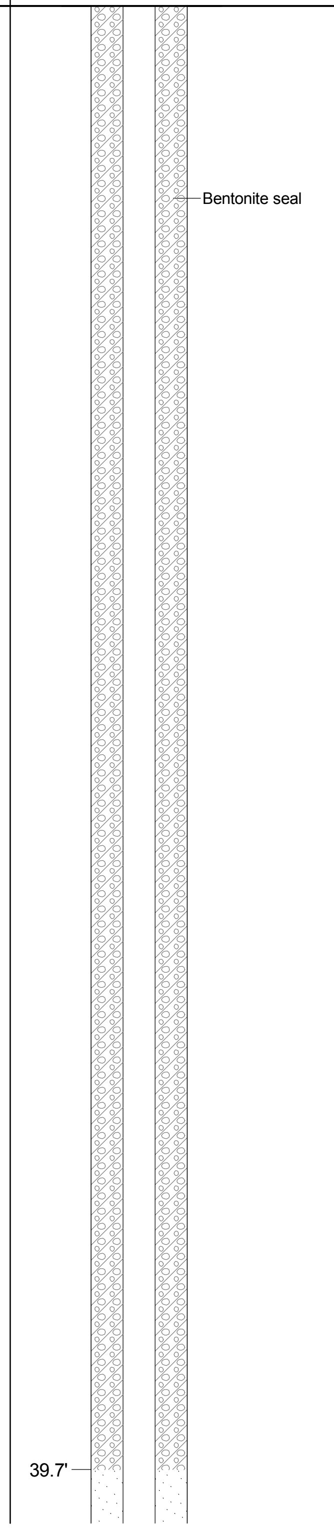
GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-31
Sheet 1 of 3

Elevation (feet)	Depth (feet)	Recovered (in)	Temperature (°C)	Sample Name	Water Level	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
				UG-MW38D-18-19 CA			(Advance Outwash)		
			0					NS	
	20	60		UG-MW38D-20-21 CA		SM	Brown silty sand (moist) (Advance Outwash)	NS	<1
							Boulder at 21 feet		
170						GP-GM	Brown fine gravel with silt and sand (moist) (Advance Outwash)	NS	<1
				UG-MW38D-24-25 CA			Increased sand content from 24 to 25 feet	NS	<1
	25	60							
				UG-MW38D-26-27 CA	▼				4.4
				UG-MW38D-27-28 CA		GM	Brown silty gravel with cobbles (moist to wet) (Advance Outwash)		3.7
165									
						GM	Brown silty gravel with sand and cobbles (wet) (Advance Outwash)		
	30	60						SS	2.3
160				UG-MW38D-33-34 CA					
	35	60						SS	1.4
						GM	Gray silt with fine to coarse sand and occasional gravel (moist) (Advance Outwash)		1.2
									1
155						Boulder	Boulder from 38 feet to 39 feet		
				UG-MW38D-39-40 CA		GM	Gray silty fine gravel with sand (moist to wet) (Advance Outwash)	NS	
	40	60						NS	2.9

WELL LOG



Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well UG-MW38D (continued)

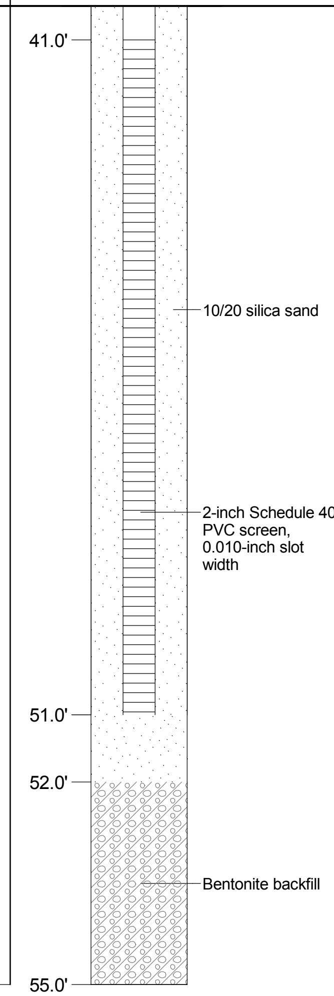
GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-31
Sheet 2 of 3

Elevation (feet)	Depth (feet)	Recovered (in)	Sample Name	Group Classification	Material Description	Sheen	Headspace Vapor (ppm)
						NS	<1
150							
			UG-MW38D-44-45 CA	SP	Gray medium sand with trace silt (wet) (Advance Outwash)	NS	<1
	45	60					
				GP	Gray fine gravel with sand and trace silt (wet) (Advance Outwash)		
145							
				SP	Gray medium to coarse sand with trace silt and occasional gravel (wet) (Advance Outwash)		
			UG-MW38D-49-49.5 CA	GP-GM	Gray fine to coarse gravel with fine to coarse sand and occasional silt (wet) (Advance Outwash)		
	50	60			Oxidized at 49 to 49.5 feet	NS	<1
			UG-MW38D-51-52 CA				
			UG-MW38D-52-53 CA	GP-GM	Gray fine to coarse gravel with sand and silt (wet) (Advance Outwash)		
140				GP	Gray fine to coarse gravel with sand and occasional silt (wet) (Advance Outwash)		
			UG-MW38D-54-55 CA				
	55						

WELL LOG



The boring was drilled with 8-inch conductor casing to 22 feet bgs. The casing was withdrawn to 15 feet bgs and 15 feet of bentonite chips were placed and hydrated for an hour.

The boring was then drilled to 55 feet bgs with 6-inch casing telescoped through the 8-inch casing.

Notes: See Figure A-1 for explanation of symbols

Log of Monitoring Well UG-MW38D (continued)

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled	Start 6/13/2013	End 6/13/2013	Total Depth (ft) 25	Logged By JCD / Checked By TSD	Driller Holt Drilling	Drilling Method Direct Push

Surface Elevation (ft) / Vertical Datum: Undetermined	Hammer Data: Pneumatic	Drilling Equipment: Geoprobe 7822 DT	
Easting (X): 1158569.27096 / Northing (Y): 703453.202326	System Datum	Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)	

Notes:

FIELD DATA

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		30						SP	Brown to gray fine to coarse sand with gravel and silt (moist) (Fill)	NS	<1	
						1A-B1-3-4 CA							
									SM	Brown to gray silty fine to coarse sand with occasional gravel and brick debris (moist) (Fill)			
	5		18								NS	<1	
									GP-GM	Brown to gray gravel with silt and fine to coarse sand (moist) (Fill)			
	10		18								NS	<1	
	15		30								NS	<1	
									SM	Brown to gray silty fine to coarse sand with gravel (moist) (Fill)			

Notes: See Figure A-1 for explanation of symbols

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Log of Boring 1A-B1

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-32
Sheet 1 of 2

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
						1A-B1-18-19 CA							
									SM-ML	Gray silty fine to coarse sand to fine to coarse sandy silt with numerous organics (wood debris, roots) (moist to wet) (Fill)			
	20		50						OL	Brown to black fine to coarse sandy silt with occasional gravel and numerous organics (moist) (Fill)	NS	<1	
									SM	Gray silty fine to medium sand with fine gravel (wet) (Ice-Contact Deposits)			
													Difficult drilling at approximately 23 feet
										Moist at 24 feet			
	25									Practical refusal at 25 feet			

Notes: See Figure A-1 for explanation of symbols

Log of Boring 1A-B1 (continued)

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-32
Sheet 2 of 2

Drilled	Start 6/13/2013	End 6/13/2013	Total Depth (ft)	30	Logged By JCD / Checked By TSD	Driller	Holt Drilling	Drilling Method	Direct Push

Surface Elevation (ft) / Vertical Datum	Undetermined	Hammer Data	Pneumatic	Drilling Equipment	Geoprobe 7822 DT
Easting (X) / Northing (Y)	1158476.36652 / 703520.075398	System Datum		Groundwater	Date Measured / Depth to Water (ft) / Elevation (ft)
Notes:					

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		16						SM	Brown to gray silty fine to coarse sand with occasional gravel (moist) (Fill)	NS	<1	
						1A-B2-2-3 / CA							
									ML	Brown to gray fine to medium sandy silt with coarse sand to fine gravel (moist) (Fill)			
	5		24								NS	<1	
									SM	Brown to gray silty fine to coarse sand with gravel (moist) (Fill)			
	10		30										
						1A-B2-14-15 / CA							
	15		30								NS	<1	
									SM-ML	Brown to gray silty fine to coarse sand to fine to coarse sandy silt (moist) (Fill)			

Notes: See Figure A-1 for explanation of symbols

Log of Boring 1A-B2

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	20		35								NS	<1	
									OL	Dark brown to black fine sandy silt with numerous organics (wood debris) and brick debris (Fill)			
	25		55			1A-B2-25-26 / CA			SM	Brown to gray silty fine to medium sand with occasional coarse sand to fine gravel (moist to wet) (Fill) Wet at 26 feet	NS	<1	Difficult drilling at approximately 28 feet
									SM-ML	Brown to gray silty fine to coarse sand to fine to coarse sandy silt (moist to wet) (Ice-Contact Deposits)			
	30												

Practical refusal at 30 feet
Temporary well screen set from 25 to 30 feet bgs
Water sample 1A-B2-W was collected

Notes: See Figure A-1 for explanation of symbols

Log of Boring 1A-B2 (continued)

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-33
Sheet 2 of 2

Drilled	Start 6/13/2013	End 6/13/2013	Total Depth (ft) 15	Logged By JCD / Checked By TSD	Driller Holt Drilling	Drilling Method Direct Push

Surface Elevation (ft) Vertical Datum	Undetermined	Hammer Data	Pneumatic	Drilling Equipment	Geoprobe 7822 DT
Easting (X) Northing (Y)	1158526.46682 703688.139679	System Datum		Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)	
Notes:					

FIELD DATA

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		40			1A-B4-0-1 CA			SM	Brown to gray silty fine to coarse sand to fine to coarse sandy silt with scattered brick debris (to 4 feet) (moist) (Fill)	NS	<1	
	5		42								NS	<1	
									ML	Brown to gray fine to coarse sandy silt with gravel (moist) (Fill)			
	10										NS	<1	
						1A-B4-11-12 CA			SM	Brown to gray silty fine to coarse sand with gravel (moist) (Fill)			
									SM	Gray silty fine to coarse sand with gravel (moist) (Ice-Contact Deposits)			Difficult drilling at approximately 12.5 feet
	15									Practical refusal at 15 feet			

Notes: See Figure A-1 for explanation of symbols

Log of Boring 1A-B4

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled — Start: 6/13/2013 — End: 6/13/2013	Total Depth (ft): 14	Logged By: JCD Checked By: TSD	Driller: Holt Drilling	Drilling Method: Direct Push
Surface Elevation (ft) / Vertical Datum: Undetermined	Hammer Data: Pneumatic		Drilling Equipment: Geoprobe 7822 DT	
Easting (X) / Northing (Y)	System / Datum		Groundwater — Date Measured / Depth to Water (ft) / Elevation (ft)	
Notes:				

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		36						SM-ML	Brown to gray silty fine to coarse sand to fine to coarse sandy silt (moist) (Fill)	NS	<1	
						1A-B5-1-2 CA				Stained soil and occasional charcoal debris from 1 to 3 feet	SS		
											NS		
	5		38								NS	<1	
									SP-SM	Brown to gray fine to coarse sand with silt and occasional gravel (moist) (Fill)			
									SM	Brown to gray silty fine to coarse sand with occasional gravel (moist) (Fill)			
						1A-B5-9-10 CA				Charcoal debris from approximately 9.2 to 9.6 feet			
	10		32						ML	Dark brown to gray fine to medium sandy silt with occasional coarse sand (moist) (Fill) Iron staining from 10.5 to 12.5	NS	<1	
						1A-B5-11-12 CA							Difficult drilling at 12 feet
									SM	Brown to gray silty fine sand with medium sand to fine gravel (moist) (Ice-Contact Deposits)			

Practical refusal at 14 feet

Notes: See Figure A-1 for explanation of symbols

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Log of Boring 1A-B5

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-35
Sheet 1 of 1

Drilled	Start 6/13/2013	End 6/13/2013	Total Depth (ft) 22	Logged By JCD / Checked By TSD	Driller Holt Drilling	Drilling Method Direct Push

Surface Elevation (ft) / Vertical Datum	Undetermined	Hammer Data	Pneumatic	Drilling Equipment	Geoprobe 7822 DT
Easting (X) / Northing (Y)		System Datum		Groundwater	Date Measured / Depth to Water (ft) / Elevation (ft)
Notes:					

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		14			1A-B6-0-1 CA			SP-SM	Brown fine to coarse sand with silt and gravel (moist) (Fill)	NS	<1	
									SM-ML	Brown to gray silty fine to coarse sand to fine to coarse sandy silt (moist) (Fill)			
									SM	Brown to gray silty fine to coarse sand with gravel (moist) (Fill)			
	5		16								NS	<1	
	10		14			1A-B6-10-11 CA					NS	<1	
	15		8								NS	<1	

Notes: See Figure A-1 for explanation of symbols

Log of Boring 1A-B6

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-36
Sheet 1 of 2

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	FIELD DATA: Recovered (in)	FIELD DATA: Temperature (°C)	FIELD DATA: Collected Sample	FIELD DATA: Sample Name / Testing	FIELD DATA: Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	20		20			1A-B6-20-21 / CA			SM	Brown silty fine to coarse sand with gravel (moist to wet) (Ice-Contact Deposits)			Difficult drilling at approximately 20 feet

Practical refusal at 22 feet

Notes: See Figure A-1 for explanation of symbols

Drilled	Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
	6/14/2013	6/14/2013	7	JCD	TSD	Holt Drilling	Direct Push

Surface Elevation (ft) Vertical Datum	Hammer Data	Drilling Equipment
Undetermined	Pneumatic	Geoprobe 7822 DT

Easting (X) Northing (Y)	System Datum	Groundwater: Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		60			1D-B1-0-1 CA			SP-SM	Brown to gray fine to coarse sand with silt and occasional gravel (moist) (Fill)	NS	<1	
									SM	Brown to gray silty fine to medium sand with coarse sand to fine gravel (moist)			Difficult drilling at approximately 1.5 feet
											NS	<1	
	5		24										
						1D-B1-6-7 CA			SM	Brown to gray silty fine to coarse sand with occasional fine gravel (wet) (Ice-Contact Deposits)	NS	<1	

Practical refusal at 7 feet

Notes: See Figure A-1 for explanation of symbols

Log of Boring 1D-B1

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled	Start 6/14/2013	End 6/14/2013	Total Depth (ft)	7.5	Logged By JCD / Checked By TSD	Driller	Holt Drilling	Drilling Method	Direct Push

Surface Elevation (ft) / Vertical Datum: Undetermined	Hammer Data: Pneumatic	Drilling Equipment: Geoprobe 7822 DT	
Easting (X) / Northing (Y)	System / Datum	Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)	
Notes:			

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		50			1D-B2-0-1 / CA			SP-SM	Brown to gray fine to coarse sand with silt and gravel (moist) (Fill)	NS	<1	
									SM	Brown to gray silty fine sand with medium to coarse sand and occasional fine gravel (moist) (Ice-Contact Deposits)			Difficult drilling at approximately 3.5 feet
									SP-SM	Brown to gray fine to medium sand with silt and occasional coarse sand lenses (moist) (Ice-Contact Deposits)			
	5												
						1D-B2-6-7 / CA					NS	<1	

Practical refusal at 7.5 feet

Notes: See Figure A-1 for explanation of symbols

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Log of Boring 1D-B2

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled	Start 6/12/2013	End 6/12/2013	Total Depth (ft) 9	Logged By JCD / Checked By TSD	Driller Holt Drilling	Drilling Method Direct Push

Surface Elevation (ft) / Vertical Datum: Undetermined	Hammer Data: Pneumatic	Drilling Equipment: Geoprobe 7822 DT	
Easting (X) / Northing (Y)	System / Datum	Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)	
Notes:			

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		35			1E-B1-0-1 CA			GP-GM	Brown to gray gravel with fine to coarse sand and silt (moist) (Fill)	NS	<1	
									SM	Brown to gray silty sand with occasional gravel (moist)	NS	<1	
	5		40										
									SP-SM	Brown to gray fine to coarse sand with silt and gravel (moist) (Ice-Contact Deposits)			
						1E-B1-7-8 CA					NS	<1	
										Grades to gray			
										Practical refusal at 9 feet			

Notes: See Figure A-1 for explanation of symbols

Log of Boring 1E-B1

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled	Start 6/12/2013	End 6/12/2013	Total Depth (ft) 8	Logged By JCD Checked By TSD	Driller Holt Drilling	Drilling Method Direct Push

Surface Elevation (ft) Vertical Datum: Undetermined	Hammer Data: Pneumatic	Drilling Equipment: Geoprobe 7822 DT
Easting (X) Northing (Y)	System Datum	Groundwater — Date Measured / Depth to Water (ft) / Elevation (ft)
Notes:		

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		12			1E-B2-0-1 / CA			SP-SM	Brown to gray fine to coarse sand with gravel and silt (moist) (Fill)	NS	<1	
									SM	Brown to gray silty fine to coarse sand with occasional gravel (moist) (Ice-Contact Deposits)			Difficult drilling at approximately 1 foot
									SP-SM	Brown to gray fine to coarse sand with gravel and silt (moist) (Ice-Contact Deposits)			
	5		30										
						1E-B2-6-7			SM	Brown to gray silty fine to coarse sand with gravel (moist) (Ice-Contact Deposits)	NS	<1	

Practical refusal at 8 feet

Notes: See Figure A-1 for explanation of symbols

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Log of Boring 1E-B2

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-40
Sheet 1 of 1

Drilled	Start 6/20/2013	End 6/20/2013	Total Depth (ft) 7	Logged By JCD, Checked By TSD	Driller Holt Drilling	Drilling Method Direct Push

Surface Elevation (ft) / Vertical Datum	Undetermined	Hammer Data	Pneumatic	Drilling Equipment	Geoprobe 7822 DT
Easting (X) / Northing (Y)		System / Datum		Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)	
Notes:					

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		24						ML	Brown to gray fine to coarse sandy silt with gravel (moist) (Fill)			
						1E-B3-1-2 / CA					NS	<1	
									SM	Brown to gray silty fine to medium sand (moist) (Fill)			
									ML	Brown to gray fine to coarse sandy silt with gravel (moist) (Ice-Contact Deposits)			
			24										
									GM	Brown to gray silty gravel with fine to coarse sand (moist) (Ice-Contact Deposits)			
	5		24								NS	<1	
						1E-B3-6-7 / CA							

Practical refusal at 7 feet

Notes: See Figure A-1 for explanation of symbols

Log of Boring 1E-B3

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled	Start 6/12/2013	End 6/12/2013	Total Depth (ft)	8	Logged By JCD / Checked By TSD	Driller	Holt Drilling	Drilling Method	Direct Push

Surface Elevation (ft) / Vertical Datum	Undetermined	Hammer Data	Pneumatic
Drilling Equipment	Geoprobe 7822 DT		
Easting (X) / Northing (Y)		System / Datum	
Groundwater	Date Measured	Depth to Water (ft)	Elevation (ft)
Notes:			

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		30						SM	Brown to gray silty fine to coarse sand (moist) (Ice-Contact Deposits)			
													Difficult drilling at 1.5 feet
						1E-B4-2-3 CA					NS	<1	
									SP-SM	Brown to gray fine to medium sand with silt and occasional coarse gravel (wet) (Ice-Contact Deposits)			
	5		36										
						1E-B4-7-8 CA					NS	<1	

Practical refusal at 8 feet

Notes: See Figure A-1 for explanation of symbols

Log of Boring 1E-B4

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled	Start 6/12/2013	End 6/12/2013	Total Depth (ft) 10	Logged By JCD, Checked By TSD	Driller Holt Drilling	Drilling Method Direct Push

Surface Elevation (ft) / Vertical Datum: Undetermined	Hammer Data: Pneumatic	Drilling Equipment: Geoprobe 7822 DT	
Easting (X) / Northing (Y)	System / Datum	Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)	
Notes:			

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		50			1E-B5-0-1 CA			SM	Brown to gray silty fine to coarse sand with gravel (moist) (Ice-Contact Deposits)	NS	<1	Difficult drilling at approximately 1.5 feet
	5		50			1E-B5-5-6 CA			SP-SM	Brown to gray fine to medium sand with silt and fine gravel (moist to wet) (Ice-Contact Deposits)	NS	<1	
									GM	Brown silty gravel with fine to coarse sand (wet) (Ice-Contact Deposits)			
	10									Practical refusal at 10 feet			

Notes: See Figure A-1 for explanation of symbols

Tacoma: Date:12/19/14 Path:C:\USERS\KJANC\DESKTOP\018308500.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_STANDARD

Log of Boring 1E-B5

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled	Start 6/12/2013	End 6/12/2013	Total Depth (ft) 9	Logged By JCD, Checked By TSD	Driller Holt Drilling	Drilling Method Direct Push

Surface Elevation (ft) / Vertical Datum	Undetermined	Hammer Data	Pneumatic
Drilling Equipment	Geoprobe 7822 DT		
Easting (X) / Northing (Y)		System / Datum	
Groundwater: Date Measured		Depth to Water (ft)	Elevation (ft)
Notes:			

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		50			1E-B6-0-1 CA			SM	Dark brown silty fine to coarse sand with scattered brick debris (moist) (Fill)	NS	<1	
									ML	Tan to gray fine sandy silt with occasional brick debris (moist) (Fill)			
									SM	Brown to gray silty fine to coarse sand to fine to coarse sandy silt with gravel (moist) (Ice-Contact Deposits)			Difficult drilling at approximately 3 feet
	5		48			1E-B6-5-6 CA			SP-SM	Brown to gray fine to medium sand with silt (moist) (Ice-Contact Deposits) Wet at 6.5 feet	NS	<1	
									SM	Brown to gray silty fine sand (moist) (Ice-Contact Deposits)			
									ML	Brown to gray fine sandy silt (moist) (Silt?) Iron staining			

Practical refusal at 9 feet

Notes: See Figure A-1 for explanation of symbols

Log of Boring 1E-B6

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-44
Sheet 1 of 1

Drilled	Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
	7/11/2013	7/11/2013	10.5	JCD	TSD	ESN	Direct Push

Surface Elevation (ft) Vertical Datum	Undetermined	Hammer Data	Pneumatic
Drilling Equipment	Powerprobe 9500 PTO		
Easting (X) Northing (Y)		System Datum	

Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)

Notes:

FIELD DATA

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		42						AC	Asphalt		<1	
						1F-B1-0.3-1.3 CA			SP-SM	Brown to gray fine to coarse sand wtih gravel and silt (moist) (Fill)	NS		
										Geotech fabric at approximately 3.5 feet			
									SM	Brown to gray silty fine to medium sand with coarse sand to fine gravel (moist) (Ice-Contact Deposits)			
			36			1F-B1-4-5 CA					NS	<1	
	5												
			24										
											NS		
						1F-B1-9-10 CA				Grades to trace fine gravel			
	10												

Practical refusal at 10.5 feet

Notes: See Figure A-1 for explanation of symbols

Log of Boring 1F-B1

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled	Start 7/18/2013	End 7/18/2013	Total Depth (ft)	10.5	Logged By JCD / Checked By TSD	Driller ESN	Drilling Method	Direct Push

Surface Elevation (ft) / Vertical Datum	Undetermined	Hammer Data	Pneumatic	Drilling Equipment	Powerprobe 9500 PTO
Easting (X) / Northing (Y)		System / Datum		Groundwater	Date Measured / Depth to Water (ft) / Elevation (ft)
Notes:					

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		38			1F-B2-0.3-1.3 CA			AC	Asphalt	NS	<1	
									SP-SM	Brown to gray fine to coarse sand with gravel and silt (moist) (Fill)			
									SM	Brown to gray silty fine to medium sand with coarse sand, occasional charcoal debris (moist) (Fill)	NS	<1	
			36								SS		
	5												
											SS		
			24			1F-B2-7-8 CA				Gray soil from 6.5 to 8 feet	MS	252 101 536	Odor at 7 feet
												5	At 8 feet bgs a void space was observed and sampler and rod was lost in the hole Hole was decomissioned and boring was moved 6 inches south and drilled to 12.5 feet
			12			1F-B2-9-10 CA						15	
	10											<1	

Practical refusal at 10.5 feet

Notes: See Figure A-1 for explanation of symbols

Log of Boring 1F-B2

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-46
Sheet 1 of 1

Drilled	Start 6/12/2013	End 6/12/2013	Total Depth (ft) 12	Logged By JCD / Checked By TSD	Driller Holt Drilling	Drilling Method Direct Push

Surface Elevation (ft) / Vertical Datum	Undetermined	Hammer Data	Pneumatic	Drilling Equipment	Geoprobe 7822 DT
Easting (X) / Northing (Y)		System / Datum		Groundwater	

Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)
6/12/2013	5.0	

Notes:

FIELD DATA

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		60						AC	Asphalt	NS	<1	
									SM-ML	Brown to gray silty fine to coarse sand to fine to coarse sandy silt with gravel (moist) (Ice-Contact Deposits)			
	2–3					1F-B3-2-3 CA							
													Difficult drilling at approximately 3 feet
	5		60			1F-B3-5-6 CA					NS	<1	Water level was measured at 5 feet bgs in temporary well
	6									Wet at 6 feet			
	7								GM	Brown to gray silty gravel with fine to coarse sand (wet) (Ice-Contact Deposits)			
	10		24								NS	<1	

Practical refusal at 12 feet
Temporary well screen set from 7 to 12 feet bgs
Water sample 1F-B3-W was collected

Notes: See Figure A-1 for explanation of symbols

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Log of Boring 1F-B3

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled	Start 6/11/2013	End 6/11/2013	Total Depth (ft) 15.5	Logged By JCD / Checked By TSD	Driller Holt Drilling	Drilling Method Direct Push

Surface Elevation (ft) / Vertical Datum	Undetermined	Hammer Data	Pneumatic	Drilling Equipment	Geoprobe 7822 DT
Easting (X) / Northing (Y)		System / Datum		Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)	
Notes:					

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		50						SM-ML	Brown to gray silty fine to coarse sand to fine to coarse sandy silt with gravel (moist) (Ice-Contact Deposits)	NS	<1	
						1F-B4-2-3 CA					NS	<1	
													Difficult drilling at 3 feet
	5		48								NS	<1	
									SM	Brown to gray silty fine to coarse sand with gravel (moist) (Ice-Contact Deposits)			
			40								NS	<1	
	10												
									GM	Brown silty gravel with fine to coarse sand (moist) (Ice-Contact Deposits)			
			20			1F-B4-13-14 CA				Moist to wet at 13 feet			
										Wet at 14.5 feet			
	15										NS	<1	
										Practical refusal at 15.5 feet			

Notes: See Figure A-1 for explanation of symbols

Log of Boring 1F-B4

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled	Start 6/12/2013	End 6/12/2013	Total Depth (ft) 12	Logged By JCD / Checked By TSD	Driller Holt Drilling	Drilling Method Direct Push

Surface Elevation (ft) / Vertical Datum	Undetermined	Hammer Data	Pneumatic	Drilling Equipment	Geoprobe 7822 DT
Easting (X) / Northing (Y)		System / Datum		Groundwater	
Notes:				Date Measured: 6/12/2013	Depth to Water (ft): 5.0; Elevation (ft):

FIELD DATA

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		40						SM-ML	Brown to gray silty fine to coarse sand to fine to coarse sandy silt with gravel (moist)	NS	<1	
						1F-B5-3-4 / CA					NS	<1	
	5		45										Water level was measured at 5 feet bgs in temporary well
									GM	Brown to gray silty gravel with fine to coarse sand (moist to wet)			
						1F-B5-7-8 / CA					NS	<1	
										Wet at 8.5 feet			
	10		24								NS	<1	

Practical refusal at 12 feet
Temporary well screen set from 7 to 12 feet bgs
Water sample 1F-B5-W was collected

Notes: See Figure A-1 for explanation of symbols

Log of Boring 1F-B5

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled	Start 6/11/2013	End 6/11/2013	Total Depth (ft) 13.5	Logged By JCD / Checked By TSD	Driller Holt Drilling	Drilling Method Direct Push

Surface Elevation (ft) / Vertical Datum: Undetermined	Hammer Data: Pneumatic	Drilling Equipment: Geoprobe 7822 DT	
Easting (X) / Northing (Y)	System / Datum	Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)	

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		40						SP-SM	Brown to gray fine to coarse sand with silt and gravel (moist) (Fill)	NS	<1	
						1F-B6-4-5 CA					NS	<1	
	5		40						ML	Brown to gray fine to coarse sandy silt with gravel (moist) (Ice-Contact Deposits)			Difficult drilling at 5 feet
									SM	Brown to gray silty fine to coarse sand with gravel (moist) (Ice-Contact Deposits)			
			33								NS	<1	
	10												
			18			1F-B6-12-13 CA					NS	<1	

Practical refusal at 13.5 feet

Notes: See Figure A-1 for explanation of symbols

Log of Boring 1F-B6

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled	Start 6/1/2013	End 6/11/2013	Total Depth (ft) 17	Logged By JCD Checked By TSD	Driller Holt Drilling	Drilling Method Direct Push

Surface Elevation (ft) Vertical Datum	Undetermined	Hammer Data	Pneumatic
Easting (X) Northing (Y)		System Datum	
Notes:			

Drilling Equipment: Geoprobe 7822 DT

Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)

FIELD DATA

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		45						GP-GM	Brown to gray gravel with fine to coarse sand and silt (moist) (Fill)	NS	<1	
						1F-B7-3-4 CA							
	5		50						ML	Dark brown to gray fine to medium sandy silt with coarse sand to fine gravel (moist) (Ice-Contact Deposits)	NS	<1	Stopped drilling at 5 feet bgs due to large cobble, moved 1 foot south
										Iron staining and occasional woody debris			
						1F-B7-9-10 CA			GM	Gray silty gravel with fine to coarse sand (moist) (Ice-Contact Deposits)			
	10		36										
									SM	Brown silty fine to coarse sand with gravel (moist) (Ice-Contact Deposits?)	NS	<1	
						1F-B7-14-15 CA				Becomes wet			Water observed at 14 feet bgs
	15												

Practical refusal at 17 feet
Temporary well screen set from 12 to 17 feet bgs
Water sample 1F-B7-W was collected

Notes: See Figure A-1 for explanation of symbols

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Log of Boring 1F-B7

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-51
Sheet 1 of 1

Drilled	Start 6/6/2013	End 6/10/2013	Total Depth (ft)	8.5	Logged By JCD / Checked By TSD	Driller	Holt Drilling	Drilling Method	Direct Push

Surface Elevation (ft) / Vertical Datum	Undetermined	Hammer Data	Pneumatic	Drilling Equipment	Geoprobe 7822 DT
Easting (X) / Northing (Y)		System / Datum		Groundwater	Date Measured / Depth to Water (ft) / Elevation (ft)
Notes:					

FIELD DATA

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		40						SM	Brown to gray silty fine to coarse sand with gravel (moist) (Ice-Contact Deposits)			
						1G-B1-2-3 CA					NS	<1	
													Difficult drilling at approximately 2.5 feet
	5												
						1G-B1-7-8 CA					NS	<1	
										Practical refusal at 8.5 feet			

Notes: See Figure A-1 for explanation of symbols

Log of Boring 1G-B1

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-52
Sheet 1 of 1

Drilled	Start 6/10/2013	End 6/10/2013	Total Depth (ft)	12	Logged By JCD / Checked By TSD	Driller	Holt Drilling	Drilling Method	Direct Push

Surface Elevation (ft) / Vertical Datum	Undetermined	Hammer Data	Pneumatic	Drilling Equipment	Geoprobe 7822 DT
Easting (X) / Northing (Y)		System / Datum		Groundwater	
Notes:					

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		25						SM	Brown to gray silty fine to coarse sand with gravel; iron staining (moist)	NS	<1	
						1G-B2-2-3 / CA							Difficult drilling at approximately 2.5 feet
									SP-SM	Brown to gray fine to medium sand with silt and fine gravel (moist)			
	5		60								NS	<1	
						1G-B2-9-10 / CA							
	10		24						GM	Brown to gray silty fine to coarse gravel with sand (moist) (Ice-Contact Deposits)	NS	<1	

Practical refusal at 12 feet

Notes: See Figure A-1 for explanation of symbols

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Log of Boring 1G-B2

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled	Start 6/10/2013	End 6/10/2013	Total Depth (ft)	5.5	Logged By JCD / Checked By TSD	Driller	Holt Drilling	Drilling Method	Direct Push

Surface Elevation (ft) / Vertical Datum	Undetermined	Hammer Data	Pneumatic	Drilling Equipment	Geoprobe 7822 DT
Easting (X) / Northing (Y)		System / Datum		Groundwater: Date Measured	Depth to Water (ft) / Elevation (ft)
Notes:					

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		45						SM	Brown to gray silty fine to coarse sand with gravel (moist) (Ice-Contact Deposits)			
						1G-B3-2-3 CA							
													Difficult drilling at approximately 3 feet
										Iron staining from 4 to 4.5 feet			
	5								ML	Gray fine sandy silt (moist) (Silt)			

Practical refusal at 5.5 feet

Notes: See Figure A-1 for explanation of symbols

Log of Boring 1G-B3

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-54
Sheet 1 of 1

Drilled	Start 6/17/2013	End 6/17/2013	Total Depth (ft) 4.5	Logged By JCD / Checked By TSD	Driller Holt Drilling	Drilling Method Direct Push

Surface Elevation (ft) / Vertical Datum	Undetermined	Hammer Data	Pneumatic	Drilling Equipment	Geoprobe 7822 DT
Easting (X) / Northing (Y)		System / Datum		Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)	
Notes:					

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		18			1G-B4-1-2 CA			ML	Brown to gray fine to coarse sandy silt (moist) (Ice-Contact Deposits)	NS	<1	Difficult drilling at 0.5 feet

Practical refusal at 4.5 feet

Notes: See Figure A-1 for explanation of symbols

Log of Boring 1G-B4

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled	Start 6/11/2013	End 6/11/2013	Total Depth (ft)	11.5	Logged By JCD	Checked By TSD	Driller	Holt Drilling	Drilling Method	Direct Push

Surface Elevation (ft) Vertical Datum	Undetermined	Hammer Data	Pneumatic	Drilling Equipment	Geoprobe 7822 DT
Easting (X) Northing (Y)		System Datum		Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)	
Notes:					

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		55						SM-ML	Brown to gray silty fine to coarse sand to fine to coarse sandy silt with gravel (moist) (Fill)	NS	<1	
						1G-B5-3-4 CA							
	5		48						SM	Brown to gray silty fine to coarse sand with gravel (moist) (Ice-Contact Deposits)	NS	<1	
											NS	<1	Difficult drilling at 7 feet
			30								NS	<1	
	10					1G-B5-10-11 CA			ML	Brown to gray fine to coarse sandy silt with gravel (moist) (Ice-Contact Deposits)			

Practical refusal at 11.5 feet

Notes: See Figure A-1 for explanation of symbols

Log of Boring 1G-B5

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled	Start 6/10/2013	End 6/10/2013	Total Depth (ft) 11	Logged By JCD, Checked By TSD	Driller Holt Drilling	Drilling Method Direct Push

Surface Elevation (ft) 126.00 Vertical Datum NGVD29	Hammer Data: Pneumatic	Drilling Equipment: Geoprobe 7822 DT	
Easting (X) Northing (Y)	System Datum: WA State Plane,South Harn	Groundwater Date Measured / Depth to Water (ft) / Elevation (ft)	

Notes: Elevation based on survey completed by Sitts and Hill for the YMCA project

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
125	0		54						SM	Brown to gray silty fine to coarse sand with gravel (moist) (Ice-Contact Deposits)	NS	<1	
	4–5					1H-B1-4-5 CA							
120	5		54										Difficult drilling at 5 feet
	6.5								GP-GM	Brown to gray gravel with silt and fine to coarse sand (moist) (Ice-Contact Deposits)	NS	<1	
	9					1H-B1-9-9.5 CA			SM	Brown to gray silty fine to coarse sand with gravel (moist) (Ice-Contact Deposits)	NS	<1	
115	10		18										

Practical refusal at 11 feet

Notes: See Figure A-1 for explanation of symbols

Log of Boring 1H-B1

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled	Start 6/10/2013	End 6/10/2013	Total Depth (ft)	10	Logged By JCD / Checked By TSD	Driller	Holt Drilling	Drilling Method	Direct Push

Surface Elevation (ft) / Vertical Datum	127.00 / NGVD29	Hammer Data	Pneumatic	Drilling Equipment	Geoprobe 7822 DT
Easting (X) / Northing (Y)		System Datum	WA State Plane,South Harn	Groundwater	

Notes: Elevation based on survey completed by Sitts and Hill for the YMCA project

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
6/10/2013	7.5	119.5

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		25						SP-SM	Dark brown sand with silt and gravel (moist) (Fill)			
									SM	Brown to gray silty fine to coarse sand with gravel (moist) (Ice-Contact Deposits)	NS	<1	
125													
										Gray silty fine to medium sand (moist)			
	5		60										
120						1H-B2-7-7.5 CA							Difficult drilling at approximately 7 feet
							▼			Wet at 7.5 feet			
						1H-B2-9-10 CA				Grades to fine sand			After sampler pulled, water came up to 2 feet
	10									Practical refusal at 10 feet			

Notes: See Figure A-1 for explanation of symbols

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Log of Boring 1H-B2

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-58
Sheet 1 of 1

Drilled	Start 6/10/2013	End 6/10/2013	Total Depth (ft) 10	Logged By JCD / Checked By TSD	Driller Holt Drilling	Drilling Method Direct Push

Surface Elevation (ft) 128.40 / Vertical Datum NGVD29	Hammer Data: Pneumatic	Drilling Equipment: Geoprobe 7822 DT	
Easting (X) / Northing (Y)	System Datum: WA State Plane,South Harn	Groundwater	
Notes: Elevation based on survey completed by Sitts and Hill for the YMCA project		Date Measured: 6/10/2013	Depth to Water (ft): 7.0 / Elevation (ft): 121.4

FIELD DATA

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		50						GP	Gravel with fine to coarse sand and silt (moist) (Fill)	NS	<1	
									SM	Brown to gray silty fine to coarse sand with gravel (moist) (Ice-Contact Deposits)			
125													
						1H-B3-4-5 CA							Difficult drilling at 4 feet
	5		58								NS	<1	
						1H-B3-7-8 CA	▼						
									SP-SM	Brown to gray fine to medium sand with silt (wet) (Ice-Contact Deposits)			
120													
	10									Practical refusal at 10 feet			

Notes: See Figure A-1 for explanation of symbols

Tacoma: Date:12/19/14 Path:C:\USERS\KJANC\DESKTOP\018308500.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_STANDARD

Log of Boring 1H-B3

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled	Start 6/17/2013	End 6/17/2013	Total Depth (ft) 8	Logged By JCD Checked By TSD	Driller Holt Drilling	Drilling Method Direct Push

Surface Elevation (ft) Vertical Datum	Undetermined	Hammer Data	Pneumatic	Drilling Equipment	Geoprobe 7822 DT
Easting (X) Northing (Y)		System Datum		Groundwater	Date Measured / Depth to Water (ft) / Elevation (ft)

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		50			2A-B1-1-2 CA			ML	Brown to gray fine to medium sandy silt with occasional coarse sand to fine gravel and occasional brick debris (moist) (Fill)	NS	<1	
									SP-SM	Brown to gray fine to medium sand with silt (moist) (Ice-Contact Deposits)			
	5		30								NS	<1	
						2A-B1-6-7 CA			ML	Brown to gray fine to medium sandy silt with occasional coarse sand to fine gravel (moist) (Ice-Contact Deposits)			
										Grades to fine to coarse sandy silt with gravel			

Practical refusal at 8 feet

Notes: See Figure A-1 for explanation of symbols

Log of Boring 2A-B1

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled	Start 6/17/2013	End 6/17/2013	Total Depth (ft) 8.5	Logged By JCD / Checked By TSD	Driller Holt Drilling	Drilling Method Direct Push

Surface Elevation (ft) / Vertical Datum	Undetermined	Hammer Data	Pneumatic	Drilling Equipment	Geoprobe 7822 DT
Easting (X) / Northing (Y)		System Datum		Groundwater	Date Measured / Depth to Water (ft) / Elevation (ft)
Notes:					

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		38						GP-GM	Gray gravel with fine to coarse sand and silt (moist) (Fill)			
						2A-B2-0.5-1.5 CA			SM	Brown to gray silty fine to coarse sand with gravel (moist) (Fill)	NS	<1	
									GP-GM	Brown to gray gravel with silt and fine to coarse sand (moist) (Ice-Contact Deposits)			Difficult drilling at 3.5 feet
	5		32										
									ML	Gray fine to medium sandy silt with occasional coarse sand to fine gravel (moist) (Ice-Contact Deposits)			
						2A-B2-7-8 CA					NS	<1	

Practical refusal at 8.5 feet

Notes: See Figure A-1 for explanation of symbols

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Log of Boring 2A-B2

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-61
Sheet 1 of 1

Drilled	Start 6/17/2013	End 6/17/2013	Total Depth (ft) 12	Logged By JCD / Checked By TSD	Driller Holt Drilling	Drilling Method Direct Push

Surface Elevation (ft) / Vertical Datum: Undetermined	Hammer Data: Pneumatic	Drilling Equipment: Geoprobe 7822 DT	
Easting (X) / Northing (Y)	System / Datum	Groundwater — Date Measured / Depth to Water (ft) / Elevation (ft)	
Notes:			

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		52			2A-B3-0-1 CA			SP-SM	Tan fine to coarse sand with silt (moist) (Fill)	NS	<1	
									GP-GM	Gray gravel with fine to coarse sand and silt (moist) (Fill)			
						2A-B3-2-3 CA			SM-ML	Brown to gray silty fine to corse sand to fine to coarse sandy silt, occasional organics (roots) and brick debris to 3 feet; iron staining (moist) (Fill)			
	5		56								NS	<1	
									SM	Brown to gray silty fine to coarse sand (moist) (Ice-Contact Deposits)			
									SM-ML	Brown to gray fine to medium sandy silt with occasional coarse sand to fine gravel (moist) (Ice-Contact Deposits)			
										Becomes moist			
	10		24			2A-B3-10-11 CA				Becomes moist to wet	NS	<1	
									SM	Brown to gray silty fine to coarse sand with gravel (moist to wet) (Ice-Contact Deposits)			
										Becomes moist			
										Practical refusal at 12 feet			

Notes: See Figure A-1 for explanation of symbols

Log of Boring 2A-B3

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled — Start: 6/17/2013 — End: 6/17/2013	Total Depth (ft): 8	Logged By: JCD Checked By: TSD	Driller: Holt Drilling	Drilling Method: Direct Push
Surface Elevation (ft) / Vertical Datum: Undetermined		Hammer Data: Pneumatic		Drilling Equipment: Geoprobe 7822 DT
Easting (X) / Northing (Y)		System / Datum		Groundwater — Date Measured / Depth to Water (ft) / Elevation (ft)
Notes:				

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		48						SP-SM	Tan fine to coarse sand with silt and gravel (moist) (Fill)	NS	<1	
						2A-B4-0.5-1.5 / CA			SM	Brown to gray silty fine to coarse sand with occasional fine gravel (moist) (fill) (darker color from 0.5 to 1 feet)			
			48						SM-ML	Brown to gray silty fine to medium sand to fine to medium sandy silt with coarse sand and occasional gravel (moist) (Ice-Contact Deposits)	NS	<1	
	5					2A-B4-5-6 / CA				Becomes moist to wet			
									SP-SM	Brown to gray fine to medium sand with silt (wet) (Ice-Contact Deposits)			
						2B-B4-7-8 / CA			SM	Brown to gray silty fine to coarse sand with gravel (wet) (Ice-Contact Deposits)			

Practical refusal at 8 feet

Notes: See Figure A-1 for explanation of symbols

Log of Boring 2A-B4

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled	Start 6/17/2013	End 6/17/2013	Total Depth (ft)	8	Logged By JCD	Checked By TSD	Driller	Holt Drilling	Drilling Method	Direct Push

Surface Elevation (ft) Vertical Datum	Undetermined	Hammer Data	Pneumatic	Drilling Equipment	Geoprobe 7822 DT
Easting (X) Northing (Y)		System Datum		Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)	
Notes:					

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		50						SM-ML	Brown to gray silty fine to medium sand to fine to medium sandy silt with coarse sand to gravel (moist) (Fill)	NS	<1	
						2A-B5-1-2 CA							
	5		36						ML	Brown to gray fine to medium sandy silt with coarse sand to fine gravel (moist) (Ice-Contact Deposits) Becomes wet at 5.5 feet	NS	<1	
						2A-B5-7-8 CA							

Practical refusal at 8 feet

Notes: See Figure A-1 for explanation of symbols

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Log of Boring 2A-B5

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled	Start 6/17/2013	End 6/17/2013	Total Depth (ft)	5	Logged By JCD Checked By TSD	Driller Holt Drilling	Drilling Method Direct Push

Surface Elevation (ft) Vertical Datum	Undetermined	Hammer Data	Pneumatic	Drilling Equipment	Geoprobe 7822 DT
Easting (X) Northing (Y)		System Datum		Groundwater: Date Measured	Depth to Water (ft) / Elevation (ft)
Notes:					

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		54						SM	Brown to gray silty fine to coarse sand with occasional gravel (moist) (Fill)	NS	<1	
						2A-B7-1-2 CA							
									ML	Gray fine to medium sandy silt with coarse sand and occasional gravel (moist) (Ice-Contact Deposits)			
						2A-B6-4-5 CA					NS	<1	
	5									Practical refusal at 5 feet			

Notes: See Figure A-1 for explanation of symbols

Log of Boring 2A-B6

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-65
Sheet 1 of 1

Drilled	Start 6/17/2013	End 6/17/2013	Total Depth (ft) 9	Logged By JCD / Checked By TSD	Driller Holt Drilling	Drilling Method Direct Push

Surface Elevation (ft) / Vertical Datum: Undetermined	Hammer Data: Pneumatic	Drilling Equipment: Geoprobe 7822 DT	
Easting (X) / Northing (Y)	System / Datum	Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)	
Notes:			

FIELD DATA

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		40						GP-GM	Gray gravel with fine to coarse sand and silt (moist) (Fill)	NS	<1	
						2A-B7-2.5-3.5 CA			SM-ML	Brown to dark brown silty fine to coarse sand to fine to coarse sandy silt (moist)			
									SP-SM	Brown to red fine to medium sand with coarse sand to gravel and silt; iron staining (moist) (Ice-Contact Deposits)			
						2A-B7-4-5 CA							
	5		40						SM	Brown to gray silty fine to medium sand with occasional coarse sand to gravel (moist) (Ice-Contact Deposits)	NS	<1	
										Grades to gray			
									ML	Gray fine to coarse sandy silt with gravel (moist) (Ice-Contact Deposits)			
						2A-B7-8-9 CA							

Practical refusal at 9 feet

Notes: See Figure A-1 for explanation of symbols

Log of Boring 2A-B7

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled: Start 6/18/2013, End 6/18/2013	Total Depth (ft) 10	Logged By JCD Checked By TSD	Driller Holt Drilling	Drilling Method Direct Push
Surface Elevation (ft) / Vertical Datum: Undetermined		Hammer Data: Pneumatic		Drilling Equipment: Geoprobe 7822 DT
Easting (X) / Northing (Y)		System / Datum		Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)
Notes:				

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		35						SP-SM	Brown fine to coarse sand with silt and gravel (moist) (Fill)	NS	<1	
						2B-B2-1-2 / CA			ML	Brown to gray fine to medium sandy silt with coarse sand to fine gravel (moist) (Ice-Contact Deposits)			
									SM	Brown to gray silty fine to medium sand (moist) (Ice-Contact Deposits)			
	5		40			2B-B2-5-6 / CA			GM	Brown to gray silty gravel with fine to coarse sand (wet) (Ice-Contact Deposits)	NS	<1	
						2B-B2-9-10			SM	Brown to gray silty fine sand (moist) (Silt?)			
	10									Practical refusal at 10 feet			

Notes: See Figure A-1 for explanation of symbols

Log of Boring 2B-B2

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-67
Sheet 1 of 1

Drilled	Start: 6/18/2013	End: 6/18/2013	Total Depth (ft)	10	Logged By: JCD	Checked By: TSD	Driller	Holt Drilling	Drilling Method	Direct Push

Surface Elevation (ft) Vertical Datum	Undetermined	Hammer Data	Pneumatic	Drilling Equipment	Geoprobe 7822 DT
Easting (X) Northing (Y)		System Datum		Groundwater	Date Measured / Depth to Water (ft) / Elevation (ft)
Notes:					

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		35						SP	Brown fine to coarse sand with gravel (moist) (Fill)	NS	<1	
						2B-B3-1-2 CA			SP-SM	Brown to gray fine to medium sand with silt and occasional coarse sand to fine gravel with occasional silty fine sand lenses (moist) (Ice-Contact Deposits)	NS	<1	
	5									Becomes moist to wet at 5.5 feet			
						2B-B3-6-7					NS	<1	
									GP-GM	Brown to gray gravel with silt and fine to coarse sand (moist) (Ice-Contact Deposits)			Difficult drilling at approximately 7 feet
	10									Practical refusal at 10 feet			

Notes: See Figure A-1 for explanation of symbols

Log of Boring 2B-B3

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-68
Sheet 1 of 1

Drilled	Start 6/18/2013	End 6/18/2013	Total Depth (ft)	10	Logged By JCD / Checked By TSD	Driller	Holt Drilling	Drilling Method	Direct Push

Surface Elevation (ft) / Vertical Datum	Undetermined	Hammer Data	Pneumatic	Drilling Equipment	Geoprobe 7822 DT
Easting (X) / Northing (Y)		System Datum		Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)	
Notes:					

FIELD DATA

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		18						GP-GM	Brown to gray gravel with fine to coarse sand and silt (moist)	NS	<1	
						2C-B1-1-2 / CA			ML	Brown to gray silt with fine to coarse sand and occasional gravel (moist) (Fill)			
	5		60								NS	<1	
									SP-SM	Brown to gray fine to medium sand with silt (moist) (Ice-Contact Deposits)			Difficult drilling at approximately 7 feet
						2C-B1-8-9 / CA							
									ML	Gray silt with fine sand; iron stained to 9.3 feet (moist) (Silt)			
	10									Practical refusal at 10 feet			

Notes: See Figure A-1 for explanation of symbols

Log of Boring 2C-B1

GeoEngineers

Project: UWT 2013 Environmental Investigation

Project Location: Tacoma, Washington

Project Number: 0183-085-00

Figure D-69

Sheet 1 of 1

Drilled	Start 6/18/2013	End 6/18/2013	Total Depth (ft) 15	Logged By JCD / Checked By TSD	Driller Holt Drilling	Drilling Method Direct Push

Surface Elevation (ft) / Vertical Datum	Undetermined	Hammer Data	Pneumatic	Drilling Equipment	Geoprobe 7822 DT
Easting (X) / Northing (Y)		System / Datum		Groundwater	Date Measured / Depth to Water (ft) / Elevation (ft)
Notes:					

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		40						SM	Brown to tan silty fine to coarse sand with gravel (moist) (Fill)	NS	<1	
						2C-B2-1-2 CA							
	5		50						ML	Brown to gray fine to medium sandy silt with coarse sand to fine gravel, occasional organics (roots) (moist) (Fill)	NS	<1	
						2C-B2-7-8 CA				Brown to gray fine sandy silt (moist)			
										Becomes moist to wet from 8 to 9 feet			
	10		50						GP-GM	Brown to gray gravel with silt and fine to coarse sand (moist) (Ice-Contact Deposits)	NS	<1	
									SP-SM	Brown to gray fine to medium sand with silt and occasional coarse sand to fine gravel (moist) (Ice-Contact Deposits)			
						2C-B2-13-14 CA				Becomes moist to wet			
										Becomes wet at 14 feet			
	15									Practical refusal at 15 feet			

Notes: See Figure A-1 for explanation of symbols

Log of Boring 2C-B2

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled	Start 6/18/2013	End 6/18/2013	Total Depth (ft) 9	Logged By JCD / Checked By TSD	Driller Holt Drilling	Drilling Method Direct Push

Surface Elevation (ft) / Vertical Datum	Undetermined	Hammer Data	Pneumatic	Drilling Equipment	Geoprobe 7822 DT
Easting (X) / Northing (Y)		System / Datum		Groundwater	Date Measured / Depth to Water (ft) / Elevation (ft)
Notes:					

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		50			2D-B1-0-1 / CA			CC	Approximately 4-inches concrete (actual depth not measured)	NS	<1	
									SP-SM	Brown to gray fine to medium sand with silt (moist)			
	5		48								NS	<1	
						2D-B1-8-9 / CA							
										Practical refusal at 9 feet			

Notes: See Figure A-1 for explanation of symbols

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Log of Boring 2D-B1

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled	Start 6/18/2013	End 6/18/2013	Total Depth (ft) 5	Logged By JCD / Checked By TSD	Driller Holt Drilling	Drilling Method Direct Push

Surface Elevation (ft) / Vertical Datum: Undetermined	Hammer Data: Pneumatic	Drilling Equipment: Geoprobe 7822 DT	
Easting (X) / Northing (Y)	System / Datum	Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)	
Notes:			

FIELD DATA

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0					2D-B2-0-1 CA			CC	Approximately 4-inches concrete (actual depth not measured)	NS	<1	
									ML	Brown to gray silt with fine sand and occasional coarse sand to fine gravel (moist) (fill to approximately 2 feet bgs)			Difficult drilling at approximately 2 feet
						2D-B2-4-5 CA							
	5									Practical refusal at 5 feet			

Notes: See Figure A-1 for explanation of symbols

Log of Boring 2D-B2

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-72
Sheet 1 of 1

Drilled	Start 6/20/2013	End 6/20/2013	Total Depth (ft) 12	Logged By JCD / Checked By TSD	Driller Holt Drilling	Drilling Method Direct Push

Surface Elevation (ft) / Vertical Datum	Undetermined	Hammer Data	Pneumatic	Drilling Equipment	Geoprobe 7822 DT
Easting (X) / Northing (Y)		System / Datum		Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)	
Notes:					

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		40			2D-B3-0-1 CA			CC	Approximately 4-inches concrete (actual depth not measured)	NS	<1	
									ML	Brown to gray fine sandy silt with occasional medium to coarse sand (moist)			
										Fine sandy silt lens (2-inches)			
			48							Fine sandy silt lens (3-inches)	NS	<1	
	5								SM	Brown to gray silty fine sand (moist)			
									ML	Brown to gray silt with fine sand; occasional iron staining (moist)			
	10												
						2D-B3-11-12 CA					NS	<1	
										Practical refusal at 12 feet			

Notes: See Figure A-1 for explanation of symbols

Log of Boring 2D-B3

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Drilled	Start 6/20/2013	End 6/20/2013	Total Depth (ft) 3	Logged By JCD / Checked By TSD	Driller Holt Drilling	Drilling Method Direct Push

Surface Elevation (ft) / Vertical Datum: Undetermined	Hammer Data: Rotohammer	Drilling Equipment: Hand operated microsampler
Easting (X) / Northing (Y)	System / Datum	Groundwater — Date Measured / Depth to Water (ft) / Elevation (ft)
Notes:		

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		10			2D-B4-0-1 CA			CC	Approximately 4-inches concrete (actual depth not measured)	NS	<1	
									SM	Brown to gray silty fine to medium sand with occasional coarse sand; iron staining (moist) (fill to 1.5 feet)			
			12										

Practical refusal at 3 feet

Notes: See Figure A-1 for explanation of symbols

Log of Boring 2D-B4

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-74
Sheet 1 of 1

Drilled	Start: 6/20/2013	End: 6/20/2013	Total Depth (ft)	8	Logged By: JCD / Checked By: TSD	Driller: Holt Drilling	Drilling Method: Direct Push

Surface Elevation (ft) / Vertical Datum	Undetermined	Hammer Data	Pneumatic	Drilling Equipment	Geoprobe 7822 DT
Easting (X) / Northing (Y)		System / Datum		Groundwater: Date Measured / Depth to Water (ft) / Elevation (ft)	

Notes: Boring completed in existing hole in the concrete slab

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		42			2D-B5-0-1 / CA			SP	Brown to black fine to coarse sand with gravel (moist) (Fill)	NS	<1	
									ML	Brown to gray fine sandy silt with occasional medium sand to fine gravel (moist) (Fill)			
									ML	Grades to gray fine sandy silt			Difficult drilling at approximately 2 feet
									SM	Brown to gray silty fine to coarse sand with gravel (moist)	NS	<1	
	5								ML	Brown to gray fine sandy silt with occasional medium to coarse sand (moist)			
						2D-B5-6-7 / CA							
									SM	Brown to gray silty fine to coarse sand with gravel (moist)			

Practical refusal at 8 feet

Notes: See Figure A-1 for explanation of symbols

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Log of Boring 2D-B5

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-75
Sheet 1 of 1

Drilled	Start 6/20/2013	End 6/20/2013	Total Depth (ft)	4	Logged By JCD Checked By TSD	Driller	Holt Drilling	Drilling Method	Direct Push

Surface Elevation (ft) Vertical Datum	Undetermined	Hammer Data	Pneumatic	Drilling Equipment	Hand operated microsampler
Easting (X) Northing (Y)		System Datum		Groundwater	
Notes:					

Groundwater

Date Measured	Depth to Water (ft)	Elevation (ft)

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Temperature (°C)	Collected Sample	Sample Name / Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)	REMARKS
	0		10			2F-B1-0-1 CA			ML	Brown to gray fine to medium sandy silt with occasional coarse sand (moist) (Fill)	NS	<1	
			10							Brown to gray fine to coarse sandy silt with gravel (moist)			

Practical refusal at 4 feet

Notes: See Figure A-1 for explanation of symbols

Log of Boring 2F-B1

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Date Excavated: 6/24/2013
Equipment: Case 580 Backhoe

Logged By: JCD
Total Depth (ft) 4.0

Elevation (feet)	Depth (feet)	SAMPLE Testing Sample	Sample Name Testing	Graphic Log	Group Classification	Encountered Water	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID	Notes
	0–3	X	1B-TP1-0-1 CA		SM/ML		Brown silty fine to medium sand to fine to medium sandy silt with coarse sand to fine gravel; iron staining (moist) (Fill)	NS	<1	
	3–4	X	1B-TP1-3-4		SM		Brown to gray silty fine to medium sand with coarse sand to fine gravel (moist) (Ice-Contact Deposits)	NS	<1	

Test pit completed at 4 feet
Slow groundwater seepage observed at 0.5 feet
No caving observed

Notes: See Figure A-1 for explanation of symbols

Log of Test Pit 1B-TP1

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Date Excavated: 6/24/2013
Equipment: Case 580 Backhoe

Logged By: JCD
Total Depth (ft) 8.0

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name Testing	Graphic Log	Group Classification	Encountered Water	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID	Notes
	0–1		1B-TP2-0-1 CA		GM		Gray rip-rap with fine to coarse sand and gravel with crushed concrete and brick debris Filter fabric at 6 inches	NS	<1	
	1.5				SM		Silty fine to coarse sand with gravel (moist) (Fill)			
	2–3		1B-TP2-2-3 CA				Gray and black silty fine to coarse sand and occasional cobbles with construction debris (concrete, brick, glass)	NS	<1	
	5–6		1B-TP2-5-6 CA		ML		Brown fine to coarse sandy silt with occasional coarse sand to fine gravel and brick debris (moist) (Fill)	NS	<1	
	6.5				ML		Brown to tan fine sandy silt; iron staining (moist) (Silt)			
	7–8		1B-TP2-7-8 CA					NS	<1	

Test pit completed at 8 feet
Rapid groundwater seepage observed at 1.5 feet
No caving observed

Notes: See Figure A-1 for explanation of symbols

Log of Test Pit 1B-TP2

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Date Excavated: 6/24/2013 | Logged By: JCD
Equipment: Case 580 Backhoe | Total Depth (ft) 4.5

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name / Testing	Graphic Log	Group Classification	Encountered Water	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID	Notes
	0	X	1B-TP3-0-1 CA		GP-GM		Gray to black gravel with silt and fine to coarse sand (moist) (Fill)	NS	<1	
	0.5				SM/ML		Brown silty fine to medium sand to fine to medium sandy silt with coarse sand to fine gravel (moist) (Fill)			
	2	X	1B-TP3-2-3 CA					NS	<1	
	3	X	1B-TP3-3-4 CA		SM		Brown to gray silty fine to medium sand with coarse sand to fine gravel (moist) (Ice-Contact Deposits)	NS	<1	

Test pit completed at 4.5 feet
No groundwater seepage observed
No caving observed

Notes: See Figure A-1 for explanation of symbols

Tacoma: Date:12/19/14 Path:C:\USERS\KJANC\DESKTOP\018308500.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_TESTPIT_1P_ENV

Log of Test Pit 1B-TP3

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Date Excavated: 6/24/2013 | Logged By: JCD
Equipment: Case 580 Backhoe | Total Depth (ft) 4.5

Elevation (feet)	Depth (feet)	SAMPLE Testing Sample	SAMPLE Sample Name Testing	Graphic Log	Group Classification	Encountered Water	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID	Notes
	0–1	X	1B-TP4-0-1 CA		SM		Dark brown silty fine to coarse sand with occasional brown gravel and organics (moist) (Fill) Dark brown to gray silty fine to coarse sand with gravel and scattered organics (roots) (moist) (Fill)	NS	<1	
	2.5–4.5	X	1B-TP4-3-4		SM		Brown to gray silty fine to coarse sand with gravel (moist) (Ice-Contact Deposits)	NS	<1	

Test pit completed at 4.5 feet
No groundwater seepage observed
No caving observed

Notes: See Figure A-1 for explanation of symbols

Log of Test Pit 1B-TP4

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Date Excavated: 6/24/2013

Equipment: Case 580 Backhoe

Logged By: JCD

Total Depth (ft) 8.0

Elevation (feet)	Depth (feet)	Testing Sample	Sample Name / Testing	Graphic Log	Group Classification	Encountered Water	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID	Notes
	0	X	1B-TP5-0-1 CA		SM		Gray to black silty fine to coarse sand with gravel and organics (roots) (moist) (Fill)	NS	<1	
	1						Brown to dark brown silty fine to coarse sand with occasional gravel and oocasional organics (roots) (Fill)			
	2	X	1B-TP5-2-3 CA					NS	<1	
	4				SM		Brown to gray mottled silty fine to medium sand with occasional coarse sand to cobbles (moist)			
	5	X	1B-TP5-5-6					NS	<1	
	6.5				GP-GM		Brown to gray fine to medium gravel with silt and sand (moist) (Ice-Contact Deposits)			
	7	X	1B-TP5-7-8 CA					NS	<1	
	8						Test pit completed at 8 feet No groundwater seepage observed No caving observed			

Notes: See Figure A-1 for explanation of symbols

Tacoma: Date:12/19/14 Path:C:\USERS\KJANC\DESKTOP\018308500.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_TESTPIT_1P_ENV

Log of Test Pit 1B-TP5

GeoEngineers

Project: UWT 2013 Environmental Investigation

Project Location: Tacoma, Washington

Project Number: 0183-085-00

Date Excavated: 6/24/2013

Equipment: Case 580 Backhoe

Logged By: JCD

Total Depth (ft) 3.5

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name / Testing	Graphic Log	Group Classification	Encountered Water	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID	Notes
	0–1	X	1B-TP6-0-1 / CA		ML		Brown to gray fine sandy silt and scattered organics (roots) (moist) (Fill)	NS	<1	
	1						Brown to gray fine to coarse sandy silt (moist)			Difficult excavating at 1 foot
	2–3	X	1B-TP6-2-3 / CA					NS	<1	

Test pit completed at 3.5 feet
No groundwater seepage observed
No caving observed

Notes: See Figure A-1 for explanation of symbols

Tacoma: Date:12/19/14 Path:C:\USERS\KJANC\DESKTOP\018308500.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_TESTPIT_1P_ENV

Log of Test Pit 1B-TP6

GeoEngineers

Project: UWT 2013 Environmental Investigation

Project Location: Tacoma, Washington

Project Number: 0183-085-00

Figure D-82

Sheet 1 of 1

Date Excavated: 6/25/2013 | Logged By: JCD
Equipment: Case 580 Backhoe | Total Depth (ft) 6.0

Elevation (feet)	Depth (feet)	Testing Sample	Sample Name / Testing	Graphic Log	Group Classification	Encountered Water	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID	Notes
	0–1	X	1C-TP1-0-1 / CA		SM		Dark brown to black silty fine to coarse sand with gravel and occasional cobbles with scattered debris (glass, brick, metal) (moist) (Fill)	NS	<1	
	1.5				SP-SM		Brown fine sand with silt and gravel (moist) (Fill)			
	2–3	X	1C-TP1-2-3 / CA					NS	<1	
	4.5				SP-SM		Brown to gray fine to medium sand with silt and gravel (moist) (Ice-Contact Deposits)			
	5–6	X	1C-TP1-5-6					NS	<1	

Test pit completed at 6 feet
No groundwater seepage observed
No caving observed

Notes: See Figure A-1 for explanation of symbols

Log of Test Pit 1C-TP1

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Date Excavated:	6/25/2013
Equipment:	Case 580 Backhoe
Logged By:	JCD
Total Depth (ft)	7.5

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name / Testing	Graphic Log	Group Classification	Encountered Water	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID	Notes
	0–1	X	1C-TP2-0-1 CA		SW-SM		Brown to gray fine to coarse sand with silt and occasional gravel and cobbles (moist) (Fill)	NS	<1	
	2				SM/ML		Dark brown to red silty fine to coarse sand to fine sandy silt with occasional gravel and cobbles and boulders with scattered brick debris (moist) (Fill)			
	3–4	X	1C-TP2-3-4 CA					NS	<1	
	6–7	X	1C-TP2-6-7 CA		SP-SM		Brown to gray fine to medium sand with silt and gravel (moist) (Ice-Contact Deposits)	NS	<1	

Test pit completed at 7.5 feet
No groundwater seepage observed
No caving observed

Notes: See Figure A-1 for explanation of symbols

Log of Test Pit 1C-TP2

GEOENGINEERS

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Date Excavated: 6/24/2013

Equipment: Case 580 Backhoe

Logged By: JCD

Total Depth (ft) 5.0

Elevation (feet)	Depth (feet)	SAMPLE Testing Sample	SAMPLE Sample Name / Testing	Graphic Log	Group Classification	Encountered Water	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID	Notes
	0–1	X	1D-TP1-0-1 / CA		SM		Gray to black silty fine to coarse sand with gravel and scattered organics (roots) and concrete debris (roots) (moist) (Fill)	NS	<1	
	2–3	X	1D-TP1-2-3 / CA		SM		Red to dark brown silty fine sand with occasional medium sand to fine gravel and scattered organics (roots) (moist) (Fill)	NS	<1	
	4–5	X	1D-TP1-4-5		SP-SM		Brown to gray fine to medium sand with silt and gravel (moist) (Ice-Contact Deposits)	NS	<1	

Test pit completed at 5 feet
No groundwater seepage observed
No caving observed

Notes: See Figure A-1 for explanation of symbols

Log of Test Pit 1D-TP1

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Date Excavated: 6/25/2013

Equipment: Case 580 Backhoe

Logged By: JCD

Total Depth (ft) 6.0

Elevation (feet)	Depth (feet)	SAMPLE Testing Sample	Sample Name / Testing	Graphic Log	Group Classification	Encountered Water	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID	Notes
	0–1	X	1D-TP2-0-1 CA		SM		Brown to dark brown silty fine sand with occasional gravel and scattered organics (roots) (moist) (Fill)	NS	<1	
	3.5–4.5	X	1D-TP2-3.5-4.5 CA		SM		Brown and gray mottled silty fine sand (moist) (Ice-Contact Deposits)	NS	<1	
	4.5				SP-SM		Brown to gray fine to medium sand with silt and fine gravel (moist) (Ice-Contact Deposits)			
	5–6	X	1D-TP2-5-6					NS	<1	

Test pit completed at 6 feet
No groundwater seepage observed
No caving observed

Notes: See Figure A-1 for explanation of symbols

Log of Test Pit 1D-TP2

GeoEngineers

Project: UWT 2013 Environmental Investigation

Project Location: Tacoma, Washington

Project Number: 0183-085-00

Date Excavated: 6/24/2013

Equipment: Case 580 Backhoe

Logged By: JCD

Total Depth (ft) 6.0

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name / Testing	Graphic Log	Group Classification	Encountered Water	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID	Notes
	0–1	X	1D-TP3-0-1 CA		SM		Black silty fine to coarse sand with gravel and concrete slab debris, with numerous organics (roots) (moist) (Fill)	NS	<1	
	1–3.5				SM/ML		Tan brown and dark brown silty fine to coarse sand to fine to coarse sandy silt with scattered organics (roots) (moist) (Fill)			
	2–3	X	1D-TP3-2-3 CA					NS	<1	
	3.5–6				SP-SM		Brown to gray fine to coarse sand with silt and gravel (moist) (Ice-Contact Deposits)			
	5–6	X	1D-TP3-5-6					NS	<1	

Test pit completed at 6 feet
No groundwater seepage observed
No caving observed

Notes: See Figure A-1 for explanation of symbols

Tacoma: Date:12/19/14 Path:C:\USERS\KJANC\DESKTOP\018308500.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_TESTPIT_1P_ENV

Log of Test Pit 1D-TP3

GEOENGINEERS

Project: UWT 2013 Environmental Investigation

Project Location: Tacoma, Washington

Project Number: 0183-085-00

Date Excavated: 6/25/2013

Equipment: Case 580 Backhoe

Logged By: JCD

Total Depth (ft) 5.5

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name / Testing	Graphic Log	Group Classification	Encountered Water	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID	Notes
	0–1	X	1G-TP1-0-1 CA		SM		Brown silty fine to coarse sand with occasional gravel, and scattered organics (roots) and concrete slab debris (moist) (Fill)	NS	<1	
	2–3	X	1G-TP1-2-3 CA		SP-SM		Brown to gray mottled fine to coarse sand with silt and gravel (moist) (Ice-Contact Deposits)	NS	<1	
	4–5	X	1G-TP1-4-5 CA					NS	<1	

Test pit completed at 5.5 feet
No groundwater seepage observed
No caving observed

Notes: See Figure A-1 for explanation of symbols

Tacoma: Date:12/19/14 Path:C:\USERS\KJANC\DESKTOP\018308500.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_TESTPIT_1P_ENV

Log of Test Pit 1G-TP1

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Figure D-88
Sheet 1 of 1

Date Excavated: 6/25/2013

Equipment: Case 580 Backhoe

Logged By: JCD

Total Depth (ft) 7.0

Elevation (feet)	Depth (feet)	Testing Sample	Sample Name / Testing	Graphic Log	Group Classification	Encountered Water	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID	Notes
	0–1	X	1G-TP2-0-1 CA		SM		Brown silty fine to coarse sand with gravel and occasional cobbles (moist) (Fill)	NS	<1	
	3–4	X	1G-TP2-3-4 CA		SP-SM		Brown fine to medium sand with silt and fine gravel (moist) (Ice-Contact Deposits)	NS	<1	
	5.5						Increased sand and gravel content			
	6–7	X	1G-TP2-6-7 CA					NS	<1	

Test pit completed at 7 feet
No groundwater seepage observed
No caving observed

Notes: See Figure A-1 for explanation of symbols

Log of Test Pit 1G-TP2

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

Date Excavated: 6/25/2013
Equipment: Case 580 Backhoe
Logged By: JWW
Total Depth (ft) 6.0

Elevation (feet)	Depth (feet)	SAMPLE: Testing Sample	SAMPLE: Sample Name / Testing	Graphic Log	Group Classification	Encountered Water	MATERIAL DESCRIPTION	Sheen	Headspace Vapor	Notes
	0–1	X	1H-TP1-0-1 CA		ML		Brown to gray fine to medium sand silt with coarse sand to gravel and occasional cobbles (moist) (Ice-Contact Deposits)	NS	<1	
	3				GP-GM		Brown to gray gravel with silt and fine to coarse sand (moist) (Ice-Contact Deposits)	NS	<1	
	5–6	X	1H-TP1-5-6 CA					NS	<1	

Test pit completed at 6 feet
No groundwater seepage observed
No caving observed

Notes: See Figure A-1 for explanation of symbols

Log of Test Pit 1H-TP1

GeoEngineers

Project: UWT 2013 Environmental Investigation
Project Location: Tacoma, Washington
Project Number: 0183-085-00

APPENDIX E
MTCA Method B Groundwater Screening Level Protective of Indoor Air Calculations

Table E-1

Method B Groundwater Vapor Intrusion Screening Level Calculations

University of Washington Tacoma - 2013 Environmental Investigation

Tacoma, Washington

VOC	Method B Air CUL [1] ($\mu g/m^3$)			Vapor Attenuation Factor [3]	Temperature-Adjusted Henry's Law (Unit less) [4] 13C	Method B Groundwater VI SL [5] ($\mu g/L$)		
	Non-Cancer (Eq. 750-1)	Cancer (Eq. 750-2)	Method B			Non-Cancer	Cancer	Method B
1,1,1-Trichloroethane[2]	2.3E+03	--	2.3E+03	1.0E-03	4.2E-01	5.5E+03	--	5.5E+03
1,1-Dichloroethane[2]	--	1.6E+00	1.6E+00	1.0E-03	1.4E-01	--	1.1E+01	1.1E+01
1,1-Dichloroethene	9.1E+01	--	9.1E+01	1.0E-03	7.1E-01	1.3E+02	--	1.3E+02
1,2,4-Trimethylbenzene[2]	3.2E+00	--	3.2E+00	1.0E-03	1.2E-01	2.8E+01	--	2.8E+01
1,2-Dichlorobenzene[2]	9.1E+01	--	9.1E+01	1.0E-03	3.5E-02	2.6E+03	--	2.6E+03
1,3,5-Trimethylbenzene[6]	2.7E+00	--	--	1.0E-03	1.1E-01	2.5E+01	--	2.5E+01
Acetone	1.4E+04	--	1.4E+04	1.0E-03	9.7E-04	1.4E+07	--	1.4E+07
Benzene	1.4E+01	3.2E-01	3.2E-01	1.0E-03	1.3E-01	1.1E+02	2.4E+00	2.4E+00
Bromodichoromethane[2]	--	6.8E-02	6.8E-02	1.0E-03	3.7E-02	--	1.8E+00	1.8E+00
Chlorobenzene[2]	2.3E+01	--	2.3E+01	1.0E-03	7.9E-02	2.9E+02	--	2.9E+02
Chloroform	4.5E+01	1.1E-01	1.1E-01	1.0E-03	9.2E-02	4.9E+02	1.2E+00	1.2E+00
cis-1,2-Dichloroethene[6]	1.6E+01	--	1.6E+01	1.0E-03	1.0E-01	1.6E+02	--	1.6E+02
Dibromochloromethane[2]	--	9.3E-02	9.3E-02	1.0E-03	2.1E-02	--	4.5E+00	4.5E+00
Ethylbenzene	4.6E+02	--	4.6E+02	1.0E-03	1.6E-01	2.8E+03	--	2.8E+03
Isopropylbenzene	1.8E+02	--	1.8E+02	1.0E-03	2.6E-01	7.1E+02	--	7.1E+02
Naphthalene[2]	1.4E+00	7.4E-02	7.4E-02	1.0E-03	8.2E-03	1.7E+02	8.9E+00	8.9E+00
n-Butylbenzene	--	--	--	1.0E-03	2.4E-01	--	--	--
n-Propylbenzene	4.6E+02	--	4.6E+02	1.0E-03	2.0E-01	2.3E+03	--	2.3E+03
p-Isopropyltoluene	--	--	--	1.0E-03	--	--	--	--
sec-Butylbenzene	--	--	--	1.0E-03	2.9E-04	--	--	--
Tetrachloroethene[2]	1.8E+01	9.6E+00	9.6E+00	1.0E-03	4.0E-01	4.5E+01	2.4E+01	2.4E+01
Toluene[2]	2.3E+03	--	2.3E+03	1.0E-03	1.5E-01	1.6E+04	--	1.6E+04
trans-1,2-Dichloroethene[2]	2.7E+01	--	2.7E+01	1.0E-03	2.4E-01	1.1E+02	--	1.1E+02
Trichloroethene[2]	9.1E-01	3.7E-01	3.7E-01	1.0E-03	2.4E-01	3.8E+00	1.5E+00	1.5E+00
Vinyl chloride	4.6E+01	2.8E-01	2.8E-01	1.0E-03	8.1E-01	5.7E+01	3.5E-01	3.5E-01
Xylenes, m,p	4.6E+01	--	4.6E+01	1.0E-03	1.6E-01	2.9E+02	--	2.9E+02
Xylenes, o	4.6E+01	--	4.6E+01	1.0E-03	1.1E-01	4.3E+02	--	4.3E+02

Notes:

[1] Method B Air Cleanup Levels (CUL) from Ecology's May 2014 Excel workbook "CLARC Master Spreadsheet.xlsx," except where noted.

[2] Method B Air CULs have been updated since publication of Ecology's review draft "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action" dated October 2009 (draft VI guidance; Ecology, 2009).

[3] Default vapor attenuation factor from Ecology's draft VI guidance.

[4] Temperature-adjusted Henry's Law (unit less) estimated using EPA's 2004 Johnson and Ettinger Groundwater-Advanced Workbook (GW-ADV-Feb04.xls)

[5] Method B Groundwater Vapor Intrusion (VI) Screening Levels (SL) calculated using Equation 1 from Ecology's draft VI Guidance.

[6] Method B Air CULs are in Ecology's draft VI Guidance, but have been withdrawn by Ecology and are not included in Ecology's May 2014 Excel workbook "CLARC Master Spreadsheet.xlsx"

APPENDIX F
Chemical Analytical Report

APPENDIX G
Report Limitations and Guidelines for Use

APPENDIX G
REPORT LIMITATIONS AND GUIDELINES FOR USE[1]

This appendix provides information to help you manage your risks with respect to the use of this report.

Environmental Services are Performed for Specific Purposes, Persons and Projects

This report has been prepared for use by University of Washington. This report is not intended for use by others, and the information contained herein is not applicable to other sites.

GeoEngineers structures our services to meet the specific needs of our clients. For example, an environmental site assessment study conducted for a property owner may not fulfill the needs of a prospective purchaser of the same property. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and project site. No one except University of Washington should rely on this environmental report without first conferring with GeoEngineers. This report should not be applied for any purpose or project except the one originally contemplated.

This Environmental Report is Based on a Unique Set of Project-Specific Factors

This report has been prepared for the University of Washington Tacoma Environmental Assessment Project located in Tacoma, Washington. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, do not rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

If important changes are made after the date of this report, GeoEngineers should be given the opportunity to review our interpretations and recommendations and provide written modifications or confirmation, as appropriate.

Reliance Conditions for Third Parties

If a lending agency or other parties intend to place legal reliance on the product of our services, we require that those parties indicate in writing their acknowledgement that the scope of services provided, and the general conditions under which the services were rendered including the limitation of professional liability, are understood and accepted by them. This is to provide our firm

[1] Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions.

Environmental Regulations are Always Evolving

Some substances may be present in the site vicinity in quantities or under conditions that may have led, or may lead, to contamination of the subject site, but are not included in current local, state or federal regulatory definitions of hazardous substances or do not otherwise present current potential liability. GeoEngineers cannot be responsible if the standards for appropriate inquiry, or regulatory definitions of hazardous substance, change or if more stringent environmental standards are developed in the future.

Subsurface Conditions can Change

This environmental report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by manmade events such as construction on or adjacent to the site, by new releases of hazardous substances, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Always contact GeoEngineers before applying this report to determine if it is still applicable.

Topsoil

For the purposes of this report, we consider topsoil to consist of generally fine-grained soil with an appreciable amount of organic matter based on visual examination, and to be unsuitable for direct support of the proposed improvements. However, the organic content and other mineralogical and gradational characteristics used to evaluate the suitability of soil for use in landscaping and agricultural purposes was not determined, nor considered in our analyses. Therefore, the information and recommendations in this report, and our logs and descriptions should not be used as a basis for estimating the volume of topsoil available for such purposes.

Most Environmental Findings are Professional Opinions

Our interpretations of subsurface conditions are based on field observations and chemical analytical data from widely spaced sampling locations at the site. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ – sometimes significantly – from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

Do Not Redraw the Exploration Logs

Environmental scientists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in an environmental report should never be redrawn for inclusion in other design drawings. Only photographic or electronic reproduction is acceptable, but recognize that separating logs from the report can elevate risk.

Read These Provisions Closely

Some clients, design professionals and contractors may not recognize that the geoscience practices (geotechnical engineering, geology and environmental science) are far less exact than other engineering and natural science disciplines. This lack of understanding can create unrealistic expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory “limitations” provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you are unclear how these “Report Limitations and Guidelines for Use” apply to your project or site.

Geotechnical, Geologic and Geoenvironmental Reports Should Not Be Interchanged

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually relate any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding a specific project.

Biological Pollutants

GeoEngineers’ Scope of Work specifically excludes the investigation, detection, prevention, or assessment of the presence of Biological Pollutants in or around any structure. Accordingly, this report includes no interpretations, recommendations, findings, or conclusions for the purpose of detecting, preventing, assessing, or abating Biological Pollutants. The term “Biological Pollutants” includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts.