Focused Feasibility Study

Southeast Portion of the
318 State Avenue NE Property
Olympia, Washington

for
City of Olympia

August 26, 2015

GeoEngineers
Earth Science + Technology

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File No. 0415-049-06

August 26, 2015

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Table of Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ACRONYMS AND ABBREVIATIONS

1,1-DCE	1,1-dichloroethene
bgs	below the ground surface
CAOs	cleanup action objectives
cis-1,2-DCE	cis-1,2-dichloroethene
City	City of Olympia
COCs	contaminants of concern
cPAH	carcinogenic aromatic hydrocarbons
DB	Downtown Business
DCA	disproportionate cost analysis
Ecology	Washington State Department of Ecology
FFS	focused feasibility study
GRA	general response action
HVAC	heating, ventilation, and air-conditioning
IC	Institutional Controls
LIHI	Low Income Housing Institute
MTCA	Model Toxics Control Act
NFA	No Further Action
NGVD	National Geodetic Vertical Datum
PCE	tetrachloroethene
RI	Remedial Investigation
SVE	Soil Vapor Extraction
TCE	trichloroethene
trans-1,2-DCE	trans-1,2-dichloroethene
UW	Urban Waterfront
VC	vinyl chloride
WAC	Washington Administrative Code
WSDOT	Washington State Department of Transportation

1.0 INTRODUCTION

This report presents the Focused Feasibility Study (FFS) for the southeast portion of the 318 State Avenue NE property located in Olympia, Washington. The 318 State Avenue NE property is an approximately 1.1-acre property owned by the City of Olympia (City). The City is planning to sell the approximately 0.4 acre southeast portion of the 318 State Avenue NE property to the Low Income Housing Institute (LIHI) for redevelopment. This FFS has been prepared to meet one of the Washington State Department of Ecology's (Ecology's) requirements to obtain a No Further Action (NFA) letter for the southeast portion of the property to support the redevelopment. A vicinity map for the property is presented on Figure 1 and the 318 State Avenue NE property and portion of the property proposed for redevelopment are shown on Figure 2.

The objective of the FFS is to develop and evaluate remedial alternatives to address contamination present in the southeast portion of the property and to identify the preferred remedial alternative. This FFS report follows procedures outlined in the Model Toxics Control Act (MTCA; Chapter 173-340-350[8] Washington Administrative Code [WAC]) and includes the following:

- Section 2 presents a brief background of the property including location, property use history, planned redevelopment, prior remedial action completed in 2009 and current environmental conditions at the property.
- Section 3 describes media requiring evaluation of remedial alternatives and identifies contaminants of concern (COCs).
- Section 4 describes the transport and exposure pathways of the COCs.
- Section 5 presents cleanup standards including cleanup levels and points of compliance at which the cleanup levels must be met.
- Section 6 presents the cleanup action objective (CAO).
- Section 7 identifies potentially applicable remedial technologies.
- Section 8 screens potentially applicable remedial technologies based on implementability, effectiveness and cost.
- Section 9 presents remedial alternatives for the southeast portion of the property that is planned for redevelopment.
- Section 10 presents the criteria used in the FFS to evaluate the remedial alternatives.
- Section 11 compares and evaluates remedial alternatives based on the FFS evaluation criteria and proposes a preferred remedial alternative for the southeast portion of the property. The MTCA disproportionate cost analysis (DCA) process is used to identify a preferred remedy for Ecology's consideration.
- Section 12 provides references to reports, documents, publications that were referred to in preparing the FFS report.

2.0 BACKGROUND

This section provides a summary of background information including location, property use history, planned redevelopment, prior remedial action completed in 2009 and current environmental conditions at the property. Additional background information about the property is provided in the Remedial Investigation (RI) Report for the 318 State Avenue NE Property (GeoEngineers, 2009a). The RI Report for the 318 State Avenue NE property is provided in Appendix A.

2.1. Property Location and Description

The 318 State Avenue NE property is approximately 1.1 acres in size and is located within the City of Olympia, Thurston County, Washington (Figure 1). The 318 State Avenue NE property is bounded on the south by State Avenue NE, on the east by Adams Street NE, on the west by Franklin Street NE and on the north by commercial buildings that are bounded by Olympia Avenue NE (Figure 2). The southeast portion of the property is approximately 0.4 acres in size and is bounded by State Avenue NE, Adams Street NE and the 318 State Avenue NE property. Approximate limits of the southeast portion of the property planned for redevelopment are identified on Figure 2. The southeast portion of the property was made into a separate parcel in March 2015 and has the tax parcel number of 78503200500. Documentation of the tax parcel number for the southeast portion of the property are provided in Appendix B.

The property is relatively flat, with ground surface elevations ranging from approximately Elevation 11 to Elevation 12 feet National Geodetic Vertical Datum (NGVD). The western half of the 318 State Avenue NE property is paved with asphalt and the eastern half, including the majority of the southeast portion of the property that is planned for redevelopment is exposed soil and gravel.

2.2. Current Land Use and Zoning

The property is currently undeveloped. The property is located within a commercial district of the City and is zoned Downtown Business (DB) District under City of Olympia Municipal Ordinance. The properties located south, west and north of the property are also zoned DB District. The properties located east and northeast of the property are also located within the commercial district of the City but are zoned Urban Waterfront (UW) District.

2.3. Property Use History

The history of the property is described in the RI Report (GeoEngineers, 2009a; Appendix A) and summarized in this section.

The property was undeveloped until at least 1888. The western portion of the property was part of the shoreline of Budd Inlet and the eastern portion of the property was part of the submerged marine or intertidal area of Budd Inlet (Luttrell, 2007). Filling of the property and surrounding area with material dredged from the Port of Olympia area began in the late 1800s. After the initial filling of the property, various property users occupied the eastern half of the property, including Olympia Foundry and Machinery Company, Pioneer Iron Works and Capital City Iron Works.

The property was purchased by the State of Washington Highway Commission (the precursor to the Washington State Department of Transportation or WSDOT) in March 1923, for use as a soils testing and materials laboratory. Various automotive/truck sheds, machine/automotive shops and the materials testing laboratory were located throughout the property.

A fire burned and damaged buildings and equipment at the property in 1936. The WSDOT facility was rebuilt and the automotive/truck sheds were replaced with a smaller automotive service facility and an office and testing laboratory. In 1968, the automotive facility structures and operations were removed and the office and testing laboratory building was renovated to accommodate a traffic data collections and analysis office. This office was demolished and removed from the property in 2007.

2.4. Planned Redevelopment

The City purchased the 318 State Avenue NE property in 2008 in support of their general plans to revitalize downtown Olympia and support use of the public transportation originating at the Olympia Transit Center located on the block to the west of the property. The City is currently planning to sell the southeastern portion of the property to the LIHI for redevelopment. The LIHI is planning to construct a multistory, low income residential housing structure. Redevelopment for the remaining portions of the property is currently not planned but as identified in the RI Report it may include mixed use residential and commercial and/or a parking garage.

2.5. Prior Remedial Action

The City completed an independent remedial action for soil at the property between September and October 2009. The remedial action was completed based on the findings of investigations completed by WSDOT and the City at the property between 2005 and 2009 (GeoEngineers, 2009a; Appendix A).

The remedial action consisted of removal and permitted off-site disposal of soil containing chlorinated solvents, benzene, carcinogenic polycyclic aromatic hydrocarbons (cPAHs), arsenic, and lead at concentrations greater than MTCA soil cleanup levels. Approximately 6,800 cubic yards of contaminated soil were excavated from two areas (Contaminated Soil Zone [CSZ] 1 and CSZ 2) at the property. The approximate locations of CSZ 1 and CSZ 2 are shown on Figure 2.

The remedial excavation at CSZ 1 measured approximately 140 feet long by 135 feet wide and ranged in depth from approximately 5.5 to 11.5 feet deep. The majority of the CSZ 1 excavation was located within the southeastern portion of the property that is planned for redevelopment. The remedial excavation at CSZ 2 measured approximately 25 feet long by 25 feet wide by 4 feet deep and was located in the northwestern portion of the 318 State Avenue NE property.

Contaminated soil removed from CSZ 1 and CSZ 2 was transported off site for disposal at a Subtitle D landfill. Chemical concentrations in confirmation soil samples collected at the limits of the excavation were below the MTCA soil cleanup levels. The remedial excavations were backfilled with clean import materials. Additional details of the remedial action are presented in the Remedial Action Construction Report (GeoEngineers, 2009b), which is provided in Appendix C.

2.6. Environmental Conditions in the Southeast Portion of the Property

2.6.1. Soil

2.6.1.1. Stratigraphy

Soil at the property generally consists of fill overlying native soil. Fill in the southeast portion of the property where the remedial action was completed in CSZ 1 consists of clean imported backfill overlying historic fill and/or native soil. Historic fill outside the limits of the excavation for CSZ 1 generally consists of fine to medium sand with variable amounts of silt, gravel and brick debris from the ground surface to a depth of

1 to 5 feet below ground surface (bgs) overlying fine to medium sand with variable amounts of silt, gravel and seashell fragments, which extends up to 12 feet bgs. The native soil and fill geologic contact occurs at a depth of approximately 5 to 12 feet bgs. Native soil consists of silt with organics (roots) or peat grading to sand or silty sand extending from beneath the fill to at least 30 feet bgs.

2.6.1.2. Soil Quality

Based on the results of the RI for the 318 State Avenue NE property and the confirmation samples collected at the limit of the excavation in CSZ 1 during the remedial action in 2009, contaminant concentrations are less than MTCA soil cleanup levels in the southeast portion of the property. The cleanup levels for soil identified in the RI Report are the MTCA Method A and Method B cleanup levels for unrestricted land use.

2.6.2. Groundwater

2.6.2.1. Hydrogeology

Two hydrogeologic units are present in the area of the property; a shallow, unconfined aquifer and a deeper, artesian aquifer. The two aquifers are separated by an aquitard reported to be approximately 30 feet thick. Groundwater is present in the shallow, unconfined aquifer in the fill and native deposits above a regional aquitard. The top of the shallow groundwater table is typically 4 to 5 feet bgs at the property and the shallow groundwater gradient is to the north/northeast. The artesian aquifer is confined below the aquitard.

2.6.2.2. Groundwater Compliance Monitoring

Groundwater compliance monitoring has been performed at the 318 State Avenue NE property since the completion of the remedial action for soil in 2009 to evaluate the concentrations and natural attenuation of chlorinated solvents. Two years of quarterly groundwater monitoring activities were completed between May 2010 and February 2012 and semi-annual groundwater monitoring activities has been performed at the property since August 2012. The results of groundwater compliance monitoring performed in February 2015, which includes a tabulated summary of all of the groundwater compliance monitoring results for the property is provided in Appendix D. Groundwater monitoring analysis is being completed for chlorinated solvents including tetrachloroethene (PCE) and trichloroethene (TCE) and associated degradation products including 1,1-dichloroethene (1,1-DCE), cis-1,2-dichloroethene (1,2-DCE), trans-1,2-dichloroethene (1,2-DCE), and vinyl chloride (VC). The cleanup levels for groundwater identified in the RI Report are the MTCA Method A and Method B cleanup levels.

Groundwater compliance monitoring performed between May 2010 and August 2013 included collection and analysis of groundwater from monitoring well MW-17 located within the southeast portion of the property (Figure 2). Sampling and analysis of groundwater from MW-17 was performed during 12 monitoring events. Chlorinated compounds were either not detected or were detected at concentrations less than groundwater cleanup levels during all 12 events. No chlorinated organic compounds or degradation products were detected in the groundwater samples collected from MW-17 during the last two monitoring events (Table 1 in Appendix D). Groundwater compliance monitoring at MW-17 was discontinued based on the results.

Groundwater compliance monitoring performed between May 2010 and February 2011 included collection and analysis of groundwater from well MW-04 located on the southeastern boundary of the property, well MW-13 located south of the property and well MW-09 located east of the property (Figure 2). Sampling and analysis of groundwater from MW-04, MW-13 and MW-09 was performed during four monitoring events. Chlorinated compounds were either not detected or were detected at concentrations less than groundwater cleanup levels during all four events. Groundwater compliance monitoring at MW-04, MW-13 and MW-09 was discontinued based on the results (Table 1 in Appendix D).

Groundwater compliance monitoring performed between May 2010 and August 2013 also included collection and analysis of groundwater from monitoring well MW-08 located within the northeast portion of the property (Figure 2). Sampling and analysis of groundwater from MW-08 was performed during 12 monitoring events. Only VC was detected in the samples collected from MW-08. The concentration of VC initially exceeded the cleanup level but decreased to a concentration below cleanup level. VC was either not detected or detected at a concentration less than the cleanup level during five consecutive monitoring events (Table 1 in Appendix D). Groundwater compliance monitoring at MW-08 was discontinued based on the results.

Groundwater compliance monitoring between May 2010 and February 2015 has included collection and analysis of groundwater from three wells (i.e., MW-03, MW-16 and MW-18) located on the northern portion of the 318 State Avenue NE property adjacent to CSZ 1 (Figure 2) and the area to be redeveloped (i.e., southeast portion of the property). Sampling and analysis of groundwater from MW-03, MW-16 and MW-18 was performed during 14 monitoring events. VC has been detected at concentrations greater than the MTCA groundwater cleanup level in MW-03, MW-16 and MW-18. All other chlorinated compounds and degradation products were either not detected or were detected at concentrations less than groundwater cleanup levels during all 14 events (Table 1 in Appendix D).

2.6.2.3. Temporary Groundwater Monitoring

In April 2015, a temporary monitoring well (i.e., TW-1) was installed and sampled at the request of Ecology to support evaluation of groundwater on the northern portion of the area to be redeveloped (Figure 2). Temporary monitoring well TW-1 was located adjacent to monitoring wells MW-03, MW-16 and MW-18. The groundwater sample from TW-1 was analyzed for chlorinated solvents and associated degradation products. The results of the groundwater sample obtained from TW-1 are presented in Supplemental Site Investigation Report (GeoEngineers, 2015b) provided in Appendix E.

VC was the only chlorinated compound detected in the groundwater sample collected from temporary monitoring well TW-1 (Table 2 in Appendix E). Chlorinated degradation compounds of PCE and TCE include DCE and VC where DCE is the initial and VC is the final chlorinated degradation compound in the degradation chain. Because only VC contamination was observed in TW-1, the results are indicative that the source of contamination at TW-1 is groundwater migration from areas with residual concentrations of PCE, TCE and DCE such as monitoring well MW-03.

The results for groundwater from TW-1 were compared to MTCA groundwater cleanup levels protective of the highest beneficial use for groundwater. Ecology does not consider groundwater at the property as a likely potable water source (Ecology, 2015). Therefore, the highest beneficial use for groundwater is as marine surface water. The results were also compared to the MTCA Method B groundwater screening level protective of indoor air provided in Ecology's Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State (Ecology, 2009) as updated in April 2015 to revise the soil gas screening levels provided in Appendix B of the guidance document (Ecology, 2015).

The detected concentration of VC was greater than groundwater cleanup level based on protection of surface water (Table 2 in Appendix E). The detected concentration of VC was also greater than groundwater cleanup level based on protection of indoor air (Table 2 in Appendix E). However, as described in the following section, the results from analysis of soil gas samples collected from the southeast portion of the property were less than soil gas screening levels that are protective of indoor air, indicating that the VC in groundwater may not be causing soil gas concentrations that would exceed criteria for indoor air.

2.6.3. Soil Gas

In April 2015, soil gas sampling was performed in the southeast portion of the property at the request of Ecology to further evaluate the area to be redeveloped. Soil gas samples were collected from four locations, SG-1 through SG-4 (Figure 2), and were analyzed for chlorinated solvents and associated degradation products including PCE, TCE, 1,1-DCE, cis-1,2-DCE, trans-1,2-DCE and VC. The results of the soil gas sampling and analysis were compared to soil gas screening level criteria, which is protective of indoor air, provided in Ecology's Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State (Ecology, 2009) as updated in April 2015 to revise the soil gas screening levels provided in Appendix B of the guidance document (Ecology, 2015). The results of the soil gas samples obtained from the southeast portion of the property are presented in Supplemental Site Investigation Report (GeoEngineers, 2015b) provided in Appendix E.

The concentrations of TCE in soil gas samples collected from SG-2 and SG-4 were greater than the MTCA Method B soil gas screening level for TCE (Table 1 in Appendix E). All other chlorinated solvents and associated degradation products were either not detected or detected at concentrations less than MTCA Method B soil gas screening level in SG-2 and SG-4. Each of the contaminants analyzed in samples collected from SG-1 and SG-4 were either not detected or detected at concentrations less than MTCA soil gas screening level. Approximate locations of soil gas sampling locations SG-1 through SG-4 are shown on Figure 2.

3.0 MEDIA REQUIRING REMEDIAL ALTERNATIVE EVALUATION AND COCs

As discussed in Section 2.6, the contaminated media present in the southeastern portion of the property that is to be redeveloped consist of:

- Groundwater containing VC at concentrations greater than the groundwater cleanup level as indicated by the results of the groundwater sample collected from temporary monitoring well TW-1 (Section 2.6.2); and
- Soil gas containing TCE at concentrations greater than MTCA soil gas screening level as indicated by the results of soil gas samples collected from locations SG-2 and SG-4 (Section 2.6.3).

Residual groundwater contamination at the property is primarily observed adjacent to the southeastern portion of the property that is planned for redevelopment as indicated by the results of groundwater samples collected from MW-03, MW-16 and MW-18 as well as MW-17 (Section 2.6.2). The City is and will continue to monitor the natural attenuation of chlorinated solvents and associated degradation products in groundwater including groundwater on the northern boundary of the area to be redeveloped. Therefore, the media requiring remedial alternative evaluation as part of this FFS is contaminated soil gas that has the potential to migrate into the indoor space of the proposed redevelopment and present an exposure risk to the receptors (i.e., occupants).

The COCs in soil gas consist of chlorinated solvents and their degradation products (i.e., PCE, TCE, 1,1-DCE, cis-1,2-DCE, trans-1,2-DCE and VC). As discussed above (Section 2.6.3), only TCE was detected at a concentration greater than the MTCA screening level in soil gas samples obtained from the southeast portion of the property. However, other chlorinated solvents and degradation products are also considered COCs for soil gas since PCE as well as other degradation products were also detected in soil gas samples collected from the southeast portion of the property.

4.0 TRANSPORT AND EXPOSURE PATHWAYS

The COCs present in soil gas could be transported upward and/or laterally and enter a building through preferential pathways such as cracks in floor slabs and foundations, utility trenches and/or subsurface utility conduits. The COCs in soil gas could also remain trapped beneath the slab or foundation of structures if the foundation remains intact. Should the foundation integrity be compromised, then the accumulated contaminants could enter the indoor air space at that time. If COCs enter the indoor environment, there is a potential risk to building occupants through inhalation of indoor air.

Inhalation of COCs from soil gas intrusion by building occupants is a potentially complete exposure pathway. A complete exposure pathway consists of: (a) the presence of a source of contaminants; (b) movement of contaminants from source into the buildings by means described above; (c) a receptor (such as a building occupant); and (d) an exposure route to the receptor from the indoor air. For the purposes of this FFS, inhalation of indoor air containing COCs is the exposure route for a receptor.

Since all four exposure pathway factors may be present during future redevelopment/construction on the southeast portion of the property, this FFS assumes that a complete vapor intrusion exposure pathway could exist.

5.0 CLEANUP STANDARDS

Cleanup standards consist of cleanup levels that are protective of human health and the environment and the points of compliance at which the cleanup levels must be met.

5.1. Cleanup Levels

The MTCA indoor air screening levels provided in Ecology's Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State (Ecology, 2009) as updated in April 2015 (Ecology, 2015) are adopted as the cleanup levels for the COCs in indoor air. The following are the cleanup levels for the COCs:

COCs	Cleanup Level (µg/m^3)
PCE	9.62
TCE	0.37
1,1-DCE	91
cis-1,2-DCE	NE
trans-1,2-DCE	NE
VC	0.28

Notes:
µg/m^3 = micrograms per cubic meter of air
NE = not established

5.2. Point of Compliance

The point of compliance is in the indoor air present within the proposed redevelopment that is planned for the southeast portion of the property.

6.0 CLEANUP ACTION OBJECTIVE (CAO)

CAOs consist of chemical- and media-specific goals for the protection of human health and the environment and are intended to assist in focusing the development and evaluation of remedial alternatives. The objective of the cleanup action is to eliminate, reduce, or otherwise control to the extent feasible and practicable, unacceptable risks to human health and the environment posed by hazardous substances in contaminated media in accordance with the MTCA Cleanup Regulation (WAC 173-340) and other applicable regulatory requirements. The CAO for the southeast portion of the property is to mitigate the risk associated with exposure (inhalation) of receptors (i.e., building occupants) to the COCs that may be transported from soil gas to indoor air through vapor intrusion pathway.

7.0 IDENTIFICATION OF VAPOR INTRUSION CONTROL TECHNOLOGIES

Remedial technologies proposed in this FFS focus on the control of the vapor intrusion pathway to prevent unacceptable human exposure to COCs in indoor air as a result of vapor intrusion. Technologies considered for this FFS are grouped below under the following general response action (GRA) categories:

- Institutional Controls (ICs) – ICs include non-engineered administrative and legal controls exercised through governmental and planning programs that restrict and define building and land/resource use. ICs considered for this FFS include:
    - Government controls;
    - Proprietary controls;
    - Enforcement tools; and
    - Informational devices.
- Monitoring - This action involves monitoring indicators of vapor intrusion. Monitoring could include sampling and analysis of groundwater, soil gas and/or indoor air. Monitoring could be performed to verify that vapor intrusion is not impacting indoor air and/or to confirm that applied vapor control measures are effective.
- Physical Barriers or Containment - Technologies that provide a physical barrier to the vapor intrusion pathway include:
    - Vapor barriers;
    - Modified soil barriers;
    - Modified on-grade foundations;
    - Conduit sealing; and
    - Surface coatings.
- Sub-Slab Pressure Control – These vapor intrusion control technologies prevent vapor migration into indoor air by applying differential pressure in the subsurface (below the building slab) to force soil gas away from the building enclosure. These technologies include:
    - Sub-slab passive ventilation;
    - Sub-slab pressurization; and
    - Sub-slab depressurization.

- Point-of-Exposure Control – These technologies are designed to reduce air concentrations in the building at the point of exposure and include:
  - Exhaust of indoor space; and
  - Mechanical heating, ventilation, and air-conditioning (HVAC) system adjustments.
- In Situ Treatment – Remedial technology considered under this GRA is Soil Vapor Extraction (SVE), which relies on a network of extraction wells to extracts contaminated vapors from soil above the water table by applying a vacuum to pull the vapors out.

Detailed description for each technology listed above is provided in Table 1.

8.0 SCREENING OF VAPOR INTRUSION CONTROL TECHNOLOGIES

This section presents the results from screening of the vapor intrusion control technologies identified in the preceding section. Initial screening of remedial technologies allows for development of a range of tools that can be used individually or combined to address potential vapor intrusion at the site. Each technology is initially screened based on implementability, effectiveness and cost. Table 1 presents screening analysis of vapor intrusion control technologies based on these criteria and identifies technologies that are retained as a result of the screening analysis. The technologies that are retained are selected as is or combined into remedial alternatives, as appropriate, to be evaluated in the detailed analysis of alternatives. Following is the summary of technologies retained for development of remedial alternatives:

General Response Action	Vapor Intrusion Control Technology	Retained for Alternative Development[1]
Institutional Controls (ICs)	Governmental Controls	Yes
	Proprietary Controls	Yes
	Enforcement Controls	No
	Informational Devices	Yes
Monitoring	Monitoring (Sampling and Analysis)	Yes
Physical Barriers or Containment	Vapor Barriers	Yes
	Modified Soil Barriers	No
	Modified On-Grade Foundations	No
	Conduit Sealing	Yes
	Surface Coatings	No
Sub-Slab Pressure Control	Sub-Slab Passive Ventilation	Yes
	Sub-Slab Pressurization	No
	Sub-Slab Depressurization	Yes
Point of Exposure Control	Exhaust of Indoor Space	No
	Mechanical HVAC Adjustments	No
In Situ Treatment	Soil Vapor Extraction (SVE)	No

Notes:

[1] Refer to Table 1 for detailed screening analysis and rational used in retaining technologies.

9.0 DEVELOPMENT AND DESCRIPTION OF REMEDIAL ALTERNATIVES

The vapor intrusion technologies that were retained, as identified in Section 8.0, are assembled into logical alternatives by applying best professional engineering judgment. The following alternatives were developed such that they meet the CAO and are appropriate for the proposed redevelopment plan:

- Remedial Alternative 1 – Vapor Barrier, Sub-Slab Passive Ventilation, Conduit Sealing, ICs and Monitoring
- Remedial Alternative 2 – Vapor Barrier, Sub-Slab Depressurization, Conduit Sealing, ICs and Monitoring

9.1. Common Elements for Remedial Alternatives

The following ICs and technologies are applied to all alternatives:

- Governmental control IC would be implemented as part of building permit review conducted by the City. Upon receipt of building permit application for the southeast portion of the property that is planned for redevelopment, the City would review the vapor intrusion control measures, as needed.
- Proprietary control IC (i.e., environmental restrictive covenant) would be recorded to cover the operation, maintenance, and monitoring of the vapor intrusion remedy to ensure that future property owners are informed of vapor intrusion considerations and any requirements for maintaining the effectiveness of an installed vapor intrusion control remedy and to restrict activities that could result in unacceptable risk to human health and environment.
- Informational device ICs would be provided to property owners to understand the process that Ecology will follow with regards to evaluating the vapor intrusion control requirements for the new construction.
- Dry conduits that have the potential to serve as a pathway for vapors from below the floor slab into the building would be sealed as part of the new construction to minimize this potential vapor intrusion pathway.
- Vapor barrier consisting of either synthetic liners or spray-applied membranes (see Table 1) with sub-slab ventilation system would be installed underneath the concrete slab of the new construction to seal off any vapor intrusion pathway and ventilate sub-slab vapors into the atmosphere. The sub-slab ventilation system consists of gravel and/or sand layer with perforated pipes (or an equivalent geomembrane for vapor collection) that is connected by solid piping to one or more vertical risers that vent sub-slab vapors to the atmosphere.
- A post-construction/pre-occupancy indoor air sampling and analysis event would be completed following the completion of new construction to monitor indoor air quality. Multiple indoor air samples would be collected from the first floor, which is immediately above the ground surface of the new building. An ambient air sample would also be collected to evaluate ambient air quality to compare to the results of indoor air samples. The indoor air sampling and analysis would be described in a sampling and analysis plan that would be submitted to Ecology for review and approval. Indoor air samples would be analyzed for the COCs identified in Section 3.0. Results of the indoor air monitoring event would be presented in a report for Ecology's review and approval.
- Inspections and maintenance of the integrity of the vapor barrier and ventilation system would be completed through ICs to provide a means to ensure protection of human health over time. An operation and maintenance plan would be prepared that identifies the methodology and procedures of

operation, maintenance and monitoring activities, schedule of activities and task responsibilities. The operation and maintenance plan would be submitted to Ecology for review and approval.

- Both Remedial Alternative 1 and 2 assume that the new construction proposed within the southeastern portion of the property does not contain a basement or floor at a depth at or below the groundwater table. A vapor barrier with a sub-slab ventilation system may not be appropriate for buildings with a basement or floor that extends into the groundwater table.

9.2. Remedial Alternative 1

In addition to the common elements described in Section 9.1, Remedial Alternative 1 includes a passive, sub-slab ventilation system that could be converted to an active ventilation system, if necessary. Passive ventilation is achieved by a wind-driven turbine located at the top of the vent riser that generates a slight, negative pressure below the vapor barrier to induce vapor flow from the sub-slab to the atmosphere via the riser(s). The exhaust of the system may require treatment depending on contaminant concentrations. This FFS assumes that exhaust treatment will not be required and does not incorporate cost associated with it. The cost estimate for Remedial Alternative 1 is presented in Table 2.

9.3. Remedial Alternative 2

In addition to common elements described in Section 9.1, Remedial Alternative 2 includes sub-slab depressurization system to enhance ventilation of sub-slab vapors. The sub-slab depressurization system consist of a blower that creates a negative sub-slab pressure by removing air from beneath the slab. This induces soil gas flow into sub-slab piping with discharge from the blower to a vent on the building roof. The exhaust of the system may require treatment depending on contaminant concentrations. This FFS assumes that exhaust treatment will not be required and does not incorporate cost associated with it. The cost estimate for Remedial Alternative 2 is presented in Table 3.

10.0 FEASIBILITY STUDY EVALUATION CRITERIA

This section presents a description of MTCA's threshold and other requirements for remedial actions that are used in this FFS to evaluate the remedial alternatives.

10.1. Threshold Requirements

Remedial actions performed under MTCA must comply with threshold requirements. Remedial alternatives that do not comply with the threshold requirements are not considered suitable remedial alternatives under MTCA. As provided in WAC 173-340-360(2)(a), remedial alternatives shall meet the following four threshold requirements:

10.1.1. Protect Human Health and the Environment

The results of remedial actions performed under MTCA must ensure that both human health and the environment are protected.

10.1.2. Comply with Cleanup Standards

Compliance with cleanup standards requires, that cleanup levels are met at the applicable points of compliance. If a remedial action does not comply with cleanup standards, the remedial action is an interim action, not a remedial action.

10.1.3. Comply with Applicable State and Federal Laws

Remedial actions conducted under MTCA must comply with applicable state and federal laws. The term "applicable state and federal laws" includes legally applicable requirements and those requirements that Ecology determines to be relevant and appropriate as described in WAC 173-340-710.

10.1.4. Provide for Compliance Monitoring

The remedial action must allow for compliance monitoring in accordance with WAC 173-340-410. Compliance monitoring consists of protection monitoring, performance monitoring and confirmational monitoring. Protection monitoring is conducted to confirm that human health and the environment are adequately protected during construction and the operation and maintenance period of a cleanup action. Performance monitoring is conducted to confirm that the remedial action has attained cleanup standards and, if appropriate, remediation levels or other performance standards. Confirmational monitoring (i.e., groundwater, soil gas, indoor air and/or other media) is conducted to confirm the long-term effectiveness of the remedial action once cleanup standards and, if appropriate, remediation levels or other performance standards have been attained.

10.2. Other MTCA Requirements

In accordance with the MTCA, when selecting from remedial alternatives that fulfill the threshold requirements, the alternatives shall be further evaluated against the criteria presented in the following sections.

10.2.1. Use Permanent Solutions to the Maximum Extent Practicable

MTCA requires that when selecting a remedial alternative, preference shall be given to permanent solutions to the maximum extent practicable [WAC 173-340-360(2)(b)(i)]. MTCA specifies that the permanence of remedial alternatives shall be evaluated by balancing the costs and benefits of each of the alternatives using a "disproportionate cost analysis" in accordance with WAC 173-340-360(3)(e). The criteria for conducting this analysis are described in Section 10.3 below.

10.2.2. Provide for a Reasonable Restoration Time Frame

In accordance with WAC 173-340-360(2)(b)(ii), MTCA places a preference on those remedial action alternatives that, while equivalent in other respects, can be implemented in a shorter period of time. According to MTCA, the following factors shall be considered to determine whether a remedial alternative provides for a reasonable restoration time frame:

- Potential risks posed by the site to human health and the environment;
- Practicability of achieving a shorter restoration time frame;
- Current use of the site, surrounding areas, and associated resources that are, or may be, affected by releases from the site;
- Potential future use of the site, surrounding areas, and associated resources that are, or may be, affected by releases from the site;
- Availability of alternative water supplies;
- Likely effectiveness and reliability of institutional controls;

- Ability to control and monitor migration of hazardous substances from the site;
- Toxicity of the hazardous substances at the site; and
- Natural processes that reduce concentrations of hazardous substances and have been documented to occur at the site or under similar site conditions.

10.2.3. Consider Public Concerns

In accordance with WAC 173-340-360(2)(b)(iii), Ecology will consider public concerns in making its preliminary selection of an appropriate remedial alternative.

10.3. MTCA Disproportionate Cost Analysis (DCA)

The MTCA DCA is used to further evaluate which of the alternatives that meet the threshold requirements are permanent to the maximum extent practicable. This analysis involves comparing the costs and benefits of alternatives and selecting the alternative whose incremental costs are not disproportionate to the incremental benefits. The evaluation criteria for the disproportionate cost analysis are specified in WAC 173-340-360(2) and include protectiveness, permanence, cost, long-term effectiveness, management of short-term risks, implementability and consideration of public concerns.

As outlined in WAC 173-340-360(3)(e), MTCA provides a methodology that uses the criteria listed below to determine whether the costs associated with each remedial alternative are disproportionate relative to the incremental benefit of the alternative above the next lowest-cost alternative. The comparison of benefits relative to costs may be quantitative, but will often be qualitative. Costs are disproportionate to benefits if the incremental costs of the more permanent alternative exceed the incremental degree of benefits achieved by the other lower-cost alternative [WAC 173-340-360(e)(i)]. Where two or more alternatives are equal in benefits, Ecology selects the less costly alternative [WAC 173-340-360(e)(ii)(c)].

Each of the MTCA criteria used in the DCA is described below.

10.3.1. Protectiveness

The overall protectiveness of a cleanup action alternative is evaluated based on several factors. First, the extent to which human health and the environment are protected and the degree to which overall risk at a Site is reduced are considered. Both on-site and off-site reduction in risk resulting from implementing the alternative are considered.

10.3.2. Permanence

MTCA specifies that when selecting a cleanup action alternative, preference shall be given to actions that are “permanent solutions to the maximum extent practicable.” Evaluation criteria include the degree to which the alternative permanently reduces the toxicity, mobility or mass of hazardous substances, including the effectiveness of the alternative in destroying the hazardous substances, the reduction or elimination of hazardous substance releases and sources of releases, the degree of irreversibility of waste treatment processes, and the characteristics and quantity of treatment residuals generated.

10.3.3. Cost

The analysis of remedial action alternative costs under MTCA includes the costs associated with implementing an alternative, such as design, construction, long-term monitoring and institutional controls.

Costs are intended to be comparable among different alternatives to assist in the overall analysis of relative costs and benefits of the alternatives. The costs to implement an alternative include the cost of construction, the net present value of any long-term costs and agency oversight costs. Long-term costs include operation and maintenance costs, monitoring costs, equipment replacement costs and the cost of maintaining institutional controls. Unit costs used to develop overall remediation costs for this FFS were derived using a combination of published engineering reference manuals (RS Means Heavy Construction Cost Data Manual); construction cost estimates solicited from applicable vendors and contractors; review of actual costs incurred during similar, applicable projects; and professional judgment.

10.3.4. Long-Term Effectiveness

Long-term effectiveness is a parameter that expresses the degree of certainty that the alternative will be successful in maintaining compliance with cleanup standards over the long-term performance of the cleanup action. MTCA regulations contain a specific preference ranking for different types of technologies that is to be considered as part of the comparative analysis. The ranking places the highest preference on technologies such as reuse/recycling, treatment, immobilization/solidification, and disposal in an engineered, lined, and monitored facility. Lower preference rankings are applied for technologies such as on-site isolation/containment with attendant engineered controls, and institutional controls and monitoring.

10.3.5. Management of Short-Term Risks

Evaluation of this criterion considers the relative magnitude and complexity of actions required to maintain protection of human health and the environment during implementation of remedial actions. Remedial actions involving mobilization of contaminants or heavy construction elements carry a higher short-term risks associated with health and safety. In-water dredging activities carry a risk of temporary water quality degradation and potential sediment recontamination. Some short-term risks can be managed through the use of best management practices during project construction, while other risks are inherent to project alternatives and can offset the long-term benefits of an alternative.

10.3.6. Implementability

Implementability is a parameter expressing the relative difficulty and uncertainty of implementing a given remedial action. Evaluation of implementability includes consideration of technical factors such as the availability of mature technologies and experience of contractors to accomplish the cleanup work. It also includes administrative factors associated with permitting and completing the cleanup.

10.3.7. Consideration of Public Concerns

The extent to which an alternative addresses public concerns is considered as part of the evaluation process. This includes potential concerns of individuals, community groups, local governments, tribes, federal and state agencies, and other organizations that may have an interest in or knowledge of the site.

11.0 EVALUATION AND COMPARISON OF REMEDIAL ALTERNATIVES

This section provides an evaluation and comparative analysis of the remedial alternatives. The remedial alternatives are evaluated with respect to the MTCA evaluation criteria described in Section 10 and then compared to each other relative to their expected performance under each criterion. The detailed

evaluation of the remedial alternatives is presented in Table 4. The results of the evaluation and MTCA DCA are summarized in Table 5.

11.1. Compliance with MTCA Requirements

Each remedial alternative was evaluated to ensure compliance with the MTCA threshold and other requirements including permanence to the maximum extent practicable and reasonable restoration timeframe. The following sections (Sections 11.1.1 through 11.1.3) discuss how each remedial alternative meet these MTCA requirements.

11.1.1. Threshold Requirements

Each of the remedial alternatives described in this FFS meet the four MTCA threshold requirements including protection of human health and the environment, compliance with cleanup standards, compliance with applicable state and federal regulations, and provision for compliance monitoring. The remedial alternatives developed meet these threshold requirements by utilizing a combination of remedial technologies to prevent human exposures to COCs.

Both remedial alternatives developed are similar in the manner in which the MTCA threshold requirements would be met. Both Remedial Alternative 1 and 2 addresses the requirements by reducing or eliminating transport/exposure pathways through the use of vapor barrier and sub-slab ventilation system. Properly designed, installed, and maintained vapor barriers with ventilation systems (passive or active sub-slab depressurization) are protective of human health by reducing or eliminating the vapor intrusion migration pathway into a building. The ventilation system enhances the performance of the vapor barrier with respect to eliminating the vapor intrusion pathway by collecting and removing the sub-surface vapors. Compliance monitoring after completing the building construction would be used to confirm that indoor air COCs concentrations are less than the cleanup standards. Inspections and maintenance of the vapor barrier integrity and ventilation system through ICs provide a means to confirm protection of human health and over time.

11.1.2. Requirement for Permanent Solutions to the Maximum Extent Practicable

Under MTCA, preference is given to cleanup actions that use permanent solutions to the maximum extent practicable. By definition (WAC 173-340-200), permanent remedies are those that would require no additional action to meet cleanup standards following implementation. A practicable cleanup action is one that can be designed, constructed and implemented in a reliable, cost-effective manner. To determine which cleanup actions are permanent to the maximum extent practicable, MTCA specifies that a DCA be used to compare the probable remedy cost to the relative benefits of the alternative. A cleanup action is not considered practicable if the incremental costs are disproportionate to the benefits when compared to lower cost alternatives. This determination is demonstrated by the relative benefit/cost ratio such that alternatives having additional incremental benefits that are disproportionate to the incremental additional cost, produce lower relative benefit/cost ratios.

The DCA used to determine which remedial alternative is most permanent to the maximum extent practicable is presented in Section 11.2.

11.1.3. Requirement for Reasonable Restoration Time Frame

Each of the remedial alternatives developed are expected to achieve the CAO within a reasonable time frame. The time frame required to achieve the CAO was evaluated in accordance with the factors outlined

in WAC 173-340-360(4). Both remedial alternatives are expected to meet the CAO and achieve protection of human health and immediately following implementation by reducing or eliminating vapor migration pathways. Therefore, restoration timeframe is short. The restoration time frame for each alternative includes design, permitting, construction, and implementation of the cleanup action components. For both Remedial Alternatives 1 and 2, the restoration time frame is estimated to be less than 1 year.

11.2. Remedial Alternative Disproportionate Cost Analysis

The DCA is used to compare the relative benefit of a remedial alternative to the probable remedy cost to select a remedy that is the most permanent and practicable. The relative benefit, estimated alternative cost and comparative analysis for the remedial alternatives are presented in the following sections (Sections 11.2.1 through 11.2.3).

11.2.1. Remedial Alternative Benefit

For each remedial alternative, the overall relative benefit was determined based on the summation of weighted scores for each DCA criterion, including protectiveness, permanence, long-term effectiveness, management of short-term risks, technical and administrative implementability and consideration of public concerns. For each criterion, the alternative was scored on a 1 to 10 scale based on the degree to which the alternative satisfies the full description of the individual criterion. A score of 1 indicates the alternative is considered to satisfy the elements of the criterion to a very low degree while a score of 10 indicates the alternative is considered to satisfy the elements of the criterion to a very high degree. For each alternative, the individual criterion scores were then weighted according to the following weighting factors identified by Ecology to be used in feasibility studies.

DCA CRITERIA WEIGHTING FACTORS

DCA Criteria	Weighting Factor (%)
Protectiveness	30
Permanence	20
Long-term effectiveness	20
Management of short-term risks	10
Technical and administrative implementability	10
Consideration of public concerns	10

The DCA criterion and scoring for each remedial alternative are presented in Table 4. Determination of the relative benefit score for each of the six MTCA criterion are summarized in the following sections (Sections 11.2.1.1 through 11.2.1.6).

11.2.1.1. Protectiveness

Both Remedial Alternatives 1 and 2 achieve high level of overall protectiveness by reducing or eliminating transport/exposure pathway of contaminated soil gas into a building. Remedial Alternative 2 achieves a slightly higher score on protectiveness due to the use of active sub-slab depressurization/ventilation system as compared to Remedial Alternative 1, which uses passive ventilation system.

11.2.1.2. Permanence

Both Remedial Alternatives 1 and 2 achieve high level of permanence. Vapor barriers with passive ventilation system or active sub-slab depressurization/ventilation system have a demonstrated long life, and their permanence is expected to be similar to that of the building. Both of the vapor intrusion control alternatives has been utilized with a demonstrated ability to prevent vapor intrusion.

11.2.1.3. Long-Term Effectiveness

Both Remedial Alternatives 1 and 2 achieve medium-high level of long-term effectiveness. The long-term effectiveness depends upon the design and installation quality, as well as long-term care to ensure that the integrity of the vapor barrier is maintained. For example, future building modifications must be appropriately completed as not to puncture the vapor barrier or to reestablish the integrity of the vapor barrier. Vapor barrier seals on utility and other conduits entering the building must also be maintained to prevent leaks through improperly sealed utility penetrations.

11.2.1.4. Management of Short-Term Risks

Both Remedial Alternatives 1 and 2 achieve high score in management of short-term risks. The installation of vapor barriers with passive ventilation or active sub-slab depressurization/ventilation system does not create conditions that could impact workers health during construction. Established construction practices are used to install and appropriately seal the vapor barrier as well as the ventilation systems.

11.2.1.5. Technical and Administrative Implementability

Vapor barriers with passive ventilation or active sub-slab depressurization/ventilation system can be implemented in new commercial or residential building. Remedial Alternative 2 achieves slightly lower score than Alternative 1 since technical implementation of active sub-slab depressurization system is slightly more complex than passive ventilation system.

11.2.1.6. Considerations of Public Concerns

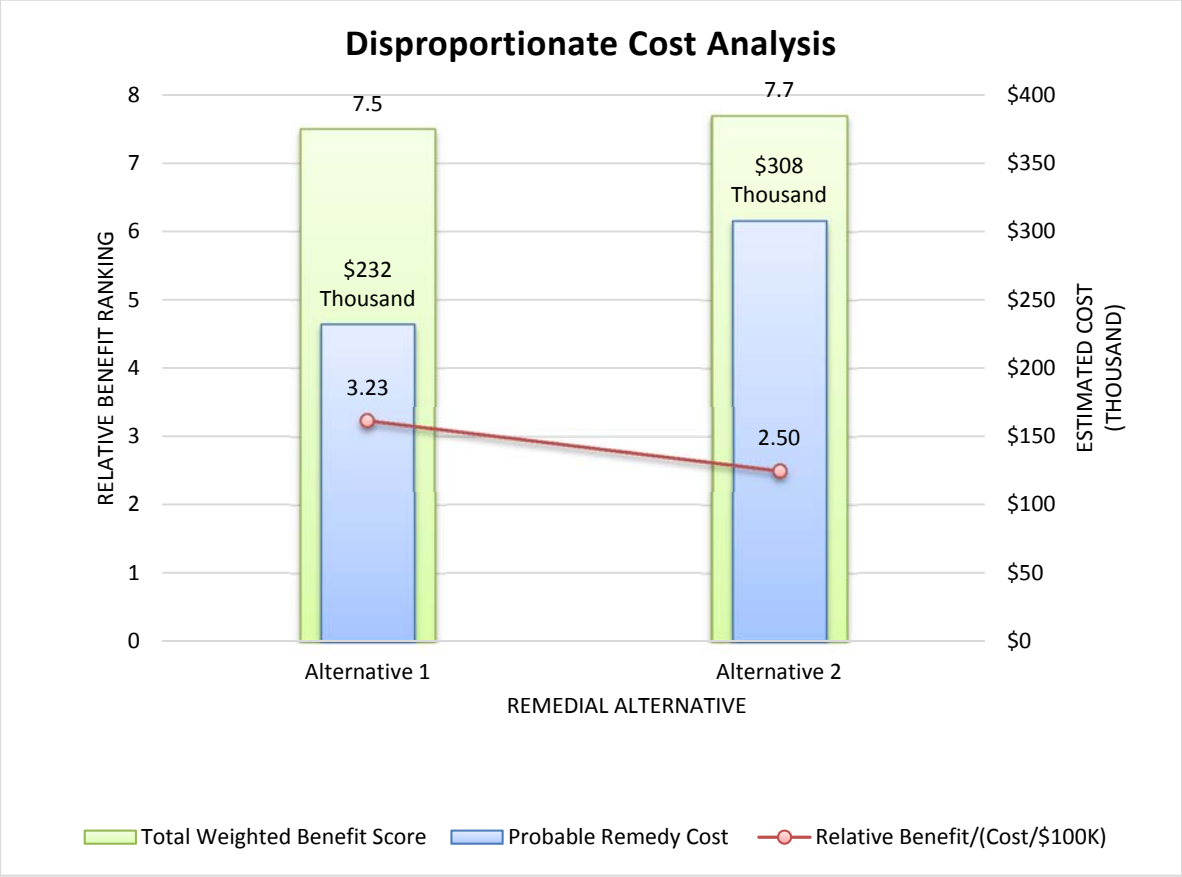
Both Remedial Alternatives 1 and 2 achieve medium score in regards to public concern. Both alternatives do not include treatment to reduce the toxicity, mobility, or volume of COCs. However, the vapor barrier in combination with the passive ventilation or active sub-slab depressurization/ventilation system reduces or eliminates the mobility of sub-slab vapors into a building. Residual contamination remaining in soil gas could be a concern to the public.

11.2.2. Remedial Alternative Cost

For each remedial alternative, probable remedy costs (+50/-30 percent) were developed as described in Section 10.3.3 using a combination of construction cost estimates solicited from applicable vendors and contractors, review of actual costs incurred during similar, applicable projects and professional judgment. Concept design level remedial alternative costs for Remedial Alternatives 1 and 2 are presented in Tables 2 and 3, respectively.

11.2.3. Comparative Analyses

The MTCA DCA analysis uses a relative benefit/cost ratio to compare each of the remedial alternatives developed and is used to determine whether overall remedy cost is disproportionate to the relative benefit when compared to other alternatives. Using the summation of the weighted benefit scores described in Section 11.2.1 and the estimated remedy cost described in Section 11.2.2, a relative benefit/cost ratio was calculated for each remedial alternative. The benefit/cost ratio was calculated by dividing the total weighted benefit score by the total cost for each alternative. The resulting relative benefit/cost ratio for each remedial alternative is plotted relative to the overall benefit score and probable remedy cost below. To facilitate graphical presentation of the relative benefit/cost shown below, the total cost of each remedial alternative was divided by $100,000.



The individual DCA criterion benefit scores (Section 11.2.1), weighting factors, weighted scores and total weighted benefit score and probable remedy cost for each of the remedial alternatives used to generate the DCA graphic above are presented in Table 5.

11.3. Preferred Remedial Alternative

Under MTCA, "costs are disproportionate to benefits if the incremental costs of the alternative over that of a lower cost alternative exceed the incremental degree of benefits achieved by the alternative over that of lower cost alternative" [WAC 173-340-360(3)(e)(i)]. From the resulting relative benefit/cost ratio graphically illustrated above in Section 11.2.3, the overall cost for Remedial Alternative 2 is disproportionate to the environmental benefit that it provides. As a result, Remedial Alternative 1 emerges as the preferred alternative.

Remedial Alternative 1 uses permanent solutions to the maximum extent practicable and achieves the highest overall cost to benefit ratio. Remedial Alternative 1 is detailed in Section 9 and summarized below:

- Implementing institutional controls including governmental control (planning and permitting of vapor intrusion control measures), proprietary control (environmental restrictive covenant) and informational devices.
- Sealing of dry conduits that have potential to serve as a pathway for vapors from the sub-slab into the building.
- Installing vapor barrier underneath the concrete slab of the new construction to seal off the vapor intrusion pathway.
- Constructing a passive, sub-slab ventilation system consisting of a gravel and/or sand layer with perforated pipes (or an equivalent geomembrane for vapor collection) that collect vapors from the sub-slab and convey it to one or more vertical risers that vent the vapors to the atmosphere.
- Completing post-construction/pre-occupancy indoor air monitoring following the completion of new construction to confirm that the indoor air COC concentrations are below cleanup standards.
- Long-term inspection and maintenance of the vapor barrier integrity and ventilation system.

12.0 REFERENCES

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Table 1

Vapor Intrusion Control Technologies Screening

318 State Avenue NE Property
Olympia, Washington

General Response Action	Remedial Technology	Option	Description	Implementability	Effectiveness	Relative Cost		Summary of Screening	Technology Retained?
						Capital	O&M		
Institutional Controls (ICs)	Governmental Controls	Zoning restrictions, Municipal ordinances, Local permits/state codes, and/or Other land or resource use restrictions	Government controls use the regulatory authority of a governmental entity (normally a state or local government) to impose restrictions or requirements on citizens or property under the entity's jurisdiction. Upon implementation, local and state entities use traditional regulatory authority to enforce the ICs.	Property owners and contractors are bound to follow restrictions/requirements imposed by governmental agencies, City guidelines and permitting requirements when implementing new construction. Risk is present should the process to implement this IC be ignored.	Highly effective if this IC is appropriately implemented, maintained, and enforced.	Low	Low	Applicable and/or required in combination with other technologies.	Yes
	Proprietary Controls	Restrictive Covenants	Proprietary ICs consist of covenants to restrict specific activities on individual properties associated with or in the vicinity of the Site that could result in unacceptable risk to human health and/or the environment.	These controls have their basis in real property law and implementation of this IC involves legal instruments placed in the chain of title of a property.	Covenents "run with the land," meaning that they are binding on subsequent property owners and would be in place permanently until revoked by Ecology. The recorded language must be general enough to apply to future conditions yet specific enough to bind future owners to those conditions.	Low	Low	The benefit of this type of IC is that they can be binding on subsequent purchasers of the property and transferable, which may make them more reliable in the long-term than other types of ICs.	Yes
	Enforcement and Permit Tools	Administrative Orders	These ICs include administrative orders and permits to compel a land owner to limit certain site activities, prohibit land use in certain ways, or from conducting certain activities at a property.	Enforcement ICs are relatively more difficult to implement as they may require negotiation to achieve agreement between the enforcing entity and the affected landowner.	Similar to other ICs, Enforcement ICs are effective as long as compliance with the mandated activities can be confirmed. Enforcement ICs can be grouped with other ICs in a layered approach; however, care must be taken to avoid misunderstandings through conflicting IC direction.	Low	Low	Difficult to implement and administer as compared to other Ics.	No
	Informational Devices	State registries of contaminated sites, Public notices, Deed notices, Fact sheets and/or Advisories	Informational tools provide information or notification with regard to a remedy or residual contamination at a site. The informational devices provide a means to inform property owners and tenants regarding Site issues and/or planned activities.	Placing information concerning the Site through recorded notices, Site Registries, or other notification methods is relatively easy to implement.	While Informational ICs provide relatively high visibility to attempt to control Site activities, limited enforcement capability exists within these controls to ensure that requested actions are taking place.	Low	Low	This IC is typically grouped with other ICs to help inform and therefore, encourage compliance with more restrictive ICs.	Yes
Monitoring	Monitoring (Sampling and Analysis)	Indoor air, Soil gas and/or groundwater sampling and analysis	Indoor air monitoring provides information on the concentration of contaminants and provides an ability to directly evaluate whether vapor intrusion is occurring at the Site. Soil gas and groundwater monitoring can provide data to identify if contaminants are present that could be transported into a building via the vapor intrustion pathway. However, monitoring of soil gas and groundwater after completion of the remedial action will not provide data to evaluate whether vapor intrusion is occuring.	Monitoring can be readily implemented prior to construction, and following construction. Established practices and procedures exist for monitoring indoor air, soil gas and groundwater. Access issues may result in monitoring not always occurring at the preferred location.	Monitoring by itself is not effective for vapor intrusion control; however, can be used to evaluate changes in the potential for vapor intrusion. Indoor air monitoring provides information for assessing if COCs concentrations are below long-term exposure goals and that vapor intrusion control measures are effective. Soil gas and groundwater monitoring allows an evaluation of whether COCs concentrations in the subsurface could migrate into buildings.	Low	Moderate	Not retained as a stand-alone technology. Monitoring is not effective for preventing risk to human health. Monitoring, in conjunction with engineering controls to verify the effectiveness of the engineered controls is retained.	Yes
Physical Barriers or Containment	Vapor Barrier	Synthetic liners and/or seamless, spray-applied membranes.	Synthetic liners are typically constructed of high-density polyethylene (HDPE), linear low-density polyethylene (LLDPE), or polyvinyl chloride (PVC). HDPE geomembrane liners have three layers of material. The material is stiff, strong, and resistant to tears and punctures. The correct installation and welding of HDPE liner material is of critical importance to ensure integrity and long-term performance of the liner. The seaming of the liner is performed by hot wedge welding and is performed by qualified installers. In addition, HDPE liners are rodent and root resistant. LLDPE liners are more flexible than HDPE liners and can be elongated in one or more directions to accommodate uneven or unsettled ground. High elongation properties make LLDPE liners ideal when increased puncture resistance is required due to ground irregularities. LLDPE is fusion and extrusion welded on-site. PVC liners are thinner and more flexible than LLDPE liners and are very easy to patch or seam together. PVC liners are less susceptible to stress, heat, or thermal expansion and can stretch to conform to moving or irregular ground surfaces. A common spray-applied vapor barrier is Liquid Boot®, which is spray applied as a cold, waterbased, seamless monolithic, membrane. It is typically applied at a thickness of 60-100 mils over a base fabric. For new construction, Liquid Boot® is applied under concrete slabs and sealed to all footings and pipe penetrations.	Vapor barriers are easy to install for future building construction because designs and installation materials and practices are established. Qualified contractors are available. Care needs to be taken to prevent compromising the vapor barrier after installation of building modifications or new utilities. Implementation of repairs or other vapor barrier modifications may be difficult post-construction of a new building.	Vapor barriers are typically applied in conjunction with passive venting as a lowcost additional safeguard against vapor intrusion. Together these two technologies have a proven record of preventing the migration of contaminants into buildings, though this effectiveness depends upon the design, installation quality, and long-term maintenance of the barrier. Post-construction modifications to building structures need to avoid puncturing the barrier. Properly sealed seams and sealing around utility penetrations are key factors in the effectiveness of vapor barriers.	Moderate	Low	This is a proven method for limiting vapor intrusion as part of the construction of new buildings. Installation is commonly associated with a passive venting system because reliability of vapor barriers as a stand-alone technology has not been demonstrated.	Yes
	Modified Soil Barriers	Barrier constructed of bentonite-soil mixture	This technology consists of applying a bentonite-soil mixture under a building to create a barrier with minimal air pores. These relatively impermeable soils reduce the upward migration of contaminants.	Modified soil barriers are easy to install for future buildings as designs and installation materials and practices are established. Qualified contractors are available. Implementation of repairs or other vapor barrier modifications may be difficult post-construction of a new building.	Modified soil barriers limit the migration of contaminants into buildings by establishing a low-permeability barrier under the building. This effectiveness depends upon the design, installation quality, and long-term maintenance of the barrier. Drying may limit the effectiveness of the barrier.	Low to Moderate	Low	This technology is most commonly used to minimize differential settlement for new building construction. Limited information is available on the long-term effectiveness of a modified soil barrier to control vapor intrusion, especially relative to vapor barriers.	No
	Modified On-Grade Foundations	Monolithic Concrete Pours	This technology includes monolithic concrete pours that limit cold joints and may include low air-entrainment, post-tension reinforcement, and thickened-mat slabs.	Modified on-grade foundations can be implemented in new buildings as designs and installation materials and practices are established. Qualified contractors are available. Implementation of repairs or other vapor barrier modifications may be difficult postconstruction of a new building.	This technology may reduce indoor air concentrations, but the technology does not eliminate pathways through the building slab. Long-term integrity of the monolithic concrete slab is hard to achieve for buildings with a larger footprint.	High	Low	This technology is not a cost-effective containment technology for vapor intrusion prevention.	No
	Conduit Sealing	Expanding foam, Pourable polyurethane and/or Plugs	Conduit sealing is used for dry conduits that serve as a direct pathway for vapors from the subslab into the building.	This technology can be readily implemented in new construction on existing and future residential and commercial buildings. Proven materials and installation practices exist for conduit sealing.	This technology is only effective at minimizing the vapor intrusion pathway associated with dry conduits. This technology needs to be combined with other technologies to achieve vapor intrusion control.	Low	Low	Conduit sealing may be combined with other technologies for vapor intrusion control alternatives.	Yes

Table 1

Vapor Intrusion Control Technologies Screening

318 State Avenue NE Property
Olympia, Washington

General Response Action	Remedial Technology	Option	Description	Implementability	Effectiveness	Relative Cost		Summary of Screening	Technology Retained?
						Capital	O&M		
Physical Barriers or Containment (Continued...)	Surface Coatings	Expandable sealants	Cracks or holes in floors can be sealed using expandable sealants to block a vapor intrusion migration pathway. These sealants can also be applied in the annulus around a conduit penetration of the floor.	This technology can be implemented in new residential and commercial buildings. In new construction, proven materials and installation practices exist for surface coatings. Implementation of long-term maintenance of surface coatings is limited for those areas where carpeting or tile has been installed.	While having been used for vapor intrusion mitigation, the effectiveness depends on the design and installation quality, as well as long-term maintenance. Re-application of the coating may be required for long-term maintenance. As all cracks, holes, or other penetrations in the building foundation that enables vapor intrusion may not be accessible, the effectiveness of this technology will vary and may not be protective.	Low	Low to Moderate	As all cracks, holes, or other penetrations in the building foundation that enables vapor intrusion may not be accessible, the effectiveness of this technology will vary and may not be protective. This technology is not a cost-effective containment technology for vapor intrusion control.	No
Sub-Slab Pressure Control	Sub-Slab Passive Ventilation	Sub-Slab Passive Ventilation	A sub-slab passive ventilation system consists of perforated pipes within an aggregate or sand layer, manifolded to a vertical riser that conveys the vapors to a vent above the building roof. The roof vent riser typically terminates with a wind-driven turbine that would create a slight negative pressure in the subsurface, thus inducing vapor flow from the subsurface to the outside air via the vent. Being a passive system, no mechanical equipment is included with the ventilation.	This technology can be readily integrated into the construction of new residential or commercial buildings. Standard construction procedures and practices would be involved. Installation commonly includes provisions to modify, if needed, to an active mechanical depressurization system, especially for larger commercial buildings.	This technology is effective to the extent that the induced negative pressure and capture of vapors covers the extent of the building slab. As a pressure differential typically exists between the sub-slab and the building, a vapor barrier is commonly needed for this passive ventilation system to achieve the desired effectiveness for vapor intrusion control.	Low to Moderate	Low	For new buildings, sub-slab passive ventiflation is combined with suitable containment technology (e.g. vapor barrier) to achieve cost-effective vapor intrusion control.	Yes
	Sub-Slab Pressurization	Sub-Slab Pressurization	Outside air is actively introduced below the building slab using a blower. The small, positive pressure created just below the building slab forces outside air into the pore spaces. This pressure layer eliminates the convective flow of vapors from the underlying soil. A system of exhaust vents is included to control the distribution of the sub-slab pressurization.	This technology can be implemented in new buildings, whether residential or commercial. Installation and operation of this system would rely on standard construction practices and readily available materials. This technology cannot be implemented for buildings with a basement below the water table.	Contaminant concentrations in ambient air would have to be sufficiently low as not to be of concern for vapor intrusion risk to human health. A layer of aggregate or sand placed below the slab enhances the effectiveness of this technology by creating a suitable pathway for uniform distribution of the air and associated sub-slab pressurization. If direct conduits or other seams are present allowing an undesired ventilation pathway, the pressure distribution may not be uniform under the building slab. Construction needs to be carefully performed to ensure that slab penetrations do not allow short-circuiting of the air.	High	High	For new or future buildings, more cost-effective vapor intrusion control technologies are available.	No
	Sub-Slab Depressurization	Sub-Slab Depressurization	This technology is similar to sub-slab pressurization with regard to sub-slab construction in that a blower is connected to the system; however, in this case, the blower creates a slight negative subslab pressure by removing air beneath the foundation. This induces soil gas flow into sub-slab piping with discharge from the blower to a vent on the roof. The exhaust of the system may require treatment depending upon contaminant concentrations.	As with sub-slab pressurization, this technology can be implemented in new residential or commercial buildings using standard construction practices and readily available materials. This technology may be subject to vapor treatment requirements and cannot be implemented for buildings with a basement below the water table.	This technology has been shown to be effective in controlling vapor intrusion. Besides removing contaminants from under the building slab, the negative pressure contributes to a net air movement from the building to the sub-slab if air flow pathways exist in the building slab.	Moderate to High	High	Effective in controling vapor intrusion and creating negative pressure to enhance net air movement in sub-slab. Assumes that vapor treatment is not required.	Yes
Point of Exposure Control	Exhaust of Indoor Space	Exhaust of Indoor Space	Fans remove air from the building interior and facilitate inflow/circulation of ambient air into the building through doors, windows, or other openings. Similar to bulk air exhaust associated with bathrooms and kitchens, and large open buildings such as warehouses.	This technology could be implemented in new residential or commercial buildings. Implementation involves standard construction materials and procedures.	While effective in removing air from a room, applying this technology to a whole building could result in negative pressure zones in the building. Such negative pressure zones could enhance vapor intrusion.	Low	Moderate to High	Costs are dependent on energy consumption, so cost-effectiveness can be low compared to other vapor intrusion control technologies.	No
	Mechanical HVAC Adjustments	Mechanical HVAC Adjustments	Mechanical heating, ventilation, and air conditioning (HVAC) systems provide ventilation for buildings by conveying outdoor air into building enclosures. The air exchange rate associated with HVAC systems is the rate at which the indoor air is exchanged with outdoor air. An HVAC system can also induce a positive pressure in a building if operated at a sufficient level, thus reducing the migration of contaminants into buildings. The operation of HVAC system can also dilute contaminant concentrations in indoor air, the extent dependent upon contaminant concentrations in the ambient air.	An effective HVAC system for vapor intrusion prevention can be readily designed and installed in new residential or commercial buildings. Long-term implementation requires that the HVAC system operate as intended if vapor intrusion control is to be sustained.	Exchanging indoor air with outdoor air, contaminants can be removed to the extent of the dilution potential of the ambient air. HVAC systems are especially applicable to commercial buildings which rely on the HVAC system for normal air exchange associated with ventilation and heating. Effectiveness is less for residential buildings as the HVAC system is not consistently used for ventilation control.	Moderate to High	High	Operating cost are high relative to other vapor intrusion remedies. Effectiveness is less for residential buildings as the HVAC system is not consistently used for ventilation control.	No
In Situ Treatment	Soil Vapor Extraction (SVE)	Soil Vapor Extraction (SVE)	SVE involves drilling a network of extraction wells into the soil to a depth above the water table, which must be deeper than 3 feet below the ground surface. Attached to the wells is equipment (such as a blower or vacuum pump) that creates a vacuum. The vacuum pulls air and vapors through the soil and up the well to the ground surface. Exhaust air (off-gas) from in situ SVE system may require treatment before being released to the atmosphere to meet air quality standards. Off-gas treatment usually involves vapor-phase Granular Activated Carbon (GAC).	SVE can be implemented near a building foundation to prevent vapor intrusion into the building where primary goal of SVE may be to control vapor intrusion and not necessarily to remediate soil. However, SVE requires a network of monitoring wells and an above ground system (blower/vaccum pump and potentially an off-gas treatment unit) that require regular monitoring and maintenance.	SVE is generally not effective for sites with groundwater table located approximately 3 feet below the land surface. Special considerations must be taken for sites with groundwater table located less than 10 feet below the land surface because groundwater upwelling can occur within SVE wells under vacuum pressures, potentially occluding well screens and reducing or eliminating vacuum-induced soil vapor flow.	High	High	Likely not applicable for site conditions since groundwater at the site is shallow (3 to 5 feet below ground surface). Shallow groundwater conditions may cause groundwater upwelling within SVE wells causing the well screen to become submurged thereby reducing airflow/efffectiveness.	No

Table 2

Remedial Alternative 1 Cost Estimate

318 State Avenue NE Property
Olympia, Washington

Item No.	Item Description	Estimated Quantity[1]	Unit Cost[2]	Unit	Estimated Cost	Notes/Assumptions
1	Install Vapor Barrier, Conduit Sealing and Passive Ventilation System	13,600	6	SF	$ 81,600	Assumes that vapor barrier and ventilation system will be installed for the entire footprint of the proposed building. Proposed building is assumed to occupy 80% of the southeastern portion of the property that is planned for redevelopment. Southeastern portion of the Property planned for redevelopment is approximately 17,000 SF.
2	Third Party Inspection of Vapor Barrier/Ventilation System Installation	1	20,000	LS	$ 20,000	Third party inspection is performed to ensure that vapor barrier and ventilation system is installed correctly beneath the concrete slab and typically consists of three inspection visits for each concrete pour after completion of the subgrade, after installation of the vapor barrier with smoke test and following placement of rebar above the barrier. Assumes building slab concrete will be poured in three events.
3	Long-term Inspection and Maintenance of Vapor Barrier/Ventilation System	1	$30,000	LS	$ 30,000	Assumes 1 monitoring event annualy to monitor conditions of vapor barrier and ventilation system. For the purposes of the FFS a total of 10 years of monitoring is assumed.
4	Post-construction/Pre-occupancy Indoor Air Monitoring	1	$10,000	LS	$ 10,000	Assumes one post-construction/pre-occupancy indoor air monitoring event. For the purposes of the FFS a total of 5 indoor air samples are assumed to be collected and analyzed for COCs during the monitoring event.
	Direct Capital Cost	--	--		$ 101,600	Sum of line items 1 and 2. Consists of equipment, labor and material costs, including contractor markups such as overhead and profit, necessary to construct the remedial alternative.
	Indirect Capital Cost	30	%		$ 30,480	Assumes 30% of the direct capital cost. Consists of costs that are not part of the actual construction project but necessary to implement the remedial alternative (e.g., engineering, legal, construction management, reporting and other technical and professional services).
	Direct O&M Cost	--	--		$ 40,000	Sum of line items 3 and 4. Consists of equipment, labor and material costs associated with activities necessary to ensure or verify the continued effectiveness of remedial alternative.
	Indirect O&M Cost	15	%		$ 6,000	Assumes 15% of the direct O&M cost. Consists of expenditures for professional and technical services including reporting necessary to support O&M activities.
	Contingency	30	%		$ 53,424	Covers unknowns, unforeseen circumstances, or unanticipated conditions associated with construction and O&M activities.
	Total Remedial Alternative Cost:				$ 231,504	Accuracy of the total remedial alternative cost is considered -30 to +50 % based on EPA's Guide to Developing and Documenting Cost Estimates During the Feasibility Study.

Notes:

[1] Concept design level.

[2] Unit costs based on a combination of construction cost estimates solicited from applicable vendors and contractors, review of actual costs incurred during similar and applicable projects, and professional judgment. Unit costs are based on 2015 rates.

LS = lump sum

O&M = operation and maintenance

SF = square feet

% = percent

Table 3

Remedial Alternative 2 Cost Estimate

318 State Avenue NE Property
Olympia, Washington

Item No.	Item Description	Estimated Quantity[1]	Unit Cost[2]	Unit	Estimated Cost	Notes/Assumptions
1	Install Vapor Barrier, Conduit Sealing, Ventilation and Sub-Slab Depressurization System	13,600	8	SF	$ 108,800	Assumes that vapor barrier, ventilation and sub-slab depressurization system will be installed for the entire footprint of the proposed building. Proposed building is assumed to occupy 80% of the southeastern portion of the property that is planned for redevelopment. Southeastern portion of the Property planned for redevelopment is approximately 17,000 SF.
2	Third Party Inspection of Vapor Barrier/Ventilation/Sub-Slab Depressurization System Installation	1	20,000	LS	$ 20,000	Third party inspection is performed to ensure that vapor barrier and ventilation system is installed correctly beneath the concrete slab and typically consists of three inspection visits for each concrete pour after completion of the subgrade, after installation of the vapor barrier with smoke test and following placement of rebar above the barrier. Assumes building slab concrete will be poured in three events.
3	Operating Cost of Sub-Slab Depressuriation	1	10,000	LS	$ 10,000	Includes cost associated with runnning the depressurization system such as electricity. Cost are assumed for running the system for 10 years.
4	Long-term Inspection and Maintenance of Vapor Barrier/Ventilatio/Sub-Slab Depressurization System	1	$40,000	LS	$ 40,000	Assumes 1 monitoring event annualy to monitor conditions of vapor barrier/ventilation/sub-slab depressurizatoin system. For the purposes of the FFS a total of 10 years of monitoring is assumed.
5	Post-construction/Pre-occupancy Indoor Air Monitoring	1	$10,000	LS	$ 10,000	Assumes one post-construction/pre-occupancy indoor air monitoring event. For the purposes of the FFS a total of 5 indoor air samples are assumed to be collected and analyzed for COCs during the monitoring event.
	Direct Capital Cost	--		--	$ 128,800	Sum of line items 1 and 2. Consists of equipment, labor and material costs, including contractor markups such as overhead and profit, necessary to construct the remedial alternative.
	Indirect Capital Cost	30		%	$ 38,640	Assumes 30% of the direct capital cost. Consists of costs that are not part of the actual construction project but necessary to implement the remedial alternative (e.g., engineering, legal, construction management, reporting and other technical and professional services).
	Direct O&M Cost	--		--	$ 60,000	Sum of line items 3 through 5. Consists of equipment, labor and material costs associated with activities necessary to ensure or verify the continued effectiveness of remedial alternative.
	Indirect O&M Cost	15		%	$ 9,000	Assumes 15% of the direct O&M cost. Consists of expenditures for professional and technical services including reporting necessary to support O&M activities.
	Contingency	30		%	$ 70,932	Covers unknowns, unforeseen circumstances, or unanticipated conditions associated with construction and O&M activities.
	Total Remedial Alternative Cost:				$ 307,372	Accuracy of the total remedial alternative cost is considered -30 to +50 % based on EPA's Guide to Developing and Documenting Cost Estimates During the Feasibility Study.

Notes:

[1] Concept design level.

[2] Unit costs based on a combination of construction cost estimates solicited from applicable vendors and contractors, review of actual costs incurred during similar and applicable projects, and professional judgment. Unit costs are based on 2015 rates.

LS = lump sum

O&M = operation and maintenance

SF = square feet

% = percent

Table 4

Evaluation of Remedial Alternatives

318 State Avenue NE Property

Olympia, Washington

Evaluation Criteria	Remedial Alternative 1	Remedial Alternative 2
Compliance with MTCA Threshold Criteria		
Protection of Human Health and the Environment	**Yes** - Alternative would protect human health and the environment primarily through reducing or eliminating transport/exposure pathways through the use of vapor barrier and passive ventilation system.	**Yes -** Alternative would protect human health and the environment primarily through reducing or eliminating transport/exposure pathways through the use of vapor barrier, sub-slab depressurization and ventilation system.
Compliance With Cleanup Standards	**Yes -** Alternative is expected to comply with the cleanup standards. Cleanup standards for Contaminants of Concern (COCs) are met by reducing or eliminating the vapor intrusion migration pathway into a building.	**Yes** - Alternative is expected to comply with the cleanup standards. Cleanup standards for Contaminants of Concern (COCs) are met by reducing or eliminating the vapor intrusion migration pathway into a building.
Compliance With Applicable State and Federal Regulations	**Yes -** Alternative complies with applicable state and federal regulations. This vapor intrusion control alternative has been utilized with a demonstrated ability to prevent vapor intrusion.	**Yes -** Alternative complies with applicable state and federal regulations. This vapor intrusion control alternative has been utilized with a demonstrated ability to prevent vapor intrusion.
Provision for Compliance Monitoring	**Yes -** Alternative includes provisions for compliance monitoring. Compliance monitoring after completing the building construction could be used to confirm that indoor air COC concentrations are less than the cleanup standards.	**Yes -** Alternative includes provisions for compliance monitoring. Compliance monitoring after completing the building construction could be used to confirm that indoor air COC concentrations are less than the cleanup standards.
Restoration Time Frame		
Restoration Time Frame	The remedy is expected to meet the cleanup action objective and achieve protection of human health and environment immediately following implementation by eliminating vapor migration pathways. Therefore, restoration timeframe is short. Potential future maintenance of the technologies and monitoring may extend the restoration time frame of this alternative.	The remedy is expected to meet the cleanup action objective and achieve protection of human health and environment immediately following implementation by eliminating vapor migration pathways. Therefore, restoration timeframe is short. Potential future maintenance of the technologies and monitoring may extend the restoration time frame of this alternative.
Relative Benefits Ranking (Scored from 1-lowest to 10-highest)		
Protectiveness	**Score = 8** Achieves a high level of overall protectiveness by reducing or eliminating transport/exposure pathway of contaminated soil gas into a building by blocking the vapor intrusion migration pathway.	**Score = 9** Achieves a high level of overall protectiveness by reducing or eliminating transport/exposure pathway of contaminated soil gas into a building by blocking the vapor intrusion migration pathway. Achieves a slightly higher score for protectiveness than Alternative 1 due to the use of active sub-slab depressurization. Alternative 1 relies on passive ventilation.
Permanence	**Score = 8** Achieves a high level of permanence. Vapor barriers with a passive ventilation system have a demonstrated long life, and the permanence of this vapor intrusion control alternative would be similar to that of the building. This vapor intrusion control alternative has been utilized with a demonstrated ability to prevent vapor intrusion.	**Score = 8** Similar to Alternative 1, Alternative 2 achieves a high level of permanence. Vapor barriers with sub-slab depressurization and ventilation system have a demonstrated long life, and the permanence of this vapor intrusion control alternative would be similar to that of the building. This vapor intrusion control alternative has been utilized with a demonstrated ability to prevent vapor intrusion.

Evaluation Criteria	Remedial Alternative 1	Remedial Alternative 2
Long-Term Effectiveness	**Score = 7** This alternative achieves a medium-high level of long-term effectiveness. The longterm effectiveness depends upon the design and installation quality, as well as long-term care to ensure that the integrity of the vapor barrier is maintained. For example, future building modifications must be appropriately completed as not to puncture the vapor barrier or to reestablish the integrity of the vapor barrier. Vapor barrier seals on utility and other conduits entering the building must also be maintained to prevent leaks through improperly sealed utility penetrations.	**Score = 7** Similar to Alternative 1, Alternative 2 achieves a medium-high level of long-term effectiveness. The longterm effectiveness depends upon the design and installation quality, as well as long-term care to ensure that the integrity of the vapor barrier is maintained. For example, future building modifications must be appropriately completed as not to puncture the vapor barrier or to reestablish the integrity of the vapor barrier. Vapor barrier seals on utility and other conduits entering the building must also be maintained to prevent leaks through improperly sealed utility penetrations.
Management of Short-Term Risks	**Score = 8** Achieves a high score in management of short-term risks. The installation of vapor barriers with passive ventilation does not create conditions that could impact workers health during construction. Established construction practices are used to install and appropriately seal the vapor barrier, as well as the passive ventilation system.	**Score = 8** Similar to Alternative 1, Alternative 2 achieves a high score in managemetn of short-term risks. The installation of vapor barriers with sub-slab depressurization and ventilation does not create conditions that could impact workers health during construction. Established construction practices are used to install and appropriately seal the vapor barrier, as well as the sub-slab depressurization and ventilation system.
Technical and Administrative Implementability	**Score = 8** Vapor barrier with passive ventilation installation can be implemented in new commercial or residential buildings. An exception is that a vapor barrier with passive ventilation installation is not appropriate if a new building has a basement beyond the depth of the groundwater table. The passive ventilation and vapor barrier are reliable, and installation utilizes proven procedures and construction practices.	**Score = 7** Vapor barrier with sub-slab depressurization and ventilation system installation can be implemented in new commercial or residential buildings. An exception is that a vapor barrier with sub-slab depressurization and ventilation system installation is not appropriate if a new building has a basement beyond the depth of the groundwater table. The vapor barrier with sub-slab depressurization and ventilation system are reliable, and installation utilizes proven procedures and construction practices. Gets slightly lower score than Alternative 1 due to higher complexity of implementability due to active sub-slab depressurization.
Consideration of Public Concerns	**Score = 5** This alternative does not include treatment to reduce the toxicity, mobility, or volume of COCs. The vapor barrier in combination with the passive ventilation reduces or eliminates the mobility of sub-slab vapors into a building. Residual contamination remaining in soil gas underneath the building slab could result in concerns by the public.	**Score = 5** This alternative does not include treatment to reduce the toxicity, mobility, or volume of COCs. The vapor barrier in combination with the active sub-slab depressurization and ventilation reduces or eliminates the mobility of sub-slab vapors into a building. Residual contamination remaining in soil gas underneath the building slab could result in concerns by the public.

Table 5

Summary of Evaluation and Ranking of Remedial Alternatives

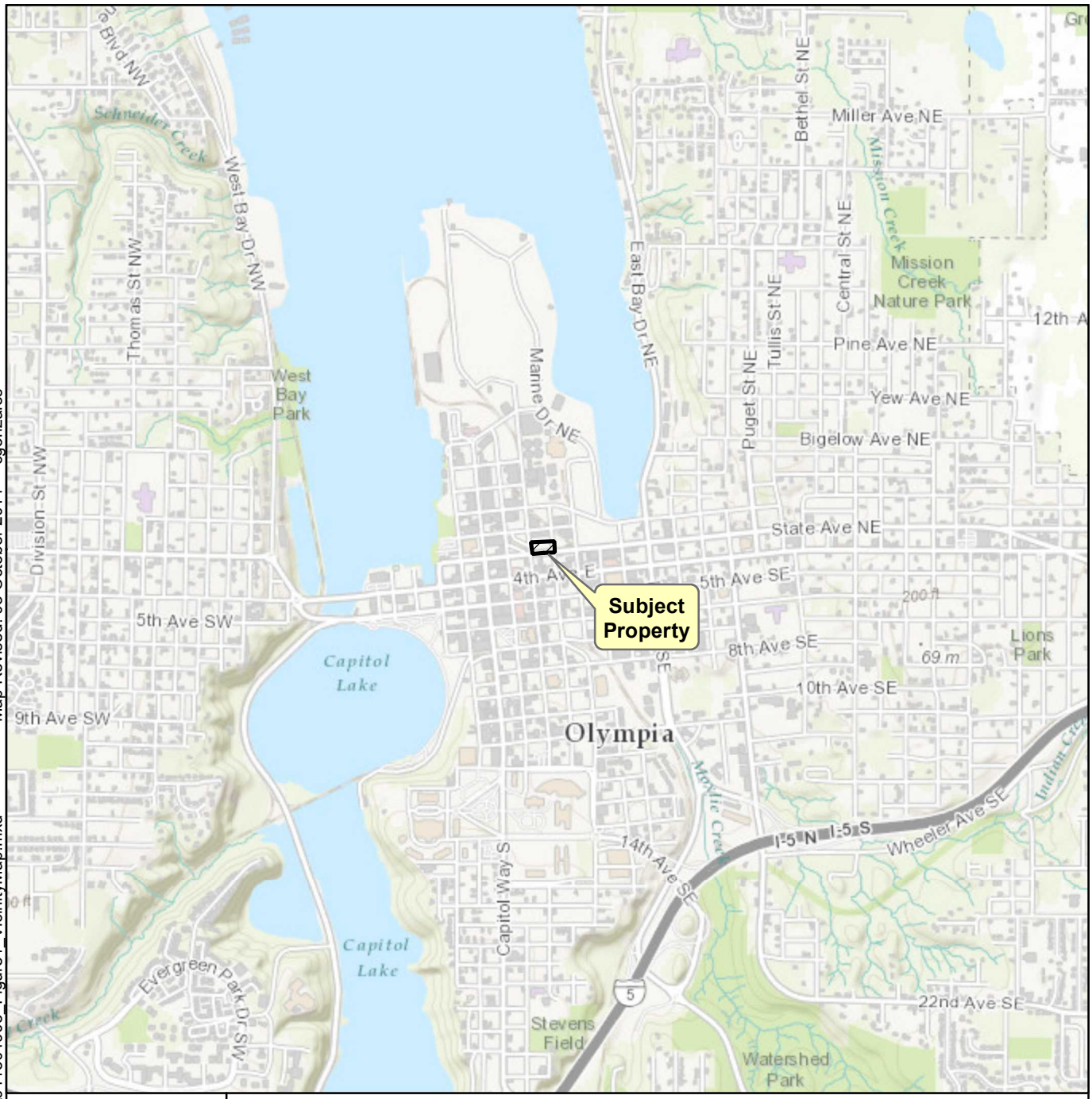
318 State Avenue NE Property

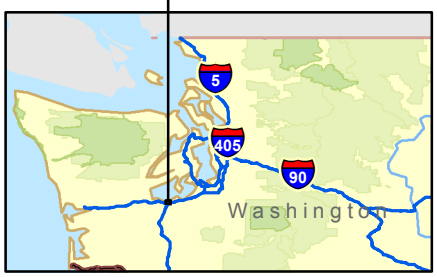
Olympia, Washington

Evaluation and Ranking	Remedial Alternative 1	Remedial Alternative 2
Evaluation		
Compliance with MTCA Threshold Criteria	Yes	Yes
Restoration Time Frame	<1 year	<1 year
Relative Benefits Ranking[1]		
Protectiveness (weighted as 30%)	2.4	2.7
Permanence (weighted as 20%)	1.6	1.6
Long-Term Effectiveness (weighted as 20%)	1.4	1.4
Management of Short-Term Risks (weighted as 10%)	0.8	0.8
Technical and Administrative Implementability (weighted as 10%)	0.8	0.7
Consideration of Public Concerns (weighted as 10%)	0.5	0.5
Total of Scores	**7.5**	**7.7**
Disproportionate Cost Analysis		
Probable Remedy Cost (+50%/-30%, rounded)	$232,000	$308,000
Costs Disproportionate to Incremental Benefits	No	Yes
Practicability of Remedy	Practicable	Practicable
Remedy Permanent to Maximum Extent Practicable	Yes	Yes
Overall Alternative Ranking	**1st**	**2nd**

Note:

[1] Ecology recommended weighting percentages are used to determine relative benefit ranking of remedial alternatives.





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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.
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Data Sources: 2008 Shaded Relief from ESRI, 2008 Topographic Maps from National Geographic Society
Projection: NAD_1983_StatePlane_Washington_North_FIPS_4601_Feet
Datum: D_North_American_1983

Vicinity Map

318 State Avenue NE
Olympia, Washington

GeoEngineers

Figure 1

Office: TAC Path: \\tac\projects\0\0415049\GIS\MXDs\0415049003_Figure1_VicinityMap.mxd Map Revised: 08 October 2014 cgonzales

Legend

- Approximate Property Boundary
- Southeast portion of property proposed for redevelopment
- Parcel Boundary
- CSZ 1 — Contaminated Soil Zones (CSZ) Remediated in September-October 2009
- MW-03 — Monitoring well currently being monitored as part of semi-annual monitoring events
- MW-01 — Monitoring well that was previously monitoring as part of quarterly or semi-annual monitoring events
- SG-1 — Soil Gas Exploration Location
- TW-1 — Temporary Groundwater Monitoring Well Location
- Vinyl Chloride at concentrations greater than MTCA groundwater cleanup level
- Trichloroethene (TCE) at concentrations greater than MTCA soil gas screening limit

N
W E
S

40 0 40
Feet

Notes:
1. MTCA = Model Toxics Control Act, ug/L = micrograms per liter.
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.

Data Sources: Approximate Property Boundary from Thurston County parcels (revised by GeoEngineers).
Aerial photograph 2013 from ESRI. Data Frame Rotated 356 degrees.

Projection: NAD_1983_StatePlane_Washington_South_FIPS_4602_Feet
Datum: D_North_American_1983

Site Plan

318 State Avenue NE
Olympia, Washington

GeoEngineers

Figure 2

Map Revised: 31 July 2015 cgonzales
Path: \\tac\projects\0\04150\49\GIS\MXDs\041504906_SoilGasExplorationsSitePlan.mxd
Office: TAC

APPENDIX A

Final Draft Remedial Investigation,
318 State Avenue NE Property,
Olympia, Washington

FINAL DRAFT REMEDIAL INVESTIGATION
318 STATE AVENUE NE PROPERTY
OLYMPIA, WASHINGTON

FEBRUARY 19, 2009

FOR
CITY OF OLYMPIA

Final Draft Remedial Investigation
318 State Avenue NE Property
Olympia, Washington
File No. 0415-049-02

February 19, 2009

Prepared for:

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TABLE OF CONTENTS

Page No.

TABLE OF CONTENTS (CONTINUED)

List of Tables

List of Figures

APPENDICES

Appendix E Tables

EXECUTIVE SUMMARY

Remedial investigation (RI) activities were completed at the Subject Property and adjacent rights-of-way to evaluate the nature and extent of contamination from former commercial and industrial activities completed at the property. Former commercial and industrial activities have included foundry operations, machine shops, automotive repair and maintenance, automotive/truck storage, and testing laboratories. The City of Olympia (City) acquired the property from the Washington State Department of Transportation (WSDOT) in 2008. The RI was prepared on behalf of the City to support the redevelopment of the Subject Property for commercial purposes (at the time of this report, an at-grade parking garage and/or mixed use commercial were being contemplated).

Three environmental investigations were completed at the Subject Property between July 2006 and October 2008. The investigations were completed for WSDOT or the City of Olympia to evaluate the presence of potential Chemicals of Concern (COCs) in soil and groundwater at the Subject Property that may have been associated with historic operations; for example, petroleum hydrocarbons, metals, solvents and semivolatile organic compounds. The results from these investigations were used in preparation of this RI.

The COCs exceeding Washington State Department of Ecology's (Ecology's) Model Toxics Control Act (MTCA) cleanup levels (CULs) observed in soil and groundwater at the Subject Property, consist of arsenic, lead, trichloroethene (TCE), and carcinogenic polycyclic aromatic hydrocarbons (cPAHs) for soil and arsenic, TCE, and vinyl chloride for groundwater. The COCs for both soil and groundwater are generally present on the eastern portion of the Subject Property where past site activities included foundry operations and materials testing laboratory operations. The contaminants are present in silty fine to medium sand fill and silty sand native soil at depths between the ground surface and approximately 10 feet below ground surface (bgs). Shallow unconfined groundwater is present at a depth of approximately 4 to 6 feet bgs and the general direction of groundwater flow is to the northeast. A 35- to 90-foot thick silt to clay representing a confining layer is present at a depth of approximately 30 feet bgs beneath the Subject Property based on studies by others in the Property vicinity.

This RI outlines the nature and extent of contamination across the Subject Property and assesses the potential sources of soil and groundwater contamination. The conclusions of this RI will be used to develop a Feasibility Study (FS) and Cleanup Action Plan (CAP) consistent with redevelopment plans at the Subject Property.

This Executive Summary should be used only in the context of the full report for which it is intended.

FINAL DRAFT REMEDIAL INVESTIGATION
318 STATE AVENUE NE PROPERTY
OLYMPIA, WASHINGTON
FOR
CITY OF OLYMPIA

1.0 INTRODUCTION

This report presents the results of the remedial investigation (RI) completed for the property located at 318 State Avenue NE in Olympia, Washington, herein referred to as the "Subject Property" (Figure 1). The City of Olympia (City) acquired the property from the Washington State Department of Transportation (WSDOT) in 2008. The RI was prepared on behalf of the City to support the redevelopment of the Subject Property for commercial purposes. Redevelopment of the Subject Property is planned by the City. Development plans at the time of this RI include either an at-grade parking garage and/or mixed use commercial structure to support nearby City related facilities, including a new City Hall building and public transportation station.

This report documents investigation activities completed at the Subject Property to evaluate the nature and extent of contamination from former commercial and industrial activities at the property. This report presents the results of soil and groundwater sampling and analyses completed at the Subject Property between September 2006 to December 2008. The results of soil and groundwater analyses are presented to identify areas where chemical concentrations are greater than Model Toxic Control Act (MTCA) cleanup levels (CULs).

The investigation and preparation of the RI report are being completed as part of the Washington State Department of Ecology (Ecology) Voluntary Cleanup Program (VCP).

2.0 PROJECT SCOPE AND OBJECTIVES

The scope of services completed for the RI includes a summary of previous investigations, the investigation completed in October and November 2008, as well as the following:

- Review of current land use and zoning and identification of future land use;
- Review of past land use and commercial and industrial activities that occurred on the Subject Property;
- Investigation and evaluation of the geology and hydrogeology of the project area;
- Sampling and analysis of soil and groundwater at the Subject Property and adjacent rights-of-way;
- Evaluation of chemical concentrations in soil and groundwater;
- Identification of chemicals of concern (COCs) for the Subject Property; and
- Identification of areas with chemical concentrations greater than MTCA cleanup criteria.

The scope of services for the supplemental investigation completed in October/November 2008 is provided in Appendix A.

The objectives of this RI were to:

- Compile the results of soil and groundwater investigation activities at the Subject Property;
- Evaluate the nature and extent of contamination from previous commercial and industrial activities; and
- Identify areas that contain COCs that are present at concentrations greater than cleanup criteria.

This RI report documents the findings from the scope of work to meet the RI objectives for the Subject Property.

3.0 BACKGROUND

3.1 PROPERTY LOCATION AND DESCRIPTION

The Subject Property is approximately 1.1 acres in size and is located within the City of Olympia, Thurston County, Washington. The property is generally situated between the southern end of the East and West Bays of Budd Inlet (Figure 1) and is bounded on the south by State Avenue, on the east by Adams Street and on the west by Franklin Street (Figure 2). The Subject Property is bounded on the north by several commercial buildings and Olympia Avenue. Finally, the Subject Property Tax Parcel Number is 78503200400 and is located within the Southeast quarter of Section 14, Township 18 North, Range 2W.

The Subject Property is relatively flat, with ground surface elevations ranging from approximately 11 to 12 feet national geodetic vertical datum (NGVD). The western half of the property is paved with asphalt and the eastern half of the Subject Property is exposed soil and gravel in the former location of the WSDOT Transportation Data Office (TDO).

Surface water that accumulates after rainfall on the western portion of the property drains to three catch basins located in the asphalt pavement. Surface water that accumulates on the eastern portion of the property infiltrates into the soil/gravel present at the property surface.

3.2 CURRENT LAND USE AND ZONING

The Subject Property is currently undeveloped, but is located in an area that is developed and used for commercial/industrial purposes. No buildings or other facilities are currently present on the Subject Property. The Subject Property most recently contained the WSDOT TDO building which was located on the eastern portion of the property (Figure 2). The TDO facility was removed by WSDOT in late 2007. Commercial/industrial businesses and operations or parking areas are present on properties located adjacent to the Subject Property.

The Subject Property is located within a commercial district of the City and is zoned Downtown Business (DB) District under City of Olympia Municipal Ordinance. The properties located south, west, and north of the Subject Property are also zoned DB District. The properties located east and northeast of the Subject Property are also located within the commercial district of the City but are zoned Urban Waterfront (UW) District.

3.3 PLANNED REDEVELOPMENT

The City purchased the Subject Property for redevelopment in support of general plans to revitalize downtown Olympia and support use of the public transportation originating at the Olympia Transit Center

located 1 block to the west. Development plans at the time of this RI include either mixed use commercial and/or an at-grade parking garage to provide vehicle parking for patrons visiting downtown Olympia and utilizing the Olympia Transit Center located west, across Franklin Street, from the Subject Property.

3.4 PROPERTY USE HISTORY

The historic use of the Subject Property has been summarized in two Phase I Environmental Site Assessments (ESAs), dated March 2005 and August 2008, and a historic building preservation review (completed by WSDOT) of the TDO. The information gathered from these evaluations was used to identify past facilities and operations at the Subject Property. A summary of the development history and past use is provided in this section as background to identify operations that may have contributed to contamination and the potential COCs present at the Subject Property. The past facilities and operations that were identified are shown on Figure 3.

The Subject Property was undeveloped until at least 1888. The western portion of the property was part of the shoreline of Budd Inlet and the eastern portion of the property was part of the submerged marine or intertidal area of Budd Inlet (Luttrell 2007).

In the late 1800s, Budd Inlet was dredged and this material was placed as fill to extend the peninsula to the north and east (Port of Olympia Commission, February 1975). Some filling of the Subject Property had occurred by 1891 that extended the upland portion of the property to the east. In 1891, the Olympia Foundry and Machinery Company established a foundry building and machine shop on the southeastern portion of the property (Figure 3). However, the area to the east and northeast of the foundry and machine shop were still a part of Budd Inlet. The foundry and machinery business expanded and was also known under business names such as Pioneer Iron Works and Capital City Iron Works until 1923. During foundry operations the remainder of the eastern portion of the Subject Property was filled; primarily during 1911 and 1912, when almost 22 blocks were added to downtown Olympia using dredged fill generated during development of a deep-water harbor and fill sloughs north and east of the City (Stevenson 1985). This dredged material comprises fill currently present from the Subject Property to the current shoreline of the East Bay of Budd Inlet. The western portion of the Subject Property remained undeveloped during the late 1800s to 1923.

The Subject Property was purchased by the State of Washington Highway Commission (the precursor to WSDOT) from Capital City Iron Works in March 1923. The State purchased the property for use as the Olympic Soils Testing and Materials Laboratory. Additionally, the property acquired by the State included a railroad spur that was present along the northeastern boundary of the Subject Property (Figure 3).

Two automotive/truck sheds, a machine/automotive shop, and a materials testing laboratory were located on the Subject Property in 1924. The automotive/truck sheds and machine/automotive shop covered the predominant portions of the east and west side of the Subject Property. The materials testing laboratory was located on the northeast portion of the property (WSDOT 2005).

A fire burned and damaged buildings and equipment at the Subject Property in 1936. By 1939, the WSDOT facility was rebuilt including a portion of the pre-existing laboratory structure (Luttrell 2007). A 1946 Sanborn map indicates that the automotive/truck sheds were replaced with a smaller automotive service facility on the southwest portion of the property and office and testing laboratory on the southeast portion of the property. The structures previously identified as the machine/ automotive shop and

materials laboratory were still present on the southwest corner and northeast portion of the property but are identified as machine shops and an automotive repair facility (WSDOT 2005).

In 1950, an addition to the testing laboratory was constructed that connected the southwest end to the north end of the building. With the construction of the addition, the building was a rectangular shape and enclosed a central courtyard area (Luttrell 2007).

In 1968, the automotive facility structures and operations were modified by WSDOT. The automotive service and repair facilities and machine shops were removed and the office and testing laboratory building was renovated to accommodate a traffic data collections and analysis office or TDO. The TDO covered approximately the western half of the Subject Property (WSDOT 2005). The TDO was demolished and removed from the property in 2007.

3.5 POTENTIAL CHEMICALS OF CONCERN (COCS)

Past facilities and operations that have been present or occurred at the Subject Property have included foundries, machine shops, automotive repair and maintenance, automotive/truck storage, testing laboratories, and office buildings. Potential COCs for the Subject Property based on past facilities and operations include the following:

- Metals,
- Petroleum hydrocarbons,
- Solvents, and
- Polychlorinated Biphenyls (PCBs).

These potential COCs were evaluated as part of the RI for the Subject Property. The following section summarizes investigation activities that were completed to investigate the presence of potential COCs in soil and groundwater at the Subject Property. This RI report also further evaluates the recognized environmental conditions identified in the Phase I ESA dated August 26, 2008 and recommended evaluation of potential soil and groundwater contamination, in rights-of-ways west and south of the Subject Property.

3.6 ENVIRONMENTAL INVESTIGATIONS

Three environmental investigations have been completed at the Subject Property between July 2006 and October 2008. The investigations were completed for WSDOT or the City to evaluate the presence of potential COCs in soil and groundwater at the Subject Property. The chemical analytical results from these investigations have been used in preparation of this RI and are summarized in Section 5.0. The scope of each of the environmental investigations is presented in the following sections and summarized in Table 1. The investigation locations for soil and groundwater are shown on Figure 4.

3.6.1 2006 Phase II Environmental Site Assessment

GeoEngineers completed a Phase II ESA in 2006. Two field sampling events were completed as part of the Phase II ESA in July and September 2006 that consisted of advancement of 17 direct-push borings (PP-1 through PP-17) to approximately 12 feet below ground surface (bgs). One or two soil samples were collected from each boring. A total of 27 soil samples were submitted to the analytical laboratory for chemical analyses. Nineteen of the soil samples were analyzed for metals (arsenic, lead, chromium, cadmium and mercury), petroleum hydrocarbons (gasoline, diesel and oil-range hydrocarbons), volatile

organic compounds (VOCs), semivolatile organic compounds (SVOCs), and carcinogenic polycyclic aromatic hydrocarbons (cPAHs). Eight of the soil samples were analyzed for metals and petroleum hydrocarbons only.

Discrete, one-time groundwater samples were collected from the boring locations for screening purposes. One groundwater screening sample was collected from each direct-push boring location (17 total). The groundwater samples were analyzed for metals (arsenic, lead, chromium, cadmium and mercury), petroleum hydrocarbons (gasoline, diesel and oil-range hydrocarbons), VOCs, SVOCs and cPAHs.

3.6.2 2007 Supplemental Phase II ESA

WSDOT completed a Supplemental Phase II ESA in October 2007. The field sampling event was completed in October 2007 and consisted of advancement of 11 direct-push borings (TDO-01 through TDO-11) to approximately 8 feet bgs. One soil sample was collected from each boring and submitted for analysis of metals (arsenic and lead), VOCs and SVOCs.

Discrete, one-time groundwater samples were collected from each direct-push boring location (11 total) for screening purposes. The groundwater samples were analyzed for metals (arsenic and lead), VOCs and SVOCs.

3.6.3 2008 Groundwater Monitoring Well Installation

GeoEngineers monitored the installation of 16 groundwater monitoring wells in and adjacent to the Subject Property. The groundwater monitoring wells were installed during two field sampling events completed in March/April and October/November 2008. Nine monitoring wells (MW-1 through MW-9) were installed in March 2008 and seven wells (MW-10 through MW-16) were installed in October 2008. The monitoring well borings were advanced to approximately 11 to 12 feet bgs and the wells screens were installed from approximately 3 to 11 feet bgs to span the shallow unconfined groundwater interface which was observed at depths between 4 to 6 feet bgs. Additionally, three direct-push borings (PP-18 through PP-20) were advanced to approximately 12 feet bgs as part of the October field sampling event to evaluate soil conditions within Adams Street, immediately west of documented solvent contaminated soil.

Two soil samples were collected during drilling of each well boring and advancement of each direct-push boring. A total of 38 soil samples were analyzed for metals (arsenic, lead, chromium, cadmium, mercury, selenium and silver), VOCs, SVOCs and cPAHs. Eighteen of the soil samples were also analyzed for PCBs.

Groundwater samples were collected from the monitoring wells and soil probes. A groundwater sample was collected from each of the monitoring wells installed in March 2008 (MW-1 through MW-9) after well installation (nine total). The groundwater samples collected in March 2008 were analyzed for metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver), VOCs, SVOCs, cPAHs, petroleum hydrocarbons (gasoline, diesel, and oil-range hydrocarbons) and PCBs. A groundwater sample was collected from each of the monitoring wells installed in October 2008 after well installation (MW-10 through MW-16) in addition to the wells installed in October 2008 (MW-1 through MW-9). Additionally, groundwater screening samples were collected from each direct-push boring location advanced in October 2008 (PP-18 through PP-20). The groundwater samples were analyzed for metals (arsenic, lead and mercury), VOCs, SVOCs and cPAHs.

4.0 GEOLOGY AND HYDROGEOLOGY

4.1 INTRODUCTION

The geologic and hydrogeologic conditions in the project area are the result of several episodes of regional glaciations, as well as recent man-made alterations to the area (e.g., dredge and fill). Evaluations of the regional geologic conditions are presented in Figure 5. Additionally, data concerning geologic and hydrogeologic conditions is provided by multiple investigations that have been completed in the project area and at the Subject Property. Information concerning the geologic and hydrogeologic conditions at the Subject Property includes the following:

- Geologic Map of the Tumwater 7.5-Minute Quadrangle, Thurston County Washington, 2003 by T.J. Walsh, R.L. Logan H.W. Schasse and Michael Polenz.
- Supplementary Geotechnical Investigation, East Bay Marina, Olympia, Washington, August 1982.
- Geotechnical Report, Downtown Transit Center, Olympia, Washington, July 1991, Shannon and Wilson, Inc.
- Final Draft Geotechnical Report, Proposed Olympia City Hall, Olympia, Washington, May 2007, Landau Associates.
- Remedial Investigation Work Plan, East Bay Redevelopment, Port of Olympia, Olympia, Washington, October 2008, GeoEngineers, Inc.
- Artesian Well Study, Thurston County Environmental Health, Olympia, Washington, 1994.
- Proposed City of Olympia Artesian Well Background Information on Groundwater Quality in Downtown Olympia, Pacific Groundwater Group, 2005.

The following sections describe the geologic and hydrogeologic conditions at the Subject Property based on the sources identified above.

4.2 GEOLOGY OF THE PROJECT AREA

Prior to manmade dredge/fill activities, the most recent surficial geologic period to affect the project area was the Vashon advance of the Fraser glaciation. The Vashon ice advanced into the Puget Sound lowland about 15,000 years ago and had melted from the area approximately 10,000 years ago. At its maximum extent, the ice spread across the entire Puget Sound lowland from the Olympic Mountains to the Cascade Mountains and extended as far south as Tenino, about 15 miles south of the project area. In the project area, the Vashon ice reached a depth (thickness) of greater than several hundred feet. The advancing ice created a large lake, called Lake Russell, in the southernmost part of modern Puget Sound. The lake drained when the ice melted sufficiently to restore northward drainage from the Puget Sound basin. A substantial amount of sediment was transported and deposited by the Vashon ice and the related meltwater streams during both the advancing stage and the retreat of the glacier. Erosion and deposition following the Vashon glaciation resulted in the general stratigraphy of the region. Deposits of glacial episodes that preceded the Vashon advance underlie the Vashon deposits.

The Vashon deposits in the general vicinity of the Subject Property include Vashon advance and/or recessional outwash. The outwash deposits consist of fine to medium grained sand with minor silt, and deposits of silt and clay. The outwash deposits beneath the site appear to be at least 400 feet thick based on a test well drilled for the Washington Public Power Supply System in 1974 (Walsh et al., 2003). This well was located near the present day Olympia Intercity Transit Terminal which is one block west of the

Subject Property (Pacific Groundwater Group, 2005). These deposits are underlain by undifferentiated Pleistocene deposits, based on the Walsh et al. geologic map.

Artesian groundwater conditions are known to exist in the downtown Olympia area in the Vashon deposits. A 1994 Thurston County Artesian Well Survey identified 94 artesian wells in the downtown area, based on historical documents, however most of the wells are no longer in use. The artesian conditions are the result of groundwater contained under pressure within coarser grained outwash deposits overlain by low permeability silt and/or lacustrine clay that acts as a confining layer and regional aquitard in the project area. Based on review of multiple reports and well logs in the project vicinity, it appears that the regional aquitard consists of interbedded soils ranging from silty sand to clay (Pacific Groundwater Group, 2005).

Fill material was placed over the Vashon deposits in the project area as part of the early development of the City. The West and East Bays of Budd Inlet were dredged, and dredge spoils were placed as fill on the Port Peninsula starting in 1892 (Port of Olympia Commission, February 1975). Between 1909 and 1911, a large-scale dredging project was conducted in Budd Inlet to provide a deeper marine navigation channel into Olympia. A large portion of northern downtown Olympia and the current Port Peninsula were created by the placement of the dredged material, as well as other fill material, in sloughs and shoreline areas (Figure 4).

Multiple exploration and/or geophysical investigations have been completed within the project area that provide information concerning the stratigraphy resulting from glaciation and filling as part of development. The following discussion summarizes some of these investigations for the purpose of (a) outlining the stratigraphy deeper than about 12 feet and (b) defining the approximate depth to the top of the regional aquitard. Because of the proximity of the borings described below to the Subject Property, depth below ground surface is assumed to be approximately the same as the Subject Property.

- The Intercity Transit Center project (1991) included two soil borings advanced to a depth of 81.5 and 46.5 feet bgs using hollow stem auger drilling techniques. The borings were located approximately 140 to 280 feet west of the Subject Property. The deeper boring encountered 7 feet of fill, consisting of very loose to loose silty sand. Beneath the fill the boring encountered dense, fine to medium native sand to 15 feet bgs. From 15 to 70 feet bgs the soil type ranged from sand and silt, and to clayey soil. The shallower boring encountered fill to 14.5 feet bgs, consisting of “very loose” silt and medium dense to dense sand. The fill was underlain by medium dense, native sand to 32 feet bgs. From 32 to 46.5 feet the soils included silty sand and sandy silt.
- The Proposed City Hall project (2007) included advancement of a 75-foot-deep soil boring using mud rotary drilling techniques. The well is located approximately 300 feet east of the Subject Property. Soils encountered included 10 feet of fill consisting of loose sandy gravel with silt underlain by wood. Underneath the fill was loose to medium dense sand with silt to a depth of 36 feet bgs. Between 36 feet and 73 feet bgs, the soil consisted of silt with sand or clay.
- The East Bay Redevelopment project (2007) included multiple soil borings and cone penetrometer (CPT) borings. Two borings were located approximately 300 feet east of the Subject Property. The two borings were advanced to approximately 22 feet bgs using hollow-stem auger drilling. The CPT boring was also located approximately 300 feet east of the Subject Property, and was advanced to 100 feet bgs. The soil borings encountered 9 feet of fill consisting of gravel and clay. Underneath the fill the borings encountered native silt to 16 feet bgs. Underneath the silt the borings encountered silt and clay to 22 feet bgs. The CPT encountered silt and clay between 25 feet and 100 feet bgs.

- The Supplementary Geotechnical Investigation project for the East Bay Marina (1986) included advancement of two soil borings to 55 feet bgs and three Dutch cone probes, two of which were advanced to 45 feet bgs. The project was located approximately one mile north of the Subject Property. The ground surface at the project site ranged from the same elevation as the Subject Property to 8 feet higher than the Subject Property. For simplicity, the following depths have been adjusted so that depths are described in reference to ground surface at the Subject Property. In general, the explorations encountered fill sand with layers of silt from the ground surface to 22 feet bgs. Sandy to clayey silt was encountered beneath the fill sand to 35 feet bgs. Soils ranging from sands to silty sands were encountered beneath the silt to the full depths explored.

Thirty-six borings were completed at the Subject Property between 2006 and 2008. The depth of the borings ranged from approximately 9 to 12 feet bgs. Figure 6 presents a geologic cross section, oriented diagonally from the southwest corner to the northeast corner of the Subject Property that shows the interpreted geologic conditions based on borings at and adjacent to the Subject Property. The boring logs from the investigations at the Subject Property are provided in Appendix D.

In general, subsurface soil encountered in the borings consisted of fill overlying native soil. The fill can be divided into two layers. The upper fill layer extends from the present ground surface to a depth of 1 to 5 feet bgs. This upper fill layer consisted of fine to medium sand with variable amounts of silt, gravel and brick debris. The lower fill layer was observed to be 2 to 10 feet in thickness, and consisted of fine to medium sand with variable amounts of silt, gravel and sea shell fragments. The total thickness of the two fill layers was approximately 5 feet in the southwest portion of the site, and 12 feet in the northeast portion of the site. This is consistent with historic maps which show that the former Budd Inlet shoreline was present at the location of the Subject Property in the late 1800s until dredge filling began.

The native soil and fill geologic contact was encountered in the borings at a depth of 5 to 12 feet bgs. This apparent native soil consisted of silt with organics (roots) or peat overlying sand or silty sand to the full depth explored.

Based on investigations completed in the project area, the near-surface stratigraphy at the Subject Project consists of the following:

- Two sand fill layers between the ground surface to approximately 5 to 12 feet bgs;
- Native silt or peat grading to sand or silty sand extending from beneath the fill to at least 30 feet bgs;
- Interbedded low-permeability soils representing a regional aquitard below a depth of approximately 30 feet bgs; and
- Coarser grained sands and gravels to depths as great as 400 feet bgs where the artesian aquifer is present beneath the regional aquitard.

4.3 HYDROGEOLOGY OF THE PROJECT AREA

Two hydrogeologic units are present within the near-surface stratigraphy of the project area. The regional aquitard physically separates the two units into shallow groundwater and deeper artesian groundwater.

A report written to support the development of a public, artesian well approximately 2,000 feet north of the Subject Property (Pacific Groundwater Group, 2005) indicates that groundwater flow in the deeper artesian aquifer is generally towards Budd Inlet. Additionally, the report indicates the artesian conditions are responsible for an upward gradient through the aquitard and into shallow groundwater. The report

indicates that the artesian aquifer is influenced by, but is not in direct connection with Budd Inlet. This is supported by the observations that artesian well flow rates are similar regardless of the tidal height, and that water samples collected from artesian wells consistently contain less than 10 mg/l of chloride.

Shallow groundwater is present in the fill and native soil above the regional aquitard. Shallow groundwater unit is unconfined and generally flows toward Budd Inlet.

Depth to shallow groundwater was measured in wells present on the Subject Property in March/April 2008 and October/November 2008. The depth to groundwater ranged from approximately 4 to 6 feet deep.

Depth to groundwater was also measured in the nine wells present on the Subject Property on August 15, 2008 to evaluate the shallow groundwater flow direction. Water levels were measured at the time corresponding to high and low tide on that day. Despite an approximately 15-foot tidal fluctuation, groundwater elevations in each well were less than 0.05 feet different at the high and low tides, suggesting that the unconfined aquifer is not significantly influenced by tidal fluctuation in the vicinity of the Subject Property. The groundwater flow direction beneath the Subject Property at high and low tide on August 15, 2008 was generally to the northeast towards the East Bay of Budd Inlet (Figure 7). There appears to be some variability in groundwater flow direction on the eastern boundary of the Subject Property. A shallow northwest-trending trough extended through the site based on the August 15 measurements. The variability in groundwater flow direction is likely attributable to: 1) naturally occurring artesian conditions beneath and adjacent to the Subject Property; 2) heterogeneous fill and inconsistent fill placement/thickness; and 3) the orientation of the lower permeability undulating native soil surface (beneath the fill).

An artesian well was located on the Subject Property. The artesian well was formerly located in the southeastern portion of the property, in the former TDO building courtyard as an aesthetic fountain (WSDOT 2005). This well was decommissioned and capped in March 2008. The well decommissioning letter and corresponding log is provided in Appendix B. The presence of the artesian well confirms the presence of the regional aquitard on the Subject Property.

5.0 ANALYTICAL RESULTS

5.1 INTRODUCTION

This section presents the results of the analyses of soil and groundwater samples collected from the Subject Property and adjacent to the Subject Property as part of the three investigations (2006, 2007 and 2008) described in Section 3.6. Reports have been prepared for the 2006 and 2007 studies. This RI includes the results from those studies and combines those data with the results of the 2008 study (which has not been previously reported).

This section presents the results for soil samples collected from a total of 47 soil borings and groundwater samples from 16 monitoring wells. Sampling and analysis for the 2006 and 2008 studies was overseen by GeoEngineers in accordance with Subject Property Sampling and Analysis Plan (SAP) presented in Appendix C.

The soil and groundwater investigation locations are shown on Figure 4. Table 1 summarizes the scope of soil and groundwater sampling and analysis completed as part of each investigation. Tables 2 through 4 present summaries of the frequency of detection of chemicals in soil and groundwater samples. The analytical results for all soil and groundwater samples are tabulated in Appendix E. Tables E-1 through

E-3 present the results for all soil and groundwater samples compared to MTCA Method A and B cleanup levels (CULs).

Test America Analytical Laboratories of Tacoma and Seattle, Washington and Environmental Services Northwest (ESN) Laboratory of Olympia, Washington were contracted to analyze samples collected by GeoEngineers. Test America Analytical Laboratories of Tacoma, Washington was used to analyze samples collected as part of the investigation performed for WSDOT. The laboratory analytical reports generated by each investigation event are provided in Appendix F.

A data quality review was performed on soil and groundwater analytical results presented in this RI. The data quality review was performed in accordance with the SAP prepared by GeoEngineers. The data is considered acceptable for use as qualified based on the results of the data quality review.

5.2 ANALYTICAL RESULTS FOR SOIL

A total of 78 soil samples were collected and analyzed as part of the three investigations completed between July 2006 and November 2008. One or two soil samples were collected from each of the direct push and/or monitoring well boring locations. The soil samples were obtained from depths ranging from approximately 2 to 10.5 feet bgs. The investigation locations were selected to evaluate the potential impacts from previous site use, and the lateral and vertical extent of contamination.

The results for individual chemical analyses are discussed below. A summary of chemicals with concentrations greater than MTCA CULs is presented at the end of this section (Section 5.2.6). Table 2 presents a summary of the frequency of detection of chemicals in the soil samples. Table E-1 in Appendix E presents the analytical results for all of the soil samples collected between July 2006 and October 2008 compared to MTCA CULs.

5.2.1 Metals

Total metals analyses for arsenic, barium, cadmium, total chromium, lead, mercury, selenium and silver were completed between 18 and 78 soil samples collected from the Subject Property (Table 2). Additionally, analysis for hexavalent chromium was completed on six soil samples as part of the 2006 investigation.

Barium, cadmium, selenium and silver were either not detected or detected at concentrations less than applicable MTCA Method B CULs (Table 2). Cadmium was analyzed in 47 samples and barium, selenium and silver were analyzed in 18 samples.

Arsenic and lead were detected in 54 and 66 out of 78 samples, respectively, analyzed for these chemicals (Table 2). The detected concentrations of arsenic in two samples were greater than the MTCA Method A soil CUL based on background concentrations of arsenic in soil in Washington State (Table E-1 in Appendix E). Samples with arsenic at concentrations greater than the soil CUL (20 milligrams per kilogram [mg/kg]) were collected from 2 to 4 feet bgs in sample location PP-17 (23 mg/kg) and 2 to 2.5 feet bgs in TD-05 (40 mg/kg).

The detected concentrations of lead in 3 out of 78 samples were greater than the MTCA Method A soil CUL (250 mg/kg) (Table 2). Samples with lead at a concentration greater than the soil CUL were collected from 2 to 4 feet bgs in sample locations PP-16 (350 mg/kg) and PP-17 (840 mg/kg) and 3 to 3.5 feet bgs in MW-15 (510 mg/kg) (Table E-1 in Appendix E).

Mercury was detected in 22 out of 69 samples analyzed for this chemical (Table 2). All detected concentrations and detection limits were less than the MTCA Method A and B soil CULs (2 mg/kg and 24 mg/kg) except for one sample at location PP-01 (Table E-1 in Appendix E). The detected concentration at PP-01, 2.3 mg/kg, in the sampled collected from 6 to 6.5 feet bgs was greater than the MTCA Method A CUL but was not greater than the Method B CUL.

Speciation of chromium was completed on soil samples collected from the Subject Property. The MTCA CULs for chromium are based on the chrome species, either hexavalent (VI) or trivalent (III) chromium, present at a site. As previously stated, six samples were selected for hexavalent chromium (VI) analysis as part of the initial investigation event (i.e., sampling at locations PP-01 through PP-09). Samples were initially analyzed using total chromium analysis. Total chromium analyses detect both species of chromium and therefore, represent the sum of the two chromium species. Six samples with total chromium concentrations between 20.5 to 25.7 mg/kg were submitted for hexavalent chromium analysis. Hexavalent chromium was not detected in the soil samples at detection limits that were less than the chromium MTCA Method A and B soil CULs (19 mg/kg and 240 mg/kg, respectively) (Table 2). Because hexavalent chromium was not detected in soil samples collected from the site, the MTCA Method A trivalent chromium soil CUL (2,000 mg/kg) is used to evaluate the results of total chromium analyses that have been completed at the Subject Property.

Total chromium analyses were performed on 47 samples (Table 2). The detected chromium concentrations were less than the MTCA Method A soil CUL (Table E-1 in Appendix E).

In summary, the metals tested were either not detected or were detected at concentrations less than MTCA soil CULs with the exception of arsenic, lead and mercury.

5.2.2 Volatile Organic Compounds (VOCs)

VOC analyses were completed to evaluate the presence of 65 chemicals within this chemical class. Only 24 of the 65 chemicals evaluated were detected in one or more samples (Table 2).

The chemicals 1,2,4-trimethylbenzene, 1,2-dichloropropane, 1,3,5-trimethylbenzene, CFC-11, chloromethane, 1,2-dichloroethene, trans-1,2-dichloroethene, carbon tetrachloride, chloroform and isopropylbenzene were detected in between one and eight out of 61 soil samples (Table 2). The detected concentrations and detection limits of these chemicals, except 1,2,3-trichlorobenzene, were less than the MTCA Method B CULs (Table E-1 in Appendix E).

The chemicals 1,2,3-trichlorobenzene, n-butylbenzene, n-propylbenzene, pentafluorobenzene, p-isopropyltoluene, and sec-butylbenzene were detected in between one and six soil samples. MTCA soil CULs are not currently available for these chemicals.

Benzene was detected in 8 of 61 soil samples. The detected concentrations of benzene (3.9 to 1,000 micrograms per kilogram [µg/kg]) were less than the MTCA Method B soil CUL (18,000 µg/kg) but four of the detected concentrations were greater than the MTCA Method A soil CUL (30 µg/kg). The samples with detected benzene concentrations greater than the Method A CUL were from TD-10 at 7 to 7.5 feet bgs (150 µg/kg), MW-02 at 7 to 7.5 feet bgs (1,000 µg/kg), MW-07 at 10 to 10.5 feet bgs (70 µg/kg) and MW-15 at 3 to 3.5 feet bgs (160 µg/kg). The detection limits for samples in which benzene was not detected were below the MTCA Method A and B soil CULs.

Ethylbenzene and toluene were detected in 5 and 6 out of 61 soil samples, respectively, collected from the Subject Property. The detected concentrations and detection limits for ethylbenzene and toluene were less than the MTCA Method A and B soil CULs (Table 2).

Methylene chloride, a common laboratory contaminant, was detected in 26 of 61 soil samples. The detected concentrations of methylene chloride and the detection limits for samples in which methylene chloride was not detected were less than the MTCA Method B soil CUL (130,000 µg/kg). However, methylene chloride was detected at a concentration greater than the current MTCA Method A CUL (20 µg/kg) in six samples and the detection limits in 20 samples were also greater than the Method A CUL. The MTCA Method A soil CUL is based on protection of groundwater. Methylene chloride was not detected in groundwater samples at detection limits and order of magnitude less than the MTCA Method A groundwater CUL (see analytical results for groundwater). Therefore, methylene chloride does not represent a COC at the Subject Property.

Trichloroethene (TCE) was detected in 13 out of 61 soil samples. The detected concentrations of TCE and detection limits were less than the MTCA Method B soil CUL (2,500 µg/kg). However, seven of the detected TCE concentrations were greater than the Method A soil CUL (30 µg/kg). The samples with detected concentrations of TCE that were greater than the Method A soil CUL were from PP15 at 2 to 4 feet bgs (2,300 mg/kg), PP-16 at 2 to 4 and 4 to 6 feet bgs (46 and 55 µg/kg, respectively), TD03 at 4 to 4.5 feet bgs (230 µg/kg), TD-08 at 4 to 4.5 feet bgs (82 µg/kg), TD09 at 4 to 4.5 feet bgs (600 µg/kg), MW02 at 7 to 7.5 feet bgs (900 µg/kg), and MW07 at 7 to 7.5 feet bgs (45 µg/kg). The detection limits for five soil samples were also greater than the MTCA Method A soil CUL. The samples with detection limits for TCE that were greater than the Method A soil CUL were from PP-13 at 6 to 8 feet bgs (33 U µg/kg), PP-17 at 6 to 8 feet bgs (31 U µg/kg), TD-01 at 7 to 7.5 feet bgs (39 U ug/kg), TD10 at 7 to 7.5 feet bgs (66 U µg/kg), and MW-07 at 10 to 10.5 feet bgs (34 U µg/kg).

Tetrachloroethene (PCE) was detected in 3 out of 61 samples. The detected concentrations of PCE and detection limits were less than the MTCA Method B soil CUL (1,900 µg/kg). However, the detected concentrations of PCE in three samples and the detection limits in nine samples were greater than the MTCA Method A soil CUL (50 ug/kg). The samples with detected concentrations greater than the Method A soil CUL were from PP-15 at 2 to 4 feet bgs (54 µg/kg), TD-09 at 4 feet bgs (66 µg/kg), and MW-16 at 5 feet bgs (230 µg/kg). The nine samples with detection limits for PCE that were greater than the Method A soil CUL were from PP-13, PP-14, PP-16, PP-17, TD-01, TD-10, MW-02 and MW-07. The samples with detection limits greater than the MTCA Method A soil CUL were from all three investigation events.

Vinyl chloride was detected in 3 out of 61 soil samples. The detected concentrations (34 to 330 µg/kg) and detection limits (1.15 to 66 µg/kg) for samples in which vinyl chloride was not detected were less than the MTCA Method B soil CULs (670 µg/kg).

The detection limit for ethylene dibromide was greater than the MTCA CULs in soil samples collected from the Subject Property. Ethylene dibromide is used in anti-knock gasoline mixtures. As gasoline was detected in only one soil sample at a concentration less than the CUL and not detected in any groundwater samples (see petroleum hydrocarbon discussions below) collected from the Subject Property, it is not expected that ethylene dibromide would be present in soil and groundwater at concentrations greater than the MTCA groundwater CULs.

In summary, of the 24 VOCs that were detected, benzene, PCE and TCE were detected at concentrations greater than MTCA CULs. All other VOCs were not detected.

5.2.3 Semivolatile Organic Compounds (SVOCs) and Polycyclic Aromatic Hydrocarbons (PAHs)

SVOC analyses were completed to evaluate the presence of 78 chemicals within this chemical class including PAHs. Only 25 of the 78 chemicals evaluated were detected in one or more samples (Table 2).

The chemicals 3,3'-dichlorobenzidine, benzyl alcohol, bis(2-ethylhexyl)phthalate, butylbenzyl phthalate, carbozole, dibenzofuran, diethyl phthalate and di-n-octyl phthalate were detected once or twice in soil samples collected from the Subject Property. The detected concentrations and detection limits for these chemicals were less than the MTCA Method B CULs (Table 2).

Non-carcinogenic PAHs were detected in between 5 and 19 soil samples collected from the Subject Property (Table 1). The detected concentrations and detection limits for non-carcinogenic PAHs were below MTCA CULs.

cPAHs were detected in between 2 and 18 samples. A toxicity equivalency soil concentration (TEQ) was calculated for cPAHs to compare the MTCA Method A CUL for benzo(a)pyrene. The TEQ was calculated for samples with detected cPAH concentrations using toxicity equivalency factors (TEFs) for each of the seven individual compounds (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chyrsene, dibenz(a,h)anthracene and indeno(1,2,3-cd)pyrene) which are then added to produce the TEQ. The TEQ for samples with detected concentrations of cPAHs (678 to 4,860 µg/kg) was greater than the CUL (100 µg/kg) in four samples collected from four investigation locations including PP-15, PP-16, PP-19 and TD-05 (Table E-1 in Appendix E).

In summary, all other SVOCs were either not detected or were detected at concentrations less than their respective MTCA CUL in soil samples.

5.2.4 Petroleum Hydrocarbons

Petroleum hydrocarbon analyses were completed on 36 samples collected from the Subject Property (Table 2). Gasoline was detected once, diesel was detected nine times, and heavy oil-range hydrocarbons were detected 11 times in the samples collected from the Subject Property. However, the detections were less than the MTCA Method A CULs (Table E-1 in Appendix E). Additionally, the detection limits for the remaining petroleum hydrocarbon sample analyses were less than the MTCA Method A CULs.

5.2.5 PCBs

PCBs analyses were completed on 18 soil samples collected from MW-01 through MW-09. PCBs were not detected in any soil samples collected at the Subject Property at detection limits that were approximately an order of magnitude less than the MTCA Method A CUL for total PCBs and MTCA Method B CULs for individual aroclors.

5.2.6 Summary of Results for Soil Analyses

Multiple metals, VOCs and SVOCs were detected in soil samples collected from the Subject Property (Table 2). The detected concentrations and detection limits for chemicals that were not detected were less than the MTCA CULs in most samples. Chemicals with detected concentrations greater than the MTCA CULs for soil include arsenic, lead, mercury, benzene, TCE, PCE and cPAHs.

The exceedances of soil CULs identified in analyses include the following:

- Arsenic was detected at PP-17 in the sample from 2 to 4 feet bgs (23 mg/kg) and at TD-05 in the sample 2 to 2.5 feet bgs (40 mg/kg) at concentrations greater than the MTCA Method A CUL (20 mg/kg).
- Lead was detected at PP-16 and PP-17 in the samples from 2 to 4 feet bgs at concentrations (350 mg/kg and 840 mg/kg, respectively) greater than the MTCA Method A CUL (250 mg/kg) and at MW-15 in a sample from 3 to 3.5 feet bgs (510 mg/kg) also at a concentration greater than the MTCA Method A CUL.
- Mercury was detected at PP-01 in a sample from 6 to 8 feet bgs (2.3 mg/kg) at a concentration greater than the MTCA Method A CUL (2.0 mg/kg) but not greater than the MTCA Method B CUL (24 mg/kg).
- Benzene was detected at TD-10 at 7 to 7.5 feet bgs (150 ug/kg), MW-02 at 7 to 7.5 feet bgs (1,000 µg/kg), MW-07 at 10 to 10.5 feet bgs (70 µg/kg) and MW-15 at 3 to 3.5 (160 µg/kg) at concentrations greater than the MTCA Method A soil CUL (30 µg/kg) but not greater than the MTCA Method B soil CUL (18,000 µg/kg).
- TCE was detected at PP-15 at 2 to 4 feet bgs (2,300 mg/kg), PP-16 at 2 to 4 and 4 to 6 feet bgs (46 and 55 µg/kg, respectively), TD-03 at 4 to 4.5 feet bgs (230 µg/kg), TD-08 at 4 to 4.5 feet bgs (82 µg/kg), TD-09 at 4 to 4.5 feet bgs (600 µg/kg), MW-02 at 7 to 7.5 feet bgs (900 µg/kg), and MW-07 at 7 to 7.5 feet bgs (45 µg/kg) at concentrations that were greater than the Method A soil CUL (30 µg/kg) but were less than the MTCA Method B soil CUL (2,500 µg/kg).
- TCE detection limits for samples collected at PP-13 at 6 to 8 feet bgs (33 U µg/kg), PP-17 at 6 to 8 feet bgs (31 U µg/kg), TD-01 at 7 to 7.5 feet bgs (39 U µg/kg), TD-10 at 7 to 7.5 feet bgs (66 U µg/kg), and MW-07 at 10 to 10.5 feet bgs (34 U µg/kg) were greater than the Method A soil CUL (30 µg/kg) but were less than the MTCA Method B soil CUL (2,500 µg/kg).
- PCE was detected at PP-15 at 2 to 4 feet bgs (54 µg/kg), TD-09 at 4 feet bgs (66 µg/kg), and MW-16 at 5 feet bgs (230 µg/kg) at concentrations that were greater than the MTCA Method A soil CUL (50 µg/kg) but were less than the MTCA Method B soil CUL (1,900 µg/kg).
- PCE detection limits for nine samples collected at PP-13, PP-14, PP-16, PP-17, TD-01, TD-10, MW-02 and MW-07 were greater than the MTCA Method A soil CUL (50 µg/kg) but were less than the MTCA Method B soil CUL (1,900 µg/kg).
- The TEQ for samples with detected concentrations of cPAHs were greater than the CUL level in four samples collected from four investigation locations including PP-15, PP-16, PP-19 and TD-05 (Table E-1 in Appendix E).

Arsenic and lead concentrations that were greater than MTCA soil CULs were present in investigation locations on the eastern portion of the Subject Property. Soil samples with benzene, TCE PCE, and cPAH concentrations greater than the CULs were generally within and adjacent to the footprint of the former material testing laboratories.

5.3 ANALYTICAL RESULTS FOR GROUNDWATER

Groundwater sampling was completed as part of 2006, 2007 and 2008 investigation events conducted at the Subject Property. Groundwater samples were collected from temporary, direct-push soil probes and from "permanent," Ecology-approved groundwater monitoring wells installed in and adjacent to the

Subject Property. Groundwater sampling from permanent monitoring wells was completed during two sampling events as part of investigations at the Subject Property.

One-time groundwater samples were also collected from 32 temporary, direct-push explorations completed at the Subject Property in 2006 through 2008. Groundwater samples were obtained from monitoring wells MW-01 through MW-09 on March 31 through April 1, 2008 after the monitoring wells were initially installed and developed. Groundwater samples were obtained from monitoring wells MW-01 through MW-16 on October 30 through November 6, 2008 after monitoring wells MW-10 through MW-16 were initially installed and developed.

The characterization of groundwater quality at the Subject Property presented in this RI is based on samples collected from the groundwater monitoring wells. The results from analysis of groundwater samples collected from the temporary, direct-push soil explorations were used for screening purposes during site characterization and to assist in the appropriate location of the permanent groundwater monitoring wells. The analytical results derived from groundwater samples obtained directly from direct-push explorations are typically biased high due to the entrainment of soil particles in the water samples. The groundwater samples obtained from monitoring wells are considered to be representative of groundwater conditions on and adjacent to the Subject Property. Therefore, the groundwater characterization presented in this RI is based on the results of samples collected from monitoring wells MW-01 through MW-16 in the March/April 2008 and October/November 2008 sampling events.

Low-flow groundwater sampling techniques were used to collect samples from monitoring wells MW-01 through MW-09 in March/April 2008 and MW-01 through MW-16 in October/November 2008. The groundwater samples were collected at a flow rate of approximately 500 milliliters per minute (ml/min) using dedicated, electric submersible pumps with vinyl tubing.

The following sections present the results for groundwater samples collected from monitoring wells MW-01 through MW-16.

5.3.1 Groundwater Monitoring Results – March/April 2008

Monitoring Wells MW-01 through MW-09 were installed in March 2008. Wells MW-01 through MW-08 were installed on the Subject Property. Monitoring well MW-09 was installed downgradient of shallow groundwater flow, on the east side of Adams Street (Figure 4). Samples collected from these wells in March/April 2008 were submitted for metals, VOCs, SVOCs including PAHs, petroleum hydrocarbons and PCBs analyses (Table 1).

The results for individual chemical analyses on groundwater samples collected in March/April 2008 are discussed in the following sections. Table 3 presents a summary of the frequency of detection of chemicals in the groundwater samples. Table E-2 in Appendix E presents the analytical results for all of the groundwater samples collected in March/April 2008 compared to MTCA CULs.

5.3.1.1 Metals

Total and dissolved metals analyses were completed on groundwater samples collected from MW-01 through MW-09. The samples were analyzed for arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver.

Cadmium, chromium, mercury, selenium and silver were not detected in total or dissolved groundwater samples collected in March/April 2008 (Table 3). The analytical detection limits for these metals were less than MTCA CULs with the exception of selenium. The detection limit for selenium (0.1 milligram

per liter [mg/l]) was slightly greater than the MTCA Method B groundwater CUL (0.08 mg/l). Selenium was not detected in any soil samples collected from the Subject Property at analytical detection limits less than the MTCA Method B soil CUL (Table E-2 in Appendix E). Therefore, selenium is not expected to be present at concentrations greater than the Method B groundwater CUL.

Lead was detected in one groundwater sample collected from monitoring well MW-05. Lead was detected in the total metals analysis at a concentration (0.0039 mg/l) substantially less than the MTCA Method A groundwater CUL (0.015 mg/l). Lead was not detected in the dissolved metals analysis for MW-05 at an analytical detection limit (0.002 mg/l) less than the Method A groundwater CUL.

Barium was detected in all groundwater samples analyzed for total and dissolved metals (Table 3). The detected barium concentrations (0.012 to 0.047 mg/l) were generally two orders of magnitude less than the Method B groundwater CUL (3.2 mg/l).

Arsenic was only detected at concentrations greater than the MTCA Method A CUL in groundwater samples collect from two wells. The total and dissolved arsenic concentrations in groundwater from monitoring well MW-01 (0.0079 mg/l and 0.0053 mg/l) and the total arsenic concentration in MW-05 (0.0061 mg/l) were slightly greater than the Method A groundwater CUL (0.005 mg/l) (Table E-2 in Appendix E). Arsenic was not detected in total and dissolved analyses performed on groundwater samples or was detected in the dissolved and/or total analyses on groundwater at concentrations less than the Method A groundwater CUL.

In summary, the metals tested were either not detected or were detected at concentrations less than MTCA groundwater CULs with the exception of arsenic.

5.3.1.2 Volatile Organic Compounds (VOCs)

VOC analyses were completed to evaluate the presence of 57 chemicals. Thirteen of the 57 chemicals evaluated were detected in one or more samples (Table 3).

The chemicals 1,1-dichloroethene, 1,2,4-trimethylbenzene, CFC-11, benzene, toluene, xylene, PCE, cis-1,2-dichloroethene, and trans-1,2-dichloroethene were detected in one to nine samples (Table 3). The detected concentrations of these chemicals were substantially less than the MTCA Method A and B groundwater CULs (Table E-2 in Appendix E).

The chemicals sec-butylbenzene, and tert-butylbenzene were detected in one sample each. MTCA cleanup criteria do not currently exist for sec-butylbenzene and tert-butylbenzene.

Trichloroethene (TCE) and vinyl chloride were the only VOCs detected at concentrations greater than the MTCA Method A groundwater CULs. TCE was detected in one monitoring well, MW-02, at a concentration (5.3 µg/l) slightly greater than the Method A groundwater CUL (5.0 µg/l). TCE was either not detected or detected at concentrations less than the Method A CUL in groundwater from the remaining eight monitoring well locations. Vinyl chloride was detected in groundwater from seven of nine monitoring wells (MW-02 through MW-07 and MW-09) at concentrations (0.27 to 1.7 µg/l) greater than the Method A groundwater CUL (0.2 µg/l). Vinyl chloride was not detected in groundwater from the remaining two wells at detection limits less than the CUL.

The detection limits for ethylene dibromide (0.019 to 0.02 µg/l) were greater than the MTCA Method A groundwater CUL (0.01 µg/l) (Table E-2 in Appendix E). Ethylene dibromide is used in anti-knock gasoline mixtures. As gasoline was not detected in any groundwater samples collected from the Subject Property (see petroleum hydrocarbon discussion below) and in only one soil sample at a concentration

less than the CUL, it is not expected that ethylene dibromide would be present in groundwater at concentrations greater than the MTCA groundwater CULs.

In summary, of the 13 VOCs that were detected, TCE and vinyl chloride were detected at concentrations greater than MTCA CULs. All other VOCs were not detected.

5.3.1.3 Semivolatile Organic Compounds (SVOCs) and Polycyclic Aromatic Hydrocarbons (PAHs)

SVOC analyses were completed to evaluate the presence of 67 chemicals including PAHs. Only two of the 67 chemicals were detected in one or more samples (Table 3).

Benzo(a)pyrene was detected in one groundwater sample collected from monitoring well MW-01 at a concentration (0.044 ug/l) less than the Method A groundwater CUL (0.1 µg/l). As benzo(a)pyrene was the only cPAH that was detected, the detected concentration of benzo(a)pyrene was less than the CUL, and the detection limits for all other cPAHs were less than the MTCA Method A groundwater CUL for benzo(a)pyrene, a TEQ was not calculated for cPAHs in groundwater.

Benzoic acid was detected in five groundwater samples at concentrations (1.2 to 1.3 µg/l) that were four orders of magnitude less than the Method B groundwater CUL (64,000 µg/l).

The detection limits for chemicals that were not detected for which there are Method B groundwater CULs were less than the CULs except for 3,3'-dichlorobenzidine, bis(2chloroethyl)ether and hexachlorobenzene. These compounds were either not detected in soil, or in the case of 3,3'-dichlorobenzidine, was detected once in soil at a concentrations several orders of magnitude less than the CUL and the detection limits were less than the MTCA Method B soil CUL. Therefore, 3,3'-dichlorobenzidine, bis(2chloroethyl)ether and hexachlorobenze are not expected to be present in groundwater at concentrations greater than the Method B groundwater CUL.

In summary, all SVOCs were either not detected or were detected at concentrations less than their respective MTCA CUL in groundwater samples.

5.3.1.4 Petroleum Hydrocarbons

Gasoline-, diesel- and/or oil-range petroleum hydrocarbons were not detected in the groundwater samples submitted for chemical analysis (Table 3). The detection limits for all petroleum hydrocarbon analyses were less than the Method A groundwater CULs (Table E-2 in Appendix E).

5.3.1.5 Polychlorinated Biphenyls (PCBs)

PCB aroclors were not detected in the groundwater samples collected from monitoring wells MW-01 through MW-09. The detection limits for Aroclor 1016 were less than the Method B groundwater cleanup level. However, the detection limits for other aroclors were greater than the MTCA Method A CUL for total PCBs and the detection limits for Aroclor 1254 were also greater than the Method B groundwater CUL. PCB aroclors were not detected in any soil samples at detection limits one order of magnitude less than the MTCA Method B soil CUL. Therefore, PCBs are not expected to be present in groundwater at concentrations greater than the MTCA CULs.

5.3.1.6 Summary of Results for Groundwater Analyses

Relatively few chemicals were detected in groundwater samples collected from monitoring wells MW-01 through MW-09 in March/April 2008 (Table 3). Most VOCs and SVOCs, and all petroleum hydrocarbons and PCBs were not detected. Additionally, the detected concentrations of all chemicals except arsenic, TCE and vinyl chloride were less than the MTCA groundwater CULs.

The exceedances of groundwater CULs identified in analyses completed in March/April 2008 include the following

- Arsenic was detected in monitoring well MW-01 (0.0079 mg/l and 0.0053 mg/l) and MW-05 (0.0061 mg/l) at concentrations slightly greater than the Method A groundwater CUL (0.005 mg/l).
- TCE was detected in monitoring well MW-02 at a concentration (5.3 µg/l) slightly greater than the Method A groundwater CUL (5.0 µg/L).
- Vinyl chloride was detected in groundwater from seven monitoring wells (MW-02 through MW-07 and MW-09) at concentrations (0.27 to 1.7 µg/l) greater than the Method A groundwater CUL (0.2 µg/l).

Arsenic concentrations that were greater than MTCA groundwater CULs were present in monitoring wells located on the southwestern and southeastern portion of the Subject Property. Monitoring wells with TCE and vinyl chloride concentrations greater than the CULs were generally within and adjacent to the footprint of the former material testing laboratories. Vinyl chloride was also detected in groundwater from monitoring well MW-09 located downgradient of the former locations of the materials testing.

5.3.2 Groundwater Monitoring Results – October/November 2008

Monitoring wells MW-10 through MW-16 were installed on and adjacent to the Subject Property in October 2008 to supplement monitoring wells MW-01 through MW-09. Monitoring wells MW-10 through MW-12 were installed downgradient, northeast of the Subject Property in Adams Street and on the east side of Adams Street north and south of MW-09 (Figure 4). Monitoring well MW-13 was installed upgradient/crossgradient, south of the Subject Property on the south side of State Avenue (Figure 4). Monitoring wells MW-14 through MW-16 were installed on the western and northeastern portions of the Subject Property.

The groundwater samples collected in October/November 2008 were submitted for metals, VOC and SVOC including PAH analyses (Table 4). Petroleum hydrocarbons, PCBs and the metals barium, cadmium, chromium, selenium and silver were not analyzed in October/November 2008 because these chemicals were either not detected or detected at concentrations less than MTCA CULs in groundwater samples collected and analyzed from monitoring wells during the March/April 2008 groundwater sampling event.

The analytical results for groundwater samples collected in October/November 2008 are discussed below. Table 4 presents a summary of the frequency of detection of chemicals in the groundwater samples. Table E-3 in Appendix E presents the analytical results for all of the groundwater samples collected in March/April 2008 compared to MTCA CULs.

5.3.2.1 Metals

Total and dissolved metals analyses were completed on groundwater samples collected from MW-01 through MW-16. The samples were analyzed for arsenic, lead, and mercury.

Mercury was not detected in any total or dissolved groundwater samples collected in October/ November 2008 (Table 4). The analytical detection limit for mercury (0.001 mg/l) was less than the MTCA Method A CUL (0.002 mg/l) (Table E-3 in Appendix E).

Lead was detected in three total metals analyses. The detected lead concentrations (0.0034 to 0.0074 mg/l) in the total metals analyses were less than the MTCA Method A groundwater CUL (0.015 mg/l). Lead was not detected in any dissolved metals analyses at detection limits less than the CUL.

Arsenic was detected in all total and dissolved analyses completed on groundwater samples collected in October/November 2008. The total and/or dissolved concentrations of arsenic in all of the samples were greater than the MTCA Method A groundwater CUL except for the samples collected from monitoring wells MW-07 and MW-16. The concentrations of arsenic detected in October/November 2008 may be the result of seasonal variation or laboratory interference from other chemicals during sample analysis.

In summary, the metals tested were either not detected or were detected at concentrations less than MTCA groundwater CULs with the exception of arsenic.

5.3.2.2 Volatile Organic Compounds (VOCs)

VOC analyses were completed to evaluate 57 chemicals in groundwater samples collected from MW-01 through MW-16. Only two of the 57 chemicals evaluated were detected in the groundwater samples (Table 4).

Benzene was detected in three samples. The detected concentrations (0.4 to 0.95 µg/l) and detection limits (0.37 µg/l) were less than MTCA Method A CUL (5.0 µg/l) (Table E-3 in Appendix E).

PCE was detected in five samples. The detected concentrations (0.49 to 0.98 µg/l) and detection limits (0.47 µg/l) were less than MTCA Method A CUL (5.0 µg/l).

The detection limits for 1,1,2,2-tetrachloroethane, 1,2,3-trichloropropane, and 1,2-dibromo-3-chloropropane were greater than the MTCA Method B groundwater CULs. 1,1,2,2-tetrachloroethane, 1,2,3-trichloropropane and 1,2-dibromo-3-chloropropane were not detected in groundwater samples collected in March/April 2008 at detection limits less than the MTCA groundwater CULs (Table 3). Additionally, these chemicals were not detected in soil (Table 2). The detection limits for these chemicals in soil were less than the MTCA Method B soil CULs. Therefore, 1,1,2,2-tetrachloroethane, 1,2,3-trichloropropane and 1,2-dibromo-3-chloropropane are not expected to be present in groundwater at concentrations greater than the MTCA CULs.

All other VOCs were not detected. For VOCs with MTCA CULs, the detection limits were less than MTCA CULs.

5.3.2.3 Semivolatile Organic Compounds (SVOCs) and Polycyclic Aromatic Hydrocarbons (PAHs)

SVOC analyses were completed to evaluate the presence of 67 chemicals including PAHs. None of the 67 chemicals evaluated were detected (Table 4).

PAHs were not detected in groundwater samples at detection limits less than the MTCA Method A groundwater CUL for benzo(a)pyrene. As cPAHs were not detected at detection limits less than the MTCA Method A groundwater CUL, a TEQ was not calculated for cPAHs in groundwater.

The detection limits for 1,3-dinitrobenzene, 1,4-dichlorobenzene, 1,4-dinitobenzene, 2,2'-oxybis(1-chloropropane), 2,4,6-trichlorophenol, bis(2-chloroethyl)ether, hexachlorobenzene, hexachlorobutadiene and pentachlorophenol were greater than the MTCA B groundwater CULs. The chemicals 1,4-dinitobenzene and hexachlorobutadiene were also analyzed as part of VOC analyses and were not detected at detection limits less than the MTCA CULs. The chemicals 2,2'-oxybis(1-chloropropane), 2,4,6-trichlorophenol, bis(2-chloroethyl)ether, hexachlorobenzene and pentachlorophenol were not

detected in groundwater analyses completed in March/April 2008 at detection limits less than the MTCA Method B CULs. The chemicals bis(2-chloroethyl)ether and hexachlorobenzene were not detected in soil and the detection limits of these compounds in soil were less than the MTCA Method B soil CUL. The chemical 1,3-dinitrobenzene is a component of explosives and 1,4-dinitobenzene is predominantly used for dyes and medicine. For the reasons stated above, these chemicals are not expected to be present in groundwater at the Subject Property at concentrations greater than the MTCA groundwater CULs.

All other SVOCs were not detected. For SVOCs with MTCA CULs, the detection limits were less than MTCA CULs.

5.3.2.4 Summary of Results for Groundwater Analyses for October/November 2008

Arsenic was the only chemical detected at concentrations greater than the MTCA groundwater CULs. Arsenic was detected in all total and dissolved analyses completed on groundwater samples collected in October/November 2008. The total and/or dissolved concentrations of arsenic in all of the samples were greater than the MTCA Method A groundwater CUL except for the samples collected from monitoring wells MW-07 and MW-16. Monitoring wells with arsenic concentrations greater than the Method A CUL are located on and adjacent to the Subject Property. The highest concentration of arsenic was detected in groundwater (MW-13) is located upgradient/crossgradient of the Subject Property.

6.0 CHEMICALS OF CONCERN

This section identifies the COCs for soil and groundwater based on evaluation of the results of sample analyses against the MTCA CULs. The following sections provide an evaluation of the COCs in each media for each chemical group. Figures 8 and 9 present the locations and concentrations of COCs for soil and groundwater.

6.1 METALS

Soil and groundwater samples were analyzed for arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver. Barium, cadmium, chromium, selenium and silver are not identified as COCs for soil or groundwater as these compounds were either not detected or were detected at concentrations less than the MTCA soil and groundwater CULs. Further evaluation is provided for arsenic, lead and mercury in soil and groundwater at the Subject Property in the following sections.

6.1.1 Arsenic

Arsenic was detected in both soil and groundwater samples at concentrations greater than the MTCA Method A CULs.

The detected concentrations of arsenic in 2 out of 78 soil samples were greater than the MTCA Method A soil CUL based on background concentrations of arsenic in soil in Washington State (Table E-1 in Appendix E). Arsenic was detected in soil at PP-17 in the sample from 2 to 4 feet bgs (23 mg/kg) and at TD-05 in the sample 2 to 2.5 feet bgs (40 mg/kg) at concentrations greater than the MTCA Method A CUL (20 mg/kg). The detected arsenic concentrations in all other soil samples were less than the soil CUL. Arsenic is identified as a COC for soil at the Subject Property.

Arsenic was only detected at concentrations greater than the MTCA Method A CUL in groundwater samples collected from two wells in March/April 2008. The total and dissolved arsenic concentrations in groundwater from monitoring well MW-01 (0.0079 mg/l and 0.0053 mg/l) and the total arsenic concentration in MW-05 (0.0061 mg/l) were slightly greater than the Method A groundwater CUL. The

total and/or dissolved concentrations of arsenic in all of the samples that were collected in October/November 2008 were greater than the MTCA Method A groundwater CUL except for the samples collected from monitoring wells MW-07 and MW-16. Monitoring wells with arsenic concentrations greater than the Method A CUL were located on and adjacent to the Subject Property. The highest concentration of arsenic was detected in groundwater (MW-13) is located upgradient/ crossgradient of the Subject Property. Arsenic is identified as a COC for groundwater at the Subject Property.

6.1.2 Lead

Lead was detected in 3 out of 78 soil samples at concentrations greater than the MTCA Method A soil CUL (250 mg/kg). Samples with lead at a concentration greater than the soil CUL were collected from 2 to 4 feet bgs in sample locations PP-16 (350 mg/kg) and PP-17 (840 mg/kg) and 3 to 3.5 feet bgs in MW-15 (510 mg/kg). The detected lead concentrations in all other soil samples were less than the soil CUL. Lead is identified as a COC for soil at the Subject Property.

Lead was only detected in one groundwater sample collected in March/April 2008 (MW-05 at 0.0039 mg/l) and the detected concentration was less than the MTCA Method A groundwater CUL (0.015 mg/l). Lead was detected in three groundwater samples collected in October/November 2008 and the detected concentrations (0.0034 to 0.0074 mg/l) were also less than the MTCA Method A groundwater CUL. Because lead is not present at concentrations greater than the groundwater CUL, it is not identified as COC for groundwater at the Subject Property.

6.1.3 Mercury

Mercury was detected in 1 out of 66 soil samples at a concentration greater than the MTCA Method A soil CUL (2.0 mg/kg) at location PP-01. The detected concentration at PP-01 collected from 6 to 6.5 feet bgs (2.3 mg/kg) was slightly greater than the MTCA Method A CUL but was not greater than the Method B CUL (24 mg/kg). The detected mercury concentrations in all other soil samples were less than the MTCA Method A and B soil CULs.

Mercury was not detected in any groundwater samples collected in March/April 2008. Mercury was also not detected in any groundwater samples collected in October/November 2008. The analytical detection limits for mercury for samples analyzed for both investigation events were less than the MTCA Method A CUL (0.002 mg/l). Because mercury is not present at concentrations greater than the groundwater CUL it is not a COC for groundwater at the Subject Property.

Mercury is also not considered a COC for soil based on the groundwater sample results. The MTCA Method A CUL for soil is based on protection of drinking water and the MTCA Method A groundwater CUL is based on the Maximum Contaminant Level (MCL) for drinking water. As mercury is not present in any groundwater samples at concentrations greater than the MTCA Method A groundwater CUL, the concentrations present in soil are protective of groundwater.

6.2 VOLATILE ORGANIC COMPOUNDS (VOCS)

Soil and groundwater samples were analyzed to evaluate the presence of 65 and 57 VOCs, respectively. Relatively few VOCs were detected in soil and groundwater samples collected from the Subject Property. All VOCs, except benzene, TCE, PCE, vinyl chloride are not evaluated further, and are not identified as COCs for soil or groundwater as the VOCs, because they were either not detected or were detected at concentrations less than the MTCA soil and groundwater CULs.

Further evaluation of benzene, TCE, PCE and vinyl chloride in soil and groundwater at the Subject Property is provided in the following sections.

6.2.1 Benzene

Benzene was detected in 8 of 61 soil samples. The detected concentrations of benzene (3.9 to 1,000 µg/kg) were less than the MTCA Method B soil CUL (18,000 µg/kg) but four of the detected concentrations were greater than the MTCA Method A soil CUL (30 µg/kg). The samples with detected benzene concentrations greater than the Method A CUL were from TD-10 at 7 to 7.5 feet bgs (150 µg/kg), MW-02 at 7 to 7.5 feet bgs (1,000 µg/kg), MW-07 at 10 to 10.5 feet bgs (70 µg/kg) and MW-15 at 3 to 3.5 (160 µg/kg).

Benzene was detected in six groundwater samples collected in March/April 2008 at concentrations (0.11 to 0.34 µg/l) that were an order of magnitude less than the MTCA Method A groundwater CUL (5.0 µg/l). Additionally, benzene was detected in three samples collected in October/November 2008 at concentrations (0.4 to 0.95 µg/l) less than MTCA Method A CUL. Because benzene is not present at concentrations greater than the MTCA Method A groundwater CUL it is not a COC for groundwater at the Subject Property.

Benzene is also not considered a COC for soil based on the groundwater sample results. The MTCA Method A CUL for soil is based on protection of drinking water and the MTCA Method A groundwater CUL is based on the MCL for drinking water. As benzene is not present in any groundwater samples at concentrations greater than the MTCA Method A groundwater CUL, the concentrations present in soil are protective of groundwater.

6.2.2 Trichloroethene (TCE)

TCE was detected in 13 out of 61 soil samples. The detected concentrations of TCE and detection limits for samples in which TCE was not detected were less than the MTCA Method B soil CUL (2,500 µg/kg). However, five of the detected TCE concentrations were greater than the Method A soil CUL (30 µg/kg). The samples with detected concentrations of TCE that were greater than the Method A soil CUL were from PP-15 at 2 to 4 feet bgs (2,300 µg/kg), PP-16 at 2 to 4 and 4 to 6 feet bgs (46 and 55 µg/kg, respectively), TD-03 at 4 to 4.5 feet bgs (230 µg/kg), TD-08 at 4 to 4.5 feet bgs (82 µg/kg), TD-09 at 4 to 4.5 feet bgs (600 µg/kg), MW-02 at 7 to 7.5 feet bgs (900 µg/kg), and MW-07 at 7 to 7.5 feet bgs (45 µg/kg). The detection limits for five soil samples were also greater than the MTCA Method A soil CUL. The samples with detection limits for TCE that were greater than the Method A soil CUL were from PP-13 at 6 to 8 feet bgs (33 U µg/kg), PP-17 at 6 to 8 feet bgs (31 U µg/kg), TD-01 at 7 to 7.5 feet bgs (39 U µg/kg), TD-10 at 7 to 7.5 feet bgs (66 U ug/kg), and MW-07 at 10 to 10.5 feet bgs (34 U µg/kg).

TCE was detected at a concentration greater than the MTCA Method A groundwater CUL in one sample collected in March/April 2008. TCE was detected in monitoring well, MW-02, at a concentration (5.3 µg/l) slightly greater than the Method A groundwater CUL (5.0 µg/l). TCE was not detected in groundwater samples collected in October/November 2008. The detection limits (0.4 µg/l) were less than the MTCA Method A groundwater CUL.

Although TCE was detected in soil at concentrations greater than the MTCA Method A soil CUL, analyses of groundwater samples collected in October/November 2008 indicate that the concentrations of TCE in soil are protective of groundwater. Only one groundwater sample collected in October/ November 2008 indicates that TCE is a COC for groundwater and therefore, is a COC in soil. TCE is retained as a COC for soil and groundwater at the Subject Property.

6.2.3 Tetrachloroethene (PCE)

PCE was detected in 3 out of 61 samples. The detected concentrations of PCE and detection limits for samples in which PCE was not detected were less than the MTCA Method B soil CUL (1,900 µg/kg). However, the detected concentrations of PCE in three samples and the detection limits in nine samples were greater than the MTCA Method A soil CUL (50 µg/kg). The samples with detected concentrations greater than the Method A soil CUL were from PP-15 at 2 to 4 feet bgs (54 µg/kg), TD-09 at 4 feet bgs (66 µg/kg), and MW16 at 5 feet bgs (230 µg/kg). The nine samples with detection limits for PCE that were greater than the Method A soil CUL were from PP-13, PP-14, PP-16, PP-17, TD-01, TD-10, MW-02 and MW-07. The samples with detection limits greater than the MTCA Method A soil CUL were from all three investigation events.

PCE was detected in one groundwater sample collected in March/April 2008. The detected PCE concentration (0.24 µg/L) and detection limits (0.1 µg/L) for samples where PCE was not detected in March/April 2008 were less than the MTCA Method A groundwater CUL (5.0 µg/L). PCE was detected in five samples collected in October/November 2008. The detected concentrations (0.49 to 0.98 µg/l) and detection limits (0.47 µg/l) for samples in which PCE was not detected were less than MTCA Method A CUL. Because PCE is not present at concentrations greater than the groundwater CUL it is not a COC for groundwater at the Subject Property.

PCE is also not considered a COC for soil based on the groundwater sample results. The MTCA Method A CUL for soil is based on protection of drinking water and the MTCA Method A groundwater CUL is based on the (MCL) for drinking water. As PCE is not present in any groundwater samples at concentrations greater than the MTCA Method A groundwater CUL, the concentrations present in soil are protective of groundwater.

6.2.4 Vinyl Chloride

Vinyl chloride was detected in 3 out of 61 soil samples. The detected concentrations (34 to 330 µg/kg) and detection limits (1.15 to 66 µg/kg) for samples in which vinyl chloride was not detected were less than the MTCA Method B soil CULs (670 µg/kg). Because vinyl chloride is not present at concentrations greater than the soil CUL it is not a COC for soil at the Subject Property.

Vinyl chloride was detected at concentrations greater than the MTCA Method A groundwater CUL in samples collected in April/March 2008. Vinyl chloride was detected in groundwater from seven of nine monitoring wells (MW-02 through MW-07 and MW-09) at concentrations (0.27 to 1.7 µg/l) greater than the Method A groundwater CUL (0.2 µg/l). Vinyl chloride was not detected in groundwater samples collected in October/November 2008. The detection limits (0.18 µg/l) were less than the MTCA Method A groundwater CUL. Analyses of groundwater samples collected in October/ November 2008 indicate that vinyl chloride is not a COC in groundwater at the Subject Property. However, groundwater samples collected in March/April 2008 indicates that vinyl chloride is a COC for groundwater. Therefore, vinyl chloride retained is retained as a COC for soil and groundwater at the Subject Property.

6.3 SEMIVOLATILE ORGANIC COMPOUNDS (SVOCS) AND POLYCYCLIC AROMATIC HYDROCARBONS (PAHS)

Soil and groundwater samples were analyzed to evaluate the presence of 78 and 67 SVOCs, respectively. Relatively few SVOCs were detected in soil and groundwater samples collected from the Subject Property. All SVOCs, except cPAHs, are not evaluated further, and are not identified as COCs for soil or

groundwater as the SVOCs, other than cPAHS, were either not detected or were detected at concentrations less than the MTCA soil and groundwater CULs.

Further evaluation for cPAHs in soil and groundwater at the Subject Property is provided in the following section.

6.3.1 Polycyclic Aromatic Hydrocarbons (PAHs)

cPAHs were detected in between 2 and 18 soil samples. A toxicity equivalency soil concentration (TEQ) was calculated for cPAHs to compare to the MTCA Method A CUL for benzo(a)pyrene (100 µg/kg). The TEQ for samples with detected concentrations of cPAHs (678 to 4,860 µg/kg) was greater than the CUL (100 µg/kg) in four samples collected from four investigation locations including PP-15, PP-16, PP-19 and TD-05 (Table E-1 in Appendix E). cPAHs are identified as a COC for soil at the Subject Property.

Benzo(a)pyrene was the only cPAH detected in one groundwater sample collected in March/April 2008 from monitoring well MW-01. The benzo(a)pyrene concentration (0.044 µg/l) was less than the Method A groundwater CUL (0.1 µg/l). All other cPAHs were not detected in groundwater samples at detection limits less than the MTCA Method A groundwater CUL for benzo(a)pyrene. As cPAHs were not detected in groundwater or were detected at a concentration less than the MTCA Method A CULs for benzo(a)pyrene, cPAHs are not considered COCs for groundwater at the Subject Property.

6.4 PETROLEUM HYDROCARBONS

Soil and groundwater samples were analyzed for petroleum hydrocarbons including gasoline-, diesel- and oil-range petroleum hydrocarbons. Petroleum hydrocarbon analyses were completed on 36 soil samples collected from sample locations PP-01 through PP-08, PP-13 through PP-17, MW-01 through MW-09. Petroleum hydrocarbons were either not detected or were detected at concentrations less than the MTCA Method A soil CULs in all soil samples. Additionally, gasoline-, diesel- and oil-range petroleum hydrocarbons were not detected in groundwater samples collected in March/April 2008. Petroleum hydrocarbons are not considered COCs for soil or groundwater at the Subject Property as petroleum hydrocarbons were either not detected or were detected in at concentrations less than the MTCA Method A CULs.

6.5 POLYCHLORINATED BIPHENYLS (PCBS)

Soil and groundwater samples were analyzed for PCBs. PCB analyses were completed on 18 soil samples collected from sample locations MW-01 through MW-09. PCBs were not detected at detection limits that were approximately one order of magnitude less than the MTCA soil CULs for PCBs in all soil samples. Additionally, PCBs were not detected in groundwater samples collected in March/April 2008. PCBs are not considered COCs for soil or groundwater at the Subject Property as PCBs were not detected in soil or groundwater samples.

7.0 CONCLUSIONS AND RECOMMENDATIONS

The COCs for soil and groundwater at the Subject Property based on the comparison of chemical concentrations to MTCA CULs are the following:

- Soil COCs include;
  - Arsenic

- Lead
- TCE
- cPAHs

Groundwater COCs include;

- Arsenic
- TCE
- Vinyl chloride

Figure 8 presents the results for soil samples with concentrations of COCs greater than MTCA CULs. With the exception of one sample collected from MW-15, all of the samples with concentrations of arsenic, lead, TCE and cPAHs greater than MTCA CULs were collected from the former locations of foundry facilities and the materials testing laboratory. Former foundry activities were likely the source of arsenic and lead in soil. TCE is likely the result of testing activities at the former material laboratories. The presence of solvents in the area of the materials testing laboratories is consistent with activities identified to occur at these facilities and associated contamination as identified in the WSDOT Phase I (WSDOT 2005) and Phase II (WSDOT 2007) reports. The source for cPAHs is likely the fire that burned and damaged the former materials testing laboratory and automotive/truck shed in 1936.

Arsenic and lead in soil at concentrations greater than the CULs are only present in localized areas (i.e., PP-16, PP-17, TD-05 and MW-15) and at depths between 2 and 4 feet bgs. Based on the investigation results, significant arsenic and lead source areas are not present at the Subject Property.

TCE in soil at concentrations greater than the CULs is predominantly present in the southeast portion of the Subject Property between 2 and 8 feet bgs. Based on the investigation results, the area with TCE in soil at concentrations greater than the CUL is generally within the footprint of the former TDO building and Subject Property boundary and is bounded by investigation sample locations with TCE concentrations that are less than the CULs.

The area with cPAH concentrations greater than the CUL is predominantly present in the southeastern portion of the property and generally within the footprint of the former TDO building. Soil containing cPAH concentrations greater than the CULs was detected between 2 and 4 feet bgs. The area where cPAHs are observed in soil at concentrations greater than the CUL is likely where material resulting from the former materials testing laboratory and automotive/truck shed fire was present prior to construction of the TDO. It is likely that debris from the fire and demolition activities was mixed with site soils and is the source of cPAHs. The concentration gradient in samples shows a decreasing concentration with depth. cPAHs were not detected in groundwater at concentrations greater than the MTCA CUL indicating that the cPAHs in soil are not impacting groundwater.

Figure 9 presents the results of groundwater samples with concentrations of COCs greater than the MTCA CULs. Variability was observed in the presence and concentration of the groundwater COCs between the March/April and October/November 2008 sampling events.

Arsenic was observed in groundwater at two locations, MW-01 and MW-05, at concentrations greater than the CUL during March/April 2008. However, arsenic was either not detected or detected at concentrations less than the CUL in groundwater from the remaining wells in March/April 2008. Arsenic concentrations in soil in and adjacent to MW-01 and MW-05 are generally less than 5.0 mg/kg and arsenic concentrations in soil at the Subject Property are less than background concentrations in Washington State. In October/November 2008, arsenic was observed in all but two wells at

concentrations greater than the CUL. The highest arsenic concentration was detected in MW-3 located upgradient/crossgradient to the Subject Property. Additional groundwater sampling and analysis is necessary to evaluate the variability in arsenic concentrations and possible factors influencing presence and aerial extent. Possible factors include seasonal variation, changes in redox potential, and laboratory interferences from other chemicals during sample analyses.

TCE and vinyl chloride were detected in groundwater samples collected during the March/April 2008 event but were not detected in groundwater samples collected during the October/November 2008 event. In March/April, TCE and vinyl chloride were observed in groundwater present in the eastern portion of the site in the same area as soil contaminated with TCE at concentrations greater than the CUL. The TCE concentration in groundwater at MW-02 was only slightly greater than the groundwater CUL. The concentrations of vinyl chloride in March/April samples ranged from the CUL (0.2 µg/l) to approximately 20 times the CUL. Vinyl chloride is a product of the degradation of chlorinated solvents including PCE and TCE. Similar to arsenic, additional groundwater sampling and analysis is necessary to evaluate the variability in TCE and vinyl chloride concentrations.

The nature and extent of contamination has been defined based on the results of this RI. The extent of COCs at concentrations greater than the CULs in soil is essentially limited to the southeastern portion of the Subject Property to depths that are less than 6 to 10 feet bgs. The extent of COCs at concentrations greater than the CULs in groundwater is also predominantly located in the southeastern portion of the Subject Property. However, variability between the spring (March/April) versus fall (October/November) groundwater sampling events suggest that additional groundwater monitoring is warranted. Because the nature and extent of COCs in groundwater are unlikely to change as a result of future groundwater monitoring, it is our opinion that proceeding with a feasibility study (FS) and a cleanup action plan (CAP) in accordance with MTCA cleanup regulations is appropriate at this time to allow redevelopment plans to continue.

8.0 REFERENCES

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9.0 LIMITATIONS

We have prepared this report for the exclusive use of the City of Olympia and their authorized agents as part of their evaluation of environmental conditions at the project area.

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
INVESTIGATION EVENTS SUMMARY
318 STATE AVENUE NE
OLYMPIA, WASHINGTON

Investigation Event	Investigation Period	Soil Investigation Locations	Number of Soil Samples	Soil Analyses	Analytical Method	Water Investigation Locations	Number of Water Samples	Water Analyses	Analytical Method
Phase II	July 2006	PP-01 through PP-08	9	Total Metals[1]	EPA 6000/7000 / EPA 7471A	PP-01 through PP-08	8	Total Metals[1]	EPA 6000/7000 / EPA 7471A
				VOCs	EPA 8260B			VOCs	EPA 8260B
				SVOCs	EPA 8270C			SVOCs	EPA 8270C
				cPAHs	EPA 8270C SIM			cPAHs	EPA 8270C SIM
				Petroleum Hydrocarbons	NWTPH-Gx, -Dx			Petroleum Hydrocarbons	NWTPH-Gx, -Dx
	September 2006	PP-09 through PP-17	20	Total Metals[1]	EPA 6000/7000 / EPA 7471A	PP-09 through PP-17	9	Total Metals[1]	EPA 6000/7000 / EPA 7471A
				VOCs	EPA 8260B			VOCs	EPA 8260B
				SVOCs	EPA 8270C			SVOCs	EPA 8270C
				cPAHs	EPA 8270C SIM			cPAHs	EPA 8270C SIM
				Petroleum Hydrocarbons	NWTPH-Gx, -Dx			Petroleum Hydrocarbons	NWTPH-Gx, -Dx
Supplemental Phase II	October 2007	TD01 through TD11	11	Total Metals[2]	EPA 6020	TD01 through TD11	12	Total Metals[2]	EPA 6020
				VOCs	EPA 8260B			VOCs	EPA 8260B
				SVOCs	EPA 8270C			SVOCs	EPA 8270C
Monitoring Well Installation	March 2008	MW-01 through MW-09	18	Total Metals[3]	EPA 6000/7000 / EPA 7471A	MW-01 through MW-09	9	Total and Dissolved Metals[4]	EPA 6000/7000 / EPA 7471A
				VOCs	EPA 8260B			VOCs	EPA 8260B
				SVOCs	EPA 8270C			SVOCs	EPA 8270C
				cPAHs	EPA 8270C SIM			cPAHs	EPA 8270C SIM
				Petroleum Hydrocarbons	NWTPH-Gx, -Dx			Petroleum Hydrocarbons	NWTPH-Gx, -Dx
				PCBs	EPA 8082			PCBs	EPA 8082
	October 2008	MW-10 through MW-16 and PP-18 through PP-20	20	Total Metals5	EPA 6020	MW-01 through MW-16 and PP-18 through PP-20	20	Total and Dissolved Metals[5]	EPA 6020
				VOCs	EPA 8260B			VOCs	EPA 8260B
				SVOCs	EPA 8270C			SVOCs	EPA 8270C
				cPAHs	EPA 8270C SIM			cPAHs	EPA 8270C SIM

Notes:

[1] Samples were analyzed for total arsenic, cadium, chromium, lead and mercury.

[2] Samples were analyzed for total arsenic and lead.

[3] Samples were analyzed for total arsenic, barium, cadium, chromium, lead, mercury, selenium and silver.

[4] Samples were analyzed for total and dissolved (water only) arsenic, barium, cadium, chromium, lead, mercury, selenium and silver.

[5] Samples were analyzed for total and dissolved (water only) arsenic, lead and mercury.

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TABLE 2
DETECTION FREQUENCY SUMMARY - SOIL
318 STATE AVENUE NE
OLYMPIA, WASHINGTON

Analyte	MTCA[1] Method A Cleanup Level	MTCA[1] Method B Cleanup Level	Number of Samples	Number of Detects	Minimum Detected Value	Maximum Detected Value	Average Detected Value	Minimum Non-detected Value	Maximum Non-detected Value	Average Non-detected Value
Metals (mg/kg)										
Arsenic	20	0.67	78	54	1	40	5.83	1	11	3.08
Barium	NC	16,000	18	18	4.8	150	34.03	NA	NA	NA
Cadmium	NC	40	47	0	NA	NA	NA	0.21	1.9	0.47
Chromium	NC	NC	47	47	8.6	45	20.04	NA	NA	NA
Chromium, Hexavalent	19	240	6	0	NA	NA	NA	1.1	1.3	1.15
Lead	250	NC	78	66	1	840	44.03	1	5	2.13
Mercury	2	24	67	22	0.018	2.3	0.17	0.017	0.541	0.16
Selenium	NC	400	18	0	NA	NA	NA	5.3	19	6.84
Silver	NC	400	18	1	2.1	2.1	2.10	1.1	3.8	1.38
Volatile Organic Compounds (µg/kg)										
1,1,1,2-Tetrachloroethane	NC	38,000	61	0	N/A	N/A	N/A	2.31	270	58.66
1,1,1-Trichloroethane	2,000	72,000,000	61	0	N/A	N/A	N/A	1.15	110	32.83
1,1,2,2-Tetrachloroethane	NC	5,000	61	0	N/A	N/A	N/A	2.31	55	24.31
1,1,2-Trichloroethane	NC	18,000	61	0	N/A	N/A	N/A	0.576	270	58.52
1,1-Dichloroethane	NC	8,000,000	61	0	N/A	N/A	N/A	0.922	270	58.55
1,1-Dichloroethene	NC	4,000,000	61	0	N/A	N/A	N/A	1.38	110	32.85
1,1-Dichloropropene	NC	NC	61	0	N/A	N/A	N/A	2.31	270	58.66
1,2,3-Trichlorobenzene	NC	NC	61	1	120	120	120.00	4.61	270	74.00
1,2,3-Trichloropropane	NC	140	61	0	N/A	N/A	N/A	2.31	270	58.66
1,2,4-Trichlorobenzene	NC	800,000	61	0	N/A	N/A	N/A	4.61	270	74.43
1,2,4-Trimethylbenzene	NC	4,000,000	61	8	53	110	83.25	2.31	270	59.97
1,2-Dibromo-3-Chloropropane	NC	710	61	0	N/A	N/A	N/A	4.61	270	58.85
1,2-Dichlorobenzene	NC	7,200,000	61	0	N/A	N/A	N/A	2.31	270	58.66
1,2-Dichloroethane	NC	11,000	61	0	N/A	N/A	N/A	0.576	270	58.52
1,2-Dichloropropane	NC	15,000	61	4	2.9	3.6	3.18	2.31	55	25.44
1,3,5-Trimethylbenzene	NC	4,000,000	61	6	62	81	68.50	2.31	270	59.61
1,3-Dichlorobenzene	NC	NC	61	0	N/A	N/A	N/A	2.31	270	58.66
1,3-Dichloropropane	NC	NC	42	0	N/A	N/A	N/A	2.31	110	25.20
1,4-Dichlorobenzene	NC	42,000	61	0	N/A	N/A	N/A	2.31	270	58.66
2,2-Dichloropropane	NC	NC	61	0	N/A	N/A	N/A	4.61	270	58.85
2-Butanone	NC	48,000,000	3	0	N/A	N/A	N/A	6.92	14.9	11.51
2-Chlorotoluene	NC	1,600,000	61	0	N/A	N/A	N/A	2.31	270	58.66
2-Hexanone	NC	NC	3	0	N/A	N/A	N/A	9.22	19.8	15.31
4-Chlorotoluene	NC	NC	61	0	N/A	N/A	N/A	2.31	270	58.66
Acetone	NC	8,000,000	3	0	N/A	N/A	N/A	13.8	29.7	22.97
Benzene	30	18,000	61	8	3.9	1000	176.59	0.692	21	14.01
Bromobenzene	NC	NC	61	0	N/A	N/A	N/A	2.31	270	58.66
Bromochloromethane	NC	NC	61	0	N/A	N/A	N/A	2.31	270	58.66
Bromoform	NC	130,000	61	0	N/A	N/A	N/A	2.31	270	58.66
Bromomethane	NC	110,000	61	0	N/A	N/A	N/A	4.61	1,400	230.21
Carbon Disulfide	NC	8,000,000	3	0	N/A	N/A	N/A	1.38	2.97	2.30
Carbon Tetrachloride	NC	7,700	61	1	66	66	66.00	2.31	110	32.93
CFC-11	NC	24,000,000	61	3	15	31	21.67	2.31	270	57.58
CFC-12	NC	16,000,000	61	0	N/A	N/A	N/A	2.31	270	58.66
Chlorobenzene	NC	1,600,000	61	0	N/A	N/A	N/A	0.922	270	58.55
Chloroethane	NC	350,000	61	0	N/A	N/A	N/A	2.31	1,400	230.02
Chloroform	NC	160,000	61	1	140	140	140.00	1.15	270	58.18
Chloromethane	NC	77,000	61	2	16	35	25.50	4.61	270	58.20
Cis-1,2-Dichloroethene	NC	800,000	61	3	170	920	423.33	1.38	110	53.12
Cis-1,3-Dichloropropene	NC	NC	61	0	N/A	N/A	N/A	2.31	270	58.66
Dibromochloromethane	NC	12,000	61	0	N/A	N/A	N/A	2.31	270	58.66
Dibromomethane	NC	800,000	61	0	N/A	N/A	N/A	2.31	270	58.66
Dichlorobromomethane	NC	16,000	61	0	N/A	N/A	N/A	2.31	270	58.66
Ethylbenzene	6,000	8,000,000	61	5	68	120	82.40	1.84	270	59.40
Ethylene dibromide	5[2]	12	61	0	N/A	N/A	N/A	2.31	270	58.66
Hexachlorobutadiene	NC	13,000	61	0	N/A	N/A	N/A	4.61	270	74.43
Isopropylbenzene (Cumene)	NC	8,000,000	61	1	71	71	71.00	2.31	270	58.81
Methyl isobutyl ketone	NC	6,400,000	3	0	N/A	N/A	N/A	9.22	19.8	15.31
Methyl t-butyl ether	100	560,000	3	0	N/A	N/A	N/A	0.461	0.992	0.77
Methylene Chloride	20[2]	130,000	61	19	7.8	82	23.48	1.61	170	43.24
Naphthalene	5,000	1,600,000	61	3	13	120	49.00	4.61	270	73.67
n-Butylbenzene	NC	NC	61	2	51	74	62.50	2.31	270	58.96
n-Propylbenzene	NC	NC	61	6	63	84	71.67	2.31	270	59.61
Pentafluorobenzene	NC	NC	3	3	40	40	40.00	N/A	N/A	N/A
p-Isopropyltoluene	NC	NC	61	3	4.9	32	17.63	2.31	170	54.66
Sec-Butylbenzene	NC	NC	61	2	25	71	48.00	2.31	170	55.23
Styrene	NC	33,000	61	0	N/A	N/A	N/A	0.461	270	58.51
Tert-Butylbenzene	NC	NC	61	0	N/A	N/A	N/A	2.31	270	58.66
Tetrachloroethene	50[2]	1,900	61	3	54	230	116.67	0.922	170	32.91
Toluene	7,000	6,400,000	61	6	9.9	700	186.32	0.692	170	55.59
Total Xylenes	9,000	16,000,000	42	0	NA	NA	NA	2.31	270	62.58
Trans-1,2-Dichloroethene	NC	1,600,000	61	2	29	550	289.50	1.15	170	55.08

Analyte	MTCA[1] Method A Cleanup Level	MTCA[1] Method B Cleanup Level	Number of Samples	Number of Detects	Minimum Detected Value	Maximum Detected Value	Average Detected Value	Minimum Non-detected Value	Maximum Non-detected Value	Average Non-detected Value
Trans-1,3-Dichloropropene	NC	NC	61	0	N/A	N/A	N/A	0.576	270	58.52
Trichloroethene	30[2]	2500	61	13	4.6	2300	332.41	1.15	66	20.91
Vinyl Chloride	NC	670	61	3	34	330	158.00	1.15	66	31.69
Semi-volatile Organic Compounds (µg/kg)										
1,2,4-Trichlorobenzene	NC	800,000	53	0	N/A	N/A	N/A	47	1,910	541.68
1,2-Dichlorobenzene	NC	7,200,000	53	0	N/A	N/A	N/A	47	1,910	541.68
1,3-Dichlorobenzene	NC	NC	53	0	N/A	N/A	N/A	47	1,910	541.68
1,3-Dinitrobenzene	NC	8,000	20	0	N/A	N/A	N/A	5,000	5,000	5,000.00
1,4-Dichlorobenzene	NC	42,000	53	0	N/A	N/A	N/A	47	1,910	541.68
2,2'-Oxybis[1-chloropropane]	NC	14,000	43	0	N/A	N/A	N/A	160	5,000	2,463.63
2,3,4,6-Tetrachlorophenol	NC	2,400,000	20	0	N/A	N/A	N/A	1,000	1,000	1,000.00
2,3,5,6-Tetrachlorophenol	NC	NC	20	0	N/A	N/A	N/A	1,000	1,000	1,000.00
2,4,5-Trichlorophenol	NC	8,000,000	53	0	N/A	N/A	N/A	95	5,000	1,995.85
2,4,6-Trichlorophenol	NC	91,000	53	0	N/A	N/A	N/A	140	5,000	2,028.60
2,4-Dichlorophenol	NC	240,000	53	0	N/A	N/A	N/A	95	5,000	1,995.85
2,4-Dimethylphenol	NC	1,600,000	53	0	N/A	N/A	N/A	95	1,910	574.42
2,4-Dinitrophenol	NC	160000	53	0	N/A	N/A	N/A	950	5,000	2,806.79
2,4-Dinitrotoluene	NC	160,000	53	0	N/A	N/A	N/A	95	1,000	508.74
2,6-Dinitrotoluene	NC	80,000	53	0	N/A	N/A	N/A	95	1,000	508.74
2-Chloronaphthalene	NC	6,400,000	53	0	N/A	N/A	N/A	19	1,000	433.79
2-Chlorophenol	NC	400,000	53	0	N/A	N/A	N/A	95	1,000	486.42
2-Nitroaniline	NC	NC	53	0	N/A	N/A	N/A	95	5,000	1,995.85
2-Nitrophenol	NC	NC	53	0	N/A	N/A	N/A	95	5,000	1,995.85
3,3'-Dichlorobenzidine	NC	2,200	33	1	95	95	95.00	190	1,910	428.44
4,6-Dinitro-2-Methylphenol	NC	NC	53	0	N/A	N/A	N/A	950	5,000	2,675.47
4-Bromophenyl phenyl ether	NC	NC	53	0	N/A	N/A	N/A	95	1,000	486.42
4-Chloro-3-Methylphenol	NC	NC	53	0	N/A	N/A	N/A	95	5,000	1,995.85
4-Chloroaniline	NC	320,000	53	0	N/A	N/A	N/A	95	5,000	2,215.17
4-Chlorophenyl-Phenylether	NC	NC	53	0	N/A	N/A	N/A	95	1,000	486.42
4-Nitroaniline	NC	NC	48	0	N/A	N/A	N/A	95	5,000	2,155.92
4-Nitrophenol	NC	NC	53	0	N/A	N/A	N/A	950	5,000	2,675.47
Aniline	NC	180,000	20	0	N/A	N/A	N/A	1000	1,000	1,000.00
Benzene, 1,4-Dinitro-	NC	32,000	20	0	N/A	N/A	N/A	5000	5,000	5,000.00
Benzoic Acid	NC	320,000,000	33	0	N/A	N/A	N/A	1,080	9,300	2,847.27
Benzyl Alcohol	NC	24,000,000	53	1	100	100	100.00	95	1,910	583.35
Bis(2-Chloroethoxy)Methane	NC	NC	53	0	N/A	N/A	N/A	95	1,000	486.42
Bis(2-Chloroethyl)Ether	NC	910[2]	48	0	N/A	N/A	N/A	95	1,000	489.25
Bis(2-chloroisopropyl) ether	NC	3,200,000	10	0	N/A	N/A	N/A	140	170	158.00
Bis(2-Ethylhexyl) Phthalate	NC	71,000	53	2	2,600	4,200	3,400.00	1000	5,600	1,618.04
Butyl benzyl phthalate	NC	16,000,000	53	2	97	5,100	2,598.50	95	1,000	500.98
Carbazole	NC	50,000	48	1	41	41	41.00	140	1,000	533.40
Dibenzofuran	NC	160,000	53	1	300	300	300.00	95	1,000	476.54
Dibutyl phthalate	NC	8,000,000	53	0	N/A	N/A	N/A	190	1,910	639.81
Diethyl phthalate	NC	64,000,000	53	1	12	12	12.00	95	1,000	493.87
Dimethyl phthalate	NC	80,000,000	53	0	N/A	N/A	N/A	95	1,000	486.42
Di-N-Octyl Phthalate	NC	1,600,000	53	2	140	160	150.00	190	1,000	565.22
Hexachlorobenzene	NC	630[2]	53	0	N/A	N/A	N/A	47	1,000	453.68
Hexachlorobutadiene	NC	13,000	53	0	N/A	N/A	N/A	47	1,910	541.68
Hexachlorocyclopentadiene	NC	480,000	53	0	N/A	N/A	N/A	95	1,910	574.42
Hexachloroethane	NC	71,000	53	0	N/A	N/A	N/A	95	1,910	574.42
Hexanedioic Acid, Bis(2-Ethylhexyl) Ester	NC	830,000	20	0	N/A	N/A	N/A	1,000	1,000	1,000.00
Isophorone	NC	1,100,000	53	0	N/A	N/A	N/A	95	1,000	486.42
m-Nitroaniline	NC	NC	53	0	N/A	N/A	N/A	95	5,000	2,083.85
Nitrobenzene	NC	40,000	53	0	N/A	N/A	N/A	95	1,000	486.42
N-Nitrosodi-n-propylamine	NC	140[2]	53	0	N/A	N/A	N/A	95	1,000	486.42
N-Nitrosodiphenylamine	NC	200,000	53	0	N/A	N/A	N/A	47	1,000	453.68
o-Cresol	NC	4,000,000	53	0	N/A	N/A	N/A	95	1,000	486.42
p-Cresol	NC	400,000	28	0	N/A	N/A	N/A	190	740	248.21
Pentachlorophenol	NC	8,300	53	0	N/A	N/A	N/A	95	5,000	2,083.85
Phenol	NC	48,000,000	53	0	N/A	N/A	N/A	95	1,000	486.42
Phenol, 3,4-dimethyl	NC	80,000	5	0	N/A	N/A	N/A	358	630	459.20
Pyridine	NC	80,000	20	0	N/A	N/A	N/A	1,000	1,000	1,000.00
Quinoline, 4-nitro-, 1-oxid	NC	NC	5	0	N/A	N/A	N/A	358	630	459.20
Total Petroleum Hydrocarbons (mg/kg)										
Gasoline Range Hydrocarbons	30 /100	NC	36	1	4.63	4.63	4.63	3.6	27	6.44
Diesel Range Hydrocarbons	2,000	NC	36	9	7.9	210	61.82	11.2	95	28.16
Heavy Oil Range Hydrocarbons	2,000	NC	36	11	24	1,100	233.81	28	190	58.52
Polycyclic Aromatic Hydrocarbon (µg/kg)										
1-Methylnaphthalene	NC	24,000	34	7	0.82	70	24.90	5.5	110	13.07
2-Methylnaphthalene	NC	320,000	34	8	0.65	190	52.02	5.5	109	13.36
Acenaphthene	NC	4,800,000	34	7	1.4	350	70.56	4.7	109	12.87
Acenaphthylene	NC	NC	34	5	0.69	100	21.26	5	109	12.69
Anthracene	NC	24,000,000	34	10	0.57	2,000	226.14	5.5	109	13.82
Benz[a]anthracene[2]	NC	NC	34	9	1.1	790	203.16	4.7	109	31.10
Benzo(a)pyrene[2]	'100[2]	140	34	11	0.72	4,200	530.19	5.8	110	36.88
Benzo(b)fluoranthene[2]	NC	NC	24	1	28	2,100	381.00	10	109	27.20
Benzo(ghi)perylene	NC	NC	34	8	2.3	1,800	402.79	5.5	109	13.52
Benzo(k)fluoranthene[2]	NC	NC	24	1	650	2,300	1,475.00	10	109	32.20

Analyte	MTCA[1] Method A Cleanup Level	MTCA[1] Method B Cleanup Level	Number of Samples	Number of Detects	Minimum Detected Value	Maximum Detected Value	Average Detected Value	Minimum Non-detected Value	Maximum Non-detected Value	Average Non-detected Value
Chrysene[2]	NC	NC	34	11	0.74	4,300	452.64	4.7	109	23.90
Dibenzo(a,h)anthracene[2]	NC	NC	34	5	8.3	290	157.81	4.7	150	32.07
Fluoranthene	NC	3,200,000	34	15	0.75	8,500	778.65	5.8	109	15.15
Fluorene	NC	3,200,000	34	5	1.1	1,100	221.54	5	109	12.69
Indeno(1,2,3-cd)pyrene[2]	NC	NC	34	9	1.6	2,600	471.40	5.5	150	33.71
Naphthalene	5,000	1,600,000	34	8	0.75	240	43.81	5.5	109	13.52
Phenanthrene	NC	NC	34	11	1.6	8,200	845.52	5.5	109	13.94
Pyrene	NC	2,400,000	34	14	0.78	7,500	746.48	5.8	109	14.94
Polychlorinated Biphenyls (µg/kg)										
PCB-aroclor 1016	NC	5,600	18	0	N/A	N/A	N/A	110	400	136.67
PCB-aroclor 1221	NC	NC	18	0	N/A	N/A	N/A	110	400	136.67
PCB-aroclor 1232	NC	NC	18	0	N/A	N/A	N/A	110	400	136.67
PCB-aroclor 1242	NC	NC	18	0	N/A	N/A	N/A	110	400	136.67
PCB-aroclor 1248	NC	NC	18	0	N/A	N/A	N/A	110	400	136.67
PCB-aroclor 1254	NC	1,600	18	0	N/A	N/A	N/A	110	400	136.67
PCB-aroclor 1260	NC	NC	18	0	N/A	N/A	N/A	110	400	136.67

Notes:

[1] Model Toxics Control Act (MTCA) Cleanup Regulation Chapter 173-340 WAC.

[2] Considered a carcinogenic polycylic aromatic hydrocarbon (cPAH) under WAC 173-349-708(8)(e),

µg/kg = migrogram per kilogram

mg/kg = milligram per kilogram

NC = Cleanup level not established by Ecology

N/A = Not applicable

Values presented in bold indicate concentrations greater than established MTCA cleanup levels.

TABLE 3
CHEMICAL DETECTION SUMMARY FOR GROUNDWATER - MARCH/APRIL
318 STATE AVENUE NE
OLYMPIA, WASHINGTON

Analyte	MTCA[1] Method A Cleanup Level	Number of Samples	Number of Detects	Minimum Detected Value	Maximum Detected Value	Average Detected Value	Minimum Non-detected Value	Maximum Non-detected Value
Total Metals (mg/l)								
Arsenic	0.005[2]	9	5	0.0025	0.0079	0.0046	0.002	0.002
Barium	3.2[3]	9	9	0.012	0.047	0.030	N/A	N/A
Cadmium	0.005[2]	9	N/A	N/A	N/A	N/A	0.002	0.002
Chromium	0.05[2]	9	N/A	N/A	N/A	N/A	0.025	0.025
Lead	0.015[2]	9	1	0.0039	0.0039	0.0039	0.002	0.002
Mercury	0.002[2]	9	N/A	N/A	N/A	N/A	0.0002	0.0002
Selenium	0.08[3]	9	N/A	N/A	N/A	N/A	0.1	0.1
Silver	0.08[3]	9	N/A	N/A	N/A	N/A	0.02	0.02
Dissolved Metals (mg/l)								
Arsenic	0.005[2]	9	4	0.0025	0.0053	0.0039	0.002	0.002
Barium	3.2[3]	9	8	0.013	0.038	0.025	0.01	0.01
Cadmium	0.005[2]	9	N/A	N/A	N/A	N/A	0.002	0.002
Chromium	0.05[2]	9	N/A	N/A	N/A	N/A	0.025	0.025
Lead	0.015[2]	9	N/A	N/A	N/A	N/A	0.002	0.002
Mercury	0.002[2]	9	N/A	N/A	N/A	N/A	0.0002	0.0002
Selenium	0.08[3]	9	N/A	N/A	N/A	N/A	0.1	0.1
Silver	0.08[3]	9	N/A	N/A	N/A	N/A	0.02	0.02
Volatile Organic Compounds (µg/l)								
1,1,1,2-Tetrachloroethane	1.7[3]	9	N/A	N/A	N/A	N/A	0.1	0.1
1,1,1-Trichloroethane	200[2]	9	N/A	N/A	N/A	N/A	0.1	0.1
1,1,2,2-Tetrachloroethane	0.22[3]	9	N/A	N/A	N/A	N/A	0.1	0.1
1,1,2-Trichloroethane	0.77[3]	9	N/A	N/A	N/A	N/A	0.1	0.1
1,1-Dichloroethane	800[3]	9	N/A	N/A	N/A	N/A	0.1	0.1
1,1-Dichloroethene	400[3]	9	1	0.32	0.32	0.32	0.1	0.1
1,1-Dichloropropene	NC	9	N/A	N/A	N/A	N/A	0.1	0.1
1,2,3-Trichlorobenzene	NC	9	N/A	N/A	N/A	N/A	0.4	0.4
1,2,3-Trichloropropane	0.0063[3]	9	N/A	N/A	N/A	N/A	0.2	0.2
1,2,4-Trichlorobenzene	80[3]	9	N/A	N/A	N/A	N/A	0.2	0.2
1,2,4-Trimethylbenzene	400[3]	9	1	0.12	0.12	0.12	0.1	0.1
1,2-Dibromo-3-Chloropropane	0.031[3]	9	N/A	N/A	N/A	N/A	0.2	0.2
1,2-Dichlorobenzene	720[3]	9	N/A	N/A	N/A	N/A	0.2	0.2
1,2-Dichloroethane	5[2]	9	N/A	N/A	N/A	N/A	0.1	0.1
1,2-Dichloropropane	0.64[3]	9	N/A	N/A	N/A	N/A	0.1	0.1
1,3,5-Trimethylbenzene	400[3]	9	N/A	N/A	N/A	N/A	0.1	0.1
1,3-Dichlorobenzene	NC	9	N/A	N/A	N/A	N/A	0.2	0.2
1,3-Dichloropropane	NC	9	N/A	N/A	N/A	N/A	0.1	0.1
2,2-Dichloropropane	NC	9	N/A	N/A	N/A	N/A	0.1	0.1
2-Chlorotoluene	160[3]	9	N/A	N/A	N/A	N/A	0.1	0.1
4-Chlorotoluene	NC	9	N/A	N/A	N/A	N/A	0.2	0.2
Benzene	5[2]	9	6	0.11	0.34	0.21	0.1	0.1
Bromobenzene	NC	9	N/A	N/A	N/A	N/A	0.1	0.1
Bromochloromethane	NC	9	N/A	N/A	N/A	N/A	0.1	0.1
Bromoform	5.5[3]	9	N/A	N/A	N/A	N/A	0.1	0.1
Bromomethane	11[3]	9	N/A	N/A	N/A	N/A	0.1	0.1
Carbon Tetrachloride	0.34[3]	9	N/A	N/A	N/A	N/A	0.1	0.1
CFC-11	2,400[3]	9	3	0.18	7.5	2.93	0.1	0.1
CFC-12	1,600[3]	9	N/A	N/A	N/A	N/A	0.4	0.4
Chlorobenzene	160[3]	9	N/A	N/A	N/A	N/A	0.1	0.1
Chloroethane	15[3]	9	N/A	N/A	N/A	N/A	0.2	0.2
Chloroform	7.2[3]	9	N/A	N/A	N/A	N/A	0.1	0.1
Chloromethane	3.4[3]	9	N/A	N/A	N/A	N/A	0.1	0.1
Cis-1,2-Dichloroethene	80[3]	9	6	0.15	1.7	0.54	0.1	0.1
Cis-1,3-Dichloropropene	NC	9	N/A	N/A	N/A	N/A	0.1	0.1
Dibromochloromethane	0.52[3]	9	N/A	N/A	N/A	N/A	0.1	0.1
Dibromomethane	80[3]	9	N/A	N/A	N/A	N/A	0.1	0.1
Dichlorobromomethane	0.71[3]	9	N/A	N/A	N/A	N/A	0.1	0.1
Ethylbenzene	700[2]	9	N/A	N/A	N/A	N/A	0.1	0.1
Ethylene dibromide	0.01[2]	9	N/A	N/A	N/A	N/A	0.019	0.02
Hexachlorobutadiene	0.56[3]	9	N/A	N/A	N/A	N/A	0.2	0.2
Isopropylbenzene (Cumene)	800[3]	9	N/A	N/A	N/A	N/A	0.1	0.1
Methylene Chloride	5[2]	9	N/A	N/A	N/A	N/A	0.1	0.1
Naphthalene	160[2,3]	9	N/A	N/A	N/A	N/A	0.4	0.4
n-Butylbenzene	NC	9	N/A	N/A	N/A	N/A	0.1	0.1
n-Propylbenzene	NC	9	N/A	N/A	N/A	N/A	0.1	0.1
p-Isopropyltoluene	NC	9	N/A	N/A	N/A	N/A	0.2	0.2
Sec-Butylbenzene	NC	9	1	0.12	0.12	0.12	0.1	0.1
Styrene	1.5[3]	9	N/A	N/A	N/A	N/A	0.1	0.1
Tert-Butylbenzene	NC	9	1	0.1	0.1	0.1	0.1	0.1
Tetrachloroethene	5[2]	9	1	0.24	0.24	0.24	0.1	0.1

Analyte	MTCA[1] Method A Cleanup Level	Number of Samples	Number of Detects	Minimum Detected Value	Maximum Detected Value	Average Detected Value	Minimum Non-detected Value	Maximum Non-detected Value
Toluene	1.000[2]	9	9	0.13	0.23	0.16	N/A	N/A
Total Xylenes	1,000[2]	9	4	0.2	0.34	0.25	0.2	0.2
Trans-1,2-Dichloroethene	160[3]	9	1	0.19	0.19	0.19	0.1	0.1
Trans-1,3-Dichloropropene	NC	9	N/A	N/A	N/A	N/A	0.1	0.1
Trichloroethene	5[2]	9	5	0.22	5.3	2.21	0.1	0.1
Vinyl Chloride	0.2[2]	9	7	0.27	3.5	1.22	0.02	0.02
Semi-volatile Organic Compounds (µg/l)								
1,2,4-Trichlorobenzene	80[3]	9	N/A	N/A	N/A	N/A	0.19	0.2
1,2-Dichlorobenzene	720[3]	9	N/A	N/A	N/A	N/A	0.19	0.2
1,3-Dichlorobenzene	NC	9	N/A	N/A	N/A	N/A	0.19	0.2
1,4-Dichlorobenzene	1.8[3]	9	N/A	N/A	N/A	N/A	0.19	0.2
2,2'-Oxybis[1-chloropropane]	0.63[3]	9	N/A	N/A	N/A	N/A	0.19	0.2
2,4,5-Trichlorophenol	800[3]	9	N/A	N/A	N/A	N/A	0.19	0.2
2,4,6-Trichlorophenol	4[3]	9	N/A	N/A	N/A	N/A	0.28	0.3
2,4-Dichlorophenol	24[3]	9	N/A	N/A	N/A	N/A	0.19	0.2
2,4-Dimethylphenol	160[3]	9	N/A	N/A	N/A	N/A	0.94	0.99
2,4-Dinitrophenol	32[3]	9	N/A	N/A	N/A	N/A	2.4	2.5
2,4-Dinitrotoluene	32[3]	9	N/A	N/A	N/A	N/A	0.19	0.2
2,6-Dinitrotoluene	16[3]	9	N/A	N/A	N/A	N/A	0.19	0.2
2-Chloronaphthalene	640[3]	9	N/A	N/A	N/A	N/A	0.028	0.03
2-Chlorophenol	40[3]	9	N/A	N/A	N/A	N/A	0.19	0.2
2-Nitroaniline	NC	9	N/A	N/A	N/A	N/A	0.19	0.2
2-Nitrophenol	NC	9	N/A	N/A	N/A	N/A	0.19	0.2
3,3'-Dichlorobenzidine	0.19[3]	9	N/A	N/A	N/A	N/A	0.94	0.99
4,6-Dinitro-2-Methylphenol	NC	9	N/A	N/A	N/A	N/A	1.9	2
4-Bromophenyl phenyl ether	NC	9	N/A	N/A	N/A	N/A	0.19	0.2
4-Chloro-3-Methylphenol	NC	9	N/A	N/A	N/A	N/A	0.19	0.2
4-Chloroaniline	32[3]	9	N/A	N/A	N/A	N/A	0.19	0.2
4-Chlorophenyl-Phenylether	NC	9	N/A	N/A	N/A	N/A	0.19	0.2
4-Nitroaniline	NC	9	N/A	N/A	N/A	N/A	0.28	0.3
4-Nitrophenol	NC	9	N/A	N/A	N/A	N/A	0.94	0.99
Anthracene	4,800[3]	9	N/A	N/A	N/A	N/A	0.019	0.02
Benzoic Acid	64,000[3]	9	5	1.2	1.3	1.22	0.98	0.99
Benzyl Alcohol	2,400[3]	9	N/A	N/A	N/A	N/A	0.19	0.2
Bis(2-Chloroethoxy)Methane	NC	9	N/A	N/A	N/A	N/A	0.19	0.2
Bis(2-Chloroethyl)Ether	0.04[3]	9	N/A	N/A	N/A	N/A	0.19	0.2
Bis(2-Ethylhexyl) Phthalate	6.3[3]	9	N/A	N/A	N/A	N/A	1.4	1.5
Butyl benzyl phthalate	3,200[3]	9	N/A	N/A	N/A	N/A	0.28	0.3
Carbazole	4.4[3]	9	N/A	N/A	N/A	N/A	0.19	0.2
Dibenzofuran	32[3]	9	N/A	N/A	N/A	N/A	0.19	0.2
Dibutyl phthalate	1,600[3]	9	N/A	N/A	N/A	N/A	0.19	0.2
Diethyl phthalate	13,000[3]	9	N/A	N/A	N/A	N/A	0.19	0.2
Dimethyl phthalate	16,000[3]	9	N/A	N/A	N/A	N/A	0.19	0.2
Di-N-Octyl Phthalate	320[3]	9	N/A	N/A	N/A	N/A	0.19	0.2
Hexachlorobenzene	0.055[3]	9	N/A	N/A	N/A	N/A	0.19	0.2
Hexachlorobutadiene	0.56[3]	9	N/A	N/A	N/A	N/A	0.28	0.3
Hexachlorocyclopentadiene	48[3]	9	N/A	N/A	N/A	N/A	0.94	0.99
Hexachloroethane	3.1[3]	9	N/A	N/A	N/A	N/A	0.28	0.3
Isophorone	46[3]	9	N/A	N/A	N/A	N/A	0.19	0.2
m-Nitroaniline	NC	9	N/A	N/A	N/A	N/A	0.19	0.2
Nitrobenzene	4[3]	9	N/A	N/A	N/A	N/A	0.19	0.2
N-Nitrosodi-n-propylamine	NC	9	N/A	N/A	N/A	N/A	0.19	0.2
N-Nitrosodiphenylamine	NC	9	N/A	N/A	N/A	N/A	0.19	0.2
o-Cresol	400[3]	9	N/A	N/A	N/A	N/A	0.19	0.2
p-Cresol	43[3]	9	N/A	N/A	N/A	N/A	0.38	0.4
Pentachlorophenol	0.73[3]	9	N/A	N/A	N/A	N/A	0.33	0.35
Phenol	4,800[3]	9	N/A	N/A	N/A	N/A	0.28	0.3
Polycyclic Aromatic Hydrocarbon (µg/l)								
1-Methylnaphthalene	2.4[3]	9	N/A	N/A	N/A	N/A	0.028	0.03
2-Methylnaphthalene	32[3]	9	N/A	N/A	N/A	N/A	0.094	0.099
Acenaphthene	960[3]	9	N/A	N/A	N/A	N/A	0.047	0.05
Acenaphthylene	NC	9	N/A	N/A	N/A	N/A	0.038	0.04
Benz[a]anthracene[4]	NC	9	N/A	N/A	N/A	N/A	0.028	0.03
Benzo(a)pyrene[4]	0.1[2]	9	1	0.044	0.044	0.044	0.019	0.02
Benzo(b)fluoranthene[4]	NC	9	N/A	N/A	N/A	N/A	0.038	0.04
Benzo(ghi)perylene[4]	NC	9	N/A	N/A	N/A	N/A	0.028	0.03
Benzo(k)fluoranthene[4]	NC	9	N/A	N/A	N/A	N/A	0.028	0.03
Chrysene[4]	NC	9	N/A	N/A	N/A	N/A	0.019	0.02
Dibenzo(a,h)anthracene	0 .1[2]	9	N/A	N/A	N/A	N/A	0.028	0.03
Fluoranthene	NC	9	N/A	N/A	N/A	N/A	0.024	0.025
Fluorene	NC	9	N/A	N/A	N/A	N/A	0.028	0.03
Indeno(1,2,3-cd)pyrene[4]	NC	9	N/A	N/A	N/A	N/A	0.028	0.03
Naphthalene	160[2,3]	9	N/A	N/A	N/A	N/A	0.19	0.2
Phenanthrene	NC	9	N/A	N/A	N/A	N/A	0.038	0.04
Pyrene	480[3]	9	N/A	N/A	N/A	N/A	0.028	0.03

Analyte	MTCA[1] Method A Cleanup Level	Number of Samples	Number of Detects	Minimum Detected Value	Maximum Detected Value	Average Detected Value	Minimum Non-detected Value	Maximum Non-detected Value
Total Petroleum Hydrocarbons (mg/l)								
Gasoline Range Hydrocarbons	1 / 0.8[2]	9	N/A	N/A	N/A	N/A	0.05	0.05
Diesel Range Hydrocarbons	0.5[2]	9	N/A	N/A	N/A	N/A	0.012	0.12
Heavy Oil Range Hydrocarbons	0.5[2]	9	N/A	N/A	N/A	N/A	0.025	0.25
Polychlorinated Biphenyls (µg/l)								
PCB-aroclor 1016	1.1[3]	9	N/A	N/A	N/A	N/A	0.47	0.5
PCB-aroclor 1221	0.1[2]	9	N/A	N/A	N/A	N/A	0.47	0.5
PCB-aroclor 1232	0.1[2]	9	N/A	N/A	N/A	N/A	0.47	0.5
PCB-aroclor 1242	0.1[2]	9	N/A	N/A	N/A	N/A	0.47	0.5
PCB-aroclor 1248	0.1[2]	9	N/A	N/A	N/A	N/A	0.47	0.5
PCB-aroclor 1254	0.32[3]	9	N/A	N/A	N/A	N/A	0.47	0.5
PCB-aroclor 1260	0.1[2]	9	N/A	N/A	N/A	N/A	0.47	0.5

Notes:

[1] Model Toxics Control Act (MTCA) Cleanup Regulation Chapter 173-340 WAC. MTCA Method A cleanup levels are presented for chemicals that have Method A criteria. Method B cleanup levels are represented for chemicals that do not have Method A criteria.

[2] MTCA Method A cleanup level

[3] MTCA Method B cleanup level

[4] Considrered a carginogenic polycylic aromatic hydrocarbon.

mg/l = milligrams per liter

µg/l - micrograms per liter

NC = Cleanup criteria not established by Washington State Department of Ecology

N/A = Not applicable

TABLE 4
CHEMICAL DETECTION SUMMARY FOR GROUNDWATER - OCTOBER/NOVEMBER
318 STATE AVENUE NE
OLYMPIA, WASHINGTON

Analyte	MTCA Cleanup Level[1]	Number of Samples	Number of Detects	Minimum Detected Value	Maximum Detected Value	Average Detected Value	Minimum Non-detected Value	Maximum Non-detected Value
Total Metals (mg/l)								
Arsenic	0.005[2]	16	16	0.0036	0.063	0.0119	N/A	N/A
Lead	0.015[2]	16	3	0.0034	0.0074	0.0049	0.002	0.002
Mercury	0.002[2]	16	0	N/A	N/A	N/A	0.001	0.001
Dissolved Metals (mg/l)								
Arsenic	0.005[2]	16	16	0.0039	0.062	0.0129	N/A	N/A
Lead	0.015[2]	16	0	N/A	N/A	N/A	0.002	0.002
Mercury	0.002[2]	16	0	N/A	N/A	N/A	0.001	0.001
Volatile Organic Compounds (µg/l)								
1,1,1,2-Tetrachloroethane	1.7[3]	16	0	N/A	N/A	N/A	1	1
1,1,1-Trichloroethane	200[2]	16	0	N/A	N/A	N/A	1	1
1,1,2,2-Tetrachloroethane	0.22[3]	16	0	N/A	N/A	N/A	0.33	0.33
1,1,2-Trichloroethane	0.77[3]	16	0	N/A	N/A	N/A	0.29	0.29
1,1-Dichloroethane	1,600[3]	16	0	N/A	N/A	N/A	1	1
1,1-Dichloroethene	400[3]	16	0	N/A	N/A	N/A	1	1
1,1-Dichloropropene	NC	16	0	N/A	N/A	N/A	1	1
1,2,3-Trichlorobenzene	NC	16	0	N/A	N/A	N/A	1	1
1,2,3-Trichloropropane	0.0063[3]	16	0	N/A	N/A	N/A	0.46	0.46
1,2,4-Trichlorobenzene	80[3]	16	0	N/A	N/A	N/A	1	1
1,2,4-Trimethylbenzene	400[3]	16	0	N/A	N/A	N/A	1	1
1,2-Dibromo-3-Chloropropane	0.031[3]	16	0	N/A	N/A	N/A	0.49	0.49
1,2-Dichlorobenzene	720[3]	16	0	N/A	N/A	N/A	1	1
1,2-Dichloroethane	5[2]	16	0	N/A	N/A	N/A	0.22	0.22
1,2-Dichloropropane	0.64[3]	16	0	N/A	N/A	N/A	0.44	0.44
1,3,5-Trimethylbenzene	400[3]	16	0	N/A	N/A	N/A	1	1
1,3-Dichlorobenzene	NC	16	0	N/A	N/A	N/A	1	1
1,4-Dichlorobenzene	1.8[3]	16	0	N/A	N/A	N/A	1	1
2,2-Dichloropropane	NC	16	0	N/A	N/A	N/A	1	1
2-Chlorotoluene	160[3]	16	0	N/A	N/A	N/A	1	1
4-Chlorotoluene	NC	16	0	N/A	N/A	N/A	1	1
Benzene	5[2]	16	3	0.4	0.95	0.6833	0.37	0.37
Bromobenzene	NC	16	0	N/A	N/A	N/A	1	1
Bromochloromethane	NC	16	0	N/A	N/A	N/A	1	1
Bromoform	5.5[3]	16	0	N/A	N/A	N/A	1	1
Bromomethane	11[3]	16	0	N/A	N/A	N/A	1	1
Carbon Tetrachloride	0.34[3]	16	0	N/A	N/A	N/A	0.42	0.42
CFC-11	2,400[3]	16	0	N/A	N/A	N/A	1	1
CFC-12	1,600[3]	16	0	N/A	N/A	N/A	1	1
Chlorobenzene	160[3]	16	0	N/A	N/A	N/A	1	1
Chloroethane	15[3]	16	0	N/A	N/A	N/A	1	1
Chloroform	7.2[3]	16	0	N/A	N/A	N/A	1	1
Chloromethane	3.4[3]	16	0	N/A	N/A	N/A	1	1
Cis-1,2-Dichloroethene	80[3]	16	0	N/A	N/A	N/A	1	1
Cis-1,3-Dichloropropene	NC	16	0	N/A	N/A	N/A	1	1
Dibromochloromethane	0.52[3]	16	0	N/A	N/A	N/A	0.36	0.36
Dibromomethane	80[3]	16	0	N/A	N/A	N/A	1	1
Dichlorobromomethane	0.71[3]	16	0	N/A	N/A	N/A	0.41	0.41
Ethylbenzene	700[2]	16	0	N/A	N/A	N/A	1	1
Ethylene dibromide	0.01[2]	16	0	N/A	N/A	N/A	1	1
Hexachlorobutadiene	0.56[3]	16	0	N/A	N/A	N/A	0.29	0.29
Isopropylbenzene (Cumene)	800[3]	16	0	N/A	N/A	N/A	1	1
Methylene Chloride	5[2]	16	0	N/A	N/A	N/A	1	1
n-Butylbenzene	NC	16	0	N/A	N/A	N/A	1	1
n-Propylbenzene	NC	16	0	N/A	N/A	N/A	1	1
p-Isopropyltoluene	NC	16	0	N/A	N/A	N/A	1	1
Sec-Butylbenzene	NC	16	0	N/A	N/A	N/A	1	1
Styrene	1.5[3]	16	0	N/A	N/A	N/A	1	1
Tert-Butylbenzene	NC	16	0	N/A	N/A	N/A	1	1
Tetrachloroethene	5[2]	16	5	0.49	0.98	0.7060	0.47	0.47
Toluene	1,000[2]	16	0	N/A	N/A	N/A	1	1
Total Xylenes	1,000[2]	16	0	N/A	N/A	N/A	3	3
Trans-1,2-Dichloroethene	160[3]	16	0	N/A	N/A	N/A	1	1
Trans-1,3-Dichloropropene	NC	16	0	N/A	N/A	N/A	1	1
Trichloroethene	5[2]	16	0	N/A	N/A	N/A	0.4	0.4
Vinyl Chloride	0.2[2]	16	0	N/A	N/A	N/A	0.18	0.18
Semi-Volatile Organic Compounds (µg/l)								
1,2,4-Trichlorobenzene	80[3]	16	0	N/A	N/A	N/A	2	2
1,2-Dichlorobenzene	5[2]	16	0	N/A	N/A	N/A	2	2
1,3-Dichlorobenzene	NC	16	0	N/A	N/A	N/A	2	2
1,3-Dinitrobenzene	1.6[3]	16	0	N/A	N/A	N/A	10	10
1,4-Dichlorobenzene	1.8[3]	16	0	N/A	N/A	N/A	2	2
1,4-Dinitrobenzene	6.4[3]	16	0	N/A	N/A	N/A	10	10

Analyte	MTCA Cleanup Level[1]	Number of Samples	Number of Detects	Minimum Detected Value	Maximum Detected Value	Average Detected Value	Minimum Non-detected Value	Maximum Non-detected Value
2,2'-Oxybis[1-chloropropane]	0.63[3]	16	0	N/A	N/A	N/A	10	10
2,3,4,6-Tetrachlorophenol	480[3]	16	0	N/A	N/A	N/A	2	2
2,3,5,6-Tetrachlorophenol	NC	16	0	N/A	N/A	N/A	2	2
2,4,5-Trichlorophenol	800[3]	16	0	N/A	N/A	N/A	10	10
2,4,6-Trichlorophenol	4[3]	16	0	N/A	N/A	N/A	10	10
2,4-Dichlorophenol	24[3]	16	0	N/A	N/A	N/A	10	10
2,4-Dimethylphenol	160[3]	16	0	N/A	N/A	N/A	2	2
2,4-Dinitrophenol	32[3]	16	0	N/A	N/A	N/A	10	10
2,4-Dinitrotoluene	32[3]	16	0	N/A	N/A	N/A	2	2
2,6-Dinitrotoluene	16[3]	16	0	N/A	N/A	N/A	2	2
2-Chloronaphthalene	640[3]	16	0	N/A	N/A	N/A	2	2
2-Chlorophenol	40[3]	16	0	N/A	N/A	N/A	2	2
2-Nitroaniline	NC	16	0	N/A	N/A	N/A	10	10
2-Nitrophenol	NC	16	0	N/A	N/A	N/A	10	10
4,6-Dinitro-2-Methylphenol	NC	16	0	N/A	N/A	N/A	10	10
4-Bromophenyl phenyl ether	NC	16	0	N/A	N/A	N/A	2	2
4-Chloro-3-Methylphenol	NC	16	0	N/A	N/A	N/A	10	10
4-Chloroaniline	32[3]	16	0	N/A	N/A	N/A	10	10
4-Chlorophenyl-Phenylether	NC	16	0	N/A	N/A	N/A	2	2
4-Nitroaniline	NC	16	0	N/A	N/A	N/A	10	10
4-Nitrophenol	NC	16	0	N/A	N/A	N/A	10	10
Aniline	7.7[3]	16	0	N/A	N/A	N/A	2	2
Benzyl Alcohol	2,400[3]	16	0	N/A	N/A	N/A	2	2
Bis(2-Chloroethoxy)Methane	NC	16	0	N/A	N/A	N/A	2	2
Bis(2-Chloroethyl)Ether	0.04[3]	16	0	N/A	N/A	N/A	2	2
Bis(2-Ethylhexyl) Phthalate	6.3[3]	16	0	N/A	N/A	N/A	2	2
Butyl benzyl phthalate	3,200[3]	16	0	N/A	N/A	N/A	2	2
Carbazole	4.4[3]	16	0	N/A	N/A	N/A	2	2
Dibenzofuran	32[3]	16	0	N/A	N/A	N/A	2	2
Dibutyl phthalate	1.600[3]	16	0	N/A	N/A	N/A	2	2
Diethyl phthalate	13,000[3]	16	0	N/A	N/A	N/A	2	2
Dimethyl phthalate	16,000[3]	16	0	N/A	N/A	N/A	2	2
Di-N-Octyl Phthalate	320[3]	16	0	N/A	N/A	N/A	2	2
Hexachlorobenzene	0.055[3]	16	0	N/A	N/A	N/A	2	2
Hexachlorobutadiene	0.56[3]	16	0	N/A	N/A	N/A	2	2
Hexachlorocyclopentadiene	48[3]	16	0	N/A	N/A	N/A	2	2
Hexachloroethane	3.1[3]	16	0	N/A	N/A	N/A	2	2
Hexanedioic Acid, Bis(2-Ethylhexyl) Ester	73[3]	16	0	N/A	N/A	N/A	2	2
Isophorone	46[3]	16	0	N/A	N/A	N/A	2	2
m-Nitroaniline	NC	16	0	N/A	N/A	N/A	10	10
Naphthalene	160[2,3]	16	0	N/A	N/A	N/A	2	2
Nitrobenzene	4[3]	16	0	N/A	N/A	N/A	2	2
N-Nitrosodi-n-propylamine	4[3]	16	0	N/A	N/A	N/A	2	2
N-Nitrosodiphenylamine	4[3]	16	0	N/A	N/A	N/A	2	2
o-Cresol	4[3]	16	0	N/A	N/A	N/A	2	2
Pentachlorophenol	0.73[3]	16	0	N/A	N/A	N/A	10	10
Phenanthrene	NC	16	0	N/A	N/A	N/A	2	2
Phenol	4,800[3]	16	0	N/A	N/A	N/A	2	2
Pyridine	8[3]	16	0	N/A	N/A	N/A	2	2
Polycyclic Aromatic Hydrocarbons (µg/l)								
1-Methylnaphthalene	2.4[3]	16	0	N/A	N/A	N/A	0.02	0.02
2-Methylnaphthalene	32[3]	16	0	N/A	N/A	N/A	0.02	0.02
Acenaphthene	960[3]	16	0	N/A	N/A	N/A	0.02	0.02
Acenaphthylene	NC	16	0	N/A	N/A	N/A	0.02	0.02
Anthracene	4,800[3]	16	0	N/A	N/A	N/A	0.02	0.02
Benz[a]anthracene[4]	NC	16	0	N/A	N/A	N/A	0.02	0.02
Benzo(a)pyrene[4]	0.1[2]	16	0	N/A	N/A	N/A	0.02	0.02
Benzo(b)fluoranthene[4]	NC	16	0	N/A	N/A	N/A	0.02	0.02
Benzo(ghi)perylene	NC	16	0	N/A	N/A	N/A	0.02	0.02
Benzo(k)fluoranthene[4]	NC	16	0	N/A	N/A	N/A	0.02	0.02
Chrysene[4]	NC	16	0	N/A	N/A	N/A	0.02	0.02
Dibenzo(a,h)anthracene[4]	NC	16	0	N/A	N/A	N/A	0.02	0.02
Fluoranthene	640[3]	16	0	N/A	N/A	N/A	0.02	0.02
Fluorene	640[3]	16	0	N/A	N/A	N/A	0.02	0.02
Indeno(1,2,3-cd)pyrene[4]	NC	16	0	N/A	N/A	N/A	0.02	0.02
Naphthalene	160[2,3]	16	0	N/A	N/A	N/A	0.02	0.02
Phenanthrene	0.73[3]	16	0	N/A	N/A	N/A	0.02	0.02
Pyrene	480[3]	16	0	N/A	N/A	N/A	0.02	0.02

Notes:

[1] Model Toxics Control Act (MTCA) Cleanup Regulation Chapter 173-340 WAC. MTCA Method A cleanup levels are presented for chemicals that have Method A criteria. Method B cleanup levels are represented for chemicals that do not have Method A criteria.

[2] MTCA Method A cleanup level.

[3] MTCA Method B cleanup level.

[4] Considered a carcinogenic polycylic aromatic hydrocarbon under MTCA.

mg/kg = milligrams per kilogram

µg/l = micrograms per liter

NC = Cleanup criteria not established by Washington State Department of Ecology

N/A = Not applicable

TACO:\0\0415049\02\Finals\041504902_Tables_021909.xls

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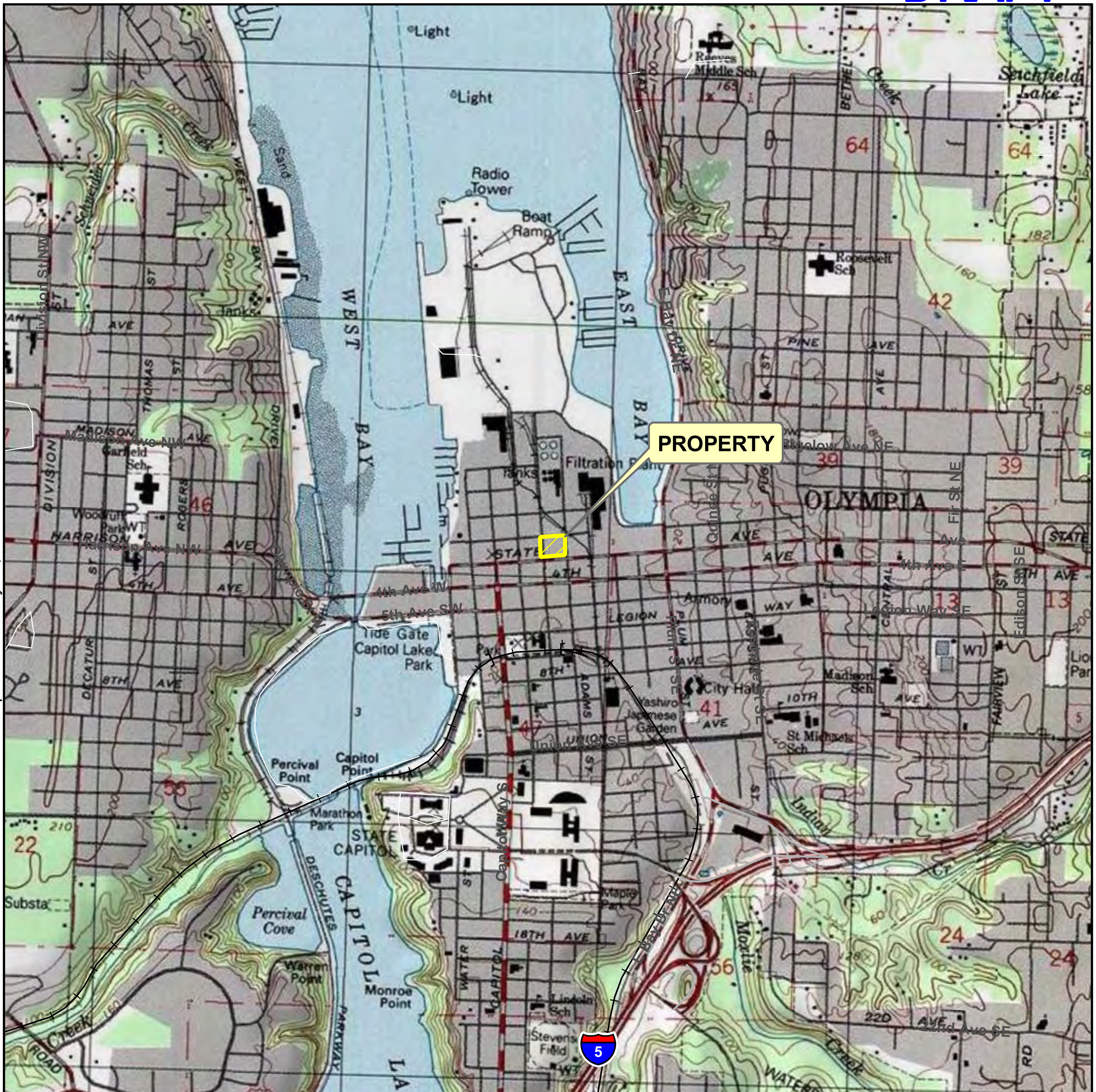
Map Revised: July 16, 2008



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. 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.
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Data Sources: Interstates, state routes, and roads from TIGER 2000. County boundaries, cities, and waterbodies from Department of Ecology. USGS topo map provided by TerraServer (DRG-Scale4m).

Lambert Conformal Conic, Washington State Plane North, North American Datum 1983

Vicinity Map

318 State Avenue NE
Olympia, Washington

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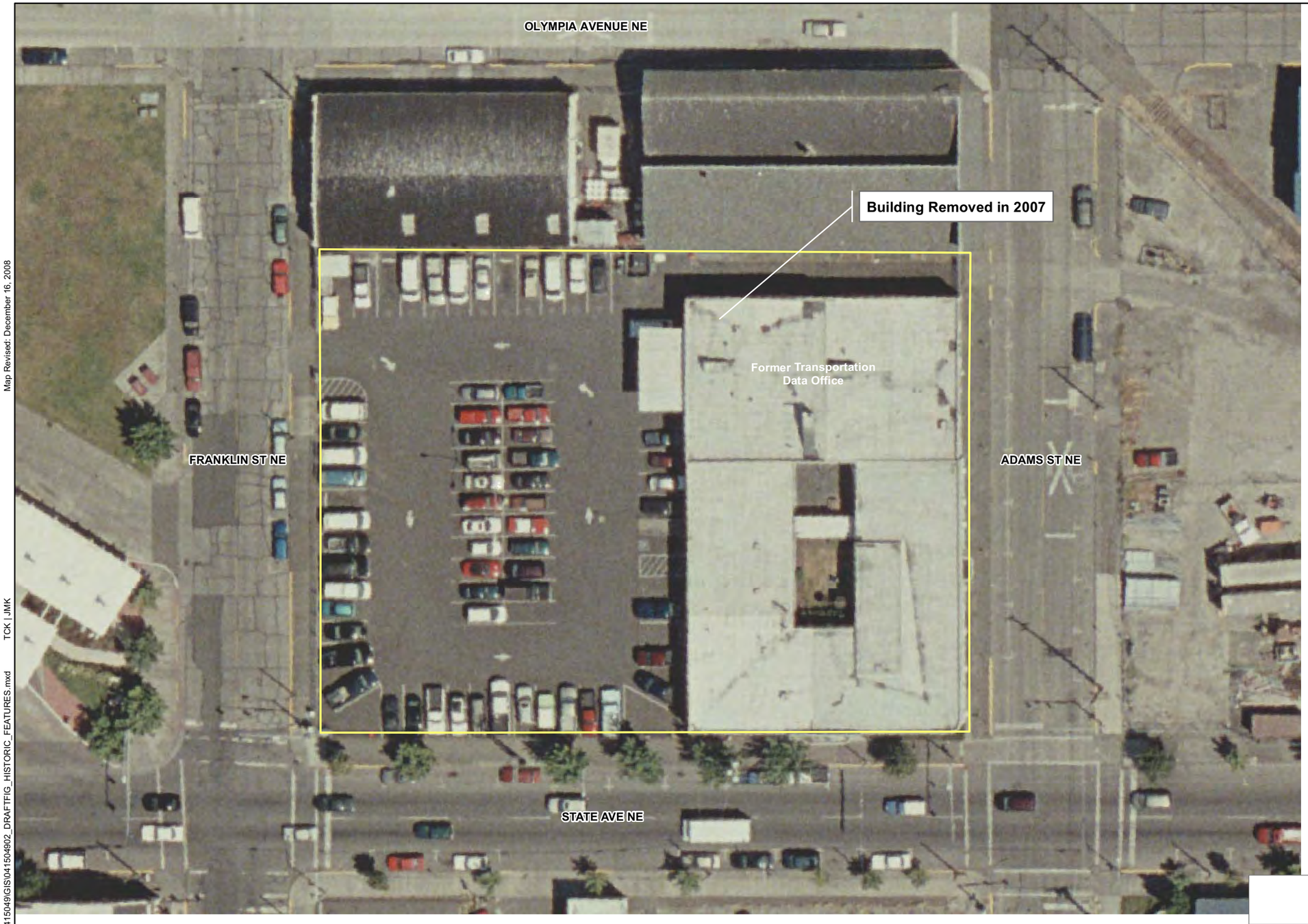
Figure 1

Path: P:\0\0415049\GIS\041504902_F1.mxd

Office: TAC

DRAFT



Explanation

Approximate Property Boundary

N
W E
S

40 0 40
Feet

Site Map

318 State Avenue NE
Olympia, Washington

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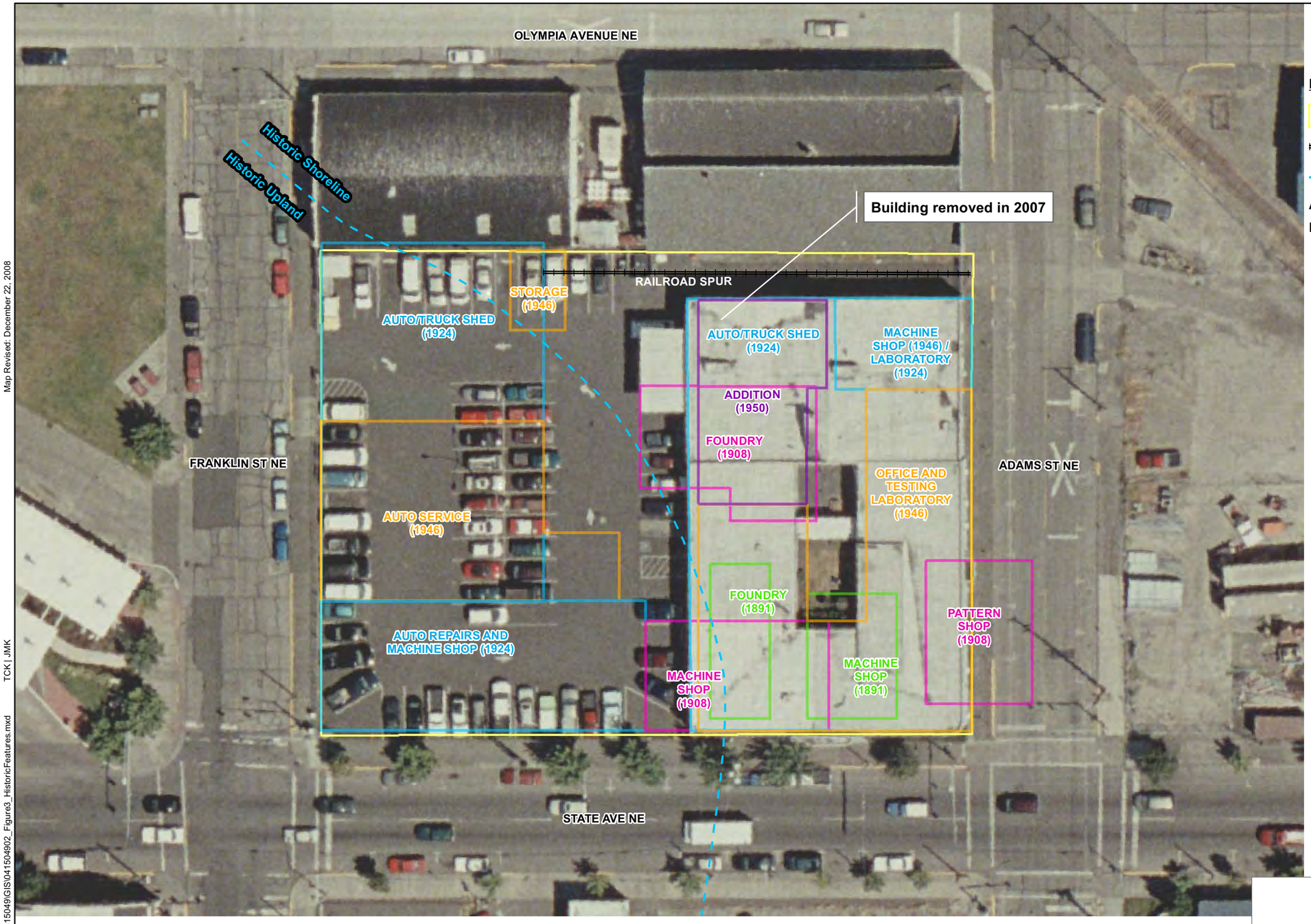
Figure 2

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.

Data Sources: Approximate Property Boundary from Thurston County parcels (revised by GeoEngineers).
Aerial photograph (2003) from Thurston County Data Center. Data Frame Rotated 356.
Projection: NAD_1983_StatePlane_Washington_South_FIPS_4602_Feet
Datum: D_North_American_1983

Map Revised: December 16, 2008
Path: P:\0\04150\49\GIS\04150490 2_DRAFTFIG_HISTORIC_FEATURES.mxd TCK | JMK
Office: TACO

DRAFT



Explanation

- Approximate Property Boundary
- Railroad Spur
- Historic Upland/Shoreline (circa 1888)

Approximate Location of Historic On-Site Features Based on Sanborn Fire Insurance Maps

- 1950
- 1946
- 1924
- 1908
- 1891

N
W E
S

40 0 40
Feet

Notes:
1. This figure provides a summary of historical features present on the property, but does not include all historic features that were present on the property.
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.

Data Sources: Approximate Property Boundary from Thurston County parcels (revised by GeoEngineers).
Aerial photograph (2003) from Thurston County Data Center. Data Frame Rotated 356.

Projection: NAD_1983_StatePlane_Washington_South_FIPS_4602_Feet
Datum: D_North_American_1983

Historic Features

318 State Avenue NE
Olympia, Washington

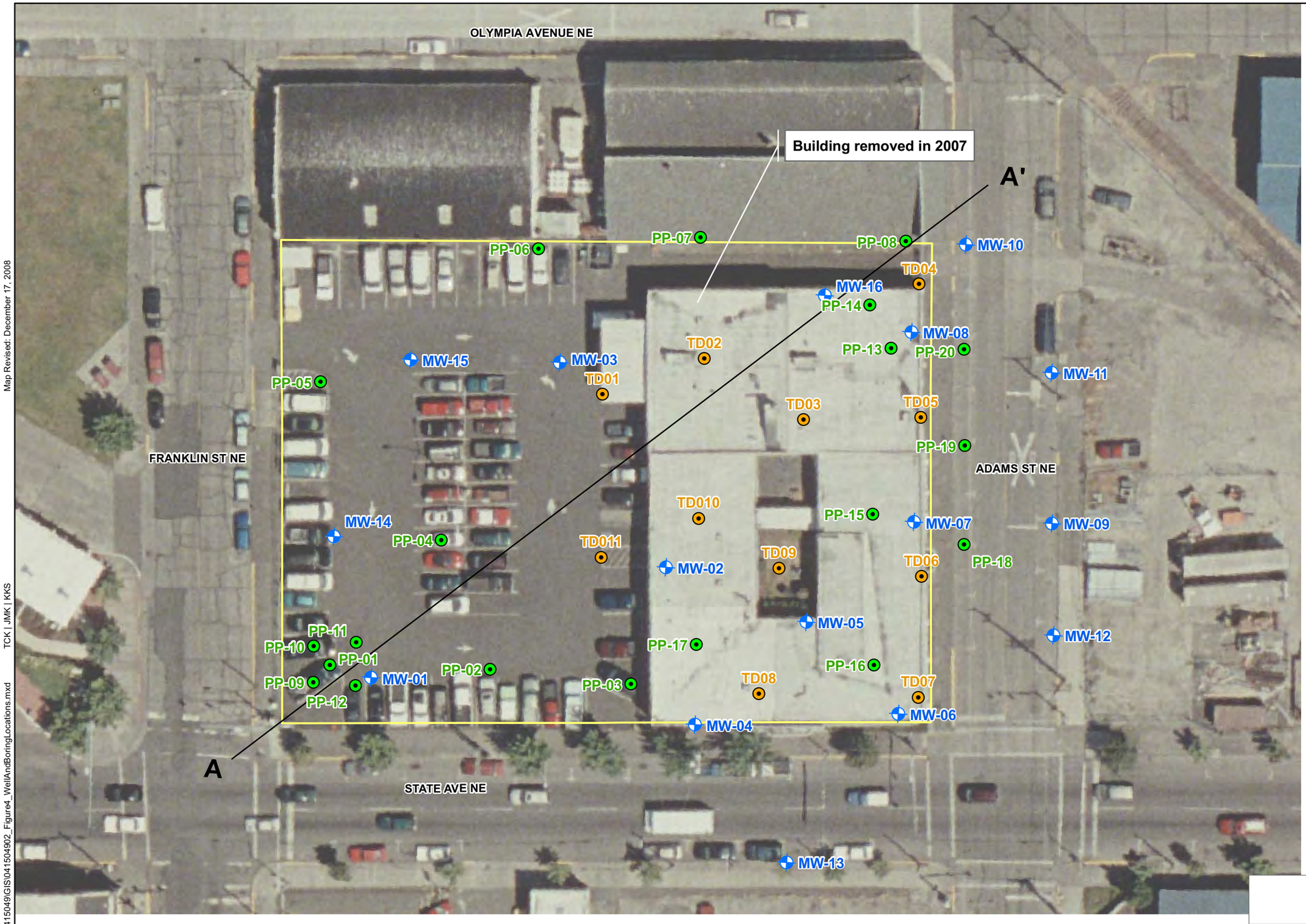
GeoEngineers

Figure 3

Map Revised: December 22, 2008

Office: TACO Path: P:\0041504\9GIS\041504902_Figure3_HistoricFeatures.mxd TCK | JMK

DRAFT



Explanation

- Approximate Property Boundary
- MW-01 *GeoEngineers Monitoring Well Location and ID (March and October 2008)*
- PP-01 *GeoEngineers Direct-Push Location and ID (July and September 2006, and October 2008)*
- TD01 *WSDOT Direct-Push Boring Location and ID (October 2007)*

N
W E
S

40 0 40
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. 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. Cross section A-A' shown on Figure 6 (drawn by GeoEngineers, Inc.)

Data Sources: Approximate Property Boundary from Thurston County parcels (revised by GeoEngineers).
Aerial photograph (2003) from Thurston County Data Center. Data Frame Rotated 356.

Projection: NAD_1983_StatePlane_Washington_South_FIPS_4602_Feet
Datum: D_North_American_1983

Monitoring Well and Direct-Push Boring Locations

318 State Avenue NE
Olympia, Washington

GeoEngineers

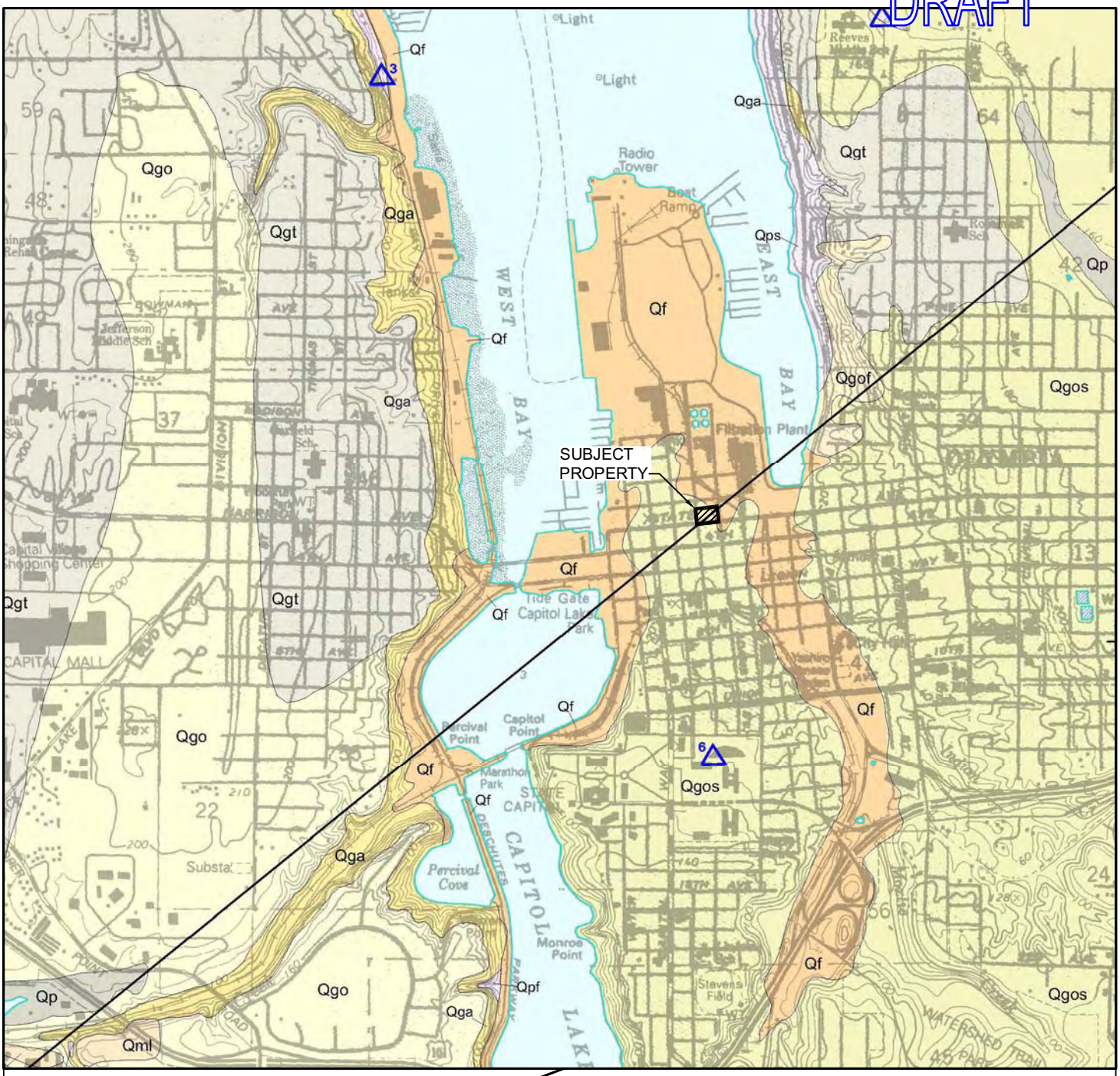
Figure 4

Map Revised: December 17, 2008

Path: P:\0\04150\49\GIS\04150490 2_Figure4_WellAndBoringLocations.mxd TCK | JMK | KKS

Office: TAC

DRAFT



Legend

Qf = Fill

Qgos = Latest Vashon recessional sand and minor silt

N W E S

2,000 0 2,000

Feet

Notes:

1. The locations of all features shown are approximate.
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Reference: Washington State Department of Natural Resources (DNR). DNR included a cross section through the Olympia region. The DNR cross section is not included in this report.

Regional Geologic Map

318 State Avenue NE
Olympia, Washington

GeoEngineers

Figure 5

OFFICE:TACO PM PSD P:\0104150491\02\CAD\041504902_F5.dwg\TAB:F5 modified by syi on Dec 22, 2008 - 14:37

DRAFT

A Southwest — A' Northeast

B-2 By Shannon and Wilson (1991) — B-2 By Landau (2007)

Intersection of Franklin Street NE and State Ave. NE

Approximate Location of Historic Shoreline

Approximately 300' West

Approximately 300' East

PP09 PP01 PP11 PP04 MW15 MW16 PP14 PP08 MW10

DEPTH BELOW GROUND SURFACE (feet)

0 5 10 15 30 35 40 45

SP (UPPER FILL)

SP (LOWER FILL)

Fine to Medium Sand, Trace Silt, Gravel, and Brick Debris

Fine to Medium Sand, Trace Silt

Fine to Medium Sand, Occasional Gravel, Trace Silt, Sea Shells

Fine to Medium Sand with Silt, Occasional Gravel, and Brick Debris

Fine to Medium Sand with Silt

Fine to Medium Sand

Silt with Organics

Medium to Coarse Sand with Gravel

Fine to Coarse Silty Sand with Gravel

Fine to Coarse Silty Sand with Gravel, Sea Shells, Roots

Fine to Medium Sand to Silty Sand

Silty fine Sand and Sandy Silt

Silty from Sand with Gravel

Gray Silt with Sand

Inferred top of regional aquitard

to 75' bgs

EXPLANATION:

APPROXIMATE LOCATION OF GROUNDWATER ON DAY EXPLORATION WAS MADE

Notes:
1. The locations of all features shown are approximate.
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3. See appendix D for soil classification symbols.

Reference: Drawing created by GeoEngineers personnel.

HORIZONTAL SCALE: 1" = 30'
VERTICAL SCALE: 1" = 5'
VERTICAL EXAGGERATION: 6X

Geologic Cross Section

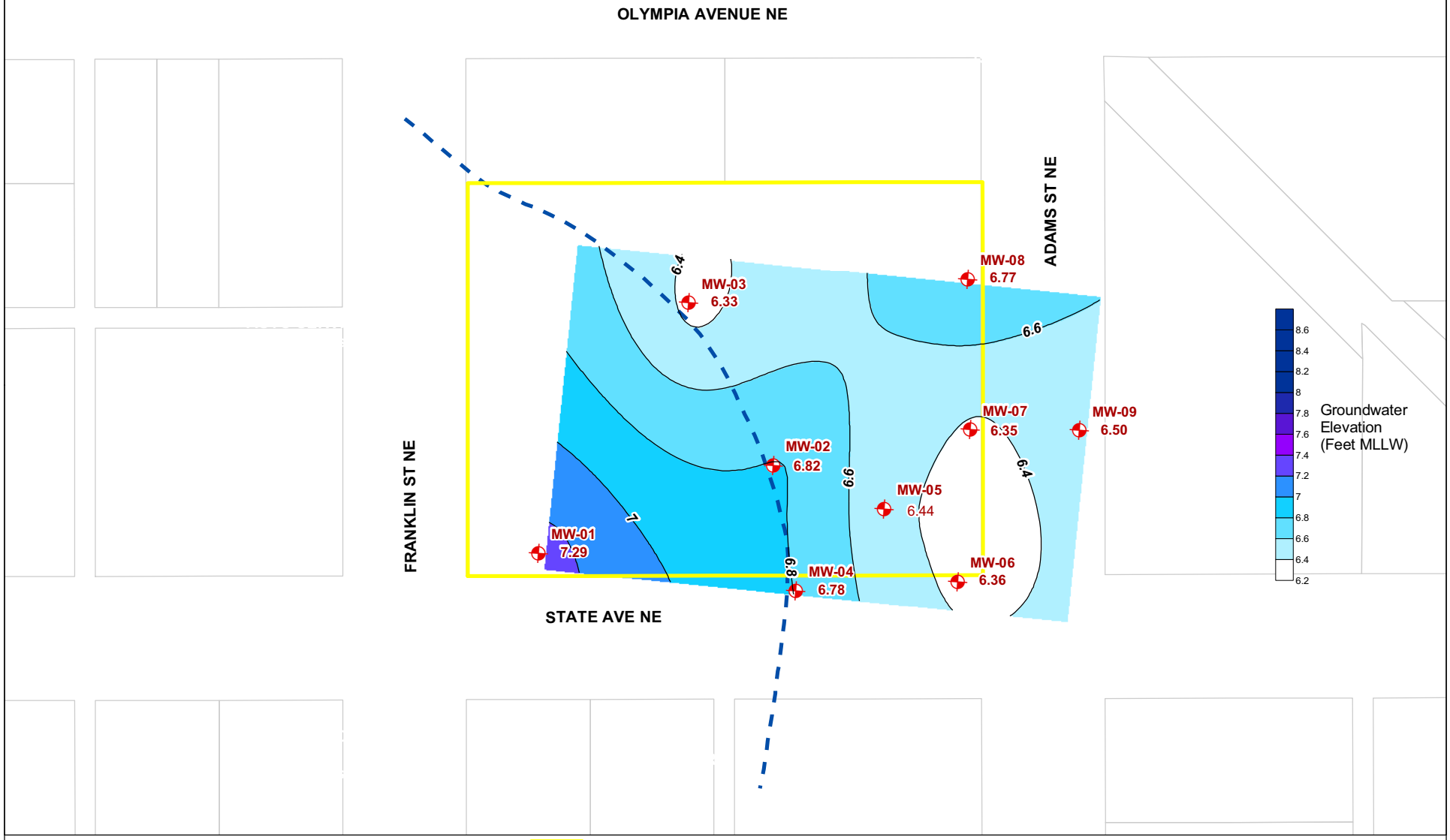
318 State Avenue NE
Olympia, Washington

GeoEngineers

Figure 6

OFFICE:TACO PM NER P:\0\04150490\02\CAD\04150490 2_Fig_6.dwg\TAB:Fig-6 modified by syi on Dec 23, 2008 - 17:10

DRAFT



MW01 7.29 GeoEngineers Monitoring Well Location, ID and Groundwater Elevation (2008)

Groundwater Contours (0.2-ft interval)

Historic Shoreline

Approximate Property Boundary

Parcel Boundary

N W E S

70 0 70

Feet

Reference: Property boundary and parcels from Thurston County.

Notes: 1. Map shown is based on measurements at low tide. Measurements for high tide were the same to within +/- 0.05 feet.
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.

Potentiometric Surface Map - April 15, 2008 Measurements

318 State Avenue NE
Olympia, Washington

GeoEngineers

Figure 7

DRAFT

Location	Depth (ft bgs)	Result
PP15		
TCE	2-4	2,300 ug/kg
cPAH	2-4	678.3 ug/kg
PP16		
Lead	2-4	350 mg/kg
TCE	2-4	46 ug/kg
cPAH	2-4	1270.7 ug/kg
TCE	6-8	55 ug/kg
PP17		
Arsenic	2-4	23 mg/kg
Lead	2-4	840 mg/kg
TD03		
TCE	4-4.5	230 ug/kg
TD05		
Arsenic	2-2.5	40 mg/kg
cPAH	2-2.5	1,715.6 ug/kg
TD08		
TCE	4-4.5	82 ug/kg
TD09		
TCE	4-4.5	600 ug/kg
MW02		
TCE	7-7.5	900 ug/kg
MW07		
TCE	7-7.5	45 ug/kg
MW-15		
Lead	3-3.5	510 mg/kg
PP19		
cPAH	3-3.5	4,860 ug/kg

Explanation

- Approximate Property Boundary
- **Arsenic and/or Lead at concentration >MTCA Method A (20 mg/kg and 250 mg/kg respectively)**
- **TCE at concentration >MTCA Method A (30 ug/kg)**
- **cPAH at concentration >MTCA Method A (100 ug/kg)**
- **Chemicals of Concern not present at concentrations greater than CULs**

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.

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Projection: NAD_1983_StatePlane_Washington_South_FIPS_4602_Feet
Datum: D_North_American_1983

N W E S

40 0 40
Feet

Chemicals of Concern in Soil

318 State Avenue NE
Olympia, Washington

GeoEngineers

Figure 8

Map Revised: February 18, 2009

Office: TAC Path: P:\00415049\GIS\0415049_Figure8_ChemicalsOfConcern_Soil.mxd TCK | JMK

DRAFT

Well	Event	Result*
MW-01		
Arsenic	Mar/Apr	0.0079 / 0.0053 mg/l
Arsenic	Oct/Nov	0.013 / 0.014 mg/l
MW-02		
TCE	Mar/Apr	5.3 ug/l
VC	Mar/Apr	0.45 ug/l
Arsenic	Oct/Nov	0.0093 / 0.0095 mg/l
MW-03		
VC	Mar/Apr	1.7 ug/l
Arsenic	Oct/Nov	0.0059 / 0.0058 mg/l
MW04		
VC	Mar/Apr	0.35 ug/l
Arsenic	Oct/Nov	0.012 / 0.017 mg/l
MW-05		
Arsenic	Mar/Apr	0.0061 / (<MTCA) mg/l
Arsenic	Oct/Nov	0.014 / 0.015 mg/l
VC	Mar/Apr	1.5 ug/l
MW-06		
VC	Mar/Apr	0.27 ug/l
Arsenic	Oct/Nov	0.0065 / 0.0074 mg/l
MW-07		
VC	Mar/Apr	3.5 ug/l
MW-08		
Arsenic	Oct/Nov	0.0062 / 0.0058 mg/l
MW-09		
VC	Mar/Apr	0.8 ug/l
Arsenic	Oct/Nov	0.0093 / 0.0097 mg/l
MW-10		
Arsenic	Oct/Nov	(<MTCA) / 0.0059 mg/l
MW-11		
Arsenic	Oct/Nov	0.016 / 0.017 mg/l
MW-12		
Arsenic	Oct/Nov	0.0064 / 0.0093 mg/l
MW-13		
Arsenic	Oct/Nov	0.063 / 0.062 mg/l
MW-14		
Arsenic	Oct/Nov	(<MTCA) / 0.0056 mg/l
MW-15		
Arsenic	Oct/Nov	0.012 / 0.013 mg/l

* Results for metals given as total/dissolved

Explanation

Approximate Property Boundary

Arsenic at concentration >MTCA Method A (0.005 mg/L)

TCE at concentration >MTCA Method A (5 mg/L)

VC at concentration >MTCA Method A (0.2 mg/L)

Chemicals of Concern not present at concentrations greater than CULs

Note: This figure presents the results for groundwater samples collected during both the March 2008 and October/November 2008 sampling events.

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.

Data Sources: Approximate Property Boundary from Thurston County parcels (revised by GeoEngineers). Aerial photograph (2003) from Thurston County Data Center. Data Frame Rotated 356.

Projection: NAD_1983_StatePlane_Washington_South_FIPS_4602_Feet
Datum: D_North_American_1983

N W E S

40 0 40
Feet

Chemicals of Concern in Groundwater

318 State Avenue NE
Olympia, Washington

GeoEngineers

Figure 9

Map Revised: February 18, 2009

Office: TAC Path: P:\0\04150491\GIS\04150491504902_Figure9_ChemicalsOfConcern_Water.mxd TCK | JMK

APPENDIX A

EXHIBIT A OF TASK ORDER 2: SCOPE OF SERVICES

EXHIBIT A
SCOPE OF SERVICES

INTRODUCTION AND BACKGROUND

The scope of services presented in Task Order (TO) No. 2 is for a supplemental site characterization to be completed at the property located at 318 State Avenue SE in Olympia, Washington (project area). The purpose of this TO is to complete a supplemental site characterization to 1) fill data gaps necessary to further evaluate the extent of impacted soil and groundwater, 2) evaluate the lateral and vertical extent of solvent contaminated soil and groundwater along Adams Street NE, which is located east of the property for future remedial excavation planning purposes and 3) prepare a Supplemental Site Characterization report and Ecology's Voluntary Cleanup Program (VCP) application documents. The potential sources of contamination are likely associated with former activities conducted at the property since the late 1800s. These historic activities included metal forging, automotive service and repair, and a Washington State Department of Transportation (WSDOT) materials testing laboratory where volatile organic compounds (VOCs) were used such as perchloroethylene (PCE) and trichloroethylene (TCE). The natural break-down products of these solvents are cis-1,2-dichloroethylene (DCE) and vinyl chloride, which are both present in groundwater at the project area.

SCOPE OF SERVICES

Our specific scope of services is based on our understanding of environmental conditions at the project area, the City's goals for remediation and redevelopment, and the recommendations from a consultation meeting with the City of Olympia (City), GeoEngineers, and the Washington State Department of Ecology (Ecology) on August 13, 2008. The specific scopes of service are presented below:

SUPPLEMENTAL SITE CHARACTERIZATION

1. Updating the existing Health and Safety Plan (HASP) (prepared as part of TO 1, dated March 24, 2008) for use by GeoEngineers' personnel during the field activities.
2. Coordinating and planning right-of -way permit with the City. This will include a traffic control plan that we will submit to the City.
3. Contacting the public utility locating service to locate utilities within City rights-of-way at least 72 hours prior to subsurface explorations. We will also subcontract a private locating service to locate utilities that may be present within the bounds of the property. GeoEngineers will review the underground utilities that are marked in the exploration areas by public and private utility locating services prior to completing subsurface explorations. Boring locations may be relocated if subsurface utilities are noted within the area of the initially proposed boring location.
4. Observing the installation of 10 subsurface soil borings (seven will be completed as monitoring wells; see Scope Item 5), beginning on October 30, 2008. The borings will be completed using direct-push and hollow-stem auger (HSA) drilling techniques to depths of approximately 10 feet below ground surface (bgs) or until a confining stratigraphic layer is encountered (i.e., silt or clay). Previous boring logs at the property indicate that such layers will likely be encountered at around 10 feet bgs. The number and location of the borings is based on our review of existing information. Logistics and other coordinating factors, including scheduling the drilling company, will be managed by GeoEngineers.

5. Collecting soil samples from the 10 borings at 2.5-foot-depth intervals (approximately 40 samples). Each sample will be field screened using visual, water sheen and headspace vapor (using a photoionization detector [PID]) screening methods. Soil cuttings and decontamination water will be contained in steel drums and stored at the property in a secure location designated by the City to await off-site transport and disposal. The drums will be labeled according to standard GeoEngineers practice.

6. Observing the installation of groundwater monitoring wells in seven of the 10 borings (MW-10 through MW-16). The wells will be installed to approximately 10 feet bgs and constructed using 2-inch-diameter PVC pipe, the bottom of which will be screened with 10- or 20-slot pre-packed slotted well screen. Flush mount monuments and locking well caps will be used at each well location for routine access to the monitoring wells for observation and sampling. The wells will be completed in accordance with the Ecology "Minimum Standards for Construction and Maintenance of Wells [173-160 WAC]".

   The new monitoring wells will become part of a larger groundwater monitoring well network that presently consists of nine existing wells (MW-01 through MW-09). The existing wells were installed in March 2008 as part of TO 1 of the on-call contract between the City and GeoEngineers, dated January 15, 2008.

7. Developing and purging the seven newly installed monitoring wells. Groundwater samples and depth to water measurements will be obtained from the monitoring well network (MW-01 through MW-16).

8. Having the vertical elevation of the top of each new well casing surveyed by a City licensed surveyor. Survey measurements will be obtained from the northern rim of the PVC well casings. Access to the property for the surveyors will be coordinated and facilitated with City personnel, as necessary. Logistics and other coordinating factors will be managed by GeoEngineers. Survey data will be provided to GeoEngineers who will use the data for groundwater elevation data and assist in evaluating groundwater flow direction and gradient.

9. Submitting up to 20 soil samples to a chemical analytical laboratory for chemical analysis that will include the following: total metals (arsenic, lead and mercury using Environmental Protection Agency (EPA) Method 6000/7000 Series), VOCs (using EPA Method 8260B), semivolatile organic compounds (SVOCs, using EPA Method 8270C) and carcinogenic polycyclic aromatic hydrocarbons (cPAHs, using EPA Method 8270C-SIM). Logistics and other coordinating factors will be managed by GeoEngineers.

10. Submitting 19 groundwater samples (one from each of the nine existing wells, the seven new wells and the three direct-push borings) to a chemical analytical laboratory for chemical analysis that will include the following: total and dissolved metals (arsenic and lead using EPA Method 6000/7000 Series), VOCs (using EPA Method 8260B), SVOCs (using EPA Method 8270C) and cPAHs (using EPA Method 8270C-SIM). Logistics and other coordinating factors will be managed by GeoEngineers.

11. Coordinating logistics related to disposal of drill cuttings, well development and purge water, and similar investigation-derived waste (IDW) from previous and current investigations.

12. Using database and GIS technologies to manage chemical analytical data from this investigation and provide interpretive site maps. The data will also be formatted by GeoEngineers for upload to Ecology's EIMS database system, as required by Ecology.

13. Evaluating the chemical analytical results relative to the Ecology's Model Toxics Control Act (MTCA) cleanup levels.

14. Preparing a Supplemental Site Characterization Report (as a supplement to existing Phase 2 ESA reports) documenting the findings of the study and providing recommendations for subsequent steps in the remedial process for the project area.

15. Completing and coordinating the submittal of Ecology's VCP application documents.

Please note that the remedy selection, cleanup action plan (CAP) and remedial action cost estimates will be address in a future TO. We recommend that these items be completed after the City has the opportunity to review the results of this study and make decisions relative to an appropriate cleanup remedy for the property that meets the City's long-term goals and objectives.

SCHEDULE

We are prepared to begin work immediately upon your authorization to proceed. We can modify our schedule to meet your needs. Scheduled tasks for this TO, as requested and prepared by the City, are as follows:

Estimated Timeframe	Description
October 2008	Additional sampling and groundwater monitoring well installation
November 2008	Prepare Report/Analysis
December 2008	Voluntary Clean-up Program (VCP) Application Submittal to Ecology along with report. Note: it is common for Ecology to take up to 90 days in reviewing the VCP application submittal. As indicated before, a CAP can be completed during this period under a separate TO.

APPENDIX B
FORMER ON-SITE ARTESIAN WELL ABANDONMENT LOG

Swanson Drilling Company

February 29, 2008

Department of Ecology, SW Regional Office
Attn: Mr. Bill Lumm. Well Construction Coordinator
P.O. Box 47775
Olympia, WA 98504-7775

Subject: Well Decommissioning Variance Request
318 East State Street, Olympia, WA 98501

Dr. Mr. Lumm:

This letter is to request a variance to leave existing casing in place as part of the decommissioning process. The existing well is described as follows:

5" threaded steel casing
Depth: 53 feet
Flowing artesian measured a 4 g.p.m., with approximately 2 pounds pressure
(Flow did not appear to change with high/low tide)

The proposed method of decommissioning is to leave the casing in place, compact ¾ bentonite chip in the bottom of the casing, then bail existing water out of the casing. Monitor to watch for any cascading water. Then proceed to fill with ¾ chip bentonite (and hydrate) to within 3 feet of the surface. Cut, and remove casing 3 feet below ground level.

Please do not hesitate to call if you have any questions or need further information.

Sincerely,

Rick Swanson
Owner

Cc: WSDOT

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300

March 13, 2008

CERTIFIED MAIL
7006 3450 0001 6754 2530

Mr. Rick Swanson
Swanson Drilling Company
3342 Libby Rd NE
Olympia, WA 98506

RE: Variance request to Chapter 173-160 Washington Administrative Code (WAC) for a water well at 318 NE State Street, Thurston County, Washington (Section 14, Township 18 N, Range 02 W). Notice of Intent A084124.

Dear Mr. Swanson:

This letter is in response to your written request for a variance to the *Minimum Standards for the Construction and Maintenance of Wells*, Chapter 173-160 WAC (Washington Administrative Code).

Specifically, your request is decommission a flowing artesian well by filling with bentonite chips. This method is required because of the threaded and coupled casing installed in this particular well. Pulling the casing would most likely break the casing and could cause flow outside the casing to become uncontrollable. Perforating the casing is nearly impossible due to the age of the casing (brittle) and the couplings usually break the tools during decommissioning. Using chips will result in a higher percent solids of bentonite to be inside the well as opposed to a slurry. All flow will be stopped before the well will be considered decommissioned.

After an investigation, interview, and review of your proposal, a variance is hereby granted to WAC 173-160-381 (4), Ecology will allow the proposed method to be used in the decommissioning of this well. This variance is granted under the following conditions:

1. All well decommissioning work shall be performed by a licensed driller as set forth by WAC 173-162.
2. The driller must submit a *Water Well Report* describing the decommissioning to Ecology (Southwest Regional office) within 30 days after completion of the well. Attach a copy of this variance to the well report.
3. With the exception of the provisions set forth (above) in this variance, all state and local (Thurston County) requirements shall apply.

You have a right to appeal this decision. To appeal this you must:

- File your appeal with the Pollution Control Hearings Board within 30 days of the "date of receipt" of this document. Filing means actual receipt by the Board during regular office hours.

- Serve your appeal on the Department of Ecology within 30 days of the "date of receipt" of this document. Service may be accomplished by any of the procedures identified in WAC 371-08-305(10). "Date of receipt" is defined at RCW 43.21B.001(2).

Be sure to do the following:

- Include a copy of this document that you are appealing with your *Notice of Appeal*.
- Serve and file your appeal in paper form; electronic copies are not accepted.

1. To file your appeal with the Pollution Control Hearings Board

Mail appeal to:

The Pollution Control Hearings Board
PO Box 40903
Olympia WA 98504-0903

OR

Deliver your appeal in person to:

The Pollution Control Hearings Board
4224 – 6th Ave SE Rowe Six, Bldg 2
Lacey WA 98503

2. To serve your appeal on the Department of Ecology

Mail appeal to:

The Department of Ecology
Appeals Coordinator
P.O. Box 47608
Olympia WA 98504-7608

OR

Deliver your appeal in person to:

The Department of Ecology
Appeals Coordinator
300 Desmond Dr SE
Lacey WA 98503

3. And send a copy of your appeal to:

William E. Lum, II
Department of Ecology
Southwest Regional Office
PO Box 47775
Olympia WA 98504-7775

For additional information visit the Environmental Hearings Office Website: http://www.eho.wa.gov .
To find laws and agency rules visit the Washington State Legislature Website:
http://www1.leg.wa.gov/CodeReviser .

If you have any questions, please contact Ecology at (360) 407-6300.

Sincerely,

Thomas Loranger
Section Manager
Water Resources Program

cc: Heather Saunders, Thurston County Health Department

TL:BL:th

_ [redacted]

Construction/Decommission *("x" in circle)*

○ Construction

⊗ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* ______

Unique Ecology Well ID Tag No. ______

Water Right Permit No. ______

Property Owner Name WSDOT

Well Street Address 318 NE Stake Street

City Olympia County Thurston

Location __ 1/4-1/4 __ 1/4 Sec 24 Twn 15 R 2 EWM or (WWM)

Lat/Long (s, t, r Still REQUIRED) Lat Deg ____ Lat Min/Sec ____ Long Deg ____ Long Min/Sec ____

Tax Parcel No. 78503200400

PROPOSED USE: ☐ Domestic ☐ Industrial ☐ Municipal ☐ DeWater ☐ Irrigation ☐ Test Well ☐ Other ______

TYPE OF WORK: Owner's number of well (if more than one) ______

☐ New well ☐ Reconditioned *Method*: ☐ Dug ☐ Bored ☐ Driven ☐ Deepened ☒ Cable ☐ Rotary ☐ Jetted

DIMENSIONS: Diameter of well 5 inches, drilled ____ ft.

Depth of completed well 52 ft.

CONSTRUCTION DETAILS

Casing Installed: ☐ Welded ____" Diam. from ____ ft. to ____ ft.

☐ Liner installed ____" Diam. from ____ ft. to ____ ft.

☒ Threaded ____" Diam. from ____ ft. to ____ ft.

Perforations: ☐ Yes ☒ No

Type of perforator used ______

SIZE of perfs ____ in. by ____ in. and no. of perfs ____ from ____ ft. to ____ ft.

Screens: ☐ Yes ☒ No ☐ K-Pac Location ______

Manufacturer's Name ______

Type ______ Model No. ______

Diam. ____ Slot size ____ from ____ ft. to ____ ft.

Diam. ____ Slot size ____ from ____ ft. to ____ ft.

Gravel/Filter packed: ☐ Yes ☒ No ☐ Size of gravel/sand ______

Materials placed from ____ ft. to ____ ft.

Surface Seal: ☐ Yes ☒ No To what depth? ____ ft.

Material used in seal ______

Did any strata contain unusable water? ☐ Yes ☐ No

Type of water? ______ Depth of strata ______

Method of sealing strata off ______

PUMP: Manufacturer's Name ______

Type ______ H.P. ______

WATER LEVELS: Land-surface elevation above mean sea level ____ ft.

Static level ____ ft. below top of well Date ____

Artesian pressure 5 gpm lbs. per square inch Date 2-5-08

Artesian water is controlled by ______ (cap, valve, etc.)

WELL TESTS: Drawdown is amount water level is lowered below static level

Was a pump test made? ☐ Yes ☐ No If yes, by whom? ______

Yield ____ gal./min. with ____ ft. drawdown after ____ hrs.

Yield ____ gal./min. with ____ ft. drawdown after ____ hrs.

Yield ____ gal./min. with ____ ft. drawdown after ____ hrs.

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test ______

Bailer test ____ gal./min. with ____ ft. drawdown after ____ hrs.

Airtest ____ gal./min. with stem set at ____ ft. for ____ hrs.

Artesian flow ____ g.p.m. Date ____

Temperature of water ____ Was a chemical analysis made? ☐ Yes ☐ No

CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
Add 3/4 Chip Bentonite		
to 5" well Casing		
Compact Bentonite From		
52 to 5 ft Came back		
Well 12 HR Later		
to Check For Flow.		
No Flow.		
Weld Dyke plate to		
Casing Left Casing		
to 1' above ground		

Start Date 3-5-08 Completed Date 3-6-08

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☐ Driller ☐ Engineer ☐ Trainee Name (Print) Rick Swanson

Driller/Engineer/Trainee Signature [signature]

Driller or trainee License No. 1??5

Drilling Company Swanson Drilling

Address 3343 Libby Rd NE

City, State, Zip Olympia WA 98506

Contractor's Registration No. SWANSDC944RB Date 3-14-08

If TRAINEE,

Driller's Licensed No. ______

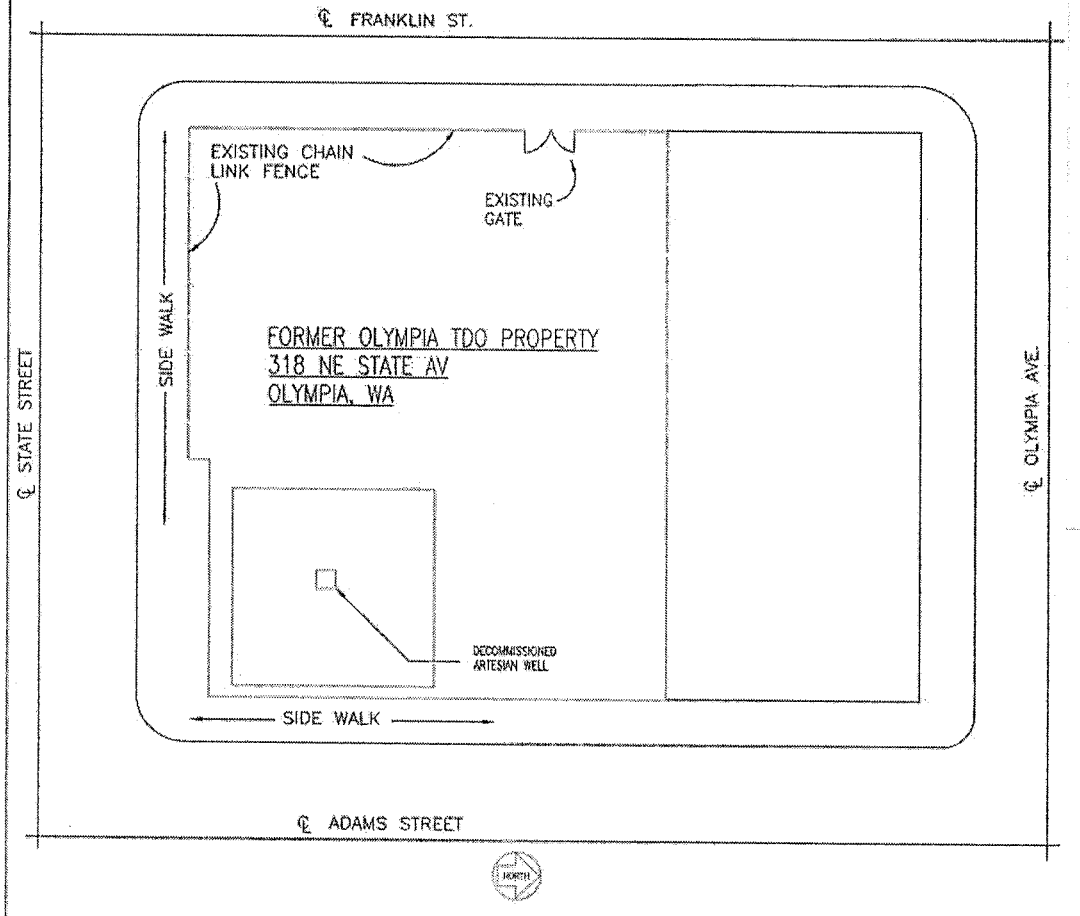
Driller's Signature ______

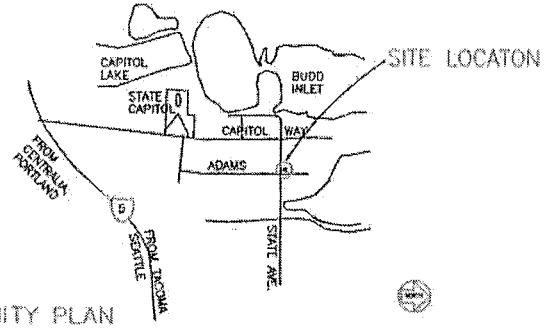
Ecology is an Equal Opportunity Employer

ECY 050-1-20 (Rev 3/05) **The Department of Ecology does NOT warranty the Data and/or Information on this Well Report.**

SITE PLAN

Scale: 1" = 10'





VICINITY PLAN

PROJECT DESCRIPTION

Phase 1: Decommission one (1) artesian well.

LEGAL DESCRIPTION

Section 14 Township 18 Range 2W Plat
SYLVESTER S 1/2 LOTS 1 TO 4 AND 5 TO 8 BLK 32 & 1/2
VAC ALLEY LOTS 2 & 3 001014

SITE DATA

Owner:	Washington State Department of Transportation
Project Address:	318 NE State Ave., Olympia, WA 98501
Tax Assessors Parcel:	78503200400
Acres:	1.08
Zoning:	DB (Downtown Business)
Use:	67 - SRV-GOVRNMTL

PRINCIPAL ARCHITECT
SENIOR ARCHITECT
PROJECT ARCHITECT
DRAWN BY: Fred Rietmann March 2004
CHECKED BY
AS BUILT BY
DATE | REVISION | BY | DATE

REGION NO. 10 | STATE WASH
FEDERAL AID PROJECT NO.
FOR H/O
DESIGN NO.
CONTRACT NO.

Architectural Design & Construction

Washington State Department of Transportation
Maintenance and Operations Office
310 Maple Park Ave SE
Olympia, WA 98504-7358

Well Decommissioning Project

Vicinity Map, Site Map

SHEET OF SHEETS

APPENDIX C
SAMPLING AND ANALYSIS PLAN

SAMPLING AND ANALYSIS PLAN
SITE CHARACTERIZATION
318 STATE AVENUE NE PROPERTY
OLYMPIA, WASHINGTON

FEBRUARY 19, 2009

FOR
CITY OF OLYMPIA

TABLE OF CONTENTS

List of Tables

TABLE OF CONTENTS (CONTINUED)

List of Tables

List of Figures

SAMPLING AND ANALYSIS PLAN
SITE CHARACTERIZATION
318 STATE AVENUE NE PROPERTY
OLYMPIA, WASHINGTON
FOR
CITY OF OLYMPIA

1.0 INTRODUCTION

This Sampling and Analysis Plan (SAP) summarizes procedures for sample collection during site characterization activities at the 318 State Avenue NE Property (Property) in Olympia, Washington. This SAP was prepared in conjunction with the Site Health and Safety Plan (HASP).

The location of the Property is indicated on the Vicinity Map, Figure 1. The purpose of the site characterization is to identify and assess contamination at the Property related to historic Property activities. The work was accomplished by utilizing a drilling rig and groundwater monitoring wells to collect soil and groundwater samples.

The purpose of this SAP is to describe field activities, sampling equipment, sampling locations and procedures that were used during investigation activities at the Property. Four separate field investigations were performed by GeoEngineers in July 2006, September 2006, March/April 2008 and October/November 2008. This SAP also identifies quality assurance/quality control (QA/QC) procedures that were implemented during sampling activities and laboratory analyses.

Detailed descriptions of the field sampling procedures are provided in this document. Property conditions may have made it necessary to modify these procedures. Any variations or modifications that became necessary during Property activities were coordinated with the City of Olympia (City), the Washington State Department of Ecology (Ecology) and other involved parties, as appropriate. Variations or modifications implemented during the Property activities and the reason for the modification were documented as necessary.

2.0 PROPERTY DESCRIPTION

GeoEngineers performed a Phase I ESA in general conformance with the scope and limitations of American Society for Testing and Materials (ASTM) Practice E 1527-05 of the Property located at 318 State Avenue NE in Olympia, Washington. The Washington State Department of Transportation (WSDOT) also performed a Phase I ESA (2005) to evaluate "the potential presence of environmental hazards that may adversely affect the sale of the property" but did not meet the requirements of current ASTM Standard E 1527-05 for Phase I ESAs. The general location of the Site is indicated on Figure 2. The identified potential sources of contamination are likely associated with former activities conducted at the property since the late 1800s. These historic activities included metal forging, automotive service and repair and a Washington State Department of Transportation (WSDOT) materials testing laboratory where volatile organic compounds (VOCs) were most likely used.

The surface of the Property is approximately 11 feet above national geodetic vertical datum (NGVD) as shown on the United States Geological Survey (USGS) 7.5 minute quadrangle map for Thurston County, Washington, dated 1949 and photo-revised in 1994. The surface of the Property is generally flat. The depth to groundwater in the Property monitoring wells ranges seasonally from about 4 to 6 feet below ground surface (bgs). In general, groundwater flow is toward the northeast. Subsurface soil mostly

consists of sand with silt (fill) overlaying occasional gravel and organic layers and near-shore silty sands and/or silt.

3.0 SAMPLING PROCEDURES

3.1 PROPERTY CHARACTERIZATION

Property characterization completed by GeoEngineers consisted of four separate phases of drilling activities, which occurred in July 2006, September 2006, March/April 2008 and October/November 2008. These activities, as well as subsequent groundwater monitoring/sampling, are summarized in Table A below.

Table A. Property Activities and Sampling Procedures

Date	Activity	Soil Samples	Water Samples
July 2006	Drilled and sampled PP-1 through PP-8	1 per boring	1 per boring
September 2006	Drilled and sampled PP-9 through PP-17	2 per boring	1 per boring
April/March 2008	Installed, developed and sampled MW-1 through MW-9	2 per boring/well	1 per boring/well
October/November 2008	Drilled and sampled PP-18 through PP-20. Installed and developed MW-10 through MW-16. Sampled from MW-1 through MW-16	2 per boring/well	1 per well

A total of 36 soil borings, including the installation of 16 groundwater monitoring wells, were completed. One or two soil samples and a groundwater sample were collected from each direct push boring location. Groundwater monitoring/sampling also took place in March/April 2008 and October/November 2008. Test America Analytical Laboratories of Seattle and Tacoma, Washington, and Environmental Services Northwest (ESN) Laboratory of Olympia, Washington, were contracted to analyze the samples collected.

Representatives from GeoEngineers, Inc. (GeoEngineers) coordinated and observed drilling and groundwater monitoring well installation procedures. GeoEngineers maintained a detailed log of soil and groundwater conditions encountered at each boring location. A global positioning system (GPS) unit was used to record sample locations. Backup measurements of the GPS data gathered were collected and recorded on the boring logs or in a field note book. The backup measurements were based on known Property features used as references for mapping the location of each well. The soil encountered at each boring was classified in general accordance with ASTM D 2488. The field screening results, as described in Section 3.2, and soil classification were recorded on GeoEngineers boring logs.

3.1.1 Soil Sampling Procedures

Each boring was advanced to depths between 10 to 12 feet on and around the Property. Continuous sampling was performed from each soil boring using 4-foot-long core sleeves and utilizing direct push technologies. Discrete soil samples were obtained from the direct push sampling sleeves using a sampling spoon. A portion of the sample was transferred immediately into a laboratory-supplied glass sample containers for chemical analysis where contamination was observed through field screening (Section 3.2 below). If contamination was not observed through field screening, sample containers were filled in the vicinity of anticipated impacts. The containers were filled according to the specifications of the contracted analytical laboratory, completely sealed and placed on ice within a cooler prior to and during shipment to the laboratory.

The sampling equipment was decontaminated prior to each sampling attempt using methods described in Section 5.2 below.

A total of 67 selected soil samples were collected from the borings and submitted to the lab as follows:

- Soil samples collected during the July 2006 and September 2006 investigation were submitted for analysis of gasoline-, diesel-, and oil-range hydrocarbons (NWTPH-Gx and -Dx), and Model Toxics Control Act (MTCA) metals (including mercury using Environmental Protection Agency (EPA) Method 6000/7000 Series). Additionally, selected samples were analyzed for VOCs (using EPA Method 8260B), semivolatile organic compounds (SVOCs, using EPA Method 8270C) and carcinogenic polycyclic aromatic hydrocarbons (cPAHs), using EPA Method 8270C-SIM.
- Soil samples collected during the March/April 2008 investigation were submitted for analysis of gasoline- and diesel-range hydrocarbons (NWTPH-Gx and -Dx), RCRA metals (using EPA Method 6000/7000 Series), VOCs (using EPA Method 8260B), SVOCs (using EPA Method 8270C), polychlorinated biphenyls (PCBs) by EPA 8082 and cPAHs (using EPA Method 8270C-SIM).
- Soil samples collected during the October/November 2008 investigation were submitted RCRA metals (arsenic, lead and mercury using EPA Method 6000/7000 Series), VOCs (using EPA Method 8260B), SVOCs (using EPA Method 8270C) and cPAHs (using EPA Method 8270C-SIM).

3.1.2 Groundwater Monitoring Well Installation and Sampling Procedures

Groundwater monitoring wells were installed in 16 of the 36 borings. The groundwater monitoring well screen intervals were set based on visual, water sheen and headspace vapor (using a photoionization detector [PID]) field screening methods as described in Section 3.2. Each new groundwater monitoring well was developed by purging at least five well volumes prior to sampling activities. Water samples from the groundwater monitoring wells were collected by low flow techniques using dedicated self-venting submersible electric pumps (Whale Pump Brand or equivalent) with flexible vinyl tubing. Groundwater well development and sampling flow rates were set at 500 milliliters per minute (ml/min). Groundwater parameters were collected prior to sample collection, which included temperature, specific conductance, dissolved oxygen, pH, oxidation/reduction potential and turbidity.

Groundwater was transferred from the tubing directly to laboratory-supplied sampling containers; samples for metals analysis were field-filtered using a dedicated 0.45-micron filter. The sample containers were labeled in the field and stored on ice in a cooler prior to and during shipment to the laboratory.

Water samples were also collected from the direct-push soil borings using contractor supplied peristaltic pumps after a temporary well screen was installed. New sections of clean polyethylene and masterflex silicone tubing were used for every sample to prevent cross contamination.

A total of 45 selected water samples were collected from the borings and submitted to the lab as follows:

- Water samples collected during the July 2006 and September 2006 investigation were submitted for gasoline-, diesel-, and oil-range hydrocarbons (NWTPH-Gx and -Dx), MTCA metals (including mercury using EPA Method 6000/7000 Series), VOCs (using EPA Method 8260B), SVOCs (using EPA Method 8270C) and cPAHs (using EPA Method 8270C-SIM).

- Water samples collected during the March/April 2008 investigation were submitted gasoline-, diesel-, and oil-range hydrocarbons (NWTPH-Gx and -Dx), RCRA metals (using EPA Method 6000/7000 Series), VOCs using EPA Method 8260B), SVOCs (using EPA Method 8270C), PCBs (by EPA 8082) and cPAHs (using EPA Method 8270C-SIM).
- Water samples collected during the October/November 2008 investigation were submitted RCRA metals (arsenic, lead and mercury using EPA Method 6000/7000 Series), VOCs (using EPA Method 8260B), SVOCs (using EPA Method 8270C) and cPAHs (using EPA Method 8270C-SIM).

3.2 FIELD SCREENING

Soil samples obtained from the boring locations were field screened for indications of petroleum hydrocarbons. Field screening results were recorded on the 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 PID Rae Instruments Mini Rae Model 2000 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.

4.0 FIELD EQUIPMENT CALIBRATION PROCEDURES

Field equipment requiring calibration were calibrated to known standards in accordance with manufacturers' recommended schedules and procedures for each instrument. Calibration checks of the vapor measurement equipment were conducted daily and the instruments were recalibrated if required. If field equipment becomes inoperable, it was replaced with a properly calibrated instrument.

5.0 INVESTIGATION DERIVED WASTE

Investigation derived wastes was containerized in steel drums and disposed of in accordance with a waste disposal authorization with Emerald Services, Inc. (Emerald). Water generated during well development and sampling activities was also stored in the property within steel drums and was disposed as appropriate. All disposal activities were documented and tracked.

5.1 SAMPLE HANDLING

The following procedures were used at all times when collecting soil samples during the Property characterization activities.

- Neoprene, nitrile or vinyl gloves were worn when handling soil samples. New disposable gloves were used for each sample.
- All soil samples were collected with a stainless steel spoon. Sufficient sample volume was obtained for the laboratory to complete the method-specific quality control analyses on a laboratory-batch basis. Samples selected for chemical analysis were placed in laboratory-supplied containers.
- Sample labels were completed for each sample following the procedures provided in this section. Samples were stored in a cooler with ice until they were delivered to the analytical laboratory. Standard chain-of-custody procedures were followed for all samples collected. All samples were submitted to the laboratory within 72 hours of collection.

5.2 DECONTAMINATION PROCEDURES

5.2 1 General

The objectives of decontamination procedures are to minimize the potential for cross-contamination between exploration locations and between individual samples within a specific exploration, to prevent contamination from leaving the sampling site by way of equipment or personnel, and to prevent exposure of field personnel to contaminated materials. This section discusses general decontamination procedures.

5.2.2 Personnel

Personnel decontamination procedures depend on the level of protection specified for a given activity. The HASP identifies the appropriate level of protection for each type of fieldwork involved in this project, as well as appropriate decontamination procedures.

5.2.3 Sampling Equipment

Decontamination procedures are designed to remove trace-level contaminants from sampling equipment to prevent cross-contamination of samples.

Sampling equipment, including stainless steel sampling tools and soil sampling equipment were decontaminated prior to and after each sampling attempt by washing with nonphosphate detergent solution (Alconox and potable tap water), rinsing with potable tap water and final rinsing with distilled water.

5.2.4 Direct Push Equipment

A designated decontamination area was established for decontamination of the direct push equipment. Direct push equipment was decontaminated between each sampling attempt and after final use. The hollow stem auger equipment used to install the groundwater monitoring wells was also decontaminated immediately following each installation including final use. Water generated during decontamination activities was collected and stored in steel drums left on the Property pending appropriate disposal.

5.3 DOCUMENTATION OF FIELD ACTIVITIES

5.3.1 General

Daily field activities, including observations and field procedures, were recorded on appropriate forms. The original field forms will be maintained in GeoEngineers' office files. Copies of the completed forms will be maintained in a sequentially numbered field file for reference during field activities. Indelible ink was used, unless prohibited by weather. Photographic documentation of field activities was performed as appropriate.

5.3.2 Sample Designation and Labeling

Each sample collected during Property characterization and groundwater monitoring activities was identified by a unique sample designation. The sample designation was included on the sample label. The designation also included the corresponding sample information on the appropriate boring log. The following designation system was used for this project.

Sample Designation Example:

Soil: Boring Number – Date (MMDDYY) – Depth
Water: Boring Number – Date (MMDDYY) – W

Sample labels were completed in indelible ink. Sample labels included the following information:

- GeoEngineers' job number
- Sample designation
- Date of sample collection (month/day/year)
- Time of sample collection (hours:minutes)
- Sample preservation, if appropriate

6.0 QUALITY ASSURANCE/QUALITY CONTROL

6.1 QUALITY ASSURANCE OBJECTIVES

The general quality assurance (QA) objectives for this project are to develop and implement procedures for obtaining and evaluating data of a specified quality that can be used to assess Property conditions and risks. Measurement data should have an appropriate degree of accuracy and reproducibility; samples collected should be representative of actual field conditions, and samples should be collected and analyzed using proper chain-of-custody procedures.

6.2 FIELD QA/QC PROCEDURES

Field QA/QC procedures followed included collecting duplicate samples and completing all appropriate sample documentation. Field QA samples represented at least 5 percent of the total number of samples obtained during this event.

6.2.1 Duplicate Samples

Duplicate water samples were analyzed at a frequency of at least 5 percent of the samples analyzed. Duplicate samples are used to evaluate the precision and accuracy of overall sampling and analytical methods. Duplicate samples were prepared by collecting twice the normal quantity of a sample at a given location. The sample was split between two separate jars at the time of collection. The duplicate sample(s) were labeled with a unique sample number and delivered to the laboratory with the normal shipment of samples.

6.2.2 Sample Preservation, Holding Times and Containers

Samples were kept in a cooler with ice before and during transport to the laboratory. The sampling, extraction and analysis dates were reviewed to confirm that extraction and analyses were completed within the recommended holding times, as specified by EPA protocol. Appropriate data qualifiers were noted if holding times were exceeded or containers do not contain the appropriate sample preservation. Table 1 summarizes sample preservation, holding times and containers for soil samples.

6.2.3 Sample Shipment and Custody

Chain-of-custody procedures were used to track the possession of the samples from the time they were collected in the field through analysis and final disposition. Each time the samples changed hands, both the sender and receiver signed and dated the chain-of-custody record form. When the samples were sent to the laboratory, one copy of the form was retained for project files and the remaining copies were enclosed in a plastic bag and secured to the inside of the cooler prior to shipment of the samples.

6.3 LABORATORY QA/QC PROCEDURES

The data quality objectives were met in the laboratory by using established instrument calibration and sample handling procedures, analysis according to standard analytical methods and analysis of quality control samples. Laboratory quality control consisted of analysis of field sample duplicates and blanks, analysis of surrogate spikes, method blanks, duplicates, matrix spikes (MS) and matrix spike duplicates (MSD). All QA/QC data, including holding times, were reported.

6.3.1 Equipment Calibration Procedures and Frequency

All instruments and equipment used by the laboratory were operated, calibrated and maintained according to manufacturer's guidelines and recommendations. Operation, calibration and maintenance were

performed by personnel who have been properly trained in these procedures. A routine schedule and record of instrument calibration and maintenance are kept on file at the laboratory.

6.3.2 Analytical Procedures

Samples were analyzed according to analytical methods listed in Table 1. EPA standard analytical methods are specified in Test Methods for Evaluating Solid Waste-Physical/Chemical Methods, 3rd Edition, EPA-SW846, September 1986. Washington analytical methods for petroleum hydrocarbons are specified in the MTCA regulations, as outlined in the Washington Administrative Code (WAC) 173-340.

6.3.3 Laboratory QA/QC Samples

Laboratory QC samples were analyzed at a frequency of 1 in 20 (5 percent) on a laboratory batch basis. Laboratory QC samples consisted of duplicates, method blanks, MS and MSD. In addition, each organic analysis included the addition of surrogate compounds to the sample for surrogate spike analysis.

6.3.4 Laboratory Deliverables

The following information was provided in the laboratory reports submitted for this project.

- Transmittal letter, including a case narrative, information about the receipt of samples, the testing methodology performed, any deviations from the required procedures, any problems encountered in the analysis of the samples, any problems meeting the method holding times or laboratory control limits, whether all internal standard recovery values within the control limits and any corrective actions taken by the laboratory relative to the quality of the data contained in the report.
- Sample analytical results, including sampling date, date of sample analysis, dilution factors and test method identification and detection limits for undetected analytes. Results will be reported for all field samples, including field duplicates and blanks submitted for analysis.
- Method blank and field blank results, including reporting limits for undetected analytes and any positive results for contaminants.
- Surrogate recovery results and corresponding control limits for samples and method blanks.
- Matrix spike and matrix spike duplicate results, including whether relative percent differences and corresponding control limits are within acceptable limits.
- MS/MSD and/or surrogate and blank spike concentrations, percent recoveries, relative percent differences and corresponding control limits.
- Laboratory duplicate results, including whether relative percent differences and corresponding control limits are within acceptable limits.
- Sample chain-of-custody documentation, including the temperature recorded by the laboratory.

6.4 REVIEW OF FIELD AND LABORATORY QA/QC DATA

The sample data, field and laboratory QA/QC results were evaluated for acceptability with respect to the data quality objectives (DQOs). Each group of samples was compared with the DQOs and evaluated using data validation guidelines contained in the following documents (as appropriate):

- EPA, 1988, *Laboratory Data Validation, Functional Guidelines for Evaluating Inorganics Analyses*, Hazardous Site Evaluation Division, U.S. Environmental Protection Agency, Washington, DC.
- EPA, 2000a, *Guidance for Data Quality Assessment, Practical Methods for Data Analysis*, EPA QA/G-9, EPA/600/R-96/084, U.S. Environmental Protection Agency, Office of Environmental Information, Washington, DC, July 2000.
- USEPA Contract Laboratory Program *National Functional Guidelines for Inorganic Data Review*, Publication 9240.1-05-01, EPA-540/R-94/013, PB94-963502, OSWER, USEPA, Washington, DC 20460, February 1994.

Data evaluation will include assessment of the criteria listed in Section 6.5.

6.5 PRECISION, ACCURACY AND COMPLETENESS

6.5.1 Precision

Precision is a measure of data variability. Variability can be attributed to sampling activities and/or chemical analysis. Relative percent difference (RPD) was used to assess the precision of the sampling and analytical method and is calculated as follows:

$$RPD = 100[(Xs - Xd)/(Xs + Xd)]/2$$

where

RPD = relative percent difference
Xs = sample analytical result
Xd = duplicate sample analytical result

The laboratory DQOs for precision are presented in Table 2.

6.5.2 Accuracy

Accuracy is a measure of the error between chemical analytical results and the true sample concentrations. Accuracy is a measure of the bias in a system and were expressed as the percent recovery of spiked samples. The accuracy was presented as percent recovery and was calculated as follows:

$$PR = 100(Xss - Xs)/T$$

where

PR = percent recovery
Xss = spike sample analytical result
Xs = sample analytical result
T = known spike concentration

The laboratory DQOs for accuracy are presented in Table 2.

6.5.3 Completeness

Completeness is evaluated to assess whether a sufficient amount of valid data is obtained. Completeness is described as the ratio of acceptable measurements to the total planned measurements. Completeness was calculated as follows:

C = (Number of samples having acceptable data)/
(total number of samples analyzed) x 100%

where

C = completeness

The laboratory DQOs for completeness are presented in Table 2.

6.6 REPORTING, DOCUMENTATION, DATA REDUCTION AND CORRECTIVE ACTION

Upon receipt of each laboratory data package, data was evaluated against the criteria outlined in the previous sections. Any deviation from the established criteria was noted, and the data was qualified, as appropriate. A review of the analytical data QA/QC was performed. Data validation procedures for all samples included checking the following (when appropriate).

- Holding times
- Detection limits
- Laboratory blanks
- Laboratory matrix spikes
- Laboratory matrix spike duplicates
- Laboratory blank spikes
- Laboratory blank spike duplicates
- Surrogate recoveries

If significant quality assurance problems were encountered, appropriate corrective action as determined by GeoEngineers' project manager, GeoEngineers' associate/principle and/or the analytical laboratory were implemented as appropriate. The corrective actions taken are defensible and the corrected data were qualified.

7.0 REFERENCES

EPA. October 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, Interim Final*. OSWER Directive 9355.3-01. EPA/540/G-89/004.

EPA. 2000a. *Guidance for Data Quality Assessment, Practical Methods for Data Analysis*, EPA QA/G-9, EPA/600/R-96/084, U.S. Environmental Protection Agency, Office of Environmental Information, Washington, DC. July 2000.

Model Toxics Control Act (MTCA) Cleanup Regulations, *Washington Administrative Code, Chapter 173-340.* Washington State Department of Ecology.

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TABLE 1
METHODS AND PROTOCOL FOR SAMPLE ANALYSIS
318 STATE AVENUE NE
OLYMPIA, WASHINGTON

Parameters	Analysis Methods	Preservation	Holding Time	Sample Container	
				Soil	Groundwater
Petroleum Hydrocarbons	NWTPH-Gx and -Dx	Cool to 4° C	Extract before 14 Days	40 mL glass VOA vials w/ Teflon sepums and Methanol preservative and 8 ounce glass jar	40 mL glass VOA vials w/ Teflon sepums and Hydrochloric Acid preservative and preserved 500mL glass ambers w/ Hydrochloric Acid preservative
PCBs	EPA Method 8082	Cool to 4° C	Extract before 14 days for soil, 7 days for water	8-ounce glass jar	Unpreserved 500mL glass ambers
Metals	EPA Method 6000/7000 Series	Cool to 4° C	Extract before 180 Days	8-ounce glass jar	500 mL poly w/ Nitric Acid preservative, one field filtered for dissolved metals
VOCs	EPA Method 8260B	Cool to 4° C	Extract before 14 Days	40 mL unpreserved glass VOA vials w/ Teflon septums	40 mL glass VOA vials w/ Teflon sepums and Hydrochloric Acid preservative
SVOCs	EPA Method 8270C	Cool to 4° C	Extract before 14 days for soil, 7 days for water	8-ounce glass jar	Unpreserved 500mL glass ambers
PAHs	EPA Method 8270C-SIM	Cool to 4° C	Extract before 14 days for soil, 7 days for water	8-ounce glass jar	Unpreserved 500mL glass ambers

Notes:
VOCs = volatile organic compounds
SVOCs = semivolatile organic compounds
PAHs = polycyclic aromatic hydrocarbons
VOA = volatile organic analysis
mL = milliliters
EPA = U.S. Environmental Protection Agency
PCBs = polychlorinated biphenyls
SIM = Selected Ion Mode
°C = degrees centigrade

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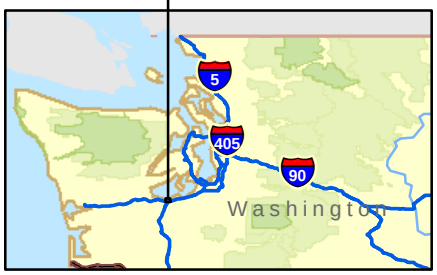
TABLE 2
ANALYTICAL DATA QUALITY OBJECTIVES
318 STATE AVENUE NE
OLYMPIA, WASHINGTON

Parameter	Method	Minimum Method Reporting Limit Goal (Soil)	Minimum Method Reporting Limit Goal (Water)	Precision (relative percent difference)	Accuracy (percent spike recovery)	Completeness (percent)
Petroleum Hydrocarbons	NWTPH-Gx and -Dx	30 mg/kg	500 µg/L	± 20 (± 35% for soils)	45 - 150	95
PCBs	EPA Method 8082	0.5 mg/kg	0.044 µg/L	± 20 (± 35% for soils)	45 - 150	95
Metals	EPA Method 6000/7000 Series	2 mg/kg	2 µg/L	± 20 (± 35% for soils)	45 - 150	95
VOCs	EPA Method 8260B	0.91 mg/kg	0.0046 µg/L	± 20 (± 35% for soils)	45 - 150	95
SVOCs	EPA Method 8270C	0.02 mg/kg	0.02 µg/L	± 20 (± 35% for soils)	45 - 150	95
PAHs	EPA Method 8270C SIM	0.02 mg/kg	0.002 µg/L	± 20 (± 35% for soils)	45 - 150	95

Notes:
N/A = not applicable
mg/kg = milligrams per kilogram
µg/l = micrograms per liter
VOCs = volatile organic compounds
SVOCs = Semi-volatile organic compounds
PAHs = polycyclic aromatic hydrocarbons
SIM = Selected Ion Mode
PCBs = polychlorinated biphenyls
EPA = U.S. Environmental Protection Agency

TACO:\0\0415049\02\Finals\041504902SAP Tables.xls

DRAFT



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: 2008 Shaded Relief from ESRI, 2008 Topographic Maps from National Geographic Society
Projection: NAD_1983_StatePlane_Washington_North_FIPS_4601_Feet
Datum: D_North_American_1983

Vicinity Map

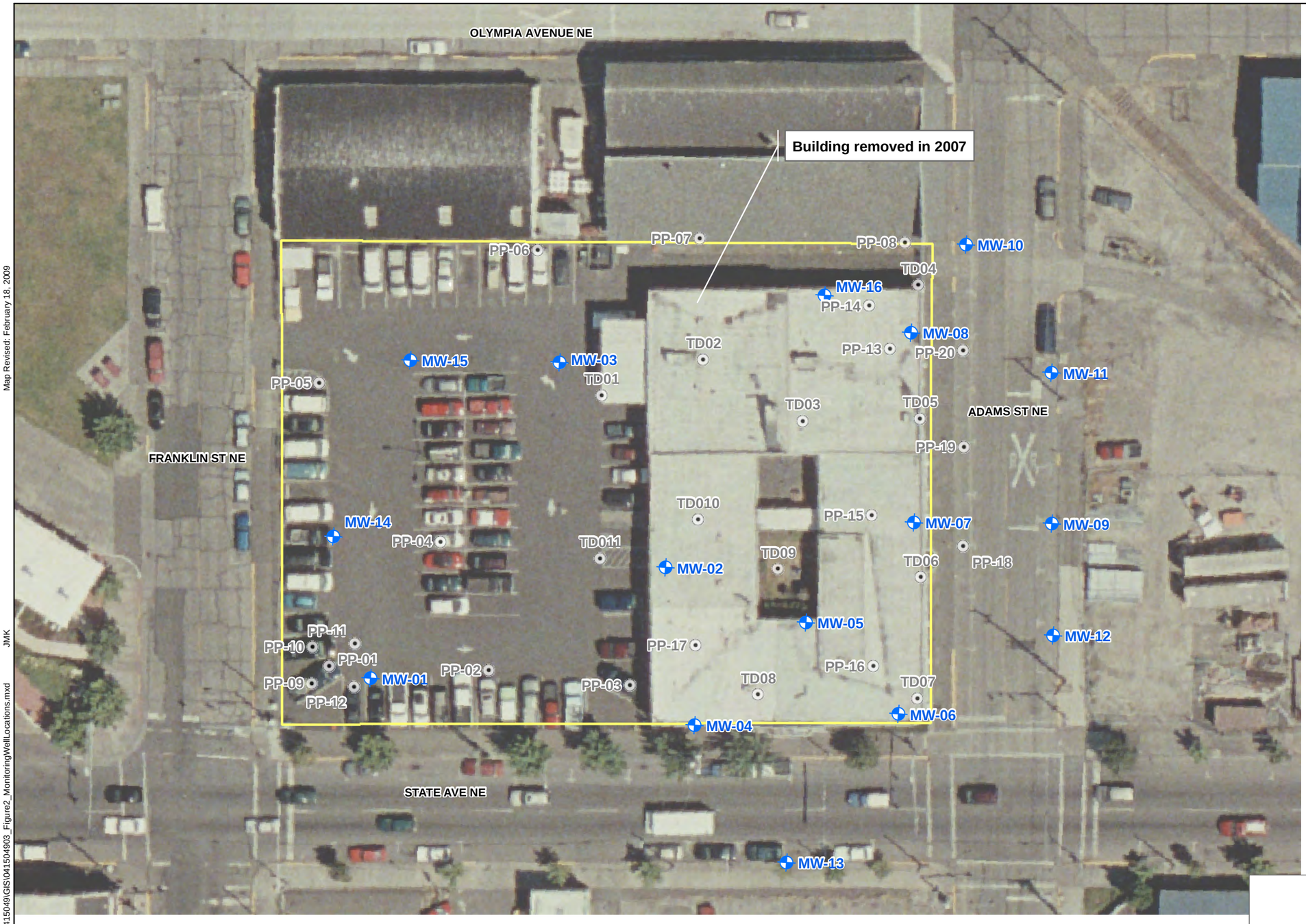
318 State Avenue NE
Olympia, Washington

GeoEngineers

Figure 1

Office: TAC Path: \\tac\projects\0\04150490\GIS\04150490_Figure1_VicinityMap.mxd JMK Map Revised: February 18, 2009

DRAFT



Explanation

- Approximate Property Boundary
- MW-01 *GeoEngineers Monitoring Well Location and ID (March and October 2008)*

N
W E
S

40 0 40
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. 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. Cross section A-A' shown on Figure 6 (drawn by GeoEngineers, Inc.)

Data Sources: Approximate Property Boundary from Thurston County parcels (revised by GeoEngineers).
Aerial photograph (2003) from Thurston County Data Center. Data Frame Rotated 356.

Projection: NAD_1983_StatePlane_Washington_South_FIPS_4602_Feet
Datum: D_North_American_1983

Monitoring Well Locations

318 State Avenue NE
Olympia, Washington

GeoEngineers

Figure 2

Map Revised: February 18, 2009

Path: P:\0\041504\9\GIS\041504903_Figure2_MonitoringWellLocations.mxd JMK

Office: TAC

APPENDIX D
BORING LOGS AND WELL CONSTRUCTION DIAGRAMS

DRAFT

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
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE			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
MORE THAN 50% RETAINED ON NO. 200 SIEVE	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, SAND-GRAVEL MIXTURES
	MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE			SP	POORLY-GRADED SANDS, SAND-GRAVEL MIXTURES
		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
	CC	Cement Concrete
	AC	Asphalt Concrete
	CR	Crushed Rock/ Quarry Spalls
	TS	Topsoil/ Forest Duff/Sod

Measured groundwater level in exploration, well, or piezometer

Groundwater observed at time of exploration

Perched water observed at time of exploration

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
PP	Pocket penetrometer
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

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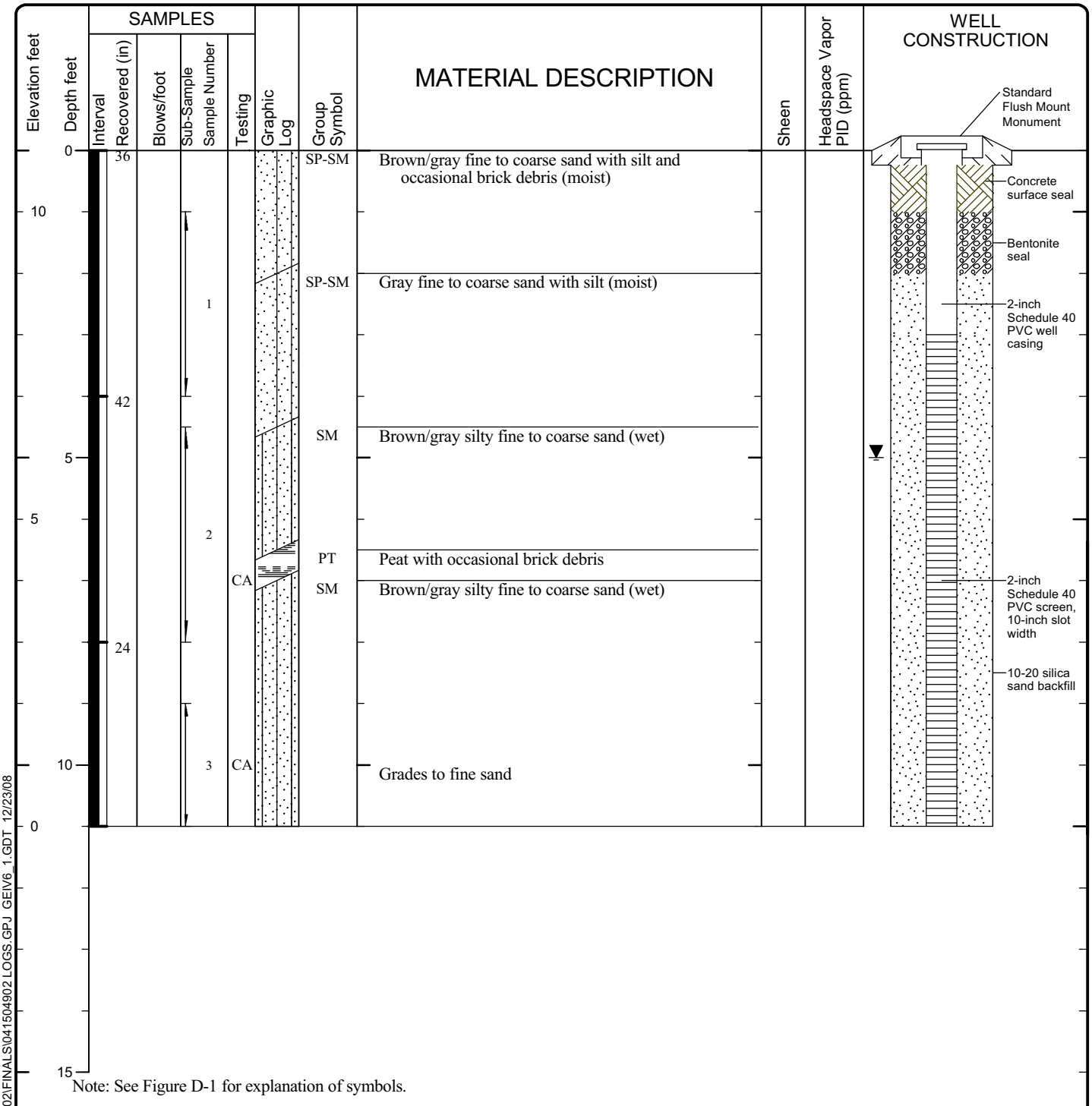
FIGURE D-1

DRAFT

Date(s) Drilled	03/26/08	Logged By	JCD	Checked By	NB/AR
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	DP with hollow-stem auger (HSA) overdrill
Auger Data	6-1/4 ID	Hammer Data	Direct Push	Drilling Equipment	Power Probe 9630
Total Well Depth (ft)	11	Ground Surface Elevation (ft)	11	Groundwater Elevation (ft)	6
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.89908 47.046072



Note: See Figure D-1 for explanation of symbols.

LOG OF MONITORING WELL MW-1

GeoEngineers

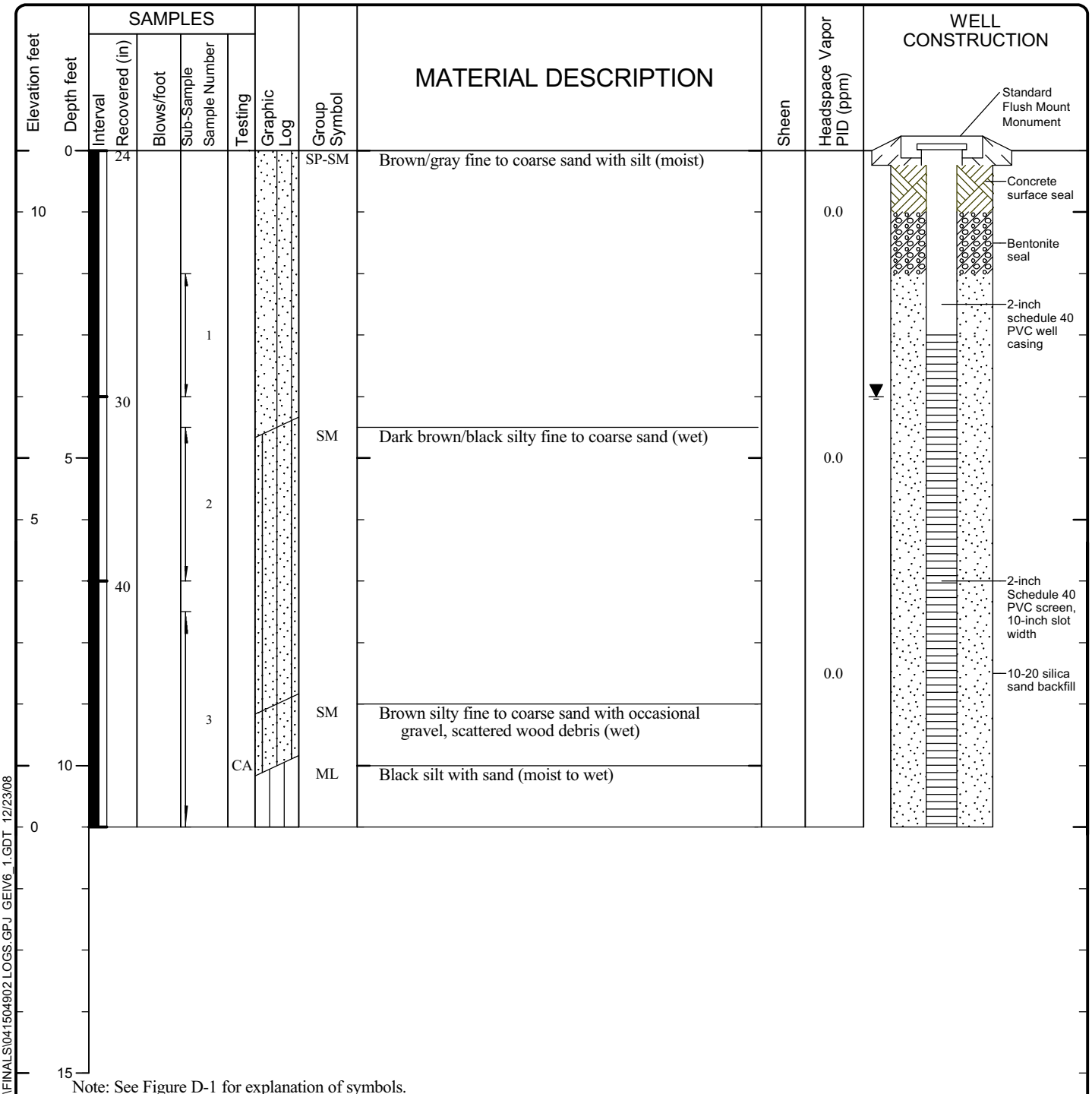
Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

Figure D-2
Sheet 1 of 1

V6_ENVWELL P:\0\04150490\2\FINALS\041504902 LOGS.GPJ GEIV6_1.GDT 12/23/08

DRAFT

Date(s) Drilled	03/26/08	Logged By	JCD	Checked By	NB/AR
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	DP with hollow-stem auger (HSA) overdrill
Auger Data	6-1/4 ID	Hammer Data	Direct Push	Drilling Equipment	Power Probe 9630
Total Well Depth (ft)	11	Ground Surface Elevation (ft)	11	Groundwater Elevation (ft)	7
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.898643 47.04622



Note: See Figure D-1 for explanation of symbols.

LOG OF MONITORING WELL MW-2

GeoEngineers

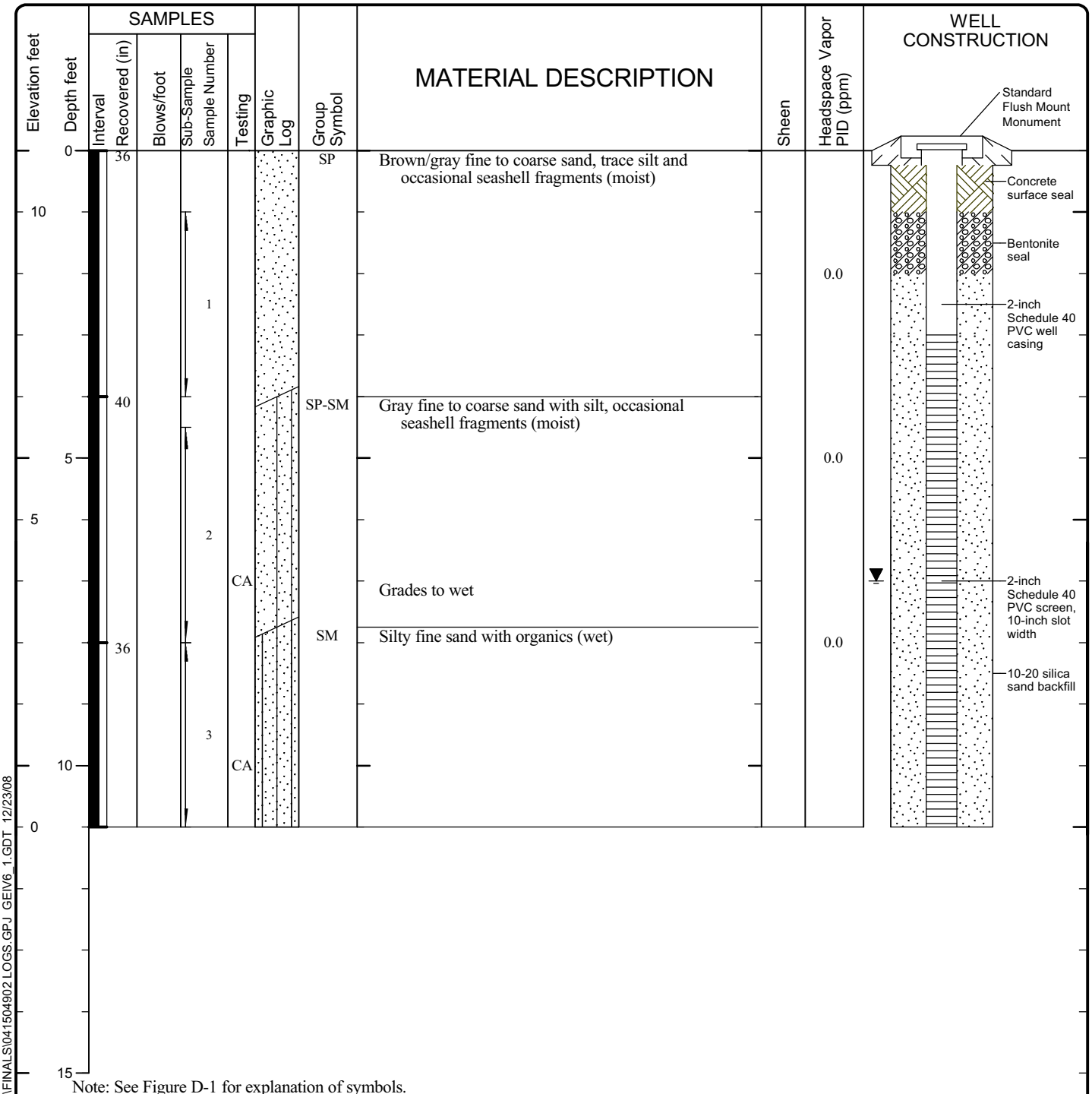
Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

Figure D-3
Sheet 1 of 1

V6_ENVWELL P:\0\04150490\02\FINALS\041504902 LOGS.GPJ GEIV6_1.GDT 12/23/08

DRAFT

Date(s) Drilled	03/26/08	Logged By	JCD	Checked By	NRB/AAR
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	DP with hollow-stem auger (HSA) overdrill
Auger Data	6-1/4 ID	Hammer Data	Direct Push	Drilling Equipment	Power Probe 9630
Total Well Depth (ft)	11	Ground Surface Elevation (ft)	11	Groundwater Elevation (ft)	4
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.898838 47.046424



Note: See Figure D-1 for explanation of symbols.

LOG OF MONITORING WELL MW-3

GeoEngineers

Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

Figure D-4
Sheet 1 of 1

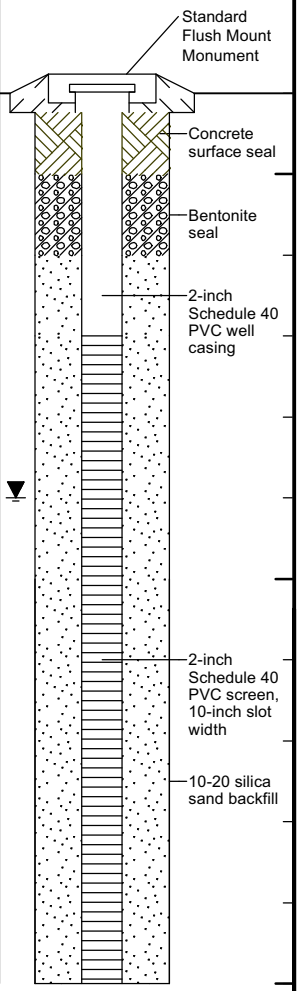
V6_ENVWELL P:\0\04150490\2\FINALS\041504902.LOGS.GPJ GEIV6_1.GDT 12/23/08

DRAFT

Date(s) Drilled	03/26/08	Logged By	JCD	Checked By	NRB/AAR
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	DP with hollow-stem auger (HSA) overdrill
Auger Data	6-1/4 ID	Hammer Data	Direct Push	Drilling Equipment	Power Probe 9630
Total Well Depth (ft)	11	Ground Surface Elevation (ft)	11	Groundwater Elevation (ft)	6
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.898574 47.046057

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Testing	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID (ppm)
0	0		30					SP-SM	Brown/gray fine to coarse sand with silt (moist)		
10					1						0.0
			40					SP-SM	Dark brown/black fine to coarse sand with silt (wet)		
5	5										0.0
5					2	CA			Slight tar-like odor		
								PT	Peat (wet)		
								SP-SM	Dark brown/black fine to coarse sand with silt (wet)		
			30								0.0
					3	CA					
10	10							SM	Dark brown silty sand with occasional gravel, scattered organics and wood debris (wet) Slight tar-like odor		
0											
	15										

WELL CONSTRUCTION



Note: See Figure D-1 for explanation of symbols.

LOG OF MONITORING WELL MW-4

GeoEngineers

Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

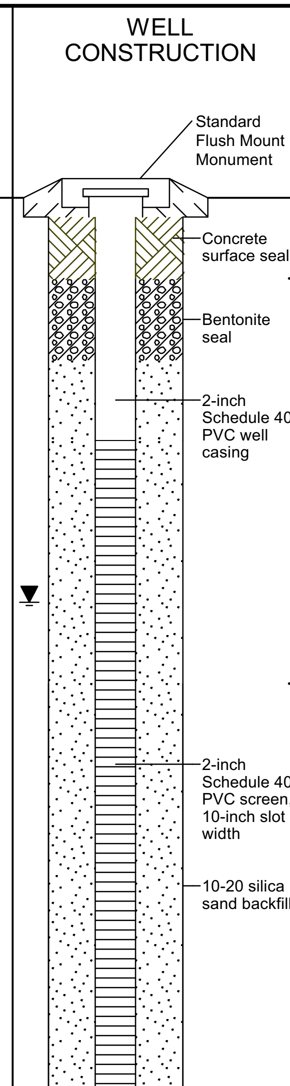
Figure D-5
Sheet 1 of 1

V6_ENVWELL P:\0\04150490\2\FINALS\041504902 LOGS.GPJ GEIV6_1.GDT 12/23/08

DRAFT

Date(s) Drilled	03/26/08	Logged By	JCD	Checked By	[illegible]
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	DP with hollow-stem auger (HSA) overdrill
Auger Data	6-1/4 ID	Hammer Data	Direct Push	Drilling Equipment	Power Probe 9630
Total Well Depth (ft)	11	Ground Surface Elevation (ft)	11	Groundwater Elevation (ft)	6
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.898419 47.046177

Elevation feet	Depth feet	SAMPLES: Recovered (in)	SAMPLES: Blows/foot	SAMPLES: Sub-Sample Sample Number	SAMPLES: Testing	Group Symbol	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID (ppm)
	0	24				SP-SM	Brown fine to coarse sand with silt (moist)		
10							Black staining		0.0
				1					
		30							
	5						Grades to wet		
						SP-SM	Brown/gray fine to coarse sand with silt (wet)		0.0
5				2	CA				
		40			CA				
				3					
	10					PT	Peat (wet)		0.0
0						ML	Gray silt with sand (wet)		
						SP-SM	Brown silty fine to coarse sand with gravel (wet)		
	15								



Note: See Figure D-1 for explanation of symbols.

V6_ENVWELL P:\0\0415049\02\FINALS\041504902 LOGS.GPJ GEIV6_1.GDT 12/23/08

LOG OF MONITORING WELL MW-5

GEOENGINEERS

Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

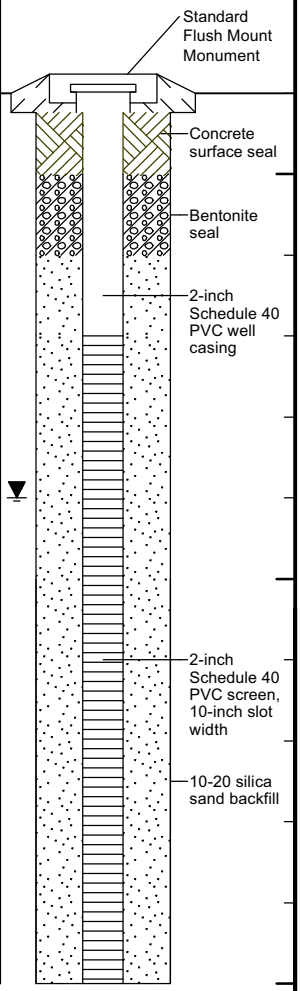
Figure D-6
Sheet 1 of 1

DRAFT

Date(s) Drilled	03/27/08	Logged By	JCD	Checked By	NB/AR
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	DP with hollow-stem auger (HSA) overdrill
Auger Data	6-1/4 ID	Hammer Data	Direct Push	Drilling Equipment	Power Probe 9630
Total Well Depth (ft)	11	Ground Surface Elevation (ft)	11	Groundwater Elevation (ft)	6
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.898263 47.04609

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Testing	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID (ppm)
	0		36					SP-SM	Brown/gray fine to medium sand with silt (moist)		
10					1						0.0
			46								0.0
5									Grades to wet		
5					2			SP-SM	Brown/gray fine to coarse sand with silt and occasional organics (seashells)		
						CA		SP-SM	Black fine to coarse sand with silt and gravel (wet) Slight odor		
								SP-SM	Brown/gray silty fine to coarse sand (wet)		
			30								
								SP-SM	Dark brown/gray fine to coarse sand with silt and occasional seashells (wet)		
						CA					
					3						
10											
0								SM	Brown silty fine to coarse sand (wet)		0.0
15											

WELL CONSTRUCTION



Note: See Figure D-1 for explanation of symbols.

LOG OF MONITORING WELL MW-6

GeoEngineers

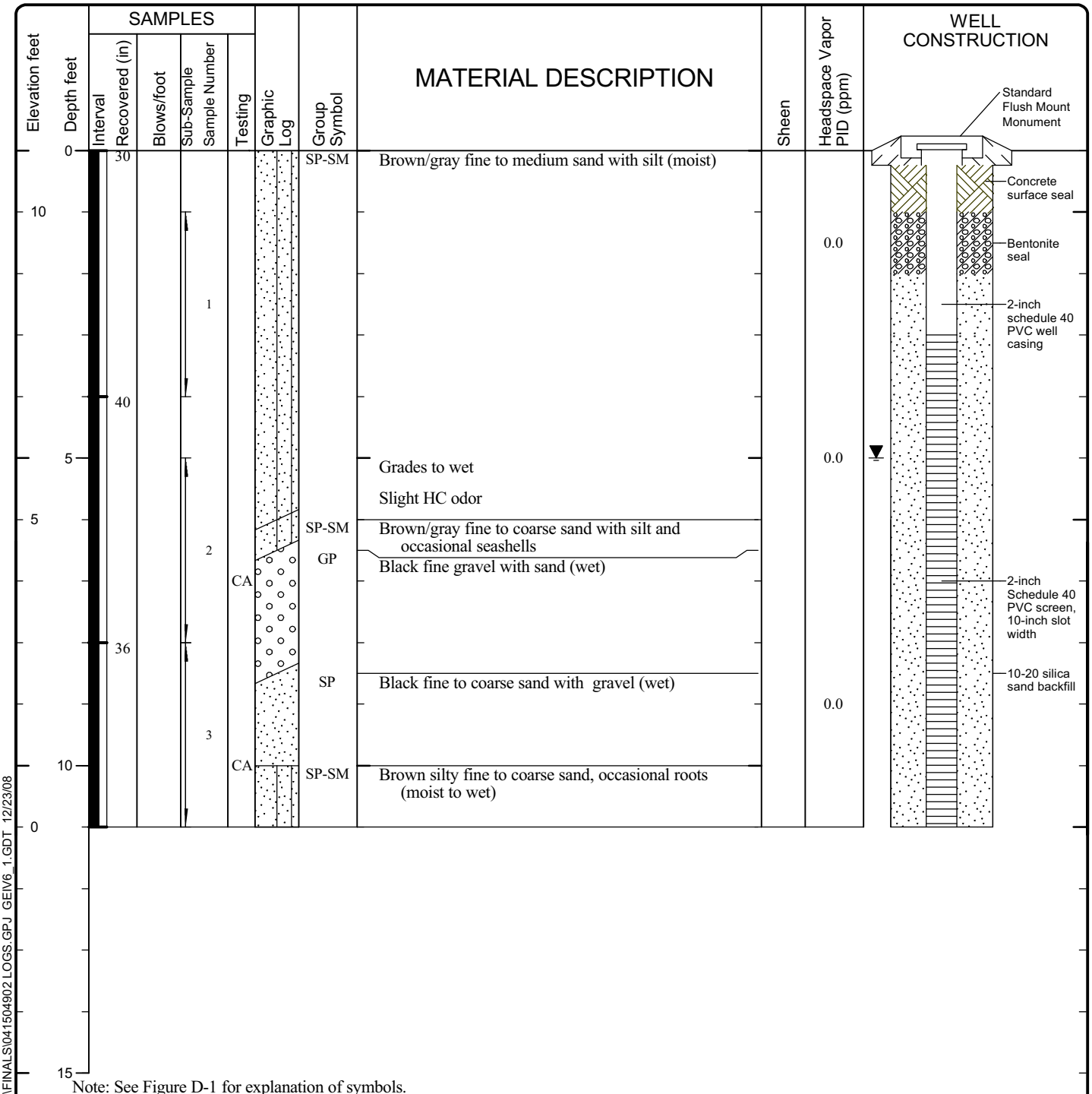
Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

Figure D-7
Sheet 1 of 1

V6_ENVWELL P:\0\04150490\2\FINALS\041504902 LOGS.GPJ GEIV6_1.GDT 12/23/08

DRAFT

Date(s) Drilled	03/27/08	Logged By	JCD	Checked By	NB/AR
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	DP with hollow-stem auger (HSA) overdrill
Auger Data	6-1/4 ID	Hammer Data	Direct Push	Drilling Equipment	Power Probe 9630
Total Well Depth (ft)	11	Ground Surface Elevation (ft)	11	Groundwater Elevation (ft)	6
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.898269 4.046293



Note: See Figure D-1 for explanation of symbols.

LOG OF MONITORING WELL MW-7

GeoEngineers

Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

Figure D-8
Sheet 1 of 1

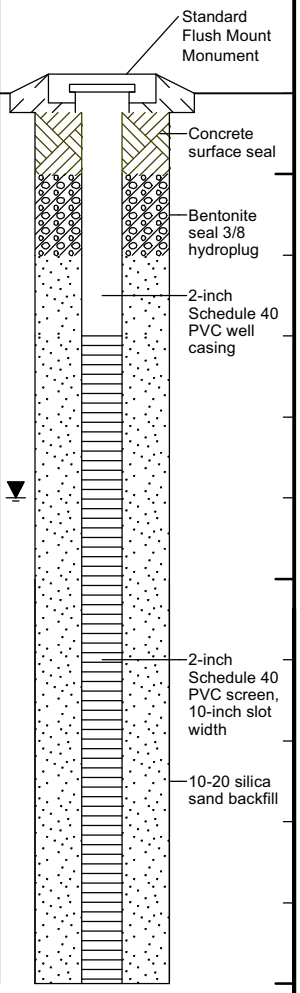
V6_ENVWELL P:\0\04150490\2\FINALS\041504902 LOGS.GPJ GEIV6_1.GDT 12/23/08

DRAFT

Date(s) Drilled	03/27/08	Logged By	JCD	Checked By	NB/AR
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	DP with hollow-stem auger (HSA) overdrill
Auger Data	6-1/4 ID	Hammer Data	Direct Push	Drilling Equipment	Power Probe 9630
Total Well Depth (ft)	11	Ground Surface Elevation (ft)	11	Groundwater Elevation (ft)	6
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.898302 47.046493

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Testing	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID (ppm)
	0		24					SW-SP	Brown/gray fine to coarse sand with silt (moist)		
	10				1						0.0
			46								
	5								Grades to wet		0.0
5					2	CA					
								SM	Gray silty fine sand (wet)		
								SW-SP	Brown/gray fine to coarse sand with silt and occasional seashells		
			36								
						CA					0.0
					3						
	10										
0								SM	Gray silty fine sand (wet)		
	15										

WELL CONSTRUCTION



Note: See Figure D-1 for explanation of symbols.

LOG OF MONITORING WELL MW-8

GeoEngineers

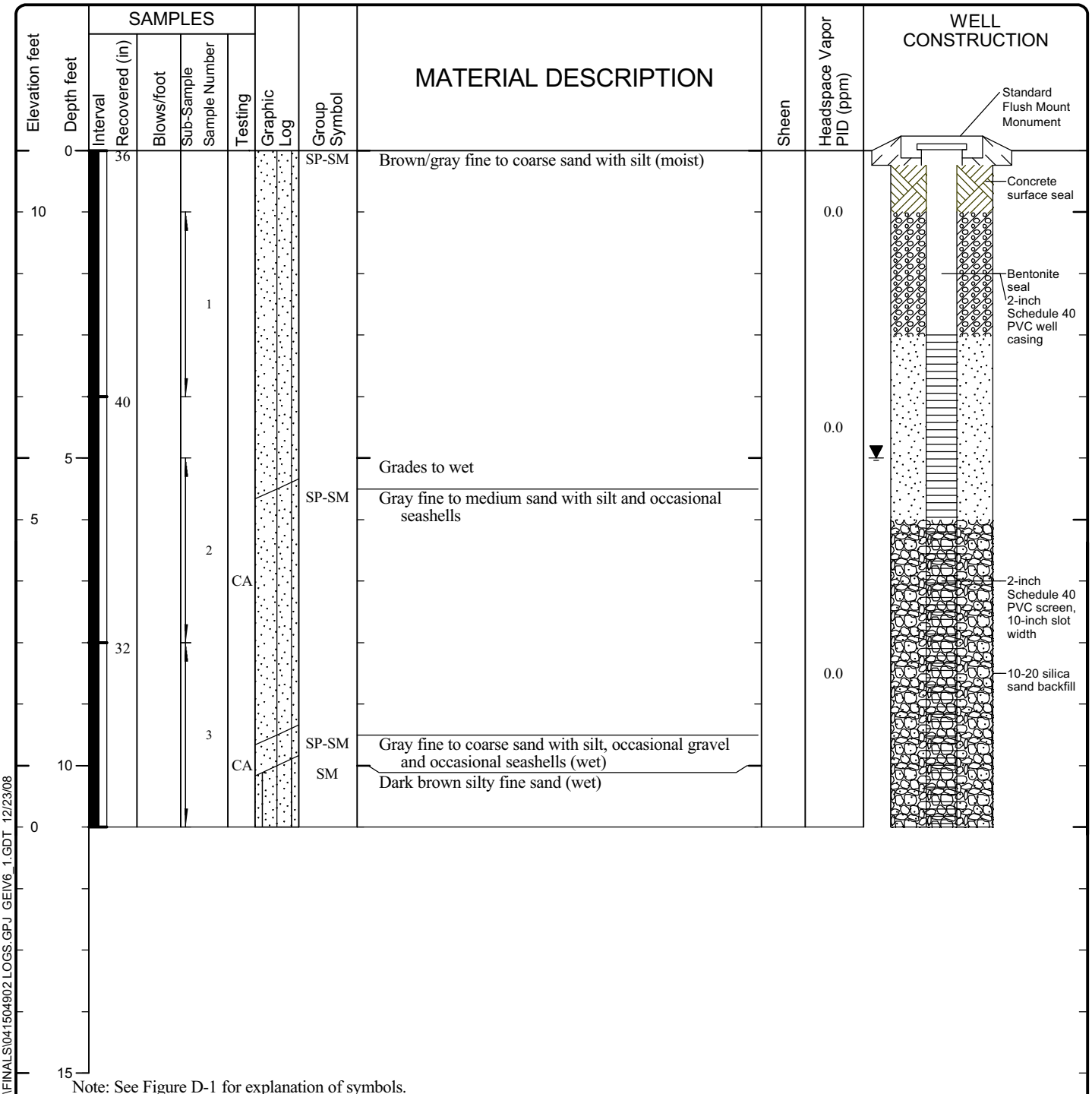
Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

Figure D-9
Sheet 1 of 1

V6_ENVWELL P:\0\04150490\2\FINALS\041504902 LOGS.GPJ GEIV6_1.GDT 12/23/08

DRAFT

Date(s) Drilled	03/27/08	Logged By	JCD	Checked By	NB/AR
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	DP with hollow-stem auger (HSA) overdrill
Auger Data	6-1/4 ID	Hammer Data	Direct Push	Drilling Equipment	Power Probe 9630
Total Well Depth (ft)	11	Ground Surface Elevation (ft)	11	Groundwater Elevation (ft)	6
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.898056 47.046307



Note: See Figure D-1 for explanation of symbols.

LOG OF MONITORING WELL MW-9

GeoEngineers

Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

Figure D-10
Sheet 1 of 1

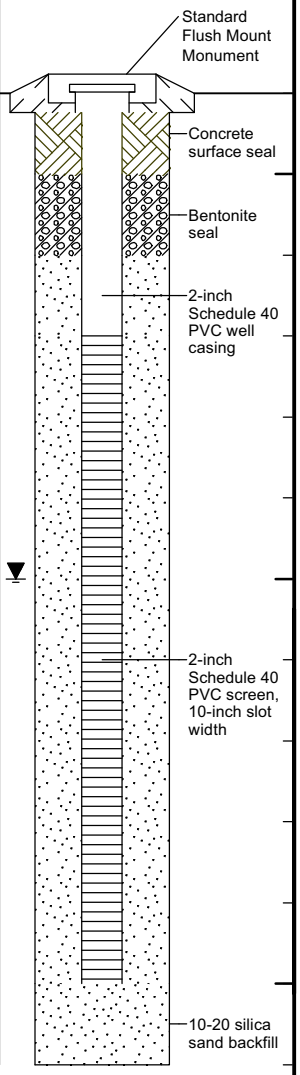
V6_ENVWELL P:\0\04150490\2\FINALS\041504902 LOGS.GPJ GEIV6_1.GDT 12/23/08

DRAFT

Date(s) Drilled	10/31/08	Logged By	JCD	Checked By	[illegible]
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	DP with hollow-stem auger (HSA) overdrill
Auger Data	4-1/4-inch ID; 5-inch OD	Hammer Data	Direct Push	Drilling Equipment	Power Probe
Total Well Depth (ft)	12	Ground Surface Elevation (ft)	11	Groundwater Elevation (ft)	5
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.898254 47.046608

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Testing	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID (ppm)
	0		36					SP-SM	Brown fine to medium sand with silt (moist to wet)		
10									No HC odor	NS	0.0
					1	CA					
			28								
5								SP	Gray fine to coarse sand with occasional gravel, trace silt and occasional seashells (wet)		
5									No HC odor	NS	0.0
					2						
			36								
						CA					
10					3			SM	Brown/black silty sand with gravel, seashells, wood debris (wet)	NS	0.0
0									No HC odor		
15											

WELL CONSTRUCTION



Note: See Figure D-1 for explanation of symbols.

LOG OF MONITORING WELL MW-10

GeoEngineers

Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

Figure D-11
Sheet 1 of 1

V6_ENVWELL P:\0\04150490\2\FINALS\041504902 LOGS.GPJ GEIV6_1.GDT 12/23/08

DRAFT

Date(s) Drilled	10/30/08	Logged By	JCD	Checked By	[illegible]
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	DP with hollow-stem auger (HSA) overdrill
Auger Data	4-1/4-inch ID; 5-inch OD	Hammer Data	Direct Push	Drilling Equipment	Power Probe
Total Well Depth (ft)	12	Ground Surface Elevation (ft)	11	Groundwater Elevation (ft)	6.5
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.898102 47.046482

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Testing	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID (ppm)
	0		40					SM	Brown/gray silty sand with gravel and occasional brick debris (moist)		
10									No HC odor	NS	0.0
								SP	Brown fine to coarse sand, trace silt (moist)		
					1	CA					
			48								
								SP	Gray fine to coarse sand, occasional gravel, seashells (moist)		
5									No HC odor	NS	0.0
5					2						
			28			CA					
										NS	0.0
									No HC odor		
10						CA		SM	Brown silty fine ton coarse sand with gravel and organics (wood debris)		
					3						
0											
15											

WELL CONSTRUCTION

- Standard Flush Mount Monument
- Concrete surface seal
- Bentonite seal
- 2-inch Schedule 40 PVC well casing
- 2-inch Schedule 40 PVC screen, 10-inch slot width
- 10-20 silica sand backfill

Note: See Figure D-1 for explanation of symbols.

LOG OF MONITORING WELL MW-11

GeoEngineers

Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

Figure D-12
Sheet 1 of 1

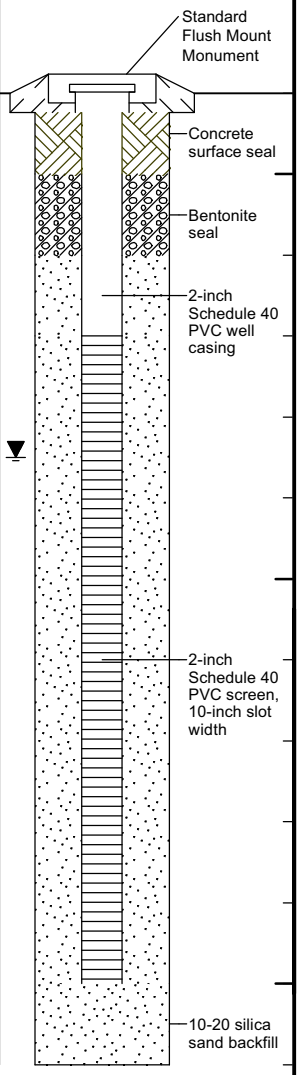
V6_ENVWELL P:\0\04150490\2\FINALS\041504902 LOGS.GPJ GEIV6_1.GDT 12/23/08

DRAFT

Date(s) Drilled	10/31/08	Logged By	JCD	Checked By	[illegible]
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	DP with hollow-stem auger (HSA) overdrill
Auger Data	4-1/4-inch ID; 5-inch OD	Hammer Data	Direct Push	Drilling Equipment	Power Probe
Total Well Depth (ft)	12	Ground Surface Elevation (ft)	11	Groundwater Elevation (ft)	6.5
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.898059 47.046207

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Testing	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID (ppm)
	0		36					CC	Concrete		
10								SM	Brown fine to coarse silty sand with gravel (moist) No HC odor	NS	0.0
					1			SP	Brown fine to coarse sand, occasional gravel, trace silt (moist)		
			44			CA					
5	5				2			SP-SM	Gray fine to coarse sand with silt and occasional gravel and numerous seashells (wet) No HC odor	NS	0.0
5						CA					
			30								
								SM/ML	Brown/black silty fine sand to sandy silt (wet)		
10	10				3				No HC odor	NS	0.0
0											
	15										

WELL CONSTRUCTION



Note: See Figure D-1 for explanation of symbols.

LOG OF MONITORING WELL MW-12

GeoEngineers

Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

Figure D-13
Sheet 1 of 1

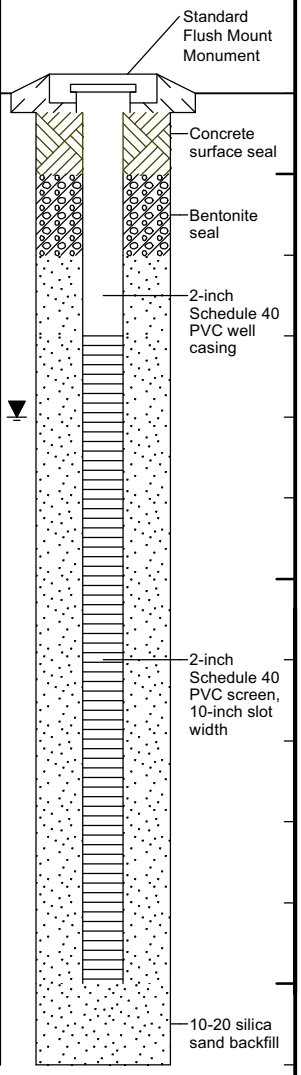
V6_ENVWELL P:\0\04150490\2\FINALS\041504902 LOGS.GPJ GEIV6_1.GDT 12/23/08

DRAFT

Date(s) Drilled	10/30/08	Logged By	JCD	Checked By	JE
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	DP with hollow-stem auger (HSA) overdrill
Auger Data	4-1/4-inch ID; 5-inch OD	Hammer Data	Direct Push	Drilling Equipment	Power Probe
Total Well Depth (ft)	12	Ground Surface Elevation (ft)	11	Groundwater Elevation (ft)	7
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.898434 47.04594

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Testing	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID (ppm)
	0							AC	4 inches asphalt		
								CC	8 inches concrete		
10								SM	Brown/gray silty fine to coarse sand with gravel (moist) No HC odor	NS	0.0
					1	CA					
									Grades to wet		
5	5								No HC odor	NS	0.0
5								SM	Gray silty fine sand swith occasional roots (wet)		
			24		2	CA		SM	Gray silty fine sand with gravel (moist)		
10	10							SM	Black silty fine to coarse sand with occasional gravel and roots (wet) No HC odor	NS	0.0
0					3			ML	Brown/black sandy silt and occasional roots (wet)		
	15										

WELL CONSTRUCTION



Note: See Figure D-1 for explanation of symbols.

LOG OF MONITORING WELL MW-13

GeoEngineers

Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

Figure D-14
Sheet 1 of 1

V6_ENVWELL P:\0\04150490\2\FINALS\041504902 LOGS.GPJ GEIV6_1.GDT 12/23/08

DRAFT

Date(s) Drilled	10/31/08	Logged By	JCD	Checked By	[illegible]
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	DP with hollow-stem auger (HSA) overdrill
Auger Data	4-1/4-inch ID; 5-inch OD	Hammer Data	Direct Push	Drilling Equipment	Power Probe
Total Well Depth (ft)	12	Ground Surface Elevation (ft)	11	Groundwater Elevation (ft)	6
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.899181 47.046234

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Testing	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID (ppm)
	0		30					SP-SM	Brown fine to medium sand with silt and gravel (moist) No HC odor	NS	0.0
	10							SP	Brown fine to coarse sand with occasional gravel, trace silt (moist)		
					1						
			44			CA		SP	Gray fine to coarse sand with occasional gravel, trace silt and occasional seashells (moist to wet)		
	5								No HC odor	NS	0.0
	5				2						
								ML	Gray/black silt with wood debris (wet)		
			40			CA		SM	Dark brown silty fine to coarse sand with gravel and occasional wood debris (wet)		
									No HC odor	NS	0.0
	10				3						
	0							SP-SM	Brown/gray fine to medium sand with silt (wet)		
	15										

WELL CONSTRUCTION

- Standard Flush Mount Monument
- Concrete surface seal
- Bentonite seal
- 2-inch Schedule 40 PVC well casing
- 2-inch Schedule 40 PVC screen, 10-inch slot width
- 10-20 silica sand backfill

Note: See Figure D-1 for explanation of symbols.

V6_ENVWELL P:\0\041504902\FINALS\041504902 LOGS.GPJ GEIV6_1.GDT 12/23/08

LOG OF MONITORING WELL MW-14

GeoEngineers

Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

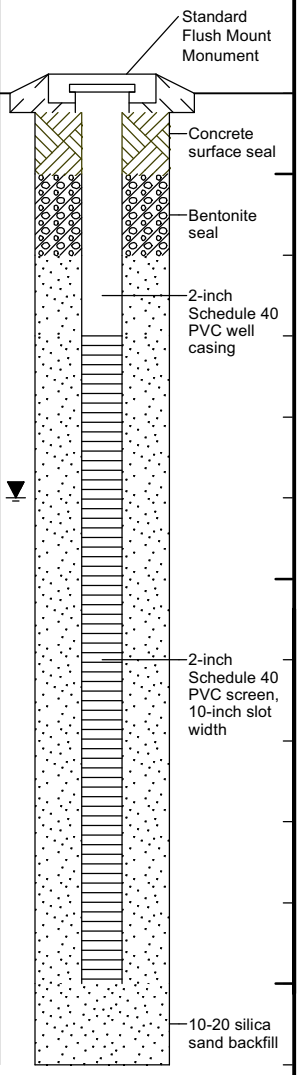
Figure D-15
Sheet 1 of 1

DRAFT

Date(s) Drilled	10/31/08	Logged By	JCD	Checked By	[illegible]
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	DP with hollow-stem auger (HSA) overdrill
Auger Data	4-1/4-inch ID; 5-inch OD	Hammer Data	Direct Push	Drilling Equipment	Power Probe
Total Well Depth (ft)	12	Ground Surface Elevation (ft)	11	Groundwater Elevation (ft)	6
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.89909 47.046428

Elevation feet	Depth feet	SAMPLES Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Testing	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID (ppm)
	0		42					SM-SP	Brown/gray sand with silt and gravel (moist) No HC odor	NS	0.0
10					1	CA		SP	Brown fine to coarse sand with occasional gravel and trace silt (moist)		
								SP	Gray fine to coarse sand with gravel, trace silt and seashells (wet)		
			40								
5						CA			No HC odor	NS	0.0
5					2			ML	Brown/black sandy silt with wood debris (wet)		
								PT	Wood debris		
			38								
								SM	Brown/gray silty fine sand with gravel and occasional organics (wet) No HC odor	NS	0.0
10					3						
0											
15											

WELL CONSTRUCTION



Note: See Figure D-1 for explanation of symbols.

LOG OF MONITORING WELL MW-15

GeoEngineers

Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

Figure D-16
Sheet 1 of 1

V6_ENVWELL P:\0\04150490\2\FINALS\041504902 LOGS.GPJ GEIV6_1.GDT 12/23/08

DRAFT

Date(s) Drilled	10/31/08	Logged By	JCD	Checked By	[illegible]
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	DP with hollow-stem auger (HSA) overdrill
Auger Data	4-1/4-inch ID; 5-inch OD	Hammer Data	Direct Push	Drilling Equipment	Power Probe
Total Well Depth (ft)	12	Ground Surface Elevation (ft)	11	Groundwater Elevation (ft)	6
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.898463 47.04654

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Sample Number	Testing	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID (ppm)
	0		40					SP-SM	Brown fine to coarse sand with silt and occasional gravel and brick debris (moist)		
10									No HC odor	NS	0.0
					1						
			40			CA					
5								SP-SM	Gray fine to coarse sand with silt and occasional gravel and seashells (wet)		
5									No HC odor	NS	0.0
					2						
			30								
						CA					
10											
0					3			SM/ML	Brown/black silty fine sand to sandy silt with wood debris (wet)	NS	0.0
									No HC odor		
15											

WELL CONSTRUCTION

- Standard Flush Mount Monument
- Concrete surface seal
- Bentonite seal
- 2-inch Schedule 40 PVC well casing
- 2-inch Schedule 40 PVC screen, 10-inch slot width
- 10-20 silica sand backfill

Note: See Figure D-1 for explanation of symbols.

LOG OF MONITORING WELL MW-16

GeoEngineers

Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

Figure D-17
Sheet 1 of 1

V6_ENVWELL P:\0\04150490\2\FINALS\041504902 LOGS.GPJ GEIV6_1.GDT 12/23/08

DRAFT

Date(s) Drilled	07/19/06	Logged By	AJF	Checked By	NB/AR
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	Macrocore
Auger Data	4-1/4-inch ID; 5-inch OD	Hammer Data	Direct Push	Drilling Equipment	Strataprobe
Total Depth (ft)	12	Surface Elevation (ft)	11	Groundwater Elevation (ft)	7
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.899145 47.046081

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Number	Testing	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID (ppm)	NOTES
	0		36		1		▼		SP	Fine to medium sand with trace silt (moist) (fill)	NS	0.0	
10													
			38						ML	Silt with organics (wet)	NS	0.0	
	5				2						NS	0.0	
5													
			20							Grades to moist	NS	0.0	
									SP	Brown fine to medium sand, trace silt (wet)			
	10				3						NS	0.0	
0													
	15												

Note: See Figure D-1 for explanation of symbols.

LOG OF BORING PP-01

GeoEngineers

Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

Figure D-18
Sheet 1 of 1

V6_ENVBORING P:\0\04150490\02\FINALS\041504902 LOGS.GPJ GEIV6_1.GDT 12/23/08

DRAFT

Date(s) Drilled	07/19/06	Logged By	AJF	Checked By	NRB/AAR
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	Macrocore
Auger Data	4-1/4-inch ID; 5-inch OD	Hammer Data	Direct Push	Drilling Equipment	Strataprobe
Total Depth (ft)	12	Surface Elevation (ft)	11	Groundwater Elevation (ft)	7
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.898898 47.046094

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Number	Testing	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID (ppm)	NOTES
	0		46						SP	Fine to medium sand with trace silt (moist) (fill)			
10					1						NS	0.0	
			36				▼		SP	Medium to coarse sand with trace silt (wet)	NS	0.0	
	5												
5					2						NS	0.0	
											NS	0.0	
									SM	Fine silty sand (wet)			
	10										NS	0.0	
0													
	15												

Note: See Figure D-1 for explanation of symbols.

LOG OF BORING PP-02

GeoEngineers

Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

Figure D-19
Sheet 1 of 1

V6_ENVBORING P:\0\04150490\02\FINALS\041504902 LOGS.GPJ GEIV6_1.GDT 12/23/08

DRAFT

Date(s) Drilled	07/19/06	Logged By	AJF	Checked By	NB/AR
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	Macrocore
Auger Data	4-1/4-inch ID; 5-inch OD	Hammer Data	Direct Push	Drilling Equipment	Strataprobe
Total Depth (ft)	12	Surface Elevation (ft)	11	Groundwater Elevation (ft)	5
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.89868 47.046093

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Number	Testing	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID (ppm)	NOTES
	0		24						SP	Medium to coarse sand with trace silt (moist) (fill)			
10					1						NS	0.0	
			24								NS	0.0	
5	5												
5					2						NS	0.0	
									PT	Wood debris (wet)			
			24						SP	Brown/gray medium to coarse sand, occasional gravel (wet)	NS	0.0	
									SP-SM	Fine to medium sand with silt, occasional gravel (wet)			
10	10				3								
0													
	15												

Note: See Figure D-1 for explanation of symbols.

LOG OF BORING PP-03

GeoEngineers

Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

Figure D-20
Sheet 1 of 1

V6_ENVBORING P:\0\04150490\02\FINALS\041504902 LOGS.GPJ GEIV6_1.GDT 12/23/08

DRAFT

Date(s) Drilled	07/20/06	Logged By	AJF	Checked By	NB/AR
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	Macrocore
Auger Data	4-1/4-inch ID; 5-inch OD	Hammer Data	Direct Push	Drilling Equipment	Strataprobe
Total Depth (ft)	12	Surface Elevation (ft)	11	Groundwater Elevation (ft)	6.5
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.898993 47.046224

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Number	Testing	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID (ppm)	NOTES
0	0		36		1				SP	Brown fine to medium sand, trace silt (moist) (fill)	NS	0.0	
10			40				▼				NS	0.0	
	5				2						NS	0.0	
5									OL	Fine silt with organics (wet)			
			40								NS	0.0	
									SP	Fine to medium sand, trace silt (wet)			
	10				3								
0													
	15												

Note: See Figure D-1 for explanation of symbols.

LOG OF BORING PP-04

GeoEngineers

Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

Figure D-21
Sheet 1 of 1

V6_ENVBORING P:\0\04150490\02\FINALS\041504902 LOGS.GPJ GEIV6_1.GDT 12/23/08

DRAFT

Date(s) Drilled	07/19/06	Logged By	AJF	Checked By	NRB/LAR
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	Macrocore
Auger Data	4-1/4-inch ID; 5-inch OD	Hammer Data	Direct Push	Drilling Equipment	Strataprobe
Total Depth (ft)	12	Surface Elevation (ft)	11	Groundwater Elevation (ft)	6
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.899204 47.046378

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Number	Testing	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID (ppm)	NOTES
	0		30						SP	Fine to medium sand with trace silt (moist) (fill)			
10					1						NS	0.0	
			40								NS	0.0	
5	5						▼			Grades to wet			
5					2						NS	0.0	
											NS	0.0	
10	10												
0					3	CA							No recovery
	15												

Note: See Figure D-1 for explanation of symbols.

V6_ENVBORING P:\0\041504902\FINALS\041504902 LOGS.GPJ GEIV6_1.GDT 12/23/08

LOG OF BORING PP-05

GeoEngineers

Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

Figure D-22
Sheet 1 of 1

DRAFT

Date(s) Drilled	07/19/06	Logged By	AJF	Checked By	NRB/AAR
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	Macrocore
Auger Data	4-1/4-inch ID; 5-inch OD	Hammer Data	Direct Push	Drilling Equipment	Strataprobe
Total Depth (ft)	11	Surface Elevation (ft)	11	Groundwater Elevation (ft)	7
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.898889 47.046541

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Number	Testing	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID (ppm)	NOTES
0	0		40						SP	Brown fine to medium sand with trace silt (moist) (fill)			
10					1						NS	0.0	
			40				▼			Grades to wet	NS	0.0	
5	5												
-5					2				SP	Gray fine to medium sand with trace silt (wet)	NS	0.0	
											NS	0.0	
0	10										NS	0.0	
	15												

Note: See Figure D-1 for explanation of symbols.

LOG OF BORING PP-06

GeoEngineers

Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

Figure D-23
Sheet 1 of 1

V6_ENVBORING P:\0\04150490\02\FINALS\041504902 LOGS.GPJ GEIV6_1.GDT 12/23/08

DRAFT

Date(s) Drilled	07/20/06	Logged By	AJF	Checked By	NB/AR
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	Macrocore
Auger Data	4-1/4-inch ID; 5-inch OD	Hammer Data	Direct Push	Drilling Equipment	Strataprobe
Total Depth (ft)	11	Surface Elevation (ft)	11	Groundwater Elevation (ft)	7
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.898642 47.04657

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Number	Testing	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID (ppm)	NOTES
	0		40						SP	Brown fine to medium sand, trace silt (moist) (fill)	NS		
									WD	Wood material (moist)	SS	10.0	
					1				GP	Gravel/concrete fill (moist)			
									SP	Gray fine to medium sand (wet)	NS	1.0	
	5		40								NS	0.0	
					2						NS	0.0	
	10												No recovery
10													
5													
0													
	15												

Note: See Figure D-1 for explanation of symbols.

LOG OF BORING PP-07

GeoEngineers

Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

Figure D-24
Sheet 1 of 1

V6_ENVBORING P:\0\04150490\02\FINALS\041504902 LOGS.GPJ GEIV6_1.GDT 12/23/08

DRAFT

Date(s) Drilled	07/20/06	Logged By	AJF	Checked By	NB/AR
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	Macrocore
Auger Data	4-1/4-inch ID; 5-inch OD	Hammer Data	Direct Push	Drilling Equipment	Strataprobe
Total Depth (ft)	11	Surface Elevation (ft)	11	Groundwater Elevation (ft)	7
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.898325 47.046588

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Number	Testing	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID (ppm)	NOTES
	0		40						SP	Fine to medium sand (moist) (fill)			
10					1						NS	0.0	
			40				▼			Grades to wet	NS	0.0	
5	5												
5					2								
			30						SP-SM	Grades to with silt (wet)	NS	0.0	
					3						NS	0.0	
0	10								SP	Grades to no silt (wet)	NS	0.0	
	15												

Note: See Figure D-1 for explanation of symbols.

V6_ENVBORING P:\0\041504902\FINALS\041504902 LOGS.GPJ GEIV6_1.GDT 12/23/08

LOG OF BORING PP-08

GeoEngineers

Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

Figure D-25
Sheet 1 of 1

DRAFT

Date(s) Drilled	09/15/06	Logged By	AJF	Checked By	NRB/LAR
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	Macrocore
Auger Data		Hammer Data	Direct Push	Drilling Equipment	StrataProbe
Total Depth (ft)	12	Surface Elevation (ft)	11	Groundwater Elevation (ft)	6.5
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.899169 47.046061

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Number	Testing	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID (ppm)	NOTES
	0		36						AC	Asphalt	NS	0.0	
									SP	Brown fine to medium sand with trace silt and gravel (moist) (fill)	NS	0.0	
10					1				SP	Gray fine to medium sand with trace silt and occasional gravel (moist)	NS	0.0	
			36				▼			Grades to wet			
	5								ML	Brown silt with sand and trace organic matter (wet)	NS	0.0	
5					2								
									ML	Brown/gray silt with sand (wet)	NS	0.0	
			40										
									SP	Gray fine to medium sand with trace silt and occasional gravel (wet)	NS	0.0	
	10				3								
0													
	15												

Note: See Figure D-1 for explanation of symbols.

LOG OF BORING PP-09

GeoEngineers

Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

Figure D-26
Sheet 1 of 1

V6_ENVBORING P:\0\04150490\02\FINALS\041504902 LOGS.GPJ GEIV6_1.GDT 12/23/08

DRAFT

Date(s) Drilled	09/15/06	Logged By	AJF	Checked By	NB/AR
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	Macrocore
Auger Data		Hammer Data	Direct Push	Drilling Equipment	Strataprobe
Total Depth (ft)	12	Surface Elevation (ft)	11	Groundwater Elevation (ft)	6.5
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.899174 47.046099

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Number	Testing	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID (ppm)	NOTES
	0		24						AC	Asphalt	NS	0.0	
									SP	Brown fine to medium sand with trace silt and gravel (moist) (fill)	NS	0.0	
10													
					1				SP	Gray fine to medium sand with trace silt and occasional gravel (moist)	NS	0.0	
			40				▼						
									ML	Brown silt with sand and organic matter (wet)	NS	0.0	
5													
5					2								
			40						SP	Brown fine to coarse sand with trace silt and occasional gravel (wet)	NS	0.0	
											NS	0.0	
									SP	Fine to medium sand with trace silt and occasional gravel (wet)	NS	0.0	
10					3								
0													
	15												

Note: See Figure D-1 for explanation of symbols.

LOG OF BORING PP-10

GeoEngineers

Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

Figure D-27
Sheet 1 of 1

V6_ENVBORING P:\0\04150490\02\FINALS\041504902 LOGS.GPJ GEIV6_1.GDT 12/23/08

DRAFT

Date(s) Drilled	09/15/06	Logged By	AJF	Checked By	NRB/LAR
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	Macrocore
Auger Data		Hammer Data	Direct Push	Drilling Equipment	Strataprobe
Total Depth (ft)	12	Surface Elevation (ft)	11	Groundwater Elevation (ft)	7
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.899109 47.046108

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Number	Testing	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID (ppm)	NOTES
0	0		36						AC	Asphalt	NS	0.0	
									SP	Brown fine to medium sand with trace silt and gravel (moist) (fill)	NS	0.0	
10													
					1				SP	Gray fine to medium sand with trace silt (moist)	NS	0.0	
			40				▼			Grades to wet			
5	5												
5					2				ML	Brown silt with fine sand and organic matter (wet)	NS	0.0	
			40						ML	Gray silt with sand and organic matter (wet)	NS	0.0	
									ML	Brown silt with sand (wet)	NS	0.0	
									SP-SM	Fine to coarse sand with silt and gravel (wet)	NS	0.0	
10	10				3								
0									SP-SM	Gray medium to coarse sand with gravel (wet)	NS	0.0	
	15												

Note: See Figure D-1 for explanation of symbols.

V6_ENVBORING P:\0\041504902\FINALS\041504902 LOGS.GPJ GEIV6_1.GDT 12/23/08

LOG OF BORING PP-11

GeoEngineers

Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

Figure D-28
Sheet 1 of 1

DRAFT

Date(s) Drilled	09/15/06	Logged By	AJF	Checked By	NRB/AAR
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	Macrocore
Auger Data		Hammer Data	Direct Push	Drilling Equipment	Strataprobe
Total Depth (ft)	12	Surface Elevation (ft)	11	Groundwater Elevation (ft)	6
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.899091 47.046069

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Number	Testing	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID (ppm)	NOTES
	0		40						AC	Asphalt	NS	0.0	
									SP	Brown fine to medium sand with trace silt and gravel (moist) (fill)	NS	0.0	
10									SP	Gray fine to medium sand with trace silt and occasional gravel (moist)	NS	0.0	
					1								
			24										
	5						▼			Grades to wet			
5											NS	0.0	
					2				ML	Brown silt with sand and organic matter (wet)			
			48										
	10				3				SP-SM	Brown fine sand with silt (wet)	NS	0.0	
0									SP-SM	Gray fine sand with silt and occasional gravel (wet)	NS	0.0	
	15												

Note: See Figure D-1 for explanation of symbols.

LOG OF BORING PP-12

GeoEngineers

Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

Figure D-29
Sheet 1 of 1

V6_ENVBORING P:\0\04150490\02\FINALS\041504902 LOGS.GPJ GEIV6_1.GDT 12/23/08

DRAFT

Date(s) Drilled	09/15/06	Logged By	AJF	Checked By	NB/AR
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	Macrocore
Auger Data		Hammer Data	Direct Push	Drilling Equipment	Strataprobe
Total Depth (ft)	12	Surface Elevation (ft)	11	Groundwater Elevation (ft)	4
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.898331 47.046474

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Number	Testing	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID (ppm)	NOTES
	0		30						CC	Concrete slab	NS	0.0	
10									SP	Brown/gray fine to medium sand with trace silt, occasional gravel and occasional burnt material (moist) (fill)	NS	0.0	
					1				SP	Gray fine to medium sand with trace silt and occasional gravel (moist)	NS	0.0	
			30										
5	5												
5											NS	0.0	
					2		▼		SP	Gray fine to medium sand with trace silt (wet)			
			36										
10	10				3								
0									ML	Brown/gray silt with fine sand and seashell fragments (wet)	NS	0.0	
	15												

Note: See Figure D-1 for explanation of symbols.

LOG OF BORING PP-13

GeoEngineers

Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

Figure D-30
Sheet 1 of 1

V6_ENVBORING P:\0\04150490\02\FINALS\041504902 LOGS.GPJ GEIV6_1.GDT 12/23/08

DRAFT

Date(s) Drilled	09/14/06	Logged By	AJF	Checked By	NB/AR
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	Macrocore
Auger Data		Hammer Data	Direct Push	Drilling Equipment	Strataprobe
Total Depth (ft)	12	Surface Elevation (ft)	11	Groundwater Elevation (ft)	4
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.898371 47.046517

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Number	Testing	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID (ppm)	NOTES
	0		0						CC	Concrete slab	NS	0.0	
10									ML	Gray silt with sand and occasional gravel and concrete (moist) (fill)	NS	0.0	
									SP	Gray fine to medium sand with trace silt (moist)	NS	0.0	
			36		1								
5	5												
5							▼			Grades to wet			
			48		2								
10	10												
0									ML	Brown/gray silt with fine sand and seashell fragments (wet)	NS	0.0	
	15												

Note: See Figure D-1 for explanation of symbols.

LOG OF BORING PP-14

GeoEngineers

Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

Figure D-31
Sheet 1 of 1

V6_ENVBORING P:\0\04150490\02\FINALS\041504902 LOGS.GPJ GEIV6_1.GDT 12/23/08

DRAFT

Date(s) Drilled	09/14/06	Logged By	AJF	Checked By	NB/AR
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	Macrocore
Auger Data		Hammer Data	Direct Push	Drilling Equipment	Strataprobe
Total Depth (ft)	12	Surface Elevation (ft)	11	Groundwater Elevation (ft)	4
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.898334 47.046297

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Number	Testing	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID (ppm)	NOTES
	0		48						CC	Concrete slab	NS	0.0	
10									SP	Brown/gray fine to medium sand with trace silt and occasional gravel and burnt material (moist) (fill)	NS	0.0	
					1								
									SP	Gray fine to medium sand with trace silt and occasional gravel (moist)	NS	0.0	
			48										
	5												
5					2					Grades to wet			
			48										
	10				3								
0									ML	Brown/gray silt with fine sand and seashell fragments (wet)	NS	0.0	
	15												

Note: See Figure D-1 for explanation of symbols.

LOG OF BORING PP-15

GeoEngineers

Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

Figure D-32
Sheet 1 of 1

V6_ENVBORING P:\0\04150490\02\FINALS\041504902 LOGS.GPJ GEIV6_1.GDT 12/23/08

DRAFT

Date(s) Drilled	09/14/06	Logged By	AJF	Checked By	NB/AR
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	Macrocore
Auger Data		Hammer Data	Direct Push	Drilling Equipment	Strataprobe
Total Depth (ft)	11	Surface Elevation (ft)	11	Groundwater Elevation (ft)	4
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.898308 47.046139

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Number	Testing	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID (ppm)	NOTES
	0		36						CC	Concrete slab	NS	0.0	
10									SP	Brown/gray fine to medium sand with trace silt, occasional gravel and burnt material (moist) (fill)	NS	0.0	
					1				SP	Brown fine to medium sand with trace silt and occasional gravel (moist)	NS	0.0	
			36										
5	5								SP	Gray fine to medium sand with trace silt (wet)	NS	0.0	
5					2		▼						
			30										
					3								
10	10								ML	Brown silt with sand (wet)	NS	0.0	
0													
	15												

Note: See Figure D-1 for explanation of symbols.

V6_ENVBORING P:\0\041504902\FINALS\041504902 LOGS.GPJ GEIV6_1.GDT 12/23/08

LOG OF BORING PP-16

GeoEngineers

Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

Figure D-33
Sheet 1 of 1

DRAFT

Date(s) Drilled	09/14/06	Logged By	AJF	Checked By	NB/AR
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	Macrocore
Auger Data		Hammer Data	Direct Push	Drilling Equipment	Strataprobe
Total Depth (ft)	12	Surface Elevation (ft)	11	Groundwater Elevation (ft)	4
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.898211 47.046292

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Number	Testing	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID (ppm)	NOTES
	0		40		1				CC	Concrete slab	NS	0.0	
10									SP	Brown fine to medium sand with trace silt, gravel and burnt material (moist)	NS	0.0	
									SP	Gray fine to medium sand with trace silt and occasional gravel (moist)	NS	0.0	
			36										
5	5				2		▼		SP	Gray fine to medium sand with trace silt (wet)	NS	0.0	
5			40										
					3								
10	10								ML	Brown silt (moist)	NS	0.0	
0													
	15												

Note: See Figure D-1 for explanation of symbols.

LOG OF BORING PP-17

GeoEngineers

Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

Figure D-34
Sheet 1 of 1

V6_ENVBORING P:\0\04150490\02\FINALS\041504902 LOGS.GPJ GEIV6_1.GDT 12/23/08

DRAFT

Date(s) Drilled	10/30/08	Logged By	JCD	Checked By	JE
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	DP with hollow-stem auger (HSA) overdrill
Auger Data	4-1/4-inch ID; 5-inch OD	Hammer Data	Direct Push	Drilling Equipment	Power Probe
Total Depth (ft)	12	Surface Elevation (ft)	11	Groundwater Elevation (ft)	7
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.898211 47.046292

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Number	Testing	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID (ppm)	NOTES
	0		36						SM	Brown silty sand with gravel (moist)			
10									SP	Brown/gray fine to coarse sand, trace silt (moist)	NS	0.0	No HC odor
					1	CA			SP	Gray fine to coarse sand with occasional gravel, trace silt and numerous organics (seashells) (wet)			
			40				▼						
5													
5					2						NS	0.0	No HC odor
			34										
									SM	Black silty fine sand to coarse sand with gravel, scattered organics (seashells and roots) (wet)			
10						CA							
					3				SM	Brown silty fine to coarse sand with occasional gravel and numerous organics (roots) (wet)			
0													
	15												

Note: See Figure D-1 for explanation of symbols.

LOG OF BORING PP-18

GeoEngineers

Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

Figure D-35
Sheet 1 of 1

V6_ENVBORING P:\0\04150490\02\FINALS\041504902 LOGS.GPJ GEIV6_1.GDT 12/23/08

DRAFT

Date(s) Drilled	10/30/08	Logged By	JCD	Checked By	JE
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	DP with hollow-stem auger (HSA) overdrill
Auger Data	4-1/4-inch ID; 5-inch OD	Hammer Data	Direct Push	Drilling Equipment	Power Probe
Total Depth (ft)	12	Surface Elevation (ft)	11	Groundwater Elevation (ft)	8
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.898225 47.046396

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Number	Testing	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID (ppm)	NOTES
	0		32		1	CA	▼		SM	Brown/gray silty sand with gravel and scattered brick debris (moist)	NS	0.0	No HC odor
10													
			36						SP	Gray fine to coarse sand with occasional gravel and trace silt (wet)	NS	0.0	No HC odor
5	5												
5					2	CA							
			24		3								
10			24		4						NS	0.0	No HC odor
0									SM/ML	Brown silty sand to sandy silt with gravel and scattered wood debris (roots) (wet)			
	15												

Note: See Figure D-1 for explanation of symbols.

V6_ENVBORING P:\0\041504902\FINALS\041504902 LOGS.GPJ GEIV6_1.GDT 12/23/08

LOG OF BORING PP-19

GeoEngineers

Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

Figure D-36
Sheet 1 of 1

DRAFT

Date(s) Drilled	10/30/08	Logged By	JCD	Checked By	JE
Drilling Contractor	ESN	Drilling Method	Direct Push (DP)	Sampling Methods	DP with hollow-stem auger (HSA) overdrill
Auger Data	4-1/4-inch ID; 5-inch OD	Hammer Data	Direct Push	Drilling Equipment	Power Probe
Total Depth (ft)	12	Surface Elevation (ft)	11	Groundwater Elevation (ft)	7
Vertical Datum	NGVD 29	Datum/ System	WGS 84	Easting(x): Northing(y):	-122.898241 47.046498

Elevation feet	Depth feet	SAMPLES: Interval	Recovered (in)	Blows/foot	Sub-Sample Number	Testing	Water Level	Graphic Log	Group Symbol	MATERIAL DESCRIPTION	Sheen	Headspace Vapor PID (ppm)	NOTES
10	0		32		1	CA	▼		SP	Brown fine to coarse sand with occasional gravel, trace silt (moist)	NS	0.0	No HC odor
5	5		30		2	CA			SP	Gray fine to medium sand with trace silt and numerous shell fragments (wet)	NS	0.0	No HC odor
0	10		34		3	CA			SM	Gray silty fine to coarse sand, occasional gravel (wet)	NS	0.0	No HC odor
-5	15												

Note: See Figure D-1 for explanation of symbols.

V6_ENVBORING P:\0\041504902\FINALS\041504902 LOGS.GPJ GEIV6_1.GDT 12/23/08

LOG OF BORING PP-20

GeoEngineers

Project: 318 State Avenue NE
Project Location: Olympia, Washington
Project Number: 0415-049-02

Figure D-37
Sheet 1 of 1

APPENDIX E
CHEMICAL ANALYTICAL DATA TABLES FOR SOIL AND GROUNDWATER

TABLE E-1
CHEMICAL ANALYTICAL DATA - SOIL
318 STATE AVENUE NE
OLYMPIA, WASHINGTON

Analyte	MTCA[1] Method A Cleanup Level	MTCA[1] Method B Cleanup Level	Location	PP01	PP01	PP02	PP03	PP04	PP05	PP06	PP07	PP08	PP09	PP09	PP09	PP10	PP10	PP11
			Sample Number	2-6	4-10	3-6	2-6	3-6	3-10	2-6	2-6	3-6	060915-020	060915-060	060915-080	060915-020	060915-060	060915-020
			Date of Collection	7/19/2006	7/19/2006	7/19/2006	7/19/2006	7/20/2006	7/19/2006	7/20/2006	7/20/2006	7/20/2006	9/15/2006	9/15/2006	9/15/2006	9/15/2006	9/15/2006	9/15/2006
			Depth Interval	6-6.5	10-10.5	6-6.5	6-6.5	6-6.5	10-10.5	6-6.5	6-6.5	6-6.5	2-4	6-8	8-10	2-4	6-8	2-4
Metals (mg/kg)																		
Arsenic	20	0.67		**3.78**	**3.77**	**1.92**	**2.74**	**2.44**	**2.04**	**1.73**	**1.72**	**1.62**	**6**	**5**	**5.4**	**4.1**	**7.2**	**3.3**
Barium	NC	16,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	NC	40		0.6 U	0.657 U	0.607 U	0.524 U	0.355 U	0.57 U	0.416 U	0.486 U	0.561 U	0.25 U	0.29 U	0.29 U	0.25 U	0.48 U	0.24 U
Chromium	NC	NC		**22.9**	**33.8**	**18.8**	**25.7**	**24.7**	**25.1**	**16.5**	**22.5**	**20.5**	**18**	**24**	**27**	**26**	**36**	**15**
Chromium, Hexavalent	19	240		1.3 U	--	--	1.1 U	1.1 U	1.1 U	--	1.1 U	1.2 U	--	--	--	--	--	--
Lead	250	NC		**124**	**2.2**	**3.76**	**9.43**	**14.3**	**27.1**	**1.59**	**3.2**	**1.47**	**68**	**6.7**	**4.8**	**44**	**6.6**	**8.3**
Mercury	2	24		**2.3**	0.541 U	0.456 U	0.472 U	0.485 U	0.42 U	0.461 U	0.405 U	0.492 U	**0.2 B**	**0.084 B**	**0.02 J**	**0.069 B**	0.039 U	**0.018 B**
Selenium	NC	400		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Silver	NC	400		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Volatile Organic Compounds (µg/kg)																		
1,1,1,2-Tetrachloroethane	NC	38,000		--	--	4.23 U	--	--	--	2.31 U	--	4.96 U	--	--	--	--	--	--
1,1,1-Trichloroethane	2,000	72,000,000		--	--	2.11 U	--	--	--	1.15 U	--	2.48 U	--	--	--	--	--	--
1,1,2,2-Tetrachloroethane	NC	5,000		--	--	4.23 U	--	--	--	2.31 U	--	4.96 U	--	--	--	--	--	--
1,1,2-Trichloroethane	NC	18,000		--	--	1.06 U	--	--	--	0.576 U	--	1.24 U	--	--	--	--	--	--
1,1-Dichloroethane	NC	8,000,000		--	--	1.69 U	--	--	--	0.922 U	--	1.98 U	--	--	--	--	--	--
1,1-Dichloroethene	NC	4,000,000		--	--	2.54 U	--	--	--	1.38 U	--	2.97 U	--	--	--	--	--	--
1,1-Dichloropropene	NC	NC		--	--	4.23 U	--	--	--	2.31 U	--	4.96 U	--	--	--	--	--	--
1,2,3-Trichlorobenzene	NC	NC		--	--	8.46 U	--	--	--	4.61 U	--	9.92 U	--	--	--	--	--	--
1,2,3-Trichloropropane	NC	140		--	--	4.23 U	--	--	--	2.31 U	--	4.96 U	--	--	--	--	--	--
1,2,4-Trichlorobenzene	NC	800,000		--	--	8.46 U	--	--	--	4.61 U	--	9.92 U	--	--	--	--	--	--
1,2,4-Trimethylbenzene	NC	4,000,000		--	--	4.23 U	--	--	--	2.31 U	--	4.96 U	--	--	--	--	--	--
1,2-Dibromo-3-Chloropropane	NC	710		--	--	8.46 U	--	--	--	4.61 U	--	9.92 U	--	--	--	--	--	--
1,2-Dichlorobenzene	NC	7,200,000		--	--	4.23 U	--	--	--	2.31 U	--	4.96 U	--	--	--	--	--	--
1,2-Dichloroethane	NC	11,000		--	--	1.06 U	--	--	--	0.576 U	--	1.24 U	--	--	--	--	--	--
1,2-Dichloropropane	NC	15,000		--	--	4.23 U	--	--	--	2.31 U	--	4.96 U	--	--	--	--	--	--
1,3,5-Trimethylbenzene	NC	4,000,000		--	--	4.23 U	--	--	--	2.31 U	--	4.96 U	--	--	--	--	--	--
1,3-Dichlorobenzene	NC	NC		--	--	4.23 U	--	--	--	2.31 U	--	4.96 U	--	--	--	--	--	--
1,3-Dichloropropane	NC	NC		--	--	4.23 U	--	--	--	2.31 U	--	4.96 U	--	--	--	--	--	--
1,4-Dichlorobenzene	NC	42,000		--	--	4.23 U	--	--	--	2.31 U	--	4.96 U	--	--	--	--	--	--
2,2-Dichloropropane	NC	NC		--	--	8.46 U	--	--	--	4.61 U	--	9.92 U	--	--	--	--	--	--
2-Butanone	NC	48,000,000		--	--	12.7 U	--	--	--	6.92 U	--	14.9 U	--	--	--	--	--	--
2-Chlorotoluene	NC	1,600,000		--	--	4.23 U	--	--	--	2.31 U	--	4.96 U	--	--	--	--	--	--
2-Hexanone	NC	NC		--	--	16.9 U	--	--	--	9.22 U	--	19.8 U	--	--	--	--	--	--
4-Chlorotoluene	NC	NC		--	--	4.23 U	--	--	--	2.31 U	--	4.96 U	--	--	--	--	--	--
Acetone	NC	8,000,000		--	--	25.4 U	--	--	--	13.8 U	--	29.7 U	--	--	--	--	--	--
Benzene	30	18,000		--	--	1.27 U	--	--	--	0.692 U	--	1.49 U	--	--	--	--	--	--
Bromobenzene	NC	NC		--	--	4.23 U	--	--	--	2.31 U	--	4.96 U	--	--	--	--	--	--
Bromochloromethane	NC	NC		--	--	4.23 U	--	--	--	2.31 U	--	4.96 U	--	--	--	--	--	--
Bromoform	NC	130,000		--	--	4.23 U	--	--	--	2.31 U	--	4.96 U	--	--	--	--	--	--

Analyte	MTCA[1] Method A Cleanup Level	MTCA[1] Method B Cleanup Level	Location	PP01	PP01	PP02	PP03	PP04	PP05	PP06	PP07	PP08	PP09	PP09	PP09	PP10	PP10	PP11
			Sample Number	2-6	4-10	3-6	2-6	3-6	3-10	2-6	2-6	3-6	060915-020	060915-060	060915-080	060915-020	060915-060	060915-020
			Date of Collection	7/19/2006	7/19/2006	7/19/2006	7/19/2006	7/20/2006	7/19/2006	7/20/2006	7/20/2006	7/20/2006	9/15/2006	9/15/2006	9/15/2006	9/15/2006	9/15/2006	9/15/2006
			Depth Interval	6-6.5	10-10.5	6-6.5	6-6.5	6-6.5	10-10.5	6-6.5	6-6.5	6-6.5	2-4	6-8	8-10	2-4	6-8	2-4
Bromomethane	NC	110,000		--	--	8.46 U R	--	--	--	4.61 U	--	9.92 U	--	--	--	--	--	--
Carbon Disulfide	NC	8,000,000		--	--	2.54 U	--	--	--	1.38 U	--	2.97 U	--	--	--	--	--	--
Carbon Tetrachloride	NC	7,700		--	--	4.23 U	--	--	--	2.31 U	--	4.96 U	--	--	--	--	--	--
CFC-11	NC	24,000,000		--	--	4.23 U	--	--	--	2.31 U	--	4.96 U	--	--	--	--	--	--
CFC-12	NC	16,000,000		--	--	4.23 U	--	--	--	2.31 U	--	4.96 U	--	--	--	--	--	--
Chlorobenzene	NC	1,600,000		--	--	1.69 U	--	--	--	0.922 U	--	1.98 U	--	--	--	--	--	--
Chloroethane	NC	350,000		--	--	4.23 U R	--	--	--	2.31 U	--	4.96 U	--	--	--	--	--	--
Chloroform	NC	160,000		--	--	2.11 U	--	--	--	1.15 U	--	2.48 U	--	--	--	--	--	--
Chloromethane	NC	77,000		--	--	8.46 U	--	--	--	4.61 U	--	9.92 U	--	--	--	--	--	--
Cis-1,2-Dichloroethene	NC	800,000		--	--	2.54 U	--	--	--	1.38 U	--	2.97 U	--	--	--	--	--	--
Cis-1,3-Dichloropropene	NC	NC		--	--	4.23 U	--	--	--	2.31 U	--	4.96 U	--	--	--	--	--	--
Dibromochloromethane	NC	12,000		--	--	4.23 U	--	--	--	2.31 U	--	4.96 U	--	--	--	--	--	--
Dibromomethane	NC	800,000		--	--	4.23 U	--	--	--	2.31 U	--	4.96 U	--	--	--	--	--	--
Dichlorobromomethane	NC	16,000		--	--	4.23 U	--	--	--	2.31 U	--	4.96 U	--	--	--	--	--	--
Ethylbenzene	6,000	8,000,000		--	--	3.38 U	--	--	--	1.84 U	--	3.97 U	--	--	--	--	--	--
Ethylene dibromide	5	12		--	--	4.23 U	--	--	--	2.31 U	--	4.96 U	--	--	--	--	--	--
Hexachlorobutadiene	NC	13,000		--	--	8.46 UJ	--	--	--	4.61 UJ	--	9.92 UJ	--	--	--	--	--	--
Isopropylbenzene (Cumene)	NC	8,000,000		--	--	4.23 U	--	--	--	2.31 U	--	4.96 U	--	--	--	--	--	--
Methyl isobutyl ketone	NC	6,400,000		--	--	16.9 U	--	--	--	9.22 U	--	19.8 U	--	--	--	--	--	--
Methyl t-butyl ether	100	560,000		--	--	0.846 U	--	--	--	0.461 U	--	0.992 U	--	--	--	--	--	--
Methylene Chloride	20	130,000		--	--	2.96 U	--	--	--	1.61 U	--	3.47 U	--	--	--	--	--	--
Naphthalene	5,000	1,600,000		--	--	8.46 U	--	--	--	4.61 U	--	9.92 U	--	--	--	--	--	--
n-Butylbenzene	NC	NC		--	--	4.23 U	--	--	--	2.31 U	--	4.96 U	--	--	--	--	--	--
n-Propylbenzene	NC	NC		--	--	4.23 U	--	--	--	2.31 U	--	4.96 U	--	--	--	--	--	--
p-Isopropyltoluene	NC	NC		--	--	4.23 UJ	--	--	--	2.31 UJ	--	4.96 UJ	--	--	--	--	--	--
Sec-Butylbenzene	NC	NC		--	--	4.23 U	--	--	--	2.31 U	--	4.96 U	--	--	--	--	--	--
Styrene	NC	33,000		--	--	0.846 U	--	--	--	0.461 U	--	0.992 U	--	--	--	--	--	--
Tert-Butylbenzene	NC	NC		--	--	4.23 U	--	--	--	2.31 U	--	4.96 U	--	--	--	--	--	--
Tetrachloroethene	50	1,900		--	--	1.69 U	--	--	--	0.922 U	--	1.98 U	--	--	--	--	--	--
Toluene	7,000	6,400,000		--	--	1.27 U	--	--	--	0.692 U	--	1.49 U	--	--	--	--	--	--
Total Xylenes	9,000	16,000,000		--	--	8.46 U	--	--	--	4.61 U	--	9.92 U	--	--	--	--	--	--
Trans-1,2-Dichloroethene	NC	1,600,000		--	--	2.11 U	--	--	--	1.15 U	--	2.48 U	--	--	--	--	--	--
Trans-1,3-Dichloropropene	NC	NC		--	--	1.06 U	--	--	--	0.576 U	--	1.24 U	--	--	--	--	--	--
Trichloroethene	30	2,500		--	--	2.11 U	--	--	--	1.15 U	--	2.48 U	--	--	--	--	--	--
Vinyl Chloride	NC	670		--	--	2.11 U	--	--	--	1.15 U	--	2.48 U	--	--	--	--	--	--
Semi-Volatile Organic Compounds (µg/kg)																		
1,2,4-Trichlorobenzene	NC	800,000		--	--	1,910 U	--	--	1,080 U	1,200 U	1,430 U	1,340 U	--	--	--	--	--	--
1,2-Dichlorobenzene	NC	7,200,000		--	--	1,910 U	--	--	1,080 U	1,200 U	1,430 U	1,340 U	--	--	--	--	--	--
1,3-Dichlorobenzene	NC	NC		--	--	1,910 U	--	--	1,080 U	1,200 U	1,430 U	1,340 U	--	--	--	--	--	--
1,3-Dinitrobenzene	NC	8,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene	NC	42,000		--	--	1,910 U	--	--	1,080 U	1,200 U	1,430 U	1,340 U	--	--	--	--	--	--
1,4-Dinitro-Benzene	NC	32,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Analyte	MTCA[1] Method A Cleanup Level	MTCA[1] Method B Cleanup Level	Location	PP01	PP01	PP02	PP03	PP04	PP05	PP06	PP07	PP08	PP09	PP09	PP09	PP10	PP10	PP11
			Sample Number	2-6	4-10	3-6	2-6	3-6	3-10	2-6	2-6	3-6	060915-020	060915-060	060915-080	060915-020	060915-060	060915-020
			Date of Collection	7/19/2006	7/19/2006	7/19/2006	7/19/2006	7/20/2006	7/19/2006	7/20/2006	7/20/2006	7/20/2006	9/15/2006	9/15/2006	9/15/2006	9/15/2006	9/15/2006	9/15/2006
			Depth Interval	6-6.5	10-10.5	6-6.5	6-6.5	6-6.5	10-10.5	6-6.5	6-6.5	6-6.5	2-4	6-8	8-10	2-4	6-8	2-4
2,2'-Oxybis[1-chloropropane]	NC	14,000		--	--	630 U	--	--	358 U	397 U	470 U	441 U	--	--	--	--	--	--
2,3,4,6-Tetrachlorophenol	NC	2,400,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,3,5,6-Tetrachlorophenol	NC	NC		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4,5-Trichlorophenol	NC	8,000,000		--	--	630 U	--	--	358 U	397 U	470 U	441 U	--	--	--	--	--	--
2,4,6-Trichlorophenol	NC	91,000		--	--	630 U	--	--	358 U	397 U	470 U	441 U	--	--	--	--	--	--
2,4-Dichlorophenol	NC	240,000		--	--	630 U	--	--	358 U	397 U	470 U	441 U	--	--	--	--	--	--
2,4-Dimethylphenol	NC	1,600,000		--	--	1,910 U	--	--	1,080 U	1,200 U	1,430 U	1,340 U	--	--	--	--	--	--
2,4-Dinitrophenol	NC	160,000		--	--	3,820 U	--	--	2,170 U	2,410 U	2,850 U	2,670 U	--	--	--	--	--	--
2,4-Dinitrotoluene	NC	160,000		--	--	954 U	--	--	542 U	602 U	713 U	668 U	--	--	--	--	--	--
2,6-Dinitrotoluene	NC	80,000		--	--	954 U	--	--	542 U	602 U	713 U	668 U	--	--	--	--	--	--
2-Chloronaphthalene	NC	6,400,000		--	--	630 U	--	--	358 U	397 U	470 U	441 U	--	--	--	--	--	--
2-Chlorophenol	NC	400,000		--	--	630 U	--	--	358 U	397 U	470 U	441 U	--	--	--	--	--	--
2-Nitroaniline	NC	NC		--	--	630 U	--	--	358 U	397 U	470 U	441 U	--	--	--	--	--	--
2-Nitrophenol	NC	NC		--	--	630 U	--	--	358 U	397 U	470 U	441 U	--	--	--	--	--	--
3,3'-Dichlorobenzidine	NC	2,200		--	--	1,910 U	--	--	1,080 U	1,200 U	1,430 U	1,340 U	--	--	--	--	--	--
4,6-Dinitro-2-Methylphenol	NC	NC		--	--	1,910 U	--	--	1,080 U	1,200 U	1,430 U	1,340 U	--	--	--	--	--	--
4-Bromophenyl phenyl ether	NC	NC		--	--	630 U	--	--	358 U	397 U	470 U	441 U	--	--	--	--	--	--
4-Chloro-3-Methylphenol	NC	NC		--	--	630 U	--	--	358 U	397 U	470 U	441 U	--	--	--	--	--	--
4-Chloroaniline	NC	320,000		--	--	3,820 U	--	--	2,170 U	2,410 U	2,850 U	2,670 U	--	--	--	--	--	--
4-Chlorophenyl-Phenylether	NC	NC		--	--	630 U	--	--	358 U	397 U	470 U	441 U	--	--	--	--	--	--
4-Nitroaniline	NC	NC		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Nitrophenol	NC	NC		--	--	1,910 U	--	--	1,080 U	1,200 U	1,430 U	1,340 U	--	--	--	--	--	--
4-Nitroaniline	NC	NC		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Nitrophenol	NC	NC		--	--	1,910 U	--	--	1,080 U	1,200 U	1,430 U	1,340 U	--	--	--	--	--	--
Aniline	NC	180,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzoic Acid	NC	320,000,000		--	--	1,910 U	--	--	1,080 U	1,200 U	1,430 U	1,340 U	--	--	--	--	--	--
Benzyl Alcohol	NC	24,000,000		--	--	1,910 U	--	--	1,080 U	1,200 U	1,430 U	1,340 U	--	--	--	--	--	--
Bis(2-Chloroethoxy)Methane	NC	NC		--	--	630 U	--	--	358 U	397 U	470 U	441 U	--	--	--	--	--	--
Bis(2-Chloroethyl)Ether	NC	910		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bis(2-chloroisopropyl) ether	NC	3,200,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bis(2-Ethylhexyl) Phthalate	NC	71,000		--	--	3,820 U	--	--	2,170 U	2,410 U	2,850 U	2,670 U	--	--	--	--	--	--
Butyl benzyl phthalate	NC	16,000,000		--	--	630 U	--	--	358 U	397 U	470 U	441 U	--	--	--	--	--	--
Carbazole	NC	50,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dibenzofuran	NC	160,000		--	--	630 U	--	--	358 U	397 U	470 U	441 U	--	--	--	--	--	--
Dibutyl phthalate	NC	8,000,000		--	--	1,910 U	--	--	1,080 U	1,200 U	1,430 U	1,340 U	--	--	--	--	--	--
Diethyl phthalate	NC	64,000,000		--	--	630 U	--	--	358 U	397 U	470 U	441 U	--	--	--	--	--	--
Dimethyl phthalate	NC	80,000,000		--	--	630 U	--	--	358 U	397 U	470 U	441 U	--	--	--	--	--	--
Di-N-Octyl Phthalate	NC	1,600,000		--	--	630 U	--	--	358 U	397 U	470 U	441 U	--	--	--	--	--	--
Hexachlorobenzene	NC	630		--	--	630 U	--	--	358 U	397 U	470 U	441 U	--	--	--	--	--	--
Hexachlorobutadiene	NC	13,000		--	--	1,910 U	--	--	1,080 U	1,200 U	1,430 U	1,340 U	--	--	--	--	--	--
Hexachlorocyclopentadiene	NC	480,000		--	--	1,910 U	--	--	1,080 U	1,200 U	1,430 U	1,340 U	--	--	--	--	--	--
Hexachloroethane	NC	71,000		--	--	1,910 U	--	--	1,080 U	1,200 U	1,430 U	1,340 U	--	--	--	--	--	--
Hexanedioic Acid, Bis(2-Ethylhexyl) Ester	NC	830,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Isophorone	NC	1,100,000		--	--	630 U	--	--	358 U	397 U	470 U	441 U	--	--	--	--	--	--

Analyte	MTCA[1] Method A Cleanup Level	MTCA[1] Method B Cleanup Level	Location	PP01	PP01	PP02	PP03	PP04	PP05	PP06	PP07	PP08	PP09	PP09	PP09	PP10	PP10	PP11
			Sample Number	2-6	4-10	3-6	2-6	3-6	3-10	2-6	2-6	3-6	060915-020	060915-060	060915-080	060915-020	060915-060	060915-020
			Date of Collection	7/19/2006	7/19/2006	7/19/2006	7/19/2006	7/20/2006	7/19/2006	7/20/2006	7/20/2006	7/20/2006	9/15/2006	9/15/2006	9/15/2006	9/15/2006	9/15/2006	9/15/2006
			Depth Interval	6-6.5	10-10.5	6-6.5	6-6.5	6-6.5	10-10.5	6-6.5	6-6.5	6-6.5	2-4	6-8	8-10	2-4	6-8	2-4
m-Nitroaniline	NC	NC		--	--	1,910 U	--	--	1,080 U	1,200 U	1,430 U	1,340 U	--	--	--	--	--	--
Naphthalene	5,000	1,600,000		--	--	630 U	--	--	358 U	397 U	470 U	441 U	--	--	--	--	--	--
Nitrobenzene	NC	40,000		--	--	630 U	--	--	358 U	397 U	470 U	441 U	--	--	--	--	--	--
N-Nitrosodi-n-propylamine	NC	140		--	--	630 U	--	--	358 U	397 U	470 U	441 U	--	--	--	--	--	--
N-Nitrosodiphenylamine	NC	200,000		--	--	630 U	--	--	358 U	397 U	470 U	441 U	--	--	--	--	--	--
o-Cresol	NC	4,000,000		--	--	630 U	--	--	358 U	397 U	470 U	441 U	--	--	--	--	--	--
p-Cresol	NC	400,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pentachlorophenol	NC	8,300		--	--	1,910 U	--	--	1,080 U	1,200 U	1,430 U	1,340 U	--	--	--	--	--	--
Phenol	NC	48,000,000		--	--	630 U	--	--	358 U	397 U	470 U	441 U	--	--	--	--	--	--
Phenol, 3,4-dimethyl	NC	80,000		--	--	630 U	--	--	358 U	397 U	470 U	441 U	--	--	--	--	--	--
Pyridine	NC	80,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Quinoline, 4-nitro-, 1-oxid	NC	NC		--	--	630 U	--	--	358 U	397 U	470 U	441 U	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons (µg/kg)																		
1-Methylnaphthalene	NC	24,000		--	--	11.2 UJ	--	--	109 UJ	11.9 UJ	10.9 UJ	11.8 UJ	--	--	--	--	--	--
2-Methylnaphthalene	NC	320,000		--	--	11.2 UJ	--	--	109 UJ	11.9 UJ	10.9 UJ	11.8 UJ	--	--	--	--	--	--
Acenaphthene	NC	4,800,000		--	--	11.2 UJ	--	--	109 UJ	11.9 UJ	10.9 UJ	11.8 UJ	--	--	--	--	--	--
Acenaphthylene	NC	NC		--	--	11.2 UJ	--	--	109 UJ	11.9 UJ	10.9 UJ	11.8 UJ	--	--	--	--	--	--
Anthracene	NC	24,000,000		--	--	11.2 UJ	--	--	109 UJ	11.9 UJ	10.9 UJ	11.8 UJ	--	--	--	--	--	--
Benz[a]anthracene[2]	NC	NC		--	--	11.2 UJ	--	--	109 UJ	11.9 UJ	10.9 UJ	11.8 UJ	--	--	--	--	--	--
Benzo(a)pyrene[2]	100	140		--	--	11.2 UJ	--	--	109 UJ	11.9 UJ	10.9 UJ	**12.6 J**	--	--	--	--	--	--
Benzo(b)fluoranthene[2]	NC	NC		--	--	11.2 UJ	--	--	109 UJ	11.9 UJ	10.9 UJ	11.8 UJ	--	--	--	--	--	--
Benzo(ghi)perylene	NC	NC		--	--	11.2 UJ	--	--	109 UJ	11.9 UJ	10.9 UJ	11.8 UJ	--	--	--	--	--	--
Benzo(k)fluoranthene[2]	NC	NC		--	--	11.2 UJ	--	--	109 UJ	11.9 UJ	10.9 UJ	11.8 UJ	--	--	--	--	--	--
Chrysene[2]	NC	NC		--	--	11.2 UJ	--	--	109 UJ	11.9 UJ	10.9 UJ	**12.6 J**	--	--	--	--	--	--
Dibenzo(a,h)anthracene[2]	NC	NC		--	--	11.2 UJ	--	--	109 UJ	11.9 UJ	10.9 UJ	11.8 UJ	--	--	--	--	--	--
Fluoranthene	NC	3,200,000		--	--	11.2 UJ	--	--	109 UJ	11.9 UJ	**23 J**	**15 J**	--	--	--	--	--	--
Fluorene	NC	3,200,000		--	--	11.2 UJ	--	--	109 UJ	11.9 UJ	10.9 UJ	11.8 UJ	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene[2]	NC	NC		--	--	11.2 UJ	--	--	109 UJ	11.9 UJ	10.9 UJ	11.8 UJ	--	--	--	--	--	--
Naphthalene	5,000	1,600,000		--	--	11.2 UJ	--	--	109 UJ	11.9 UJ	10.9 UJ	11.8 UJ	--	--	--	--	--	--
Phenanthrene	NC	NC		--	--	11.2 UJ	--	--	109 UJ	11.9 UJ	**35.2 J**	11.8 UJ	--	--	--	--	--	--
Pyrene	NC	2,400,000		--	--	11.2 UJ	--	--	109 UJ	11.9 UJ	10.9 UJ	11.8 UJ	--	--	--	--	--	--
cPAH Toxic Equivalency[3] (ug/kg)	100	140		--	--	11.2 UJ	--	--	109 UJ	11.9 UJ	10.9 UJ	**13**	--	--	--	--	--	--
Total Petroleum Hydrocarbons (mg/kg)																		
Gasoline Range Hydrocarbons	30 /100	NC		3.96 U	--	5.71 U	5.58 U	**4.63**	4.3 U	3.86 U	3.86 U	4.06 U	--	--	--	--	--	--
Diesel Range Hydrocarbons	2,000	NC		**21.5 UJ**	--	11.2 UJ	11.5 UJ	11.9 UJ	**12.1 J**	11.9 UJ	**10.9 J**	11.8 UJ	--	--	--	--	--	--
Heavy Oil Range Hydrocarbons	2,000	NC		**206 J**	--	28 UJ	28.7 UJ	**139 J**	**150 J**	29.8 UJ	**56.9 J**	29.5 UJ	--	--	--	--	--	--
Polychlorinated Biphenyls (µg/kg)																		
PCB-aroclor 1016	NC	5,600		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-aroclor 1221	NC	NC		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-aroclor 1232	NC	NC		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-aroclor 1242	NC	NC		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-aroclor 1248	NC	NC		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-aroclor 1254	NC	1,600		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-aroclor 1260	NC	NC		--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Analyte	MTCA[1] Method A Cleanup Level	MTCA[1] Method B Cleanup Level	Location	PP11	PP11	PP12	PP12	PP13	PP13	PP14	PP14	PP15	PP15	PP16	PP16	PP17	PP17
			Sample Number	060915-060	060915-080	060915-020	060915-040	060915-020	060915-060	060915-040	060915-060	060915-020	060915-060	060915-020	060915-060	060915-020	060915-060
			Date of Collection	9/15/2006	9/15/2006	9/15/2006	9/15/2006	9/14/2006	9/14/2006	9/14/2006	9/14/2006	9/14/2006	9/14/2006	9/14/2006	9/14/2006	9/14/2006	9/14/2006
			Depth Interval	6-8	8-10	2-4	4-6	2-4	6-8	4-6	6-8	2-4	6-8	2-4	6-8	2-4	6-8
Metals (mg/kg)																	
Arsenic	20	0.67		**17**	**5.9**	**4.2**	**4.7**	**3.7**	**3**	**6.4**	**3**	**9.4**	**3.1**	**16**	**3**	**23**	**2.6 J**
Barium	NC	16,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	NC	40		0.72 U	0.24 U	0.27 U	0.23 U	0.21 U	0.25 U	0.22 U	0.24 U	0.22 U	0.28 U	0.25 U	0.26 U	0.23 U	0.27 U
Chromium	NC	NC		**14**	**27**	**21**	**23**	**18**	**16**	**19**	**16**	**18**	**14**	**18**	**15**	**45**	**15**
Chromium, Hexavalent	19	240		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	250	NC		**18**	**6.8**	**8.9**	**14**	**8.3**	**2**	**4.6**	**1.8**	**86**	**1.4**	**350**	**2.2**	**840**	**9.2**
Mercury	2	24		**0.04 J**	**0.039 B**	**0.08 B**	**0.058 B**	0.017 U	0.018 U	**0.025 B**	0.018 U	**0.1 B**	**0.022 J**	0.021 U	0.017 U	**0.024 B**	**0.023 B**
Selenium	NC	400		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Silver	NC	400		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Volatile Organic Compounds (µg/kg)																	
1,1,1,2-Tetrachloroethane	NC	38,000		--	--	--	--	72 UJ	83 UJ	79 UJ	83 UJ	82 UJ	73 UJ	110 UJ	81 UJ	92 UJ	79 UJ
1,1,1-Trichloroethane	2,000	72,000,000		--	--	--	--	29 U	33 U	32 U	33 U	33 U	29 U	43 U	32 U	37 U	31 U
1,1,2,2-Tetrachloroethane	NC	5,000		--	--	--	--	14 U	17 U	16 U	17 U	16 U	15 U	21 U	16 U	18 U	16 U
1,1,2-Trichloroethane	NC	18,000		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
1,1-Dichloroethane	NC	8,000,000		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
1,1-Dichloroethene	NC	4,000,000		--	--	--	--	29 U	33 U	32 U	33 U	33 U	29 U	43 U	32 U	37 U	31 U
1,1-Dichloropropene	NC	NC		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
1,2,3-Trichlorobenzene	NC	NC		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
1,2,3-Trichloropropane	NC	140		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
1,2,4-Trichlorobenzene	NC	800,000		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
1,2,4-Trimethylbenzene	NC	4,000,000		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
1,2-Dibromo-3-Chloropropane	NC	710		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
1,2-Dichlorobenzene	NC	7,200,000		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
1,2-Dichloroethane	NC	11,000		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
1,2-Dichloropropane	NC	15,000		--	--	--	--	14 U	17 U	16 U	17 U	16 U	15 U	21 U	16 U	18 U	16 U
1,3,5-Trimethylbenzene	NC	4,000,000		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
1,3-Dichlorobenzene	NC	NC		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
1,3-Dichloropropane	NC	NC		--	--	--	--	29 U	33 U	32 U	33 U	33 U	29 U	43 U	32 U	37 U	31 U
1,4-Dichlorobenzene	NC	42,000		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
2,2-Dichloropropane	NC	NC		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
2-Butanone	NC	48,000,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Chlorotoluene	NC	1,600,000		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
2-Hexanone	NC	NC		--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Chlorotoluene	NC	NC		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
Acetone	NC	8,000,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzene	30	18,000		--	--	--	--	14 U	17 U	16 U	17 U	16 U	15 U	21 U	16 U	18 U	16 U
Bromobenzene	NC	NC		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
Bromochloromethane	NC	NC		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
Bromoform	NC	130,000		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U

Analyte	MTCA[1] Method A Cleanup Level	MTCA[1] Method B Cleanup Level	Location	PP11	PP11	PP12	PP12	PP13	PP13	PP14	PP14	PP15	PP15	PP16	PP16	PP17	PP17
			Sample Number	060915-060	060915-080	060915-020	060915-040	060915-020	060915-060	060915-040	060915-060	060915-020	060915-060	060915-020	060915-060	060915-020	060915-060
			Date of Collection	9/15/2006	9/15/2006	9/15/2006	9/15/2006	9/14/2006	9/14/2006	9/14/2006	9/14/2006	9/14/2006	9/14/2006	9/14/2006	9/14/2006	9/14/2006	9/14/2006
			Depth Interval	6-8	8-10	2-4	4-6	2-4	6-8	4-6	6-8	2-4	6-8	2-4	6-8	2-4	6-8
Bromomethane	NC	110,000		--	--	--	--	360 UJ	410 UJ	400 UJ	410 UJ	410 UJ	360 UJ	530 UJ	410 UJ	460 UJ	390 UJ
Carbon Disulfide	NC	8,000,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbon Tetrachloride	NC	7,700		--	--	--	--	29 U	33 U	32 U	33 U	**66**	29 U	43 U	32 U	37 U	31 U
CFC-11	NC	24,000,000		--	--	--	--	72 U	**15 J**	79 U	**31 J**	82 U	**19 J**	110 U	81 U	92 U	79 U
CFC-12	NC	16,000,000		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
Chlorobenzene	NC	1,600,000		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
Chloroethane	NC	350,000		--	--	--	--	360 UJ	410 UJ	400 UJ	410 UJ	410 UJ	360 UJ	530 UJ	410 UJ	460 UJ	390 UJ
Chloroform	NC	160,000		--	--	--	--	72 U	83 U	79 U	83 U	**140**	73 U	110 U	81 U	92 U	79 U
Chloromethane	NC	77,000		--	--	--	--	72 U	83 U	79 U	**16 J**	82 U	**35 J**	110 U	81 U	92 U	79 U
Cis-1,2-Dichloroethene	NC	800,000		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
Cis-1,3-Dichloropropene	NC	NC		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
Dibromochloromethane	NC	12,000		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
Dibromomethane	NC	800,000		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
Dichlorobromomethane	NC	16,000		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
Ethylbenzene	6,000	8,000,000		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
Ethylene dibromide	5	12		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
Hexachlorobutadiene	NC	13,000		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
Isopropylbenzene (Cumene)	NC	8,000,000		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
Methyl isobutyl ketone	NC	6,400,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methyl t-butyl ether	100	560,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methylene Chloride	20	130,000		--	--	--	--	72 U	83 U	79 U	**21 J**	82 U	73 U	110 U	81 U	92 U	79 U
Naphthalene	5,000	1,600,000		--	--	--	--	72 U	83 U	79 U	83 U	**13 J**	73 U	110 U	81 U	92 U	79 U
n-Butylbenzene	NC	NC		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
n-Propylbenzene	NC	NC		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
p-Isopropyltoluene	NC	NC		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
Sec-Butylbenzene	NC	NC		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
Styrene	NC	33,000		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
Tert-Butylbenzene	NC	NC		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
Tetrachloroethene	50	1,900		--	--	--	--	45 U	52 U	49 U	52 U	**54**	45 U	67 U	51 U	58 U	49 U
Toluene	7,000	6,400,000		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
Total Xylenes	9,000	16,000,000		--	--	--	--	144 U	166 U	158 U	166 U	164 U	146 U	220 U	162 U	184 U	158 U
Trans-1,2-Dichloroethene	NC	1,600,000		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
Trans-1,3-Dichloropropene	NC	NC		--	--	--	--	72 U	83 U	79 U	83 U	82 U	73 U	110 U	81 U	92 U	79 U
Trichloroethene	30	2,500		--	--	--	--	29 U	33 U	**12 J**	**7.7 J**	**2,300**	29 U	**46**	**55**	**26 J**	31 U
Vinyl Chloride	NC	670		--	--	--	--	29 U	33 U	32 U	33 U	33 U	29 U	43 U	32 U	37 U	31 U
Semi-Volatile Organic Compounds (µg/kg)																	
1,2,4-Trichlorobenzene	NC	800,000		--	--	--	--	47 U	54 U	56 U	58 U	51 U	57 U	51 U	55 U	50 U	55 U
1,2-Dichlorobenzene	NC	7,200,000		--	--	--	--	47 U	54 U	56 U	58 U	51 U	57 U	51 U	55 U	50 U	55 U
1,3-Dichlorobenzene	NC	NC		--	--	--	--	47 U	54 U	56 U	58 U	51 U	57 U	51 U	55 U	50 U	55 U
1,3-Dinitrobenzene	NC	8,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene	NC	42,000		--	--	--	--	47 U	54 U	56 U	58 U	51 U	57 U	51 U	55 U	50 U	55 U
1,4-Dinitro-Benzene	NC	32,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--

Analyte	MTCA[1] Method A Cleanup Level	MTCA[1] Method B Cleanup Level	Location	PP11	PP11	PP12	PP12	PP13	PP13	PP14	PP14	PP15	PP15	PP16	PP16	PP17	PP17
			Sample Number	060915-060	060915-080	060915-020	060915-040	060915-020	060915-060	060915-040	060915-060	060915-020	060915-060	060915-020	060915-060	060915-020	060915-060
			Date of Collection	9/15/2006	9/15/2006	9/15/2006	9/15/2006	9/14/2006	9/14/2006	9/14/2006	9/14/2006	9/14/2006	9/14/2006	9/14/2006	9/14/2006	9/14/2006	9/14/2006
			Depth Interval	6-8	8-10	2-4	4-6	2-4	6-8	4-6	6-8	2-4	6-8	2-4	6-8	2-4	6-8
2,2'-Oxybis[1-chloropropane]	NC	14,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,3,4,6-Tetrachlorophenol	NC	2,400,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,3,5,6-Tetrachlorophenol	NC	NC		--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4,5-Trichlorophenol	NC	8,000,000		--	--	--	--	95 U	110 U	110 U	120 U	100 U	110 U	100 U	110 U	99 U	110 U
2,4,6-Trichlorophenol	NC	91,000		--	--	--	--	140 U	160 U	170 U	170 U	150 U	170 U	150 U	160 U	150 U	160 U
2,4-Dichlorophenol	NC	240,000		--	--	--	--	95 U	110 U	110 U	120 U	100 U	110 U	100 U	110 U	99 U	110 U
2,4-Dimethylphenol	NC	1,600,000		--	--	--	--	95 U	110 U	110 U	120 U	100 U	110 U	100 U	110 U	99 U	110 U
2,4-Dinitrophenol	NC	160,000		--	--	--	--	950 U	1,100 U	1,100 U	1,200 U	1,000 U	1,100 U	1,000 U	1,100 U	990 U	1,100 U
2,4-Dinitrotoluene	NC	160,000		--	--	--	--	95 U	110 U	110 U	120 U	100 U	110 U	100 U	110 U	99 U	110 U
2,6-Dinitrotoluene	NC	80,000		--	--	--	--	95 U	110 U	110 U	120 U	100 U	110 U	100 U	110 U	99 U	110 U
2-Chloronaphthalene	NC	6,400,000		--	--	--	--	19 U	21 U	22 U	23 U	20 U	23 U	20 U	22 U	20 U	22 U
2-Chlorophenol	NC	400,000		--	--	--	--	95 U	110 U	110 U	120 U	100 U	110 U	100 U	110 U	99 U	110 U
2-Nitroaniline	NC	NC		--	--	--	--	95 U	110 U	110 U	120 U	100 U	110 U	100 U	110 U	99 U	110 U
2-Nitrophenol	NC	NC		--	--	--	--	95 U	110 U	110 U	120 U	100 U	110 U	100 U	110 U	99 U	110 U
3,3'-Dichlorobenzidine	NC	2,200		--	--	--	--	190 U	210 U	220 U	230 U	200 U	230 U	**95 J**	220 U	200 U	220 U
4,6-Dinitro-2-Methylphenol	NC	NC		--	--	--	--	950 U	1,100 U	1,100 U	1,200 U	1,000 U	1,100 U	1,000 U	1,100 U	990 U	1,100 U
4-Bromophenyl phenyl ether	NC	NC		--	--	--	--	95 U	110 U	110 U	120 U	100 U	110 U	100 U	110 U	99 U	110 U
4-Chloro-3-Methylphenol	NC	NC		--	--	--	--	95 U	110 U	110 U	120 U	100 U	110 U	100 U	110 U	99 U	110 U
4-Chloroaniline	NC	320,000		--	--	--	--	95 U	110 U	110 U	120 U	100 U	110 U	100 U	110 U	99 U	110 U
4-Chlorophenyl-Phenylether	NC	NC		--	--	--	--	95 U	110 U	110 U	120 U	100 U	110 U	100 U	110 U	99 U	110 U
4-Nitroaniline	NC	NC		--	--	--	--	95 U	110 U	110 U	120 U	100 U	110 U	100 U	110 U	99 U	110 U
4-Nitrophenol	NC	NC		--	--	--	--	950 U	1,100 U	1,100 U	1,200 U	1,000 U	1,100 U	1,000 U	1,100 U	990 U	1,100 U
Aniline	NC	180,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzoic Acid	NC	320,000,000		--	--	--	--	2,400 U	2,700 U	2,800 U	2,900 U	2,600 U	2,800 U	2,500 U	2,700 U	2,500 U	2,700 U
Benzyl Alcohol	NC	24,000,000		--	--	--	--	95 U	110 U	**100 J**	120 U	100 U	110 U	100 U	110 U	99 U	110 U
Bis(2-Chloroethoxy)Methane	NC	NC		--	--	--	--	95 U	110 U	110 U	120 U	100 U	110 U	100 U	110 U	99 U	110 U
Bis(2-Chloroethyl)Ether	NC	910		--	--	--	--	95 U	110 U	110 U	120 U	100 U	110 U	100 U	110 U	99 U	110 U
Bis(2-chloroisopropyl) ether	NC	3,200,000		--	--	--	--	140 U	160 U	170 U	170 U	150 U	170 U	150 U	160 U	150 U	160 U
Bis(2-Ethylhexyl) Phthalate	NC	71,000		--	--	--	--	1,400 U	1,600 U	**2,600**	1,700 U	1,500 U	1,700 U	1,500 U	1,600 U	1,500 U	1,600 U
Butyl benzyl phthalate	NC	16,000,000		--	--	--	--	95 U	110 U	**5,100**	**97 J**	100 U	110 U	100 U	110 U	99 U	110 U
Carbazole	NC	50,000		--	--	--	--	140 U	160 U	170 U	170 U	**41 J**	170 U	150 U	160 U	150 U	160 U
Dibenzofuran	NC	160,000		--	--	--	--	95 U	110 U	110 U	120 U	100 U	110 U	100 U	110 U	99 U	110 U
Dibutyl phthalate	NC	8,000,000		--	--	--	--	190 U	210 U	220 U	230 U	200 U	230 U	200 U	220 U	200 U	220 U
Diethyl phthalate	NC	64,000,000		--	--	--	--	95 U	110 U	110 U	120 U	100 U	110 U	100 U	110 U	**12 J**	110 U
Dimethyl phthalate	NC	80,000,000		--	--	--	--	95 U	110 U	110 U	120 U	100 U	110 U	100 U	110 U	99 U	110 U
Di-N-Octyl Phthalate	NC	1,600,000		--	--	--	--	190 U	210 U	**160 J**	230 U	200 U	230 U	200 U	220 U	**140 J**	220 U
Hexachlorobenzene	NC	630		--	--	--	--	47 U	54 U	56 U	58 U	51 U	57 U	51 U	55 U	50 U	55 U
Hexachlorobutadiene	NC	13,000		--	--	--	--	47 U	54 U	56 U	58 U	51 U	57 U	51 U	55 U	50 U	55 U
Hexachlorocyclopentadiene	NC	480,000		--	--	--	--	95 U	110 U	110 U	120 U	100 U	110 U	100 U	110 U	99 U	110 U
Hexachloroethane	NC	71,000		--	--	--	--	95 U	110 U	110 U	120 U	100 U	110 U	100 U	110 U	99 U	110 U
Hexanedioic Acid, Bis(2-Ethylhexyl) Ester	NC	830,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Isophorone	NC	1,100,000		--	--	--	--	95 U	110 U	110 U	120 U	100 U	110 U	100 U	110 U	99 U	110 U

Analyte	MTCA[1] Method A Cleanup Level	MTCA[1] Method B Cleanup Level	Location	PP11	PP11	PP12	PP12	PP13	PP13	PP14	PP14	PP15	PP15	PP16	PP16	PP17	PP17
			Sample Number	060915-060	060915-080	060915-020	060915-040	060915-020	060915-060	060915-040	060915-060	060915-020	060915-060	060915-020	060915-060	060915-020	060915-060
			Date of Collection	9/15/2006	9/15/2006	9/15/2006	9/15/2006	9/14/2006	9/14/2006	9/14/2006	9/14/2006	9/14/2006	9/14/2006	9/14/2006	9/14/2006	9/14/2006	9/14/2006
			Depth Interval	6-8	8-10	2-4	4-6	2-4	6-8	4-6	6-8	2-4	6-8	2-4	6-8	2-4	6-8
m-Nitroaniline	NC	NC		--	--	--	--	95 UJ	110 UJ	110 UJ	120 UJ	100 UJ	110 UJ	100 UJ	110 UJ	99 UJ	110 UJ
Naphthalene	5,000	1,600,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrobenzene	NC	40,000		--	--	--	--	95 U	110 U	110 U	120 U	100 U	110 U	100 U	110 U	99 U	110 U
N-Nitrosodi-n-propylamine	NC	140		--	--	--	--	95 U	110 U	110 U	120 U	100 U	110 U	100 U	110 U	99 U	110 U
N-Nitrosodiphenylamine	NC	200,000		--	--	--	--	47 U	54 U	56 U	58 U	51 U	57 U	51 U	55 U	50 U	55 U
o-Cresol	NC	4,000,000		--	--	--	--	95 U	110 U	110 U	120 U	100 U	110 U	100 U	110 U	99 U	110 U
p-Cresol	NC	400,000		--	--	--	--	190 U	210 U	220 U	230 U	200 U	230 U	200 U	220 U	200 U	220 U
Pentachlorophenol	NC	8,300		--	--	--	--	95 U	110 U	110 U	120 U	100 U	110 U	100 U	110 U	99 U	110 U
Phenol	NC	48,000,000		--	--	--	--	95 U	110 U	110 U	120 U	100 U	110 U	100 U	110 U	99 U	110 U
Phenol, 3,4-dimethyl	NC	80,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pyridine	NC	80,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Quinoline, 4-nitro-, 1-oxid	NC	NC		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons (µg/kg)																	
1-Methylnaphthalene	NC	24,000		--	--	--	--	**0.82 J**	**1.3 J**	5.6 U	5.8 U	**11**	5.7 U	**2.2 J**	5.5 U	**39**	5.5 U
2-Methylnaphthalene	NC	320,000		--	--	--	--	**0.65 J**	**1.3 J**	**0.68 J**	5.8 U	**11**	5.7 U	**2.5 J**	5.5 U	**190**	5.5 U
Acenaphthene	NC	4,800,000		--	--	--	--	4.7 U	**1.4 J**	5.6 U	5.8 U	**8.9**	5.7 U	**2.6 J**	5.5 U	**11**	5.5 U
Acenaphthylene	NC	NC		--	--	--	--	**1.3 J**	**1.6 J**	5.6 U	5.8 U	**2.7 J**	5.7 U	**0.69 J**	5.5 U	5 U	5.5 U
Anthracene	NC	24,000,000		--	--	--	--	**1 J**	**1.4 J**	**0.57 J**	5.8 U	**21**	**4.1 J**	**19**	5.5 U	**4.3 J**	5.5 U
Benz[a]anthracene[2]	NC	NC		--	--	--	--	4.7 U	**3.6 J**	5.6 U	**1.1 J**	**410 B**	**7.9 B**	**790 B**	**2.1 J**	**48 B**	**1.2 J**
Benzo(a)pyrene[2]	100	140		--	--	--	--	**2.3 J**	**3.1 J**	**2.5 J**	5.8 U	**480 B**	**6 B**	**880 B**	**1.3 J**	**38 B**	**0.72 J**
Benzo(b)fluoranthene[2]	NC	NC		--	--	--	--	**5 JB**	**5.8 JB**	**6.5 JB**	12 U	**1,000 B**	**14 B**	**1,900 B**	**2.9 JB**	**90 B**	**1.4 JB**
Benzo(ghi)perylene	NC	NC		--	--	--	--	**2.3 J**	**2.5 J**	**2.6 J**	5.8 U	**480 B**	**6.9 B**	**890 B**	5.5 U	**38 B**	5.5 U
Benzo(k)fluoranthene[2]	NC	NC		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Chrysene[2]	NC	NC		--	--	--	--	4.7 U	**3.5 J**	**3.1 J**	**0.74 J**	**430 B**	**9.8 B**	**870 B**	**1.7 J**	**46 B**	**0.76 J**
Dibenzo(a,h)anthracene[2]	NC	NC		--	--	--	--	4.7 U	5.4 U	5.6 U	5.8 U	**110**	**8.6**	**270**	5.5 U	**8.3**	5.5 U
Fluoranthene	NC	3,200,000		--	--	--	--	**4.1 J**	**2.7 J**	**5.2 J**	5.8 U	**620 B**	**7.6 B**	**980 B**	**1.4 J**	**100 B**	**0.75 J**
Fluorene	NC	3,200,000		--	--	--	--	**1.1 J**	**1.5 J**	5.6 U	5.8 U	**3 J**	5.7 U	**2.1 J**	5.5 U	5 U	5.5 U
Indeno(1,2,3-cd)pyrene[2]	NC	NC		--	--	--	--	**1.9 J**	**2.2 J**	**2.1 J**	5.8 U	**420 B**	**8 B**	**860 B**	**1.6 J**	**29 B**	5.5 U
Naphthalene	5,000	1,600,000		--	--	--	--	**0.75 J**	**1.4 J**	**0.96 J**	5.8 U	**12**	**0.87 J**	**6.5**	5.5 U	**88**	5.5 U
Phenanthrene	NC	NC		--	--	--	--	**6 B**	**1.6 J**	**2.5 J**	5.8 U	**140 B**	**3.4 J**	**140 B**	5.5 U	**52 B**	5.5 U
Pyrene	NC	2,400,000		--	--	--	--	**5.2 B**	**3.2 J**	**4.7 J**	5.8 U	**550 B**	**7.5 B**	**810 B**	**1.3 J**	**90 B**	**0.78 J**
cPAH Toxic Equivalency[3] (ug/kg)	100	140		--	--	--	--	**3**	**4**	**3**	**0.1**	**678**	**10**	**1,271**	**2**	**56**	**1**
Total Petroleum Hydrocarbons (mg/kg)																	
Gasoline Range Hydrocarbons	30 /100	NC		--	--	--	--	7.2 U	8.3 U	7.9 U	8.3 U	8.2 U	7.3 U	11 U	8.1 U	9.2 U	7.9 U
Diesel Range Hydrocarbons	2,000	NC		--	--	--	--	25 U	27 U	28 U	29 U	**7.9 J**	**15 J**	25 U	28 U	**210**	27 U
Heavy Oil Range Hydrocarbons	2,000	NC		--	--	--	--	49 U	54 U	55 U	58 U	**24 J**	**54 J**	51 U	56 U	**140**	54 U
Polychlorinated Biphenyls (µg/kg)																	
PCB-aroclor 1016	NC	5,600		--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-aroclor 1221	NC	NC		--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-aroclor 1232	NC	NC		--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-aroclor 1242	NC	NC		--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-aroclor 1248	NC	NC		--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-aroclor 1254	NC	1,600		--	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-aroclor 1260	NC	NC		--	--	--	--	--	--	--	--	--	--	--	--	--	--

Analyte	MTCA[1] Method A Cleanup Level	MTCA[1] Method B Cleanup Level	Location	TD01	TD02	TD03	TD04	TD05	TD06	TD07	TD08	TD09	TD10	TD11	MW01	MW01	MW02
			Sample Number	TD01	TD02	TD03	TD04	TD05	TD06	TD07	TD08	TD09	TD10	TD11	032608-7	032608-10	032608-7
			Date of Collection	10/17/2007	10/17/2007	10/17/2007	10/17/2007	10/17/2007	10/17/2007	10/17/2007	10/17/2007	10/17/2007	10/17/2007	10/17/2007	3/26/2008	3/26/2008	3/26/2008
			Depth Interval	7-7.5	5-5.5	4-4.5	4-4.5	2-2.5	4-4.5	4-4.5	4-4.5	4-4.5	7-7.5	4-4.5	7-7.5	10-10.5	7-7.5
Metals (mg/kg)																	
Arsenic	20	0.67		**8.1**	**6.5**	2.6 U	2.8 U	**40**	2.8 U	3 U	2.9 U	**4.9**	**18**	**3.8**	3.8 U	**4.9**	11 U
Barium	NC	16,000		--	--	--	--	--	--	--	--	--	--	--	**50**	**33**	**70**
Cadmium	NC	40		--	--	--	--	--	--	--	--	--	--	--	0.63 U	0.61 U	1.9 U
Chromium	NC	NC		--	--	--	--	--	--	--	--	--	--	--	**18**	**19**	**14**
Chromium, Hexavalent	19	240		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	250	NC		**26**	**3.8**	**16**	1.4 U	**38**	**2.8**	1.5 U	**2.2**	**33**	**41**	**13**	**38**	**2.5**	**18**
Mercury	2	24		--	--	--	--	--	--	--	--	--	--	--	**0.39**	**0.024**	**0.095**
Selenium	NC	400		--	--	--	--	--	--	--	--	--	--	--	6.3 U	6.1 U	19 U
Silver	NC	400		--	--	--	--	--	--	--	--	--	--	--	**2.1**	1.2 U	3.8 U
Volatile Organic Compounds (µg/kg)																	
1,1,1,2-Tetrachloroethane	NC	38,000		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
1,1,1-Trichloroethane	2,000	72,000,000		39 U	21 U	15 U	16 U	21 U	18 U	17 U	19 U	21 U	66 U	18 U	17 U	21 U	110 U
1,1,2,2-Tetrachloroethane	NC	5,000		19 U	10 U	7.5 U	7.9 U	10 U	9 U	8.6 U	9.3 U	11 U	33 U	8.8 U	8.3 U	10 U	55 U
1,1,2-Trichloroethane	NC	18,000		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
1,1-Dichloroethane	NC	8,000,000		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
1,1-Dichloroethene	NC	4,000,000		39 U	21 U	15 U	16 U	21 U	18 U	17 U	19 U	21 U	66 U	18 U	17 U	21 U	110 U
1,1-Dichloropropene	NC	NC		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
1,2,3-Trichlorobenzene	NC	NC		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
1,2,3-Trichloropropane	NC	140		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
1,2,4-Trichlorobenzene	NC	800,000		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
1,2,4-Trimethylbenzene	NC	4,000,000		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
1,2-Dibromo-3-Chloropropane	NC	710		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
1,2-Dichlorobenzene	NC	7,200,000		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
1,2-Dichloroethane	NC	11,000		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
1,2-Dichloropropane	NC	15,000		19 U	10 U	7.5 U	7.9 U	10 U	9 U	8.6 U	9.3 U	11 U	33 U	8.8 U	**3.2 J**	10 U	55 U
1,3,5-Trimethylbenzene	NC	4,000,000		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
1,3-Dichlorobenzene	NC	NC		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
1,3-Dichloropropane	NC	NC		39 U	21 U	15 U	16 U	21 U	18 U	17 U	19 U	21 U	66 U	18 U	17 U	21 U	110 U
1,4-Dichlorobenzene	NC	42,000		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
2,2-Dichloropropane	NC	NC		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
2-Butanone	NC	48,000,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Chlorotoluene	NC	1,600,000		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
2-Hexanone	NC	NC		--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Chlorotoluene	NC	NC		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
Acetone	NC	8,000,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzene	30	18,000		19 U	10 U	7.5 U	7.9 U	10 U	9 U	8.6 U	**11**	11 U	**150**	**8.9**	8.3 U	10 U	**1,000**
Bromobenzene	NC	NC		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
Bromochloromethane	NC	NC		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
Bromoform	NC	130,000		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U

Analyte	MTCA[1] Method A Cleanup Level	MTCA[1] Method B Cleanup Level	Location	TD01	TD02	TD03	TD04	TD05	TD06	TD07	TD08	TD09	TD10	TD11	MW01	MW01	MW02
			Sample Number	TD01	TD02	TD03	TD04	TD05	TD06	TD07	TD08	TD09	TD10	TD11	032608-7	032608-10	032608-7
			Date of Collection	10/17/2007	10/17/2007	10/17/2007	10/17/2007	10/17/2007	10/17/2007	10/17/2007	10/17/2007	10/17/2007	10/17/2007	10/17/2007	3/26/2008	3/26/2008	3/26/2008
			Depth Interval	7-7.5	5-5.5	4-4.5	4-4.5	2-2.5	4-4.5	4-4.5	4-4.5	4-4.5	7-7.5	4-4.5	7-7.5	10-10.5	7-7.5
Bromomethane	NC	110,000		480 U	260 U	190 U	200 U	260 U	220 U	210 U	230 U	270 U	830 U	220 U	210 U	260 U	1,400 U
Carbon Disulfide	NC	8,000,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbon Tetrachloride	NC	7,700		39 U	21 U	15 U	16 U	21 U	18 U	17 U	19 U	21 U	66 U	18 U	17 U	21 U	110 U
CFC-11	NC	24,000,000		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
CFC-12	NC	16,000,000		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
Chlorobenzene	NC	1,600,000		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
Chloroethane	NC	350,000		480 UJ	260 UJ	190 UJ	200 UJ	260 UJ	220 UJ	210 UJ	230 UJ	270 UJ	830 UJ	220 UJ	210 U	260 U	1,400 U
Chloroform	NC	160,000		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
Chloromethane	NC	77,000		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
Cis-1,2-Dichloroethene	NC	800,000		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	**180**	44 U	42 U	52 U	**920**
Cis-1,3-Dichloropropene	NC	NC		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
Dibromochloromethane	NC	12,000		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
Dibromomethane	NC	800,000		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
Dichlorobromomethane	NC	16,000		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
Ethylbenzene	6,000	8,000,000		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
Ethylene dibromide	5	12		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
Hexachlorobutadiene	NC	13,000		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
Isopropylbenzene (Cumene)	NC	8,000,000		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
Methyl isobutyl ketone	NC	6,400,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methyl t-butyl ether	100	560,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methylene Chloride	20	130,000		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	**66 B**	**10 J**	**82 J**
Naphthalene	5,000	1,600,000		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
n-Butylbenzene	NC	NC		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
n-Propylbenzene	NC	NC		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
p-Isopropyltoluene	NC	NC		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	**32 J**
Sec-Butylbenzene	NC	NC		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	**25 J**
Styrene	NC	33,000		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
Tert-Butylbenzene	NC	NC		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
Tetrachloroethene	50	1,900		60 U	32 U	23 U	25 U	32 U	28 U	27 U	29 U	**66**	100 U	27 U	26 U	33 U	170 U
Toluene	7,000	6,400,000		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	**84 J**
Total Xylenes	9,000	16,000,000		192 U	104 U	74 U	80 U	102 U	90 U	86 U	92 U	106 U	340 U	88 U	84 U	104 U	540 U
Trans-1,2-Dichloroethene	NC	1,600,000		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	**550**
Trans-1,3-Dichloropropene	NC	NC		96 U	52 U	37 U	40 U	51 U	45 U	43 U	46 U	53 U	170 U	44 U	42 U	52 U	270 U
Trichloroethene	30	2,500		39 U	21 U	**230**	16 U	21 U	18 U	17 U	**82**	**600**	66 U	18 U	17 U	21 U	**900**
Vinyl Chloride	NC	670		39 U	21 U	15 U	16 U	21 U	18 U	17 U	19 U	21 U	66 U	18 U	17 U	21 U	**330**
Semi-Volatile Organic Compounds (µg/kg)																	
1,2,4-Trichlorobenzene	NC	800,000		--	--	--	--	--	--	--	--	--	--	--	60 U	58 U	190 U
1,2-Dichlorobenzene	NC	7,200,000		--	--	--	--	--	--	--	--	--	--	--	60 U	58 U	190 U
1,3-Dichlorobenzene	NC	NC		--	--	--	--	--	--	--	--	--	--	--	60 U	58 U	190 U
1,3-Dinitrobenzene	NC	8,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene	NC	42,000		--	--	--	--	--	--	--	--	--	--	--	60 U	58 U	190 U
1,4-Dinitro-Benzene	NC	32,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--

Analyte	MTCA[1] Method A Cleanup Level	MTCA[1] Method B Cleanup Level	Location	TD01	TD02	TD03	TD04	TD05	TD06	TD07	TD08	TD09	TD10	TD11	MW01	MW01	MW02
			Sample Number	TD01	TD02	TD03	TD04	TD05	TD06	TD07	TD08	TD09	TD10	TD11	032608-7	032608-10	032608-7
			Date of Collection	10/17/2007	10/17/2007	10/17/2007	10/17/2007	10/17/2007	10/17/2007	10/17/2007	10/17/2007	10/17/2007	10/17/2007	10/17/2007	3/26/2008	3/26/2008	3/26/2008
			Depth Interval	7-7.5	5-5.5	4-4.5	4-4.5	2-2.5	4-4.5	4-4.5	4-4.5	4-4.5	7-7.5	4-4.5	7-7.5	10-10.5	7-7.5
2,2'-Oxybis[1-chloropropane]	NC	14,000		--	--	--	--	--	--	--	--	--	--	--	180 U	180 U	560 U
2,3,4,6-Tetrachlorophenol	NC	2,400,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,3,5,6-Tetrachlorophenol	NC	NC		--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4,5-Trichlorophenol	NC	8,000,000		--	--	--	--	--	--	--	--	--	--	--	120 U	120 U	370 U
2,4,6-Trichlorophenol	NC	91,000		--	--	--	--	--	--	--	--	--	--	--	180 U	180 U	560 U
2,4-Dichlorophenol	NC	240,000		--	--	--	--	--	--	--	--	--	--	--	120 U	120 U	370 U
2,4-Dimethylphenol	NC	1,600,000		--	--	--	--	--	--	--	--	--	--	--	120 U	120 U	370 U
2,4-Dinitrophenol	NC	160,000		--	--	--	--	--	--	--	--	--	--	--	1,200 U	1,200 U	3,700 U
2,4-Dinitrotoluene	NC	160,000		--	--	--	--	--	--	--	--	--	--	--	120 U	120 U	370 U
2,6-Dinitrotoluene	NC	80,000		--	--	--	--	--	--	--	--	--	--	--	120 U	120 U	370 U
2-Chloronaphthalene	NC	6,400,000		--	--	--	--	--	--	--	--	--	--	--	24 U	23 U	74 U
2-Chlorophenol	NC	400,000		--	--	--	--	--	--	--	--	--	--	--	120 U	120 U	370 U
2-Nitroaniline	NC	NC		--	--	--	--	--	--	--	--	--	--	--	120 U	120 U	370 U
2-Nitrophenol	NC	NC		--	--	--	--	--	--	--	--	--	--	--	120 U	120 U	370 U
3,3'-Dichlorobenzidine	NC	2,200		--	--	--	--	--	--	--	--	--	--	--	240 U	230 U	740 U
4,6-Dinitro-2-Methylphenol	NC	NC		--	--	--	--	--	--	--	--	--	--	--	1,200 U	1,200 U	3,700 U
4-Bromophenyl phenyl ether	NC	NC		--	--	--	--	--	--	--	--	--	--	--	120 U	120 U	370 U
4-Chloro-3-Methylphenol	NC	NC		--	--	--	--	--	--	--	--	--	--	--	120 U	120 U	370 U
4-Chloroaniline	NC	320,000		--	--	--	--	--	--	--	--	--	--	--	120 U	120 U	370 U
4-Chlorophenyl-Phenylether	NC	NC		--	--	--	--	--	--	--	--	--	--	--	120 U	120 U	370 U
4-Nitroaniline	NC	NC		--	--	--	--	--	--	--	--	--	--	--	120 U	120 U	370 U
4-Nitrophenol	NC	NC		--	--	--	--	--	--	--	--	--	--	--	1,200 U	1,200 U	3,700 U
Aniline	NC	180,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzoic Acid	NC	320,000,000		--	--	--	--	--	--	--	--	--	--	--	3,000 U	2,900 U	9,300 U
Benzyl Alcohol	NC	24,000,000		--	--	--	--	--	--	--	--	--	--	--	120 U	120 U	370 U
Bis(2-Chloroethoxy)Methane	NC	NC		--	--	--	--	--	--	--	--	--	--	--	120 U	120 U	370 U
Bis(2-Chloroethyl)Ether	NC	910		--	--	--	--	--	--	--	--	--	--	--	120 U	120 U	370 U
Bis(2-chloroisopropyl) ether	NC	3,200,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bis(2-Ethylhexyl) Phthalate	NC	71,000		--	--	--	--	--	--	--	--	--	--	--	1,800 U	1,800 U	5,600 U
Butyl benzyl phthalate	NC	16,000,000		--	--	--	--	--	--	--	--	--	--	--	120 U	120 U	370 U
Carbazole	NC	50,000		--	--	--	--	--	--	--	--	--	--	--	180 U	180 U	560 U
Dibenzofuran	NC	160,000		--	--	--	--	--	--	--	--	--	--	--	120 U	120 U	370 U
Dibutyl phthalate	NC	8,000,000		--	--	--	--	--	--	--	--	--	--	--	240 U	230 U	740 U
Diethyl phthalate	NC	64,000,000		--	--	--	--	--	--	--	--	--	--	--	120 U	120 U	370 U
Dimethyl phthalate	NC	80,000,000		--	--	--	--	--	--	--	--	--	--	--	120 U	120 U	370 U
Di-N-Octyl Phthalate	NC	1,600,000		--	--	--	--	--	--	--	--	--	--	--	240 U	230 U	740 U
Hexachlorobenzene	NC	630		--	--	--	--	--	--	--	--	--	--	--	60 U	58 U	190 U
Hexachlorobutadiene	NC	13,000		--	--	--	--	--	--	--	--	--	--	--	60 U	58 U	190 U
Hexachlorocyclopentadiene	NC	480,000		--	--	--	--	--	--	--	--	--	--	--	120 U	120 U	370 U
Hexachloroethane	NC	71,000		--	--	--	--	--	--	--	--	--	--	--	120 U	120 U	370 U
Hexanedioic Acid, Bis(2-Ethylhexyl) Ester	NC	830,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Isophorone	NC	1,100,000		--	--	--	--	--	--	--	--	--	--	--	120 U	120 U	370 U

Analyte	MTCA[1] Method A Cleanup Level	MTCA[1] Method B Cleanup Level	Location	TD01	TD02	TD03	TD04	TD05	TD06	TD07	TD08	TD09	TD10	TD11	MW01	MW01	MW02
			Sample Number	TD01	TD02	TD03	TD04	TD05	TD06	TD07	TD08	TD09	TD10	TD11	032608-7	032608-10	032608-7
			Date of Collection	10/17/2007	10/17/2007	10/17/2007	10/17/2007	10/17/2007	10/17/2007	10/17/2007	10/17/2007	10/17/2007	10/17/2007	10/17/2007	3/26/2008	3/26/2008	3/26/2008
			Depth Interval	7-7.5	5-5.5	4-4.5	4-4.5	2-2.5	4-4.5	4-4.5	4-4.5	4-4.5	7-7.5	4-4.5	7-7.5	10-10.5	7-7.5
m-Nitroaniline	NC	NC		--	--	--	--	--	--	--	--	--	--	--	120 U	120 U	370 U
Naphthalene	5,000	1,600,000		--	--	--	--	--	--	--	--	--	--	--	24 U	23 U	74 U
Nitrobenzene	NC	40,000		--	--	--	--	--	--	--	--	--	--	--	120 U	120 U	370 U
N-Nitrosodi-n-propylamine	NC	140		--	--	--	--	--	--	--	--	--	--	--	120 U	120 U	370 U
N-Nitrosodiphenylamine	NC	200,000		--	--	--	--	--	--	--	--	--	--	--	60 U	58 U	190 U
o-Cresol	NC	4,000,000		--	--	--	--	--	--	--	--	--	--	--	120 U	120 U	370 U
p-Cresol	NC	400,000		--	--	--	--	--	--	--	--	--	--	--	240 U	230 U	740 U
Pentachlorophenol	NC	8,300		--	--	--	--	--	--	--	--	--	--	--	120 U	120 U	370 U
Phenol	NC	48,000,000		--	--	--	--	--	--	--	--	--	--	--	120 U	120 U	370 U
Phenol, 3,4-dimethyl	NC	80,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pyridine	NC	80,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Quinoline, 4-nitro-, 1-oxid	NC	NC		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons (µg/kg)																	
1-Methylnaphthalene	NC	24,000		--	--	--	--	--	--	--	--	--	--	--	36 U	35 U	110 U
2-Methylnaphthalene	NC	320,000		--	--	--	--	--	--	--	--	--	--	--	24 U	23 U	74 U
Acenaphthene	NC	4,800,000		--	--	--	--	--	--	--	--	--	--	--	24 U	23 U	74 U
Acenaphthylene	NC	NC		--	--	--	--	--	--	--	--	--	--	--	24 U	23 U	74 U
Anthracene	NC	24,000,000		--	--	--	--	--	--	--	--	--	--	--	24 U	23 U	74 U
Benz[a]anthracene[2]	NC	NC		56 U	34 U	**60**	27 U	**820**	28 U	28 U	28 U	30 U	97 U	30 U	30 U	29 U	93 U
Benzo(a)pyrene[2]	100	140		68 U	41 U	**66**	33 U	**1,200**	33 U	34 U	34 U	36 U	120 U	37 U	36 U	35 U	110 U
Benzo(b)fluoranthene[2]	NC	NC		**52**	27 U	**83**	22 U	**2,100**	22 U	22 U	23 U	24 U	78 U	**28**	24 U	23 U	74 U
Benzo(ghi)perylene	NC	NC		--	--	--	--	--	--	--	--	--	--	--	30 U	29 U	93 U
Benzo(k)fluoranthene[2]	NC	NC		56 U	34 U	28 U	27 U	**650**	28 U	28 U	28 U	30 U	97 U	30 U	30 U	29 U	93 U
Chrysene[2]	NC	NC		56 U	34 U	**67**	27 U	**960**	28 U	28 U	28 U	30 U	97 U	**58**	30 U	29 U	93 U
Dibenzo(a,h)anthracene[2]	NC	NC		90 U	55 U	44 U	43 U	**290**	44 U	45 U	45 U	48 U	160 U	49 U	48 U	47 U	150 U
Fluoranthene	NC	3,200,000		--	--	--	--	--	--	--	--	--	--	--	24 U	23 U	74 U
Fluorene	NC	3,200,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene[2]	NC	NC		90 U	55 U	**61**	43 U	**1,200**	44 U	45 U	45 U	48 U	160 U	49 U	48 U	47 U	150 U
Naphthalene	5,000	1,600,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenanthrene	NC	NC		--	--	--	--	--	--	--	--	--	--	--	**46**	23 U	74 U
Pyrene	NC	2,400,000		--	--	--	--	--	--	--	--	--	--	--	24 U	23 U	74 U
cPAH Toxic Equivalency[3] (ug/kg)	100	140		**5**	41 U	**87**	33 U	**1,716**	33 U	34 U	34 U	36 U	120 U	**3**	36 U	35 U	110 U
Total Petroleum Hydrocarbons (mg/kg)																	
Gasoline Range Hydrocarbons	30 /100	NC		--	--	--	--	--	--	--	--	--	--	--	4.2 U	5.2 U	27 U
Diesel Range Hydrocarbons	2,000	NC		--	--	--	--	--	--	--	--	--	--	--	**84**	28 U	95 U
Heavy Oil Range Hydrocarbons	2,000	NC		--	--	--	--	--	--	--	--	--	--	--	**1,100**	57 U	190 U
Polychlorinated Biphenyls (µg/kg)																	
PCB-aroclor 1016	NC	5,600		--	--	--	--	--	--	--	--	--	--	--	120 U	120 U	400 U
PCB-aroclor 1221	NC	NC		--	--	--	--	--	--	--	--	--	--	--	120 U	120 U	400 U
PCB-aroclor 1232	NC	NC		--	--	--	--	--	--	--	--	--	--	--	120 U	120 U	400 U
PCB-aroclor 1242	NC	NC		--	--	--	--	--	--	--	--	--	--	--	120 U	120 U	400 U
PCB-aroclor 1248	NC	NC		--	--	--	--	--	--	--	--	--	--	--	120 U	120 U	400 U
PCB-aroclor 1254	NC	1,600		--	--	--	--	--	--	--	--	--	--	--	120 U	120 U	400 U
PCB-aroclor 1260	NC	NC		--	--	--	--	--	--	--	--	--	--	--	120 UJ	120 UJ	400 UJ

Analyte	MTCA[1] Method A Cleanup Level	MTCA[1] Method B Cleanup Level	Location	MW02	MW03	MW03	MW04	MW04	MW05	MW05	MW06	MW06	MW07	MW07	MW08	MW08	MW09
			Sample Number	032608-10	032608-7	032608-10	032608-6	032608-9	032608-7	032608-9	032708-7	032708-10	032708-7	032708-10	032708-6	032708-9	032708-7
			Date of Collection	3/26/2008	3/26/2008	3/26/2008	3/26/2008	3/26/2008	3/26/2008	3/26/2008	3/27/2008	3/27/2008	3/27/2008	3/27/2008	3/27/2008	3/27/2008	3/27/2008
			Depth Interval	10-10.5	7-7.5	10-10.5	6-6.5	9-9.5	7-7.5	9-9.5	7-7.5	10-10.5	7-7.5	10-10.5	6-6.5	9-9.5	7-7.5
Metals (mg/kg)																	
Arsenic	20	0.67		**7.2**	3.7 U	3.4 U	**7.8**	**7.1**	**7.9**	3.3 U	**5.5**	3.3 U	**9.7**	**8**	3.5 U	3.8 U	3.2 U
Barium	NC	16,000		**40**	**8**	**6.3**	**44**	**38**	**25**	**4.9**	**37**	**10**	**150**	**69**	**6.3**	**7.3**	**4.8**
Cadmium	NC	40		0.76 U	0.62 U	0.57 U	0.58 U	0.67 U	0.56 U	0.55 U	0.69 U	0.55 U	0.63 U	0.6 U	0.59 U	0.64 U	0.53 U
Chromium	NC	NC		**24**	**11**	**11**	**27**	**26**	**12**	**8.7**	**15**	**10**	**36**	**20**	**10**	**12**	**8.6**
Chromium, Hexavalent	19	240		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	250	NC		**29**	1.9 U	1.7 U	**230**	**4.4**	**55**	1.7 U	**63**	**3.2**	**14**	**26**	1.8 U	1.9 U	1.6 U
Mercury	2	24		0.031 U	0.025 U	0.021 U	**0.075**	**0.049**	**0.09**	0.021 U	**0.13**	0.023 U	0.025 U	0.025 U	0.023 U	0.023 U	0.022 U
Selenium	NC	400		7.6 U	6.2 U	5.7 U	5.8 U	6.7 U	5.6 U	5.5 U	6.9 U	5.5 U	6.3 U	6 U	5.9 U	6.4 U	5.3 U
Silver	NC	400		1.5 U	1.2 U	1.1 U	1.2 U	1.3 U	1.1 U	1.1 U	1.4 U	1.1 U	1.3 U	1.2 U	1.2 U	1.3 U	1.1 U
Volatile Organic Compounds (µg/kg)																	
1,1,1,2-Tetrachloroethane	NC	38,000		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
1,1,1-Trichloroethane	2,000	72,000,000		19 U	17 U	19 U	14 U	19 U	29 U	16 U	22 U	16 U	21 U	34 U	17 U	19 U	16 U
1,1,2,2-Tetrachloroethane	NC	5,000		9.7 U	8.5 U	9.4 U	7.1 U	9.3 U	14 U	8 U	11 U	8.2 U	11 U	17 U	8.6 U	9.3 U	7.9 U
1,1,2-Trichloroethane	NC	18,000		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
1,1-Dichloroethane	NC	8,000,000		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
1,1-Dichloroethene	NC	4,000,000		19 U	17 U	19 U	14 U	19 U	29 U	16 U	22 U	16 U	21 U	34 U	17 U	19 U	16 U
1,1-Dichloropropene	NC	NC		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
1,2,3-Trichlorobenzene	NC	NC		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
1,2,3-Trichloropropane	NC	140		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
1,2,4-Trichlorobenzene	NC	800,000		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
1,2,4-Trimethylbenzene	NC	4,000,000		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
1,2-Dibromo-3-Chloropropane	NC	710		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
1,2-Dichlorobenzene	NC	7,200,000		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
1,2-Dichloroethane	NC	11,000		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
1,2-Dichloropropane	NC	15,000		9.7 U	8.5 U	9.4 U	**3 J**	9.3 U	14 U	8 U	11 U	**3.6 J**	11 U	17 U	8.6 U	9.3 U	7.9 U
1,3,5-Trimethylbenzene	NC	4,000,000		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
1,3-Dichlorobenzene	NC	NC		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
1,3-Dichloropropane	NC	NC		19 U	17 U	19 U	14 U	19 U	29 U	16 U	22 U	16 U	21 U	34 U	17 U	19 U	16 U
1,4-Dichlorobenzene	NC	42,000		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
2,2-Dichloropropane	NC	NC		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
2-Butanone	NC	48,000,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Chlorotoluene	NC	1,600,000		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
2-Hexanone	NC	NC		--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Chlorotoluene	NC	NC		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
Acetone	NC	8,000,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzene	30	18,000		9.7 U	8.5 U	9.4 U	7.1 U	9.3 U	14 U	8 U	11 U	**3.9 J**	**70**	**8.9 J**	8.6 U	9.3 U	7.9 U
Bromobenzene	NC	NC		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
Bromochloromethane	NC	NC		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
Bromoform	NC	130,000		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U

Analyte	MTCA[1] Method A Cleanup Level	MTCA[1] Method B Cleanup Level	Location	MW02	MW03	MW03	MW04	MW04	MW05	MW05	MW06	MW06	MW07	MW07	MW08	MW08	MW09
			Sample Number	032608-10	032608-7	032608-10	032608-6	032608-9	032608-7	032608-9	032708-7	032708-10	032708-7	032708-10	032708-6	032708-9	032708-7
			Date of Collection	3/26/2008	3/26/2008	3/26/2008	3/26/2008	3/26/2008	3/26/2008	3/26/2008	3/27/2008	3/27/2008	3/27/2008	3/27/2008	3/27/2008	3/27/2008	3/27/2008
			Depth Interval	10-10.5	7-7.5	10-10.5	6-6.5	9-9.5	7-7.5	9-9.5	7-7.5	10-10.5	7-7.5	10-10.5	6-6.5	9-9.5	7-7.5
Bromomethane	NC	110,000		240 U	210 U	230 U	180 U	230 U	360 U	200 U	280 U	210 U	260 U	420 U	210 U	230 U	200 U
Carbon Disulfide	NC	8,000,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbon Tetrachloride	NC	7,700		19 U	17 U	19 U	14 U	19 U	29 U	16 U	22 U	16 U	21 U	34 U	17 U	19 U	16 U
CFC-11	NC	24,000,000		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
CFC-12	NC	16,000,000		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
Chlorobenzene	NC	1,600,000		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
Chloroethane	NC	350,000		240 U	210 U	230 U	180 U	230 U	360 U	200 U	280 U	210 U	260 U	420 U	210 U	230 U	200 U
Chloroform	NC	160,000		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
Chloromethane	NC	77,000		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
Cis-1,2-Dichloroethene	NC	800,000		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	**170**	85 U	43 U	46 U	40 U
Cis-1,3-Dichloropropene	NC	NC		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
Dibromochloromethane	NC	12,000		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
Dibromomethane	NC	800,000		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
Dichlorobromomethane	NC	16,000		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
Ethylbenzene	6,000	8,000,000		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
Ethylene dibromide	5	12		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
Hexachlorobutadiene	NC	13,000		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
Isopropylbenzene (Cumene)	NC	8,000,000		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
Methyl isobutyl ketone	NC	6,400,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methyl t-butyl ether	100	560,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methylene Chloride	20	130,000		**23 J**	**19 J**	**14 J**	**7.8 J**	**12 J**	**15 J**	**38 J**	**53 J**	**8 J**	**14 J**	**19 J**	**11 J**	**9.2 J**	**15 J**
Naphthalene	5,000	1,600,000		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	**14 J**	43 U	46 U	40 U
n-Butylbenzene	NC	NC		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
n-Propylbenzene	NC	NC		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
p-Isopropyltoluene	NC	NC		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	**4.9 J**	**16 J**	43 U	46 U	40 U
Sec-Butylbenzene	NC	NC		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
Styrene	NC	33,000		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
Tert-Butylbenzene	NC	NC		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
Tetrachloroethene	50	1,900		30 U	27 U	29 U	22 U	29 U	45 U	25 U	35 U	26 U	33 U	53 U	27 U	29 U	25 U
Toluene	7,000	6,400,000		48 U	**9.9 J**	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
Total Xylenes	9,000	16,000,000		96 U	86 U	94 U	72 U	92 U	144 U	80 U	112 U	82 U	106 U	170 U	86 U	92 U	80 U
Trans-1,2-Dichloroethene	NC	1,600,000		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	**29 J**	85 U	43 U	46 U	40 U
Trans-1,3-Dichloropropene	NC	NC		48 U	43 U	47 U	36 U	46 U	72 U	40 U	56 U	41 U	53 U	85 U	43 U	46 U	40 U
Trichloroethene	30	2,500		19 U	**4.6 J**	19 U	14 U	19 U	29 U	**13 J**	22 U	16 U	**45**	34 U	17 U	19 U	16 U
Vinyl Chloride	NC	670		19 U	17 U	19 U	14 U	19 U	29 U	16 U	22 U	16 U	**110**	**34 J**	17 U	19 U	16 U
Semi-Volatile Organic Compounds (µg/kg)																	
1,2,4-Trichlorobenzene	NC	800,000		78 U	62 U	58 U	58 U	65 U	57 U	53 U	66 U	58 U	61 U	62 U	57 U	60 U	52 U
1,2-Dichlorobenzene	NC	7,200,000		78 U	62 U	58 U	58 U	65 U	57 U	53 U	66 U	58 U	61 U	62 U	57 U	60 U	52 U
1,3-Dichlorobenzene	NC	NC		78 U	62 U	58 U	58 U	65 U	57 U	53 U	66 U	58 U	61 U	62 U	57 U	60 U	52 U
1,3-Dinitrobenzene	NC	8,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene	NC	42,000		78 U	62 U	58 U	58 U	65 U	57 U	53 U	66 U	58 U	61 U	62 U	57 U	60 U	52 U
1,4-Dinitro-Benzene	NC	32,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--

Analyte	MTCA[1] Method A Cleanup Level	MTCA[1] Method B Cleanup Level	Location	MW02	MW03	MW03	MW04	MW04	MW05	MW05	MW06	MW06	MW07	MW07	MW08	MW08	MW09
			Sample Number	032608-10	032608-7	032608-10	032608-6	032608-9	032608-7	032608-9	032708-7	032708-10	032708-7	032708-10	032708-6	032708-9	032708-7
			Date of Collection	3/26/2008	3/26/2008	3/26/2008	3/26/2008	3/26/2008	3/26/2008	3/26/2008	3/27/2008	3/27/2008	3/27/2008	3/27/2008	3/27/2008	3/27/2008	3/27/2008
			Depth Interval	10-10.5	7-7.5	10-10.5	6-6.5	9-9.5	7-7.5	9-9.5	7-7.5	10-10.5	7-7.5	10-10.5	6-6.5	9-9.5	7-7.5
2,2'-Oxybis[1-chloropropane]	NC	14,000		230 U	190 U	180 U	170 U	190 U	170 U	160 U	200 U	170 U	180 U	190 U	170 U	180 U	160 U
2,3,4,6-Tetrachlorophenol	NC	2,400,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,3,5,6-Tetrachlorophenol	NC	NC		--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4,5-Trichlorophenol	NC	8,000,000		160 U	120 U	120 U	120 U	130 U	110 U	110 U	130 U	120 U	120 U	120 U	110 U	120 U	100 U
2,4,6-Trichlorophenol	NC	91,000		230 U	190 U	180 U	170 U	190 U	170 U	160 U	200 U	170 U	180 U	190 U	170 U	180 U	160 U
2,4-Dichlorophenol	NC	240,000		160 U	120 U	120 U	120 U	130 U	110 U	110 U	130 U	120 U	120 U	120 U	110 U	120 U	100 U
2,4-Dimethylphenol	NC	1,600,000		160 U	120 U	120 U	120 U	130 U	110 U	110 U	130 U	120 U	120 U	120 U	110 U	120 U	100 U
2,4-Dinitrophenol	NC	160,000		1,600 U	1,200 U	1,200 U	1,200 U	1,300 U	1,100 U	1,100 U	1,300 U	1,200 U	1,200 U	1,200 U	1,100 U	1,200 U	1,000 U
2,4-Dinitrotoluene	NC	160,000		160 U	120 U	120 U	120 U	130 U	110 U	110 U	130 U	120 U	120 U	120 U	110 U	120 U	100 U
2,6-Dinitrotoluene	NC	80,000		160 U	120 U	120 U	120 U	130 U	110 U	110 U	130 U	120 U	120 U	120 U	110 U	120 U	100 U
2-Chloronaphthalene	NC	6,400,000		31 U	25 U	23 U	23 U	26 U	23 U	21 U	26 U	23 U	24 U	25 U	23 U	24 U	21 U
2-Chlorophenol	NC	400,000		160 U	120 U	120 U	120 U	130 U	110 U	110 U	130 U	120 U	120 U	120 U	110 U	120 U	100 U
2-Nitroaniline	NC	NC		160 U	120 U	120 U	120 U	130 U	110 U	110 U	130 U	120 U	120 U	120 U	110 U	120 U	100 U
2-Nitrophenol	NC	NC		160 U	120 U	120 U	120 U	130 U	110 U	110 U	130 U	120 U	120 U	120 U	110 U	120 U	100 U
3,3'-Dichlorobenzidine	NC	2,200		310 U	250 U	230 U	230 U	260 U	230 U	210 U	260 U	230 U	240 U	250 U	230 U	240 U	210 U
4,6-Dinitro-2-Methylphenol	NC	NC		1,600 U	1,200 U	1,200 U	1,200 U	1,300 U	1,100 U	1,100 U	1,300 U	1,200 U	1,200 U	1,200 U	1,100 U	1,200 U	1,000 U
4-Bromophenyl phenyl ether	NC	NC		160 U	120 U	120 U	120 U	130 U	110 U	110 U	130 U	120 U	120 U	120 U	110 U	120 U	100 U
4-Chloro-3-Methylphenol	NC	NC		160 U	120 U	120 U	120 U	130 U	110 U	110 U	130 U	120 U	120 U	120 U	110 U	120 U	100 U
4-Chloroaniline	NC	320,000		160 U	120 U	120 U	120 U	130 U	110 U	110 U	130 U	120 U	120 U	120 U	110 U	120 U	100 U
4-Chlorophenyl-Phenylether	NC	NC		160 U	120 U	120 U	120 U	130 U	110 U	110 U	130 U	120 U	120 U	120 U	110 U	120 U	100 U
4-Nitroaniline	NC	NC		160 U	120 U	120 U	120 U	130 U	110 U	110 U	130 U	120 U	120 U	120 U	110 U	120 U	100 U
4-Nitrophenol	NC	NC		1,600 U	1,200 U	1,200 U	1,200 U	1,300 U	1,100 U	1,100 U	1,300 U	1,200 U	1,200 U	1,200 U	1,100 U	1,200 U	1,000 U
Aniline	NC	180,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzoic Acid	NC	320,000,000		3,900 U	3,100 U	2,900 U	2,900 U	3,200 U	2,900 U	2,600 U	3,300 U	2,900 U	3,000 U	3,100 U	2,800 U	3,000 U	2,600 U
Benzyl Alcohol	NC	24,000,000		160 U	120 U	120 U	120 U	130 U	110 U	110 U	130 U	120 U	120 U	120 U	110 U	120 U	100 U
Bis(2-Chloroethoxy)Methane	NC	NC		160 U	120 U	120 U	120 U	130 U	110 U	110 U	130 U	120 U	120 U	120 U	110 U	120 U	100 U
Bis(2-Chloroethyl)Ether	NC	910		160 U	120 U	120 U	120 U	130 U	110 U	110 U	130 U	120 U	120 U	120 U	110 U	120 U	100 U
Bis(2-chloroisopropyl) ether	NC	3,200,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bis(2-Ethylhexyl) Phthalate	NC	71,000		2,300 U	1,900 U	1,800 U	1,700 U	1,900 U	1,700 U	1,600 U	2,000 U	1,700 U	1,800 U	**4,200**	1,700 U	1,800 U	1,600 U
Butyl benzyl phthalate	NC	16,000,000		160 U	120 U	120 U	120 U	130 U	110 U	110 U	130 U	120 U	120 U	120 U	110 U	120 U	100 U
Carbazole	NC	50,000		230 U	190 U	180 U	170 U	190 U	170 U	160 U	200 U	170 U	180 U	190 U	170 U	180 U	160 U
Dibenzofuran	NC	160,000		160 U	120 U	120 U	120 U	130 U	110 U	110 U	130 U	120 U	120 U	120 U	110 U	120 U	100 U
Dibutyl phthalate	NC	8,000,000		310 U	250 U	230 U	230 U	260 U	230 U	210 U	260 U	230 U	240 U	250 U	230 U	240 U	210 U
Diethyl phthalate	NC	64,000,000		160 U	120 U	120 U	120 U	130 U	110 U	110 U	130 U	120 U	120 U	120 U	110 U	120 U	100 U
Dimethyl phthalate	NC	80,000,000		160 U	120 U	120 U	120 U	130 U	110 U	110 U	130 U	120 U	120 U	120 U	110 U	120 U	100 U
Di-N-Octyl Phthalate	NC	1,600,000		310 U	250 U	230 U	230 U	260 U	230 U	210 U	260 U	230 U	240 U	250 U	230 U	240 U	210 U
Hexachlorobenzene	NC	630		78 U	62 U	58 U	58 U	65 U	57 U	53 U	66 U	58 U	61 U	62 U	57 U	60 U	52 U
Hexachlorobutadiene	NC	13,000		78 U	62 U	58 U	58 U	65 U	57 U	53 U	66 U	58 U	61 U	62 U	57 U	60 U	52 U
Hexachlorocyclopentadiene	NC	480,000		160 U	120 U	120 U	120 U	130 U	110 U	110 U	130 U	120 U	120 U	120 U	110 U	120 U	100 U
Hexachloroethane	NC	71,000		160 U	120 U	120 U	120 U	130 U	110 U	110 U	130 U	120 U	120 U	120 U	110 U	120 U	100 U
Hexanedioic Acid, Bis(2-Ethylhexyl) Ester	NC	830,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Isophorone	NC	1,100,000		160 U	120 U	120 U	120 U	130 U	110 U	110 U	130 U	120 U	120 U	120 U	110 U	120 U	100 U

Analyte	MTCA[1] Method A Cleanup Level	MTCA[1] Method B Cleanup Level	Location	MW02	MW03	MW03	MW04	MW04	MW05	MW05	MW06	MW06	MW07	MW07	MW08	MW08	MW09
			Sample Number	032608-10	032608-7	032608-10	032608-6	032608-9	032608-7	032608-9	032708-7	032708-10	032708-7	032708-10	032708-6	032708-9	032708-7
			Date of Collection	3/26/2008	3/26/2008	3/26/2008	3/26/2008	3/26/2008	3/26/2008	3/26/2008	3/27/2008	3/27/2008	3/27/2008	3/27/2008	3/27/2008	3/27/2008	3/27/2008
			Depth Interval	10-10.5	7-7.5	10-10.5	6-6.5	9-9.5	7-7.5	9-9.5	7-7.5	10-10.5	7-7.5	10-10.5	6-6.5	9-9.5	7-7.5
m-Nitroaniline	NC	NC		160 U	120 U	120 U	120 U	130 U	110 U	110 U	130 U	120 U	120 U	120 U	110 U	120 U	100 U
Naphthalene	5,000	1,600,000		31 U	25 U	23 U	23 U	26 U	23 U	21 U	26 U	23 U	24 U	25 U	23 U	24 U	21 U
Nitrobenzene	NC	40,000		160 U	120 U	120 U	120 U	130 U	110 U	110 U	130 U	120 U	120 U	120 U	110 U	120 U	100 U
N-Nitrosodi-n-propylamine	NC	140		160 U	120 U	120 U	120 U	130 U	110 U	110 U	130 U	120 U	120 U	120 U	110 U	120 U	100 U
N-Nitrosodiphenylamine	NC	200,000		78 U	62 U	58 U	58 U	65 U	57 U	53 U	66 U	58 U	61 U	62 U	57 U	60 U	52 U
o-Cresol	NC	4,000,000		160 U	120 U	120 U	120 U	130 U	110 U	110 U	130 U	120 U	120 U	120 U	110 U	120 U	100 U
p-Cresol	NC	400,000		310 U	250 U	230 U	230 U	260 U	230 U	210 U	260 U	230 U	240 U	250 U	230 U	240 U	210 U
Pentachlorophenol	NC	8,300		160 U	120 U	120 U	120 U	130 U	110 U	110 U	130 U	120 U	120 U	120 U	110 U	120 U	100 U
Phenol	NC	48,000,000		160 U	120 U	120 U	120 U	130 U	110 U	110 U	130 U	120 U	120 U	120 U	110 U	120 U	100 U
Phenol, 3,4-dimethyl	NC	80,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pyridine	NC	80,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Quinoline, 4-nitro-, 1-oxid	NC	NC		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons (µg/kg)																	
1-Methylnaphthalene	NC	24,000		47 U	37 U	35 U	35 U	39 U	34 U	32 U	39 U	35 U	36 U	37 U	34 U	36 U	31 U
2-Methylnaphthalene	NC	320,000		31 U	25 U	23 U	23 U	26 U	23 U	21 U	26 U	23 U	24 U	25 U	23 U	24 U	21 U
Acenaphthene	NC	4,800,000		31 U	25 U	23 U	23 U	26 U	23 U	21 U	26 U	23 U	24 U	25 U	23 U	24 U	21 U
Acenaphthylene	NC	NC		31 U	25 U	23 U	23 U	26 U	23 U	21 U	26 U	23 U	24 U	25 U	23 U	24 U	21 U
Anthracene	NC	24,000,000		31 U	25 U	23 U	23 U	26 U	23 U	21 U	26 U	23 U	24 U	25 U	23 U	24 U	21 U
Benz[a]anthracene[2]	NC	NC		39 U	31 U	29 U	29 U	32 U	29 U	26 U	33 U	29 U	**34**	31 U	28 U	30 U	26 U
Benzo(a)pyrene[2]	100	140		47 U	37 U	35 U	35 U	39 U	34 U	32 U	39 U	35 U	36 U	37 U	34 U	36 U	31 U
Benzo(b)fluoranthene[2]	NC	NC		31 U	25 U	23 U	**38**	26 U	23 U	21 U	26 U	23 U	**32**	25 U	23 U	24 U	21 U
Benzo(ghi)perylene	NC	NC		39 U	31 U	29 U	29 U	32 U	29 U	26 U	33 U	29 U	30 U	31 U	28 U	30 U	26 U
Benzo(k)fluoranthene[2]	NC	NC		39 U	31 U	29 U	29 U	32 U	29 U	26 U	33 U	29 U	30 U	31 U	28 U	30 U	26 U
Chrysene[2]	NC	NC		39 U	31 U	29 U	**30**	32 U	29 U	26 U	33 U	29 U	30 U	31 U	28 U	30 U	26 U
Dibenzo(a,h)anthracene[2]	NC	NC		62 U	50 U	47 U	47 U	52 U	46 U	42 U	53 U	46 U	49 U	49 U	45 U	48 U	41 U
Fluoranthene	NC	3,200,000		31 U	25 U	23 U	**33**	26 U	**27**	21 U	26 U	23 U	**37**	**53**	23 U	24 U	21 U
Fluorene	NC	3,200,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene[2]	NC	NC		62 U	50 U	47 U	47 U	52 U	46 U	42 U	53 U	46 U	49 U	49 U	45 U	48 U	41 U
Naphthalene	5,000	1,600,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenanthrene	NC	NC		31 U	25 U	23 U	23 U	26 U	23 U	21 U	26 U	23 U	24 U	**48**	23 U	24 U	21 U
Pyrene	NC	2,400,000		31 U	25 U	23 U	**33**	26 U	**30**	21 U	26 U	23 U	**49**	**57**	23 U	24 U	21 U
cPAH Toxic Equivalency[3] (ug/kg)	100	140		47 U	37 U	35 U	**10**	39 U	34 U	32 U	39 U	35 U	**7**	37 U	34 U	36 U	31 U
Total Petroleum Hydrocarbons (mg/kg)																	
Gasoline Range Hydrocarbons	30 /100	NC		4.8 U	4.3 U	4.7 U	3.6 U	4.6 U	7.2 U	4 U	5.6 U	4.1 U	5.3 U	8.5 U	4.3 U	4.6 U	4 U
Diesel Range Hydrocarbons	2,000	NC		38 U	31 U	28 U	30 U	33 U	30 U	27 U	**75**	28 U	30 U	**120**	29 U	30 U	26 U
Heavy Oil Range Hydrocarbons	2,000	NC		76 U	63 U	56 U	60 U	66 U	**62**	54 U	**350**	56 U	60 U	**290**	59 U	60 U	52 U
Polychlorinated Biphenyls (µg/kg)																	
PCB-aroclor 1016	NC	5,600		160 U	120 U	120 U	120 U	130 U	120 U	110 U	130 U	110 U	120 U	120 U	110 U	120 U	110 U
PCB-aroclor 1221	NC	NC		160 U	120 U	120 U	120 U	130 U	120 U	110 U	130 U	110 U	120 U	120 U	110 U	120 U	110 U
PCB-aroclor 1232	NC	NC		160 U	120 U	120 U	120 U	130 U	120 U	110 U	130 U	110 U	120 U	120 U	110 U	120 U	110 U
PCB-aroclor 1242	NC	NC		160 U	120 U	120 U	120 U	130 U	120 U	110 U	130 U	110 U	120 U	120 U	110 U	120 U	110 U
PCB-aroclor 1248	NC	NC		160 U	120 U	120 U	120 U	130 U	120 U	110 U	130 U	110 U	120 U	120 U	110 U	120 U	110 U
PCB-aroclor 1254	NC	1,600		160 U	120 U	120 U	120 U	130 U	120 U	110 U	130 U	110 U	120 U	120 U	110 U	120 U	110 U
PCB-aroclor 1260	NC	NC		160 UJ	120 UJ	120 UJ	120 UJ	130 UJ	120 UJ	110 UJ	130 UJ	110 UJ	120 UJ	120 UJ	110 UJ	120 UJ	110 UJ

Analyte	MTCA[1] Method A Cleanup Level	MTCA[1] Method B Cleanup Level	Location	MW09	MW10	MW10	MW11	MW11	MW12	MW12	MW13	MW-13	MW14	MW14	MW15	MW15	MW16
			Sample Number	032708-10	103108-3	103108-7	103008-8	103008-8	103108-4.5	103108-8	103008-3	103008-8	103108-4	103108-8	103108-3	103108-5	103108-5
			Date of Collection	3/27/2008	10/31/2008	10/31/2008	10/30/2008	10/30/2008	10/31/2008	10/31/2008	10/30/2008	10/30/2008	10/31/2008	10/31/2008	10/31/2008	10/31/2008	10/31/2008
			Depth Interval	10-10.5	3-3.5	7-7.5	3-3.5	8-8.5	4-4.5	8-8.5	3-3.5	8-8.5	4-4.5	8-8.5	3-3.5	5-5.5	5-5.5
Metals (mg/kg)																	
Arsenic	20	0.67		3.8 U	**1.1**	5 U	**1.6**	5 U	1 U	1 U	**1.3**	**1.4**	**1.7**	**1**	**2.1**	1 U	1 U
Barium	NC	16,000		**9**	--	--	--	--	--	--	--	--	--	--	--	--	--
Cadmium	NC	40		0.63 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Chromium	NC	NC		**11**	--	--	--	--	--	--	--	--	--	--	--	--	--
Chromium, Hexavalent	19	240		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Lead	250	NC		**2.1**	**8.1**	**1.2**	1.1 U	1 U	**1.3**	**1.4**	**4**	**2**	**1.7**	**1**	**510**	5 U	5 U
Mercury	2	24		0.025 U	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**
Selenium	NC	400		6.3 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Silver	NC	400		1.3 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Volatile Organic Compounds (µg/kg)																	
1,1,1,2-Tetrachloroethane	NC	38,000		46 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
1,1,1-Trichloroethane	2,000	72,000,000		18 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
1,1,2,2-Tetrachloroethane	NC	5,000		9.2 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
1,1,2-Trichloroethane	NC	18,000		46 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
1,1-Dichloroethane	NC	8,000,000		46 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
1,1-Dichloroethene	NC	4,000,000		18 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
1,1-Dichloropropene	NC	NC		46 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
1,2,3-Trichlorobenzene	NC	NC		46 U	100 U	**120**	100 U	100 U	100 U	100 U	100 U	--	100 U	100 U	100 U	100 U	100 U
1,2,3-Trichloropropane	NC	140		46 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
1,2,4-Trichlorobenzene	NC	800,000		46 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	--	100 U	100 U	100 U	100 U	100 U
1,2,4-Trimethylbenzene	NC	4,000,000		46 U	**53**	**110**	50 U	50 U	**66**	50 U	50 U	--	50 U	**89**	**100**	**60**	**78**
1,2-Dibromo-3-Chloropropane	NC	710		46 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
1,2-Dichlorobenzene	NC	7,200,000		46 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
1,2-Dichloroethane	NC	11,000		46 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
1,2-Dichloropropane	NC	15,000		**2.9 J**	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
1,3,5-Trimethylbenzene	NC	4,000,000		46 U	50 U	**81**	50 U	50 U	**62**	50 U	50 U	--	50 U	**66**	**65**	50 U	**63**
1,3-Dichlorobenzene	NC	NC		46 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
1,3-Dichloropropane	NC	NC		18 U	--	--	--	--	--	--	--	--	--	--	--	--	--
1,4-Dichlorobenzene	NC	42,000		46 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
2,2-Dichloropropane	NC	NC		46 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
2-Butanone	NC	48,000,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Chlorotoluene	NC	1,600,000		46 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
2-Hexanone	NC	NC		--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Chlorotoluene	NC	NC		46 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
Acetone	NC	8,000,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzene	30	18,000		9.2 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	--	20 U	20 U	**160**	20 U	20 U
Bromobenzene	NC	NC		46 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
Bromochloromethane	NC	NC		46 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
Bromoform	NC	130,000		46 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U

Analyte	MTCA[1] Method A Cleanup Level	MTCA[1] Method B Cleanup Level	Location	MW09	MW10	MW10	MW11	MW11	MW12	MW12	MW13	MW-13	MW14	MW14	MW15	MW15	MW16
			Sample Number	032708-10	103108-3	103108-7	103008-8	103008-8	103108-4.5	103108-8	103008-3	103008-8	103108-4	103108-8	103108-3	103108-5	103108-5
			Date of Collection	3/27/2008	10/31/2008	10/31/2008	10/30/2008	10/30/2008	10/31/2008	10/31/2008	10/30/2008	10/30/2008	10/31/2008	10/31/2008	10/31/2008	10/31/2008	10/31/2008
			Depth Interval	10-10.5	3-3.5	7-7.5	3-3.5	8-8.5	4-4.5	8-8.5	3-3.5	8-8.5	4-4.5	8-8.5	3-3.5	5-5.5	5-5.5
Bromomethane	NC	110,000		230 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
Carbon Disulfide	NC	8,000,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbon Tetrachloride	NC	7,700		18 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
CFC-11	NC	24,000,000		46 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
CFC-12	NC	16,000,000		46 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
Chlorobenzene	NC	1,600,000		46 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
Chloroethane	NC	350,000		230 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
Chloroform	NC	160,000		46 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
Chloromethane	NC	77,000		46 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
Cis-1,2-Dichloroethene	NC	800,000		46 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
Cis-1,3-Dichloropropene	NC	NC		46 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
Dibromochloromethane	NC	12,000		46 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
Dibromomethane	NC	800,000		46 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
Dichlorobromomethane	NC	16,000		46 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
Ethylbenzene	6,000	8,000,000		46 U	50 U	**72**	50 U	50 U	50 U	50 U	50 U	--	50 U	**68**	**120**	50 U	**77**
Ethylene dibromide	5	12		46 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
Hexachlorobutadiene	NC	13,000		46 U	100 U	100 U	100 U	100 U	100 U	100 U	100 U	--	100 U	100 U	100 U	100 U	100 U
Isopropylbenzene (Cumene)	NC	8,000,000		46 U	50 U	**71**	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
Methyl isobutyl ketone	NC	6,400,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methyl t-butyl ether	100	560,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Methylene Chloride	20	130,000		**9.1 J**	20 U	20 U	20 U	20 U	20 U	20 U	20 U	--	20 U	20 U	20 U	20 U	20 U
Naphthalene	5,000	1,600,000		46 U	100 U	100 U	100 U	100 U	**120**	100 U	100 U	--	100 U	100 U	100 U	100 U	100 U
n-Butylbenzene	NC	NC		46 U	50 U	**74**	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	**51**	50 U	50 U
n-Propylbenzene	NC	NC		46 U	50 U	**75**	50 U	50 U	**63**	50 U	50 U	--	**84**	**64**	**70**	50 U	50 U
p-Isopropyltoluene	NC	NC		46 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
Sec-Butylbenzene	NC	NC		46 U	50 U	**71**	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
Styrene	NC	33,000		46 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
Tert-Butylbenzene	NC	NC		46 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
Tetrachloroethene	50	1,900		29 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	--	20 U	20 U	20 U	20 U	**230**
Toluene	7,000	6,400,000		46 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	**82**	**700**	50 U	**170**
Total Xylenes	9,000	16,000,000		92 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Trans-1,2-Dichloroethene	NC	1,600,000		46 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
Trans-1,3-Dichloropropene	NC	NC		46 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
Trichloroethene	30	2,500		18 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	--	20 U	20 U	20 U	20 U	20 U
Vinyl Chloride	NC	670		18 U	50 U	50 U	50 U	50 U	50 U	50 U	50 U	--	50 U	50 U	50 U	50 U	50 U
Semi-Volatile Organic Compounds (µg/kg)																	
1,2,4-Trichlorobenzene	NC	800,000		60 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
1,2-Dichlorobenzene	NC	7,200,000		60 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
1,3-Dichlorobenzene	NC	NC		60 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
1,3-Dinitrobenzene	NC	8,000		--	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U
1,4-Dichlorobenzene	NC	42,000		60 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
1,4-Dinitro-Benzene	NC	32,000		--	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U

Analyte	MTCA[1] Method A Cleanup Level	MTCA[1] Method B Cleanup Level	Location	MW09	MW10	MW10	MW11	MW11	MW12	MW12	MW13	MW-13	MW14	MW14	MW15	MW15	MW16
			Sample Number	032708-10	103108-3	103108-7	103008-8	103008-8	103108-4.5	103108-8	103008-3	103008-8	103108-4	103108-8	103108-3	103108-5	103108-5
			Date of Collection	3/27/2008	10/31/2008	10/31/2008	10/30/2008	10/30/2008	10/31/2008	10/31/2008	10/30/2008	10/30/2008	10/31/2008	10/31/2008	10/31/2008	10/31/2008	10/31/2008
			Depth Interval	10-10.5	3-3.5	7-7.5	3-3.5	8-8.5	4-4.5	8-8.5	3-3.5	8-8.5	4-4.5	8-8.5	3-3.5	5-5.5	5-5.5
2,2'-Oxybis[1-chloropropane]	NC	14,000		180 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U
2,3,4,6-Tetrachlorophenol	NC	2,400,000		--	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
2,3,5,6-Tetrachlorophenol	NC	NC		--	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
2,4,5-Trichlorophenol	NC	8,000,000		120 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U
2,4,6-Trichlorophenol	NC	91,000		180 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U
2,4-Dichlorophenol	NC	240,000		120 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U
2,4-Dimethylphenol	NC	1,600,000		120 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
2,4-Dinitrophenol	NC	160,000		1,200 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U
2,4-Dinitrotoluene	NC	160,000		120 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
2,6-Dinitrotoluene	NC	80,000		120 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
2-Chloronaphthalene	NC	6,400,000		24 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
2-Chlorophenol	NC	400,000		120 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
2-Nitroaniline	NC	NC		120 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U
2-Nitrophenol	NC	NC		120 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U
3,3'-Dichlorobenzidine	NC	2,200		240 U	--	--	--	--	--	--	--	--	--	--	--	--	--
4,6-Dinitro-2-Methylphenol	NC	NC		1,200 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U
4-Bromophenyl phenyl ether	NC	NC		120 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
4-Chloro-3-Methylphenol	NC	NC		120 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U
4-Chloroaniline	NC	320,000		120 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U
4-Chlorophenyl-Phenylether	NC	NC		120 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
4-Nitroaniline	NC	NC		120 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U
4-Nitrophenol	NC	NC		1,200 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U
Aniline	NC	180,000		--	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Benzoic Acid	NC	320,000,000		3,000 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzyl Alcohol	NC	24,000,000		120 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Bis(2-Chloroethoxy)Methane	NC	NC		120 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Bis(2-Chloroethyl)Ether	NC	910		120 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Bis(2-chloroisopropyl) ether	NC	3,200,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bis(2-Ethylhexyl) Phthalate	NC	71,000		1,800 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Butyl benzyl phthalate	NC	16,000,000		120 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Carbazole	NC	50,000		180 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Dibenzofuran	NC	160,000		120 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Dibutyl phthalate	NC	8,000,000		240 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Diethyl phthalate	NC	64,000,000		120 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Dimethyl phthalate	NC	80,000,000		120 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Di-N-Octyl Phthalate	NC	1,600,000		240 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Hexachlorobenzene	NC	630		60 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Hexachlorobutadiene	NC	13,000		60 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Hexachlorocyclopentadiene	NC	480,000		120 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Hexachloroethane	NC	71,000		120 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Hexanedioic Acid, Bis(2-Ethylhexyl) Ester	NC	830,000		--	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Isophorone	NC	1,100,000		120 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U

Analyte	MTCA[1] Method A Cleanup Level	MTCA[1] Method B Cleanup Level	Location	MW09	MW10	MW10	MW11	MW11	MW12	MW12	MW13	MW-13	MW14	MW14	MW15	MW15	MW16
			Sample Number	032708-10	103108-3	103108-7	103008-8	103008-8	103108-4.5	103108-8	103008-3	103008-8	103108-4	103108-8	103108-3	103108-5	103108-5
			Date of Collection	3/27/2008	10/31/2008	10/31/2008	10/30/2008	10/30/2008	10/31/2008	10/31/2008	10/30/2008	10/30/2008	10/31/2008	10/31/2008	10/31/2008	10/31/2008	10/31/2008
			Depth Interval	10-10.5	3-3.5	7-7.5	3-3.5	8-8.5	4-4.5	8-8.5	3-3.5	8-8.5	4-4.5	8-8.5	3-3.5	5-5.5	5-5.5
m-Nitroaniline	NC	NC		120 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U
Naphthalene	5,000	1,600,000		24 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Nitrobenzene	NC	40,000		120 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
N-Nitrosodi-n-propylamine	NC	140		120 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
N-Nitrosodiphenylamine	NC	200,000		60 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
o-Cresol	NC	4,000,000		120 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
p-Cresol	NC	400,000		240 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Pentachlorophenol	NC	8,300		120 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U
Phenol	NC	48,000,000		120 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Phenol, 3,4-dimethyl	NC	80,000		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pyridine	NC	80,000		--	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Quinoline, 4-nitro-, 1-oxid	NC	NC		--	--	--	--	--	--	--	--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons (µg/kg)																	
1-Methylnaphthalene	NC	24,000		36 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	**50**	10 U	10 U
2-Methylnaphthalene	NC	320,000		24 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	**140**	10 U	10 U
Acenaphthene	NC	4,800,000		24 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	**70**	**50**	10 U	10 U	10 U
Acenaphthylene	NC	NC		24 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Anthracene	NC	24,000,000		24 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benz[a]anthracene[2]	NC	NC		30 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(a)pyrene[2]	100	140		36 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(b)fluoranthene[2]	NC	NC		24 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(ghi)perylene	NC	NC		30 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene[2]	NC	NC		30 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Chrysene[2]	NC	NC		30 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Dibenzo(a,h)anthracene[2]	NC	NC		48 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Fluoranthene	NC	3,200,000		24 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	**80**	10 U	10 U
Fluorene	NC	3,200,000		--	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene[2]	NC	NC		48 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Naphthalene	5,000	1,600,000		--	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	**240**	10 U	10 U
Phenanthrene	NC	NC		24 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Pyrene	NC	2,400,000		**29**	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	**80**	10 U	10 U
cPAH Toxic Equivalency[3] (ug/kg)	100	140		36 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Total Petroleum Hydrocarbons (mg/kg)																	
Gasoline Range Hydrocarbons	30 /100	NC		4.6 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Diesel Range Hydrocarbons	2,000	NC		30 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Heavy Oil Range Hydrocarbons	2,000	NC		61 U	--	--	--	--	--	--	--	--	--	--	--	--	--
Polychlorinated Biphenyls (µg/kg)																	
PCB-aroclor 1016	NC	5,600		120 U	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-aroclor 1221	NC	NC		120 U	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-aroclor 1232	NC	NC		120 U	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-aroclor 1242	NC	NC		120 U	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-aroclor 1248	NC	NC		120 U	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-aroclor 1254	NC	1,600		120 U	--	--	--	--	--	--	--	--	--	--	--	--	--
PCB-aroclor 1260	NC	NC		120 UJ	--	--	--	--	--	--	--	--	--	--	--	--	--

Analyte	MTCA[1] Method A Cleanup Level	MTCA[1] Method B Cleanup Level	Location	MW16	PP18	PP18	PP19	PP19	PP20	PP20
			Sample Number	103108-10	103008-3	103008-10	103008-3	103008-6	103008-3	103008-9
			Date of Collection	10/31/2008	10/30/2008	10/30/2008	10/30/2008	10/30/2008	10/30/2008	10/30/2008
			Depth Interval	10-10.5	3-3.5	10-10.5	3-3.5	6-6.5	3-3.5	9-9.5
Metals (mg/kg)										
Arsenic	20	0.67		1 U	**1.8**	**1.3**	**1.3**	1 U	**1.5**	1 U
Barium	NC	16,000		--	--	--	--	--	--	--
Cadmium	NC	40		--	--	--	--	--	--	--
Chromium	NC	NC		--	--	--	--	--	--	--
Chromium, Hexavalent	19	240		--	--	--	--	--	--	--
Lead	250	NC		**4.4**	**1.3**	**7.1**	**46**	**1.6**	**20**	**1.6**
Mercury	2	24		**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**
Selenium	NC	400		--	--	--	--	--	--	--
Silver	NC	400		--	--	--	--	--	--	--
Volatile Organic Compounds (µg/kg)										
1,1,1,2-Tetrachloroethane	NC	38,000		50 U	50 U	50 U	50 U	50 U	50 U	50 U
1,1,1-Trichloroethane	2,000	72,000,000		50 U	50 U	50 U	50 U	50 U	50 U	50 U
1,1,2,2-Tetrachloroethane	NC	5,000		50 U	50 U	50 U	50 U	50 U	50 U	50 U
1,1,2-Trichloroethane	NC	18,000		50 U	50 U	50 U	50 U	50 U	50 U	50 U
1,1-Dichloroethane	NC	8,000,000		50 U	50 U	50 U	50 U	50 U	50 U	50 U
1,1-Dichloroethene	NC	4,000,000		50 U	50 U	50 U	50 U	50 U	50 U	50 U
1,1-Dichloropropene	NC	NC		50 U	50 U	50 U	50 U	50 U	50 U	50 U
1,2,3-Trichlorobenzene	NC	NC		100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,2,3-Trichloropropane	NC	140		50 U	50 U	50 U	50 U	50 U	50 U	50 U
1,2,4-Trichlorobenzene	NC	800,000		100 U	100 U	100 U	100 U	100 U	100 U	100 U
1,2,4-Trimethylbenzene	NC	4,000,000		**110**	50 U	50 U	50 U	50 U	50 U	50 U
1,2-Dibromo-3-Chloropropane	NC	710		50 U	50 U	50 U	50 U	50 U	50 U	50 U
1,2-Dichlorobenzene	NC	7,200,000		50 U	50 U	50 U	50 U	50 U	50 U	50 U
1,2-Dichloroethane	NC	11,000		50 U	50 U	50 U	50 U	50 U	50 U	50 U
1,2-Dichloropropane	NC	15,000		50 U	50 U	50 U	50 U	50 U	50 U	50 U
1,3,5-Trimethylbenzene	NC	4,000,000		**74**	50 U	50 U	50 U	50 U	50 U	50 U
1,3-Dichlorobenzene	NC	NC		50 U	50 U	50 U	50 U	50 U	50 U	50 U
1,3-Dichloropropane	NC	NC		--	--	--	--	--	--	--
1,4-Dichlorobenzene	NC	42,000		50 U	50 U	50 U	50 U	50 U	50 U	50 U
2,2-Dichloropropane	NC	NC		50 U	50 U	50 U	50 U	50 U	50 U	50 U
2-Butanone	NC	48,000,000		--	--	--	--	--	--	--
2-Chlorotoluene	NC	1,600,000		50 U	50 U	50 U	50 U	50 U	50 U	50 U
2-Hexanone	NC	NC		--	--	--	--	--	--	--
4-Chlorotoluene	NC	NC		50 U	50 U	50 U	50 U	50 U	50 U	50 U
Acetone	NC	8,000,000		--	--	--	--	--	--	--
Benzene	30	18,000		20 U	20 U	20 U	20 U	20 U	20 U	20 U
Bromobenzene	NC	NC		50 U	50 U	50 U	50 U	50 U	50 U	50 U
Bromochloromethane	NC	NC		50 U	50 U	50 U	50 U	50 U	50 U	50 U
Bromoform	NC	130,000		50 U	50 U	50 U	50 U	50 U	50 U	50 U
Bromomethane	NC	110,000		50 U	50 U	50 U	50 U	50 U	50 U	50 U
Carbon Disulfide	NC	8,000,000		--	--	--	--	--	--	--

Analyte	MTCA[1] Method A Cleanup Level	MTCA[1] Method B Cleanup Level	Location	MW16	PP18	PP18	PP19	PP19	PP20	PP20
			Sample Number	103108-10	103008-3	103008-10	103008-3	103008-6	103008-3	103008-9
			Date of Collection	10/31/2008	10/30/2008	10/30/2008	10/30/2008	10/30/2008	10/30/2008	10/30/2008
			Depth Interval	10-10.5	3-3.5	10-10.5	3-3.5	6-6.5	3-3.5	9-9.5
Carbon Tetrachloride	NC	7,700		50 U	50 U	50 U	50 U	50 U	50 U	50 U
CFC-11	NC	24,000,000		50 U	50 U	50 U	50 U	50 U	50 U	50 U
CFC-12	NC	16,000,000		50 U	50 U	50 U	50 U	50 U	50 U	50 U
Chlorobenzene	NC	1,600,000		50 U	50 U	50 U	50 U	50 U	50 U	50 U
Chloroethane	NC	350,000		50 U	50 U	50 U	50 U	50 U	50 U	50 U
Chloroform	NC	160,000		50 U	50 U	50 U	50 U	50 U	50 U	50 U
Chloromethane	NC	77,000		50 U	50 U	50 U	50 U	50 U	50 U	50 U
Cis-1,2-Dichloroethene	NC	800,000		50 U	50 U	50 U	50 U	50 U	50 U	50 U
Cis-1,3-Dichloropropene	NC	NC		50 U	50 U	50 U	50 U	50 U	50 U	50 U
Dibromochloromethane	NC	12,000		50 U	50 U	50 U	50 U	50 U	50 U	50 U
Dibromomethane	NC	800,000		50 U	50 U	50 U	50 U	50 U	50 U	50 U
Dichlorobromomethane	NC	16,000		50 U	50 U	50 U	50 U	50 U	50 U	50 U
Ethylbenzene	6,000	8,000,000		**75**	50 U	50 U	50 U	50 U	50 U	50 U
Ethylene dibromide	5	12		50 U	50 U	50 U	50 U	50 U	50 U	50 U
Hexachlorobutadiene	NC	13,000		100 U	100 U	100 U	100 U	100 U	100 U	100 U
Isopropylbenzene (Cumene)	NC	8,000,000		50 U	50 U	50 U	50 U	50 U	50 U	50 U
Methyl isobutyl ketone	NC	6,400,000		--	--	--	--	--	--	--
Methyl t-butyl ether	100	560,000		--	--	--	--	--	--	--
Methylene Chloride	20	130,000		20 U	20 U	20 U	20 U	20 U	20 U	20 U
Naphthalene	5,000	1,600,000		100 U	100 U	100 U	100 U	100 U	100 U	100 U
n-Butylbenzene	NC	NC		50 U	50 U	50 U	50 U	50 U	50 U	50 U
n-Propylbenzene	NC	NC		**74**	50 U	50 U	50 U	50 U	50 U	50 U
p-Isopropyltoluene	NC	NC		50 U	50 U	50 U	50 U	50 U	50 U	50 U
Sec-Butylbenzene	NC	NC		50 U	50 U	50 U	50 U	50 U	50 U	50 U
Styrene	NC	33,000		50 U	50 U	50 U	50 U	50 U	50 U	50 U
Tert-Butylbenzene	NC	NC		50 U	50 U	50 U	50 U	50 U	50 U	50 U
Tetrachloroethene	50	1,900		20 U	20 U	20 U	20 U	20 U	20 U	20 U
Toluene	7,000	6,400,000		**72**	50 U	50 U	50 U	50 U	50 U	50 U
Total Xylenes	9,000	16,000,000		--	--	--	--	--	--	--
Trans-1,2-Dichloroethene	NC	1,600,000		50 U	50 U	50 U	50 U	50 U	50 U	50 U
Trans-1,3-Dichloropropene	NC	NC		50 U	50 U	50 U	50 U	50 U	50 U	50 U
Trichloroethene	30	2,500		20 U	20 U	20 U	20 U	20 U	20 U	20 U
Vinyl Chloride	NC	670		50 U	50 U	50 U	50 U	50 U	50 U	50 U
Semi-Volatile Organic Compounds (µg/kg)										
1,2,4-Trichlorobenzene	NC	800,000		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
1,2-Dichlorobenzene	NC	7,200,000		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
1,3-Dichlorobenzene	NC	NC		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
1,3-Dinitrobenzene	NC	8,000		5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U
1,4-Dichlorobenzene	NC	42,000		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
1,4-Dinitro-Benzene	NC	32,000		5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U
2,2'-Oxybis[1-chloropropane]	NC	14,000		5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U
2,3,4,6-Tetrachlorophenol	NC	2,400,000		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
2,3,5,6-Tetrachlorophenol	NC	NC		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
2,4,5-Trichlorophenol	NC	8,000,000		5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U
2,4,6-Trichlorophenol	NC	91,000		5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U
2,4-Dichlorophenol	NC	240,000		5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U

Analyte	MTCA[1] Method A Cleanup Level	MTCA[1] Method B Cleanup Level	Location	MW16	PP18	PP18	PP19	PP19	PP20	PP20
			Sample Number	103108-10	103008-3	103008-10	103008-3	103008-6	103008-3	103008-9
			Date of Collection	10/31/2008	10/30/2008	10/30/2008	10/30/2008	10/30/2008	10/30/2008	10/30/2008
			Depth Interval	10-10.5	3-3.5	10-10.5	3-3.5	6-6.5	3-3.5	9-9.5
2,4-Dimethylphenol	NC	1,600,000		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
2,4-Dinitrophenol	NC	160,000		5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U
2,4-Dinitrotoluene	NC	160,000		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
2,6-Dinitrotoluene	NC	80,000		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
2-Chloronaphthalene	NC	6,400,000		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
2-Chlorophenol	NC	400,000		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
2-Nitroaniline	NC	NC		5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U
2-Nitrophenol	NC	NC		5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U
3,3'-Dichlorobenzidine	NC	2,200		--	--	--	--	--	--	--
4,6-Dinitro-2-Methylphenol	NC	NC		5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U
4-Bromophenyl phenyl ether	NC	NC		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
4-Chloro-3-Methylphenol	NC	NC		5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U
4-Chloroaniline	NC	320,000		5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U
4-Chlorophenyl-Phenylether	NC	NC		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
4-Nitroaniline	NC	NC		5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U
4-Nitrophenol	NC	NC		5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U
Aniline	NC	180,000		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Benzoic Acid	NC	320,000,000		--	--	--	--	--	--	--
Benzyl Alcohol	NC	24,000,000		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Bis(2-Chloroethoxy)Methane	NC	NC		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Bis(2-Chloroethyl)Ether	NC	910		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Bis(2-chloroisopropyl) ether	NC	3,200,000		--	--	--	--	--	--	--
Bis(2-Ethylhexyl) Phthalate	NC	71,000		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Butyl benzyl phthalate	NC	16,000,000		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Carbazole	NC	50,000		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Dibenzofuran	NC	160,000		1,000 U	1,000 U	1,000 U	**300**	1,000 U	1,000 U	1,000 U
Dibutyl phthalate	NC	8,000,000		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Diethyl phthalate	NC	64,000,000		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Dimethyl phthalate	NC	80,000,000		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Di-N-Octyl Phthalate	NC	1,600,000		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Hexachlorobenzene	NC	630		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Hexachlorobutadiene	NC	13,000		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Hexachlorocyclopentadiene	NC	480,000		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Hexachloroethane	NC	71,000		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Hexanedioic Acid, Bis(2-Ethylhexyl) Ester	NC	830,000		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Isophorone	NC	1,100,000		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
m-Nitroaniline	NC	NC		5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U
Naphthalene	5,000	1,600,000		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Nitrobenzene	NC	40,000		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
N-Nitrosodi-n-propylamine	NC	140		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
N-Nitrosodiphenylamine	NC	200,000		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
o-Cresol	NC	4,000,000		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
p-Cresol	NC	400,000		--	--	--	--	--	--	--
Pentachlorophenol	NC	8,300		5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U	5,000 U
Phenol	NC	48,000,000		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Phenol, 3,4-dimethyl	NC	80,000		--	--	--	--	--	--	--

Analyte	MTCA[1] Method A Cleanup Level	MTCA[1] Method B Cleanup Level	Location	MW16	PP18	PP18	PP19	PP19	PP20	PP20
			Sample Number	103108-10	103008-3	103008-10	103008-3	103008-6	103008-3	103008-9
			Date of Collection	10/31/2008	10/30/2008	10/30/2008	10/30/2008	10/30/2008	10/30/2008	10/30/2008
			Depth Interval	10-10.5	3-3.5	10-10.5	3-3.5	6-6.5	3-3.5	9-9.5
Pyridine	NC	80,000		1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U	1,000 U
Quinoline, 4-nitro-, 1-oxid	NC	NC		--	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons (µg/kg)										
1-Methylnaphthalene	NC	24,000		10 U	10 U	10 U	**70**	10 U	10 U	10 U
2-Methylnaphthalene	NC	320,000		10 U	10 U	10 U	**70**	10 U	10 U	10 U
Acenaphthene	NC	4,800,000		10 U	10 U	10 U	**350**	10 U	10 U	10 U
Acenaphthylene	NC	NC		10 U	10 U	10 U	**100**	10 U	10 U	10 U
Anthracene	NC	24,000,000		10 U	10 U	**180**	**2,000**	10 U	**30**	10 U
Benz[a]anthracene[2]	NC	NC		10 U	10 U	10 U	**260**	10 U	10 U	10 U
Benzo(a)pyrene[2]	100	140		10 U	10 U	10 U	**4,200**	10 U	10 U	10 U
Benzo(b)fluoranthene[2]	NC	NC		10 U	10 U	10 U	**750**	10 U	10 U	10 U
Benzo(ghi)perylene	NC	NC		10 U	10 U	10 U	**1,800**	10 U	10 U	10 U
Benzo(k)fluoranthene[2]	NC	NC		10 U	10 U	10 U	**2,300**	10 U	10 U	10 U
Chrysene[2]	NC	NC		10 U	10 U	10 U	**4,300**	10 U	10 U	10 U
Dibenzo(a,h)anthracene[2]	NC	NC		10 U	10 U	10 U	**260**	10 U	10 U	10 U
Fluoranthene	NC	3,200,000		10 U	10 U	**1,200**	**8,500**	10 U	**140**	10 U
Fluorene	NC	3,200,000		10 U	10 U	10 U	**1,100**	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene[2]	NC	NC		10 U	10 U	10 U	**2,600**	10 U	10 U	10 U
Naphthalene	5,000	1,600,000		10 U	10 U	10 U	10 U	10 U	10 U	10 U
Phenanthrene	NC	NC		10 U	10 U	**520**	**8,200**	10 U	**200**	10 U
Pyrene	NC	2,400,000		10 U	10 U	**1,200**	**7,500**	10 U	**180**	10 U
cPAH Toxic Equivalency[3] (ug/kg)	100	140		10 U	10 U	10 U	**4,860**	10 U	10 U	10 U
Total Petroleum Hydrocarbons (mg/kg)										
Gasoline Range Hydrocarbons	30 /100	NC		--	--	--	--	--	--	--
Diesel Range Hydrocarbons	2,000	NC		--	--	--	--	--	--	--
Heavy Oil Range Hydrocarbons	2,000	NC		--	--	--	--	--	--	--
Polychlorinated Biphenyls (µg/kg)										
PCB-aroclor 1016	NC	5,600		--	--	--	--	--	--	--
PCB-aroclor 1221	NC	NC		--	--	--	--	--	--	--
PCB-aroclor 1232	NC	NC		--	--	--	--	--	--	--
PCB-aroclor 1242	NC	NC		--	--	--	--	--	--	--
PCB-aroclor 1248	NC	NC		--	--	--	--	--	--	--
PCB-aroclor 1254	NC	1,600		--	--	--	--	--	--	--
PCB-aroclor 1260	NC	NC		--	--	--	--	--	--	--

Notes:

[1] Model Toxics Control Act (MTCA) Cleanup Regulation Chapter 173-340 WAC.

[2] Considered a carcinogen polycyclic aromatic hydrocarbon under WAC 173-340-708 (8)(e).

[3] cPAH testing and regulatory evaluation is completed for individual carcinogenic compounds as well as the for the summation of the mixture of the seven carcinogenic PAHs (known as Ecology's toxicity equivalency methodology). The summation procedure is completed using toxicity equivalency factors for each individual compound which are then added to produce a toxicity equivalency quotient (TEQ), which is then compared to the MTCA cleanup level of 0.1 mg/kg (or 100 µg/kg). Calculations were performed on samples with detections only.

U = The analyte was not detected at a concentration greater than the given reporting limit as shown

J = The analyte concentration is estimated

B = The analyte was found in the method blank

R = The result for the analyte was rejected, and determined to not be usable during data validation

mg/kg = milligram per kilogram

µg/kg = microgram per kilogram

NC = Cleanup level not established by Ecology

-- = Indicates that the chemical analysis was not performed

Values presented in **bold** indicate the chemical was detected

Highlighted items indicate that the chemical concentration is greater than the MTCA cleanup level

TABLE E-2
CHEMICAL ANALYTICAL RESULTS FOR GROUNDWATER - MARCH/APRIL
318 STATE AVENUE NE
OLYMPIA, WASHINGTON

Analyte	MTCA[1] Cleanup Level	MW01 3/31/2008	MW02 3/31/2008	MW03 3/31/2008	MW04 3/31/2008	MW05 3/31/2008	MW06 3/31/2008	MW07 3/31/2008	MW08 4/1/2008	MW09 4/1/2008
Total Metals (mg/l)										
Arsenic	0.005[2]	**0.0079**	**0.0025**	0.002 U	0.002 U	**0.0061**	0.002 U	**0.0032**	0.002 U	**0.0034**
Barium	3.2[3]	**0.028**	**0.029**	**0.012**	**0.047**	**0.041**	**0.025**	**0.036**	**0.031**	**0.023**
Cadmium	0.005[2]	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Chromium	0.05[2]	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U
Lead	0.015[2]	0.002 U	0.002 U	0.002 U	0.002 U	**0.0039**	0.002 U	0.002 U	0.002 U	0.002 U
Mercury	0.002[2]	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Selenium	0.08[3]	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Silver	0.08[3]	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Dissolved Metals (mg/l)										
Arsenic	0.005[2]	**0.0053**	0.002 U	0.002 U	0.002 U	**0.0047**	0.002 U	**0.0025**	0.002 U	**0.0029**
Barium	3.2[3]	**0.015**	**0.025**	0.01 U	**0.028**	**0.038**	**0.013**	**0.03**	**0.027**	**0.021**
Cadmium	0.005[2]	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Chromium	0.05[2]	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U
Lead	0.015[2]	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Mercury	0.002[2]	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Selenium	0.08[3]	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Silver	0.08[3]	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Volatile Organic Compounds (µg/l)										
1,1,1,2-Tetrachloroethane	1.7[3]	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1,1-Trichloroethane	200[2]	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1,2,2-Tetrachloroethane	0.22[3]	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1,2-Trichloroethane	0.77[3]	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1-Dichloroethane	800[3]	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1-Dichloroethene	400[3]	0.1 U	0.1 U	**0.32**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,1-Dichloropropene	NC	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,2,3-Trichlorobenzene	NC	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
1,2,3-Trichloropropane	0.0063[3]	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2,4-Trichlorobenzene	80[3]	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2,4-Trimethylbenzene	400[3]	0.1 U	0.1 U	0.1 U	**0.12**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,2-Dibromo-3-Chloropropane	0.031[3]	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2-Dichlorobenzene	720[3]	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,2-Dichloroethane	5[2]	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,2-Dichloropropane	0.64[3]	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,3,5-Trimethylbenzene	400[3]	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
1,3-Dichlorobenzene	NC	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
1,3-Dichloropropane	NC	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
2,2-Dichloropropane	NC	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
2-Chlorotoluene	160[3]	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
4-Chlorotoluene	NC	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Benzene	5[2]	0.1 U	**0.11**	0.1 U	**0.17**	**0.33**	**0.19**	**0.34**	0.1 U	**0.12**
Bromobenzene	NC	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Bromochloromethane	NC	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Bromoform	5.5[3]	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Bromomethane	11[3]	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Carbon Tetrachloride	0.34[3]	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
CFC-11	2,400[3]	0.1 U	**1.1**	0.1 U	0.1 U	**7.5**	0.1 U	0.1 U	0.1 U	**0.18**
CFC-12	1,600[3]	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Chlorobenzene	160[3]	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Chloroethane	15[3]	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Chloroform	7.2[3]	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Chloromethane	3.4[3]	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Cis-1,2-Dichloroethene	80[3]	0.1 U	**0.45**	**1.7**	**0.15**	**0.21**	**0.22**	**0.5**	0.1 U	0.1 U
Cis-1,3-Dichloropropene	NC	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Dibromochloromethane	0.52[3]	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Dibromomethane	80[3]	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Dichlorobromomethane	0.71[3]	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Ethylbenzene	700[2]	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Ethylene dibromide	0.01[2]	0.019 U	0.019 U	0.019 U	0.02 U	0.019 U	0.019 U	0.02 U	0.02 U	0.019 U
Hexachlorobutadiene	0.56[3]	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Isopropylbenzene (Cumene)	800[3]	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Methylene Chloride	5[2]	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Naphthalene	160[2,3]	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
n-Butylbenzene	NC	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
n-Propylbenzene	NC	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
p-Isopropyltoluene	NC	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U
Sec-Butylbenzene	NC	0.1 U	0.1 U	0.1 U	**0.12**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Styrene	1.5[3]	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Tert-Butylbenzene	NC	0.1 U	0.1 U	0.1 U	**0.1**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Tetrachloroethene	5[2]	0.1 U	**0.24**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Toluene	1.000[2]	**0.16**	**0.15**	**0.13**	**0.15**	**0.23**	**0.16**	**0.16**	**0.15**	**0.15**
Total Xylenes	1,000[2]	0.3 U	**0.2**	0.3 U	**0.34**	**0.2**	0.3 U	0.3 U	0.3 U	0.3 U

Analyte	MTCA[1] Cleanup Level	MW01 3/31/2008	MW02 3/31/2008	MW03 3/31/2008	MW04 3/31/2008	MW05 3/31/2008	MW06 3/31/2008	MW07 3/31/2008	MW08 4/1/2008	MW09 4/1/2008
Trans-1,2-Dichloroethene	160[3]	0.1 U	0.1 U	**0.19**	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Trans-1,3-Dichloropropene	NC	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Trichloroethene	5[2]	0.1 U	**5.3**	**3.8**	**0.35**	**1.4**	0.1 U	**0.22**	0.1 U	0.1 U
Vinyl Chloride	0.2[2]	0.02 U	**0.45**	**1.7**	**0.35**	**1.5**	**0.27**	**3.5**	0.02 U	**0.8**
Semi-Volatile Organic Compounds (µg/l)										
1,2,4-Trichlorobenzene	80[3]	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.2 U	0.2 U
1,2-Dichlorobenzene	720[3]	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.2 U	0.2 U
1,3-Dichlorobenzene	NC	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.2 U	0.2 U
1,4-Dichlorobenzene	1.8[3]	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.2 U	0.2 U
2,2'-Oxybis[1-chloropropane]	0.63[3]	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.2 U	0.2 U
2,4,5-Trichlorophenol	800[3]	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.2 U	0.2 U
2,4,6-Trichlorophenol	4[3]	0.29 U	0.29 U	0.28 U	0.29 U	0.3 U	0.29 U	0.29 U	0.29 U	0.29 U
2,4-Dichlorophenol	24[3]	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.2 U	0.2 U
2,4-Dimethylphenol	160[3]	0.98 UJ	0.96 UJ	0.94 UJ	0.96 UJ	0.99 UJ	0.95 UJ	0.96 UJ	0.98 UJ	0.98 UJ
2,4-Dinitrophenol	32[3]	2.5 U	2.4 U	2.4 U	2.4 U	2.5 U	2.4 U	2.4 U	2.5 U	2.5 U
2,4-Dinitrotoluene	32[3]	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.2 U	0.2 U
2,6-Dinitrotoluene	16[3]	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.2 U	0.2 U
2-Chloronaphthalene	640[3]	0.029 U	0.029 U	0.028 U	0.029 U	0.03 U	0.029 U	0.029 U	0.029 U	0.029 U
2-Chlorophenol	40[3]	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.2 U	0.2 U
2-Nitroaniline	NC	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.2 U	0.2 U
2-Nitrophenol	NC	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.2 U	0.2 U
3,3'-Dichlorobenzidine	0.19[3]	0.98 U	0.96 U	0.94 U	0.96 U	0.99 U	0.95 U	0.96 U	0.98 U	0.98 U
4,6-Dinitro-2-Methylphenol	NC	2 U	1.9 U	1.9 U	1.9 U	2 U	1.9 U	1.9 U	2 U	2 U
4-Bromophenyl phenyl ether	NC	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.2 U	0.2 U
4-Chloro-3-Methylphenol	NC	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.2 U	0.2 U
4-Chloroaniline	32[3]	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.2 U	0.2 U
4-Chlorophenyl-Phenylether	NC	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.2 U	0.2 U
4-Nitroaniline	NC	0.29 U	0.29 U	0.28 U	0.29 U	0.3 U	0.29 U	0.29 U	0.29 U	0.29 U
4-Nitrophenol	NC	0.98 U	0.96 U	0.94 U	0.96 U	0.99 U	0.95 U	0.96 U	0.98 U	0.98 U
Anthracene	4,800[3]	0.02 U	0.019 U	0.019 U	0.019 U	0.02 U	0.019 U	0.019 U	0.02 U	0.02 U
Benzoic Acid	64,000[3]	0.98 U	**1.2**	**1.2**	**1.3**	0.99 U	**1.2**	**1.2**	0.98 U	0.98 U
Benzyl Alcohol	2,400[3]	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.2 U	0.2 U
Bis(2-Chloroethoxy)Methane	NC	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.2 U	0.2 U
Bis(2-Chloroethyl)Ether	0.04[3]	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.2 U	0.2 U
Bis(2-Ethylhexyl) Phthalate	6.3[3]	1.5 U	1.4 U	1.4 U	1.4 U	1.5 U	1.4 U	1.4 U	1.5 U	1.5 U
Butyl benzyl phthalate	3,200[3]	0.29 U	0.29 U	0.28 U	0.29 U	0.3 U	0.29 U	0.29 U	0.29 U	0.29 U
Carbazole	4.4[3]	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.2 U	0.2 U
Dibenzofuran	32[3]	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.2 U	0.2 U
Dibutyl phthalate	1,600[3]	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.2 U	0.2 U
Diethyl phthalate	13,000[3]	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.2 U	0.2 U
Dimethyl phthalate	16,000[3]	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.2 U	0.2 U
Di-N-Octyl Phthalate	320[3]	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.2 U	0.2 U
Hexachlorobenzene	0.055[3]	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.2 U	0.2 U
Hexachlorobutadiene	0.56[3]	0.29 U	0.29 U	0.28 U	0.29 U	0.3 U	0.29 U	0.29 U	0.29 U	0.29 U
Hexachlorocyclopentadiene	48[3]	0.98 U	0.96 U	0.94 U	0.96 U	0.99 U	0.95 U	0.96 U	0.98 U	0.98 U
Hexachloroethane	3.1[3]	0.29 U	0.29 U	0.28 U	0.29 U	0.3 U	0.29 U	0.29 U	0.29 U	0.29 U
Isophorone	46[3]	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.2 U	0.2 U
m-Nitroaniline	NC	0.2 UJ	0.19 UJ	0.19 UJ	0.19 UJ	0.2 UJ	0.19 UJ	0.19 UJ	0.2 UJ	0.2 UJ
Nitrobenzene	4[3]	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.2 U	0.2 U
N-Nitrosodi-n-propylamine	NC	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.2 U	0.2 U
N-Nitrosodiphenylamine	NC	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.2 U	0.2 U
o-Cresol	400[3]	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.2 U	0.2 U
p-Cresol	43[3]	0.39 U	0.38 U	0.38 U	0.38 U	0.4 U	0.38 U	0.38 U	0.39 U	0.39 U
Pentachlorophenol	0.73[3]	0.34 U	0.34 U	0.33 U	0.34 U	0.35 U	0.33 U	0.34 U	0.34 U	0.34 U
Phenol	4,800[3]	0.29 U	0.29 U	0.28 U	0.29 U	0.3 U	0.29 U	0.29 U	0.29 U	0.29 U
Pyrene	480[3]	0.029 U	0.029 U	0.028 U	0.029 U	0.03 U	0.029 U	0.029 U	0.029 U	0.029 U
Polycyclic Aromatic Hydrocarbons (µg/l)										
1-Methylnaphthalene	2.4[3]	0.029 U	0.029 U	0.028 U	0.029 U	0.03 U	0.029 U	0.029 U	0.029 U	0.029 U
2-Methylnaphthalene	32[3]	0.098 U	0.096 U	0.094 U	0.096 U	0.099 U	0.095 U	0.096 U	0.098 U	0.098 U
Acenaphthene	960[3]	0.049 U	0.048 U	0.047 U	0.048 U	0.05 U	0.048 U	0.048 U	0.049 U	0.049 U
Acenaphthylene	NC	0.039 U	0.038 U	0.038 U	0.038 U	0.04 U	0.038 U	0.038 U	0.039 U	0.039 U
Benz[a]anthracene[4]	NC	0.029 U	0.029 U	0.028 U	0.029 U	0.03 U	0.029 U	0.029 U	0.029 U	0.029 U
Benzo(a)pyrene[4]	0 .1[2]	**0.044**	0.019 U	0.019 U	0.019 U	0.02 U	0.019 U	0.019 U	0.02 U	0.02 U
Benzo(b)fluoranthene[4]	NC	0.039 U	0.038 U	0.038 U	0.038 U	0.04 U	0.038 U	0.038 U	0.039 U	0.039 U
Benzo(k)fluoranthene[4]	NC	0.029 U	0.029 U	0.028 U	0.029 U	0.03 U	0.029 U	0.029 U	0.029 U	0.029 U
Benzo(ghi)perylene[4]	NC	0.029 U	0.029 U	0.028 U	0.029 U	0.03 U	0.029 U	0.029 U	0.029 U	0.029 U
Chrysene[4]	NC	0.02 U	0.019 U	0.019 U	0.019 U	0.02 U	0.019 U	0.019 U	0.02 U	0.02 U
Dibenzo(a,h)anthracene	NC	0.029 U	0.029 U	0.028 U	0.029 U	0.03 U	0.029 U	0.029 U	0.029 U	0.029 U
Fluoranthene	640[3]	0.025 U	0.024 U	0.024 U	0.024 U	0.025 U	0.024 U	0.024 U	0.025 U	0.025 U
Fluorene	640[3]	0.029 U	0.029 U	0.028 U	0.029 U	0.03 U	0.029 U	0.029 U	0.029 U	0.029 U
Indeno(1,2,3-cd)pyrene[4]	NC	0.029 U	0.029 U	0.028 U	0.029 U	0.03 U	0.029 U	0.029 U	0.029 U	0.029 U
Naphthalene	160[2,3]	0.2 U	0.19 U	0.19 U	0.19 U	0.2 U	0.19 U	0.19 U	0.2 U	0.2 U
Phenanthrene	NC	0.039 U	0.038 U	0.038 U	0.038 U	0.04 U	0.038 U	0.038 U	0.039 U	0.039 U
Carcinogenic Polycyclic Aromatic Hydrocarbons (µg/l)[5]	0.12	0.044	ND	ND	ND	ND	ND	ND	ND	ND
Total Petroleum Hydrocarbons (mg/l)										
Gasoline Range Hydrocarbons	1 / 0.8[2]	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Diesel Range Hydrocarbons	0.5[2]	0.12 U	0.12 U	0.12 U	0.012 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
Heavy Oil Range Hydrocarbons	0.5[2]	0.25 U	0.24 U	0.24 U	0.025 U	0.25 U	0.24 U	0.25 U	0.24 U	0.25 U

Analyte	MTCA[1] Cleanup Level	MW01 3/31/2008	MW02 3/31/2008	MW03 3/31/2008	MW04 3/31/2008	MW05 3/31/2008	MW06 3/31/2008	MW07 3/31/2008	MW08 4/1/2008	MW09 4/1/2008
Polychlorinated Biphenyls (µg/l)										
PCB-aroclor 1016	1.1[3]	0.49 U	0.48 U	0.48 U	0.49 U	0.5 U	0.48 U	0.47 U	0.48 U	0.48 U
PCB-aroclor 1221	NC	0.49 U	0.48 U	0.48 U	0.49 U	0.5 U	0.48 U	0.47 U	0.48 U	0.48 U
PCB-aroclor 1232	NC	0.49 U	0.48 U	0.48 U	0.49 U	0.5 U	0.48 U	0.47 U	0.48 U	0.48 U
PCB-aroclor 1242	NC	0.49 U	0.48 U	0.48 U	0.49 U	0.5 U	0.48 U	0.47 U	0.48 U	0.48 U
PCB-aroclor 1248	NC	0.49 U	0.48 U	0.48 U	0.49 U	0.5 U	0.48 U	0.47 U	0.48 U	0.48 U
PCB-aroclor 1254	0.32[3]	0.49 U	0.48 U	0.48 U	0.49 U	0.5 U	0.48 U	0.47 U	0.48 U	0.48 U
PCB-aroclor 1260	NC	0.49 U	0.48 U	0.48 U	0.49 U	0.5 U	0.48 U	0.47 U	0.48 U	0.48 U
Total PCBs	0.1[2]	0.49 U	0.48 U	0.48 U	0.49 U	0.5 U	0.48 U	0.47 U	0.48 U	0.48 U

Notes:

[1] Model Toxics Control Act (MTCA) Cleanup Regulation Chapter 173-340 WAC. MTCA Method A cleanup levels are presented for chemicals that have Method A criteria. Method B cleanup levels are represented for chemicals that do not have Method A criteria.

[2] MTCA Method A cleanup level.

[3] MTCA Method B cleanup level.

[4] Considered a carcinogenic polycyclic aromatic hydrocarbon (cPAH) under WAC 173-349-708(8)(e).

[5] cPAH testing and regulatory evaluation is completed for individual carcinogenic compounds as well as the for the summation of the mixture of the seven carcinogenic PAHs (known as Ecology's toxicity equivalency methodology). The summation procedure is completed using toxicity equivalency factors for each individual compound which are then added to produce a toxicity equivalency quotient (TEQ) which is then compared to the MTCA cleanup level of 0.1 mg/kg (or 100 µg/kg). Calculations were performed on samples with detections only.

U = The analyte was not detected at a concentration greater than the given reporting limit as shown

J = The analyte concentration is estimated

mg/l = milligram per liter

µg/l = microgram per liter

NC = Cleanup level not established by Washington State Department of Ecology

ND = cPAHs were not detected. Therefore, a total cPAH toxic equivalency quotient (TEQ) was not calculated.

Highlighted items indicate that the chemical concentration is greater than the MTCA cleanup level.

Values presented in **bold** indicate that the chemical was detected in the specific sample.

TABLE E-3
CHEMICAL ANALYTICAL RESULTS FOR GROUNDWATER - OCTOBER/NOVEMBER
318 STATE AVENUE NE
OLYMPIA, WASHINGTON

Analyte	MTCA[1] Cleanup Level	MW01 10/30/2008	MW02 10/30/2008	MW03 10/30/2008	MW04 10/30/2008	MW05 10/31/2008	MW06 10/31/2008	MW07 10/31/2008	MW08 10/31/2008	MW09 10/31/2008	MW10 11/4/2008	MW11 11/4/2008	MW12 11/4/2008	MW13 11/4/2008	MW14 11/6/2008	MW15 11/6/2008	MW16 11/6/2008
Total Metals (mg/l)																	
Arsenic	0.005[2]	**0.013**	**0.0093**	**0.0059**	**0.012**	**0.014**	**0.0065**	**0.0036**	**0.0062**	**0.0093**	**0.0047**	**0.016**	**0.0064**	**0.063**	**0.0045**	**0.012**	**0.0036**
Lead	0.015[2]	0.002 U	**0.004**	0.002 U	**0.0034**	**0.0074**	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Mercury	0.002[2]	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Dissolved Metals (mg/l)																	
Arsenic	0.005[2]	**0.014**	**0.0095**	**0.0058**	**0.017**	**0.015**	**0.0074**	**0.005**	**0.0058**	**0.0097**	**0.0059**	**0.017**	**0.0093**	**0.062**	**0.0056**	**0.013**	**0.0039**
Lead	0.015[2]	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Mercury	0.002[2]	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Volatile Organic Compounds (µg/l)																	
1,1,1,2-Tetrachloroethane	1.7[3]	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,1-Trichloroethane	200[2]	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1,2,2-Tetrachloroethane	0.22[3]	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
1,1,2-Trichloroethane	0.77[3]	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U
1,1-Dichloroethane	1,600[3]	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	400[3]	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloropropene	NC	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2,3-Trichlorobenzene	NC	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2,3-Trichloropropane	0.0063[3]	0.46 U	0.46 U	0.46 U	0.46 U	0.46 U	0.46 U	0.46 U	0.46 U	0.46 U	0.46 U	0.46 U	0.46 U	0.46 U	0.46 U	0.46 U	0.46 U
1,2,4-Trichlorobenzene	80[3]	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2,4-Trimethylbenzene	400[3]	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromo-3-Chloropropane	0.031[3]	0.49 U	0.49 U	0.49 U	0.49 U	0.49 U	0.49 U	0.49 U	0.49 U	0.49 U	0.49 U	0.49 U	0.49 U	0.49 U	0.49 U	0.49 U	0.49 U
1,2-Dichlorobenzene	720[3]	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	5[2]	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U
1,2-Dichloropropane	0.64[3]	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U
1,3,5-Trimethylbenzene	400[3]	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,3-Dichlorobenzene	NC	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	1.8[3]	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,4-Dinitrobenzene	6.4[3]	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,2-Dichloropropane	NC	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2-Chlorotoluene	160[3]	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
4-Chlorotoluene	NC	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Benzene	5[2]	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	**0.95**	**0.7**	0.37 U	0.37 U	**0.4**	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U	0.37 U
Bromobenzene	NC	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromochloromethane	NC	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromoform	5.5[3]	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bromomethane	11[3]	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Carbon Tetrachloride	0.34[3]	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U
CFC-11	2,400[3]	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
CFC-12	1,600[3]	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chlorobenzene	160[3]	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U

Analyte	MTCA[1] Cleanup Level	MW01 10/30/2008	MW02 10/30/2008	MW03 10/30/2008	MW04 10/30/2008	MW05 10/31/2008	MW06 10/31/2008	MW07 10/31/2008	MW08 10/31/2008	MW09 10/31/2008	MW10 11/4/2008	MW11 11/4/2008	MW12 11/4/2008	MW13 11/4/2008	MW14 11/6/2008	MW15 11/6/2008	MW16 11/6/2008
Chloroethane	15[3]	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloroform	7.2[3]	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Chloromethane	3.4[3]	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Cis-1,2-Dichloroethene	80[3]	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Cis-1,3-Dichloropropene	NC	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Dibromochloromethane	0.52[3]	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
Dibromomethane	80[3]	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Dichlorobromomethane	0.71[3]	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U
Ethylbenzene	700[2]	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Ethylene dibromide	0.01[2]	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Hexachlorobutadiene	0.56[3]	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U
Isopropylbenzene (Cumene)	800[3]	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Methylene Chloride	5[2]	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Naphthalene	160[2,3]	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
n-Butylbenzene	NC	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
n-Propylbenzene	NC	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
p-Isopropyltoluene	NC	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Sec-Butylbenzene	NC	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Styrene	1.5[3]	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tert-Butylbenzene	NC	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	5[2]	0.47 U	0.47 U	0.47 U	0.47 U	**0.98**	**0.8**	**0.76**	0.47 U	0.47 U	0.47 U	0.47 U	0.47 U	0.47 U	**0.49**	0.47 U	**0.5**
Toluene	1,000[2]	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Total Xylenes	1,000[2]	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Trans-1,2-Dichloroethene	160[3]	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trans-1,3-Dichloropropene	NC	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	5[2]	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Vinyl Chloride	0.2[2]	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
Semivolatile Organic Componds (µg/l)																	
1,2,4-Trichlorobenzene	80[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
1,2-Dichlorobenzene	720[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
1,3-Dichlorobenzene	NC	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
1,3-Dinitrobenzene	1.6[3]	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	1.8[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
2,2'-Oxybis[1-chloropropane]	0.63[3]	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,3,4,6-Tetrachlorophenol	480[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
2,3,5,6-Tetrachlorophenol	NC	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
2,4,5-Trichlorophenol	800[3]	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4,6-Trichlorophenol	4[3]	**10 U**	**10 U**	**10 U**	**10 U**	**10 U**	**10 U**	**10 U**	**10 U**	**10 U**	**10 U**	**10 U**	**10 U**	**10 U**	**10 U**	**10 U**	**10 U**
2,4-Dichlorophenol	24[3]	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dimethylphenol	160[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
2,4-Dinitrophenol	32[3]	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2,4-Dinitrotoluene	32[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
2,6-Dinitrotoluene	16[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
2-Chloronaphthalene	640[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
2-Chlorophenol	40[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
2-Nitroaniline	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
2-Nitrophenol	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U

Analyte	MTCA[1] Cleanup Level	MW01 10/30/2008	MW02 10/30/2008	MW03 10/30/2008	MW04 10/30/2008	MW05 10/31/2008	MW06 10/31/2008	MW07 10/31/2008	MW08 10/31/2008	MW09 10/31/2008	MW10 11/4/2008	MW11 11/4/2008	MW12 11/4/2008	MW13 11/4/2008	MW14 11/6/2008	MW15 11/6/2008	MW16 11/6/2008
4,6-Dinitro-2-Methylphenol	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Bromophenyl phenyl ether	NC	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
4-Chloro-3-Methylphenol	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Chloroaniline	32[3]	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Chlorophenyl-Phenylether	NC	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
4-Nitroaniline	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
4-Nitrophenol	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Aniline	7.7[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Benzo(ghi)perylene	NC	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Benzyl Alcohol	2,400[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Bis(2-Chloroethoxy)Methane	NC	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Bis(2-Chloroethyl)Ether	0.04[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Bis(2-Ethylhexyl) Phthalate	6.3[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Butyl benzyl phthalate	3,200[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Carbazole	4.4[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Dibenzofuran	32[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Dibutyl phthalate	1.600[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Diethyl phthalate	13,000[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Dimethyl phthalate	16,000[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Di-N-Octyl Phthalate	320[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Hexachlorobenzene	0.055[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Hexachlorobutadiene	0.56[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Hexachlorocyclopentadiene	48[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Hexachloroethane	3.1[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Hexanedioic Acid, Bis(2-Ethylhexyl) Ester	73[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Isophorone	46[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
m-Nitroaniline	NC	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Nitrobenzene	4[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
N-Nitrosodi-n-propylamine	NC	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
N-Nitrosodiphenylamine	NC	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
o-Cresol	400[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Pentachlorophenol	0.73[3]	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Phenanthrene	NC	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Phenol	4,800[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Pyridine	8[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Polycyclic Aromatic Hydrocarbons (µg/l)																	
1-Methylnaphthalene	2.4[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
2-Methylnaphthalene	32[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Acenaphthene	960[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Acenaphthylene	NC	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Anthracene	4,800[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Benz[a]anthracene[4]	NC	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Benzo(a)pyrene[4]	0.1[2]	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Benzo(b)fluoranthene[4]	NC	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Benzo(k)fluoranthene[4]	NC	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Chrysene[4]	NC	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U

Analyte	MTCA[1] Cleanup Level	MW01 10/30/2008	MW02 10/30/2008	MW03 10/30/2008	MW04 10/30/2008	MW05 10/31/2008	MW06 10/31/2008	MW07 10/31/2008	MW08 10/31/2008	MW09 10/31/2008	MW10 11/4/2008	MW11 11/4/2008	MW12 11/4/2008	MW13 11/4/2008	MW14 11/6/2008	MW15 11/6/2008	MW16 11/6/2008
Dibenzo(a,h)anthracene[4]	NC	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Fluoranthene	640[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Fluorene	640[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Indeno(1,2,3-cd)pyrene[4]	NC	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Naphthalene	160[2,3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Pyrene	480[3]	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Carcinogenic Polycyclic Aromatic Hydrocarbons[5]	0.12	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U

Notes:

[1] Model Toxics Control Act (MTCA) Cleanup Regulation Chapter 173-340 WAC. MTCA Method A cleanup levels are presented for chemicals that have Method A criteria. Method B cleanup levels are represented for chemicals that do not have Method A criteria.

[2] MTCA Method A cleanup level

[3] MTCA Method B cleanup level

[4] Considered a carcinogenic polycyclic aromatic hydrocarbon (cPAH) under WAC 173-349-708(8)(e).

[5] cPAH testing and regulatory evaluation is completed for individual carcinogenic compounds as well as the for the summation of the mixture of the seven carcinogenic PAHs (known as Ecology's toxicity equivalency methodology). The summation procedure is completed using toxicity equivalency factors for each individual compound which are then added to produce a toxicity equivalency quotient (TEQ) which is then compared to the MTCA cleanup level of 0.1 mg/kg (or 100 µg/kg). Calculations were performed on samples with detections only.

NC = A cleanup criteria is currently not available for this chemical

ND = cPAHs were not detected, therefore, a total cPAH toxic equivalency quotient (TEQ) was not calculated

U = The analyte was not detected at a concentration greater than the given reporting limit as shown

mg/l = milligram per liter

µg/l = microgram per liter

-- = Chemical analysis was not performed

Values presented in **bold** indicate that the chemical was detected in the specific sample

Highlighted items indicate that the chemical concentration is greater than the MTCA cleanup level

APPENDIX F
CHEMICAL ANALYTICAL LABORATORY DATA REPORTS

Provided upon Request

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 the City of Olympia. This report may be made available to other agencies for review. 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 the City of Olympia 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 Remedial Investigation (RI) has been prepared for the property located at 318 State Avenue NE in Olympia, 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.

[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 ground water 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; for example, 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

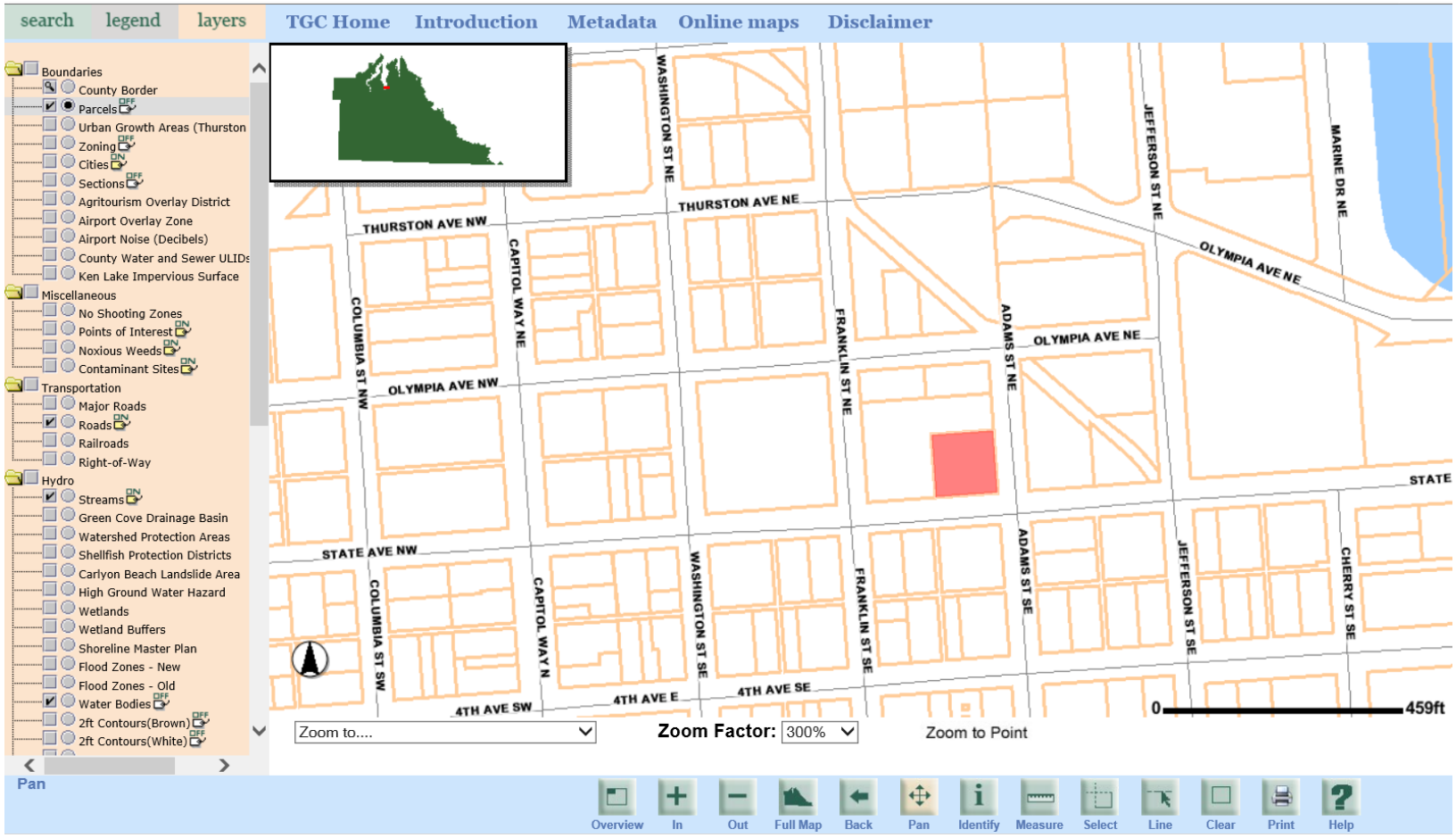
GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention, or assessment of the presence of Biological Pollutants in or around any structure. Accordingly, this report includes no interpretations, recommendations, findings, or conclusions for the purpose of detecting, 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
Tax Parcel Documentation

Data for Parcel No. 78503200500

(Link to Thurston County GoeData Center: http://www.geodata.org/website/cadastral/resultsparcel.asp?parcel=78503200500)

(Link to Assessor's Data: http://tcproperty.co.thurston.wa.us/propsql/basic.asp?fe=PS&pn=78503200500)



SOUTH HALF OF LOTS 1-4, LOTS 5-8, BLOCK 32 SYLVESTER'S PLAT OF OLYMPIA, TOGETHER WITH VACATED ALLEYS ATTACHED BY OPERATION OF LAW
SITUATED IN THE NORTHEAST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 14, TOWNSHIP 18 NORTH, RANGE 2 WEST, WILLAMETTE MERIDIAN,
THURSTON COUNTY, WASHINGTON
2015

DECLARATION OF BOUNDARY LINE ADJUSTMENT

KNOW ALL MEN BY THESE PRESENTS:

THAT WE, THE UNDERSIGNED, ARE THE OWNERS OF THE REAL PROPERTY DESCRIBED BY THE DECLARATION; AND ARE SEEKING APPROVAL BY THE CITY OF OLYMPIA COMMUNITY PLANNING AND DEVELOPMENT OF THE HEREIN DESCRIBED ADJUSTMENT OF LAND KNOWN AS BOUNDARY LINE ADJUSTMENT NUMBER BLA-15-0050-OL

1. WE, THE UNDERSIGNED HEREBY DEFEND, INDEMNIFY, AND HOLD HARMLESS THE CITY OF OLYMPIA, ITS OFFICERS, AGENTS AND EMPLOYEES FROM ANY AND ALL COSTS OR DAMAGES, INCLUDING, BUT NOT LIMITED TO, ATTORNEY'S FEES INCURRED AS A RESULT OF THIS SIGNATORY NOT BEING THE OWNER OF THE PROPERTY BEING ADJUSTED. SUCH COSTS AND DAMAGES INCLUDE, BUT ARE NOT LIMITED TO, LITIGATION, VOLUNTARY QUITE TITLE, BOUNDARY DISPUTES, LOSS OF USE OF ALL OR PORTION OF REAL PROPERTY AND SLANDER OF TITLE.

2. WE, THE UNDERSIGNED, HEREBY ACKNOWLEDGE THAT THIS BOUNDARY LINE ADJUSTMENT HAS BEEN MADE WITH OUR FREE CONSENT AND IN ACCORDANCE WITH OUR DESIRES.

3. THE ATTACHED BOUNDARY LINE ADJUSTMENT MAP (PAGE TWO) AND LEGAL DESCRIPTIONS OF PARCELS ARE MADE PART OF THIS DECLARATION.

[signature] 6-15-2015
STEVE HALL, CITY MANAGER DATE

STATE OF WASHINGTON)
) SS
COUNTY OF THURSTON)

ON THIS DAY AND YEAR ABOVE PERSONALLY APPEARED BEFORE ME, STEVE HALL, KNOWN TO BE THE CITY MANAGER FOR THE CITY OF OLYMPIA, A MUNICIPAL CORPORATION, WHO EXECUTED THE FOREGOING INSTRUMENT AND ACKNOWLEDGE THE SAID INSTRUMENT TO BE THE FREE AND VOLUNTARY ACT AND DEED OF SAID MUNICIPAL CORPORATION FOR THE USES AND PURPOSES THEREIN MENTIONED AND ON OATH STATES HE IS AUTHORIZED TO EXECUTE THE SAID INSTRUMENT.

GIVEN UNDER MY HAND AND OFFICIAL SEAL THE DAY AND YEAR LAST ABOVE WRITTEN.

Signature Heather R. Reed
Print Name: Heather R. Reed
Notary Public in and for the State of Washington, residing at: 9101 Steilacoom Rd #178 Olympia WA 98513
My commission expires: 7-29-17

HEATHER R. REED NOTARY PUBLIC STATE OF WASHINGTON COMMISSION EXPIRES 7-29-17

PARCEL	ADDRESS	SQUARE FEET
A	214 FRANKLIN ST NE	8,453
B	215 ADAMS ST NE	6,845
C	318 STATE AVE NE	15,971
D	310 STATE AVE NE	8,754
E	304 STATE AVE NE	7,503
	OLYMPIA, WA 98501	

BASIS OF BEARINGS

NAD 83/91, WSPC SOUTH ZONE, US FEET.
PROJECT COMBINED SCALE FACTOR CALCULATION:
LATITUDE: 47°02'21.76639"N
LONGITUDE: 122°51'23.88928"W
ELLIPSOID HEIGHT: 37.453
ORTHOMETRIC HEIGHT: 193.880(NAVD88)
CONVERGENCE: -1°42'42.6614"
PROJECT COMBINED SCALE FACTOR: 0.99994015
HELD THE BEARING SHOWN FROM THE FOUND MONUMENT AT OLYMPIA AVE. & FRANKLIN ST. AND THE FOUND MONUMENT AT OLYMPIA AVE. & JEFFERSON ST.
ALL DISTANCES SHOWN ARE GROUND DISTANCE.

SURVEY EQUIPMENT

TOPCON GR3 GPS/GLONASS
TOPCON PS103A ROBOTIC TOTAL STATION

SURVEY PROCEDURES

INITIAL CONTROL ESTABLISHED USING REAL TIME KINEMATIC (RTK) OBSERVATIONS WITH THE WASHINGTON STATE REFERENCE NETWORK (WSRN). EACH CONTROL POINT WAS OBSERVED FOR SIXTY (60) TO NINETY (90) EPOCHS AVERAGED FOR COORDINATE VALUES. PROJECT COMBINED SCALE FACTOR CALCULATION WAS CHECKED AND ADJUSTED USING ELECTRONIC DISTANCE METER (EDM) GROUND DISTANCES MEASURED BETWEEN TWO OR MORE FOUND AND/OR SET CONTROL MONUMENTS. CONVENTIONAL

RESULTING LEGAL DESCRIPTIONS OF BLA SURVEY:

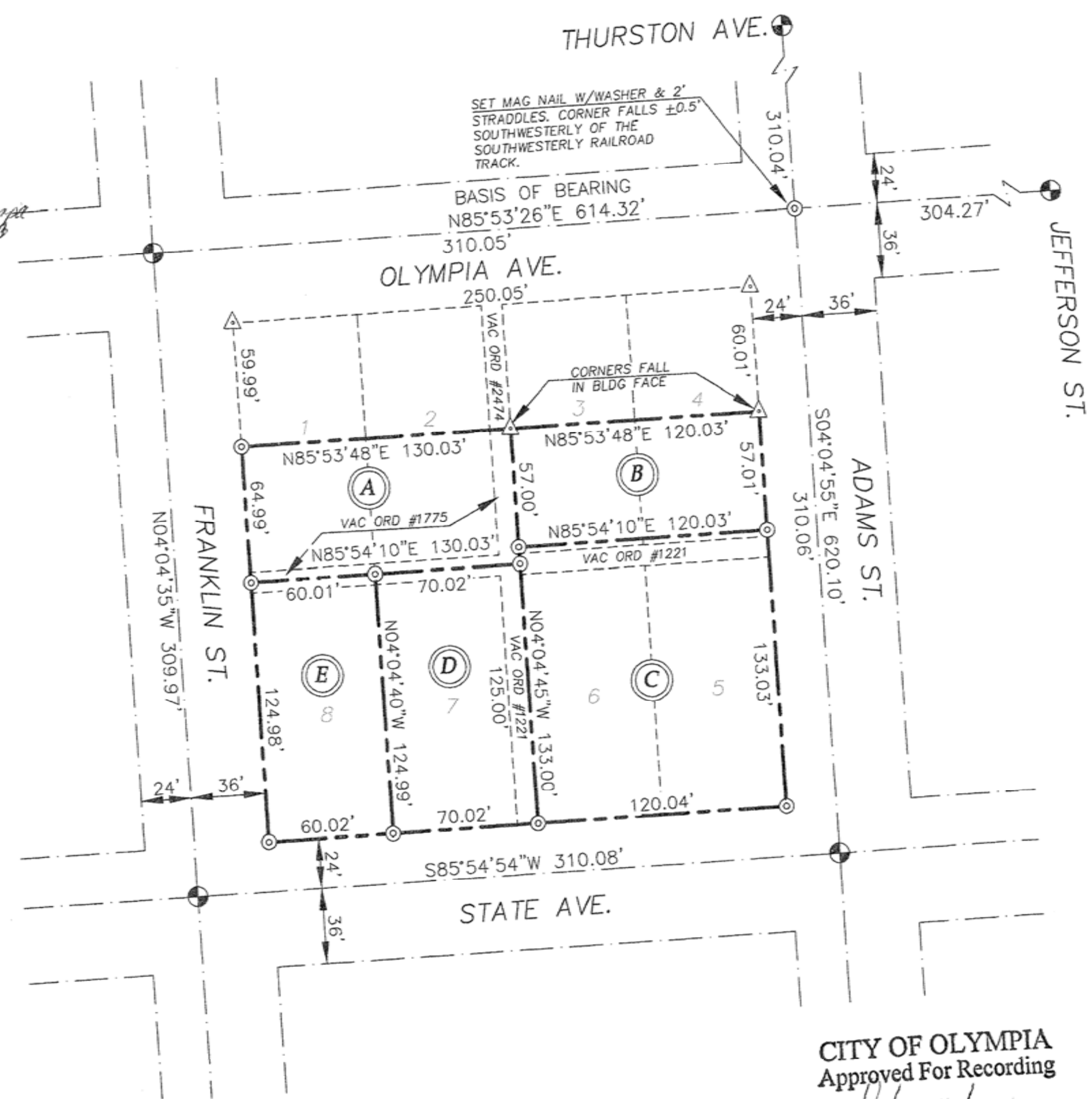
PARCEL A:
THE SOUTH HALF OF LOTS 1 AND 2, BLOCK 32, SYLVESTER'S PLAT OF OLYMPIA, AS RECORDED IN VOLUME 1 OF PLATS AT PAGE 14, RECORDS OF THURSTON COUNTY, WASHINGTON. TOGETHER WITH: THE VACATED EAST-WEST ALLEY ADJOINING SAID LOTS THAT ATTACHES BY OPERATION OF LAW, ALL OF THE NORTH-SOUTH ALLEY ADJOINING LOTS 2 AND 3, AS VACATED BY CITY OF OLYMPIA ORDINANCE NO. 1775, DATED JUNE 5, 1923.

PARCEL B:
THE SOUTH HALF OF LOTS 3 AND 4, BLOCK 32, SYLVESTER'S PLAT OF OLYMPIA, AS RECORDED IN VOLUME 1 OF PLATS AT PAGE 14, RECORDS OF THURSTON COUNTY, WASHINGTON. EXCEPT THEREFROM: THE SOUTH 3.00 FEET OF SAID LOTS 3 AND 4, THE EAST-WEST ALLEY ADJOINING SAID LOTS, AS VACATED BY CITY OF OLYMPIA ORDINANCE NO. 1221, DATED OCTOBER 22, 1912, THE NORTH-SOUTH ALLEY ADJOINING SAID LOT 3, AS VACATED BY CITY OF OLYMPIA ORDINANCE NO. 1775, DATED JUNE 5, 1923.

PARCEL C:
LOTS 5 AND 6, THE SOUTH 3.00 FEET OF LOTS 3 AND 4, BLOCK 32, SYLVESTER'S PLAT OF OLYMPIA, AS RECORDED IN VOLUME 1 OF PLATS AT PAGE 14, RECORDS OF THURSTON COUNTY, WASHINGTON. TOGETHER WITH: THE VACATED EAST-WEST ALLEY ADJOINING SAID LOTS. EXCEPT THEREFROM: THE NORTH-SOUTH ALLEY ADJOINING SAID LOTS 3 AND 6, AS VACATED BY CITY OF OLYMPIA ORDINANCE NO. 1775, DATED JUNE 5, 1923 AND CITY OF OLYMPIA ORDINANCE NO. 1221, DATED OCTOBER 22, 1912.

PARCEL D:
LOT 7, BLOCK 32, SYLVESTER'S PLAT OF OLYMPIA, AS RECORDED IN VOLUME 1 OF PLATS AT PAGE 14, RECORDS OF THURSTON COUNTY, WASHINGTON. TOGETHER WITH: THE VACATED EAST-WEST ALLEY ADJOINING SAID LOT THAT ATTACHES BY OPERATION OF LAW, ALL OF THE NORTH-SOUTH ALLEY ADJOINING LOTS 6 AND 7, AS VACATED BY CITY OF OLYMPIA ORDINANCE NO. 1221, DATED OCTOBER 22, 1912.

PARCEL E:
LOT 8, BLOCK 32, SYLVESTER'S PLAT OF OLYMPIA, AS RECORDED IN VOLUME 1 OF PLATS AT PAGE 14, RECORDS OF THURSTON COUNTY, WASHINGTON. TOGETHER WITH: THE VACATED EAST-WEST ALLEY ADJOINING SAID LOT THAT ATTACHES BY OPERATION OF LAW.



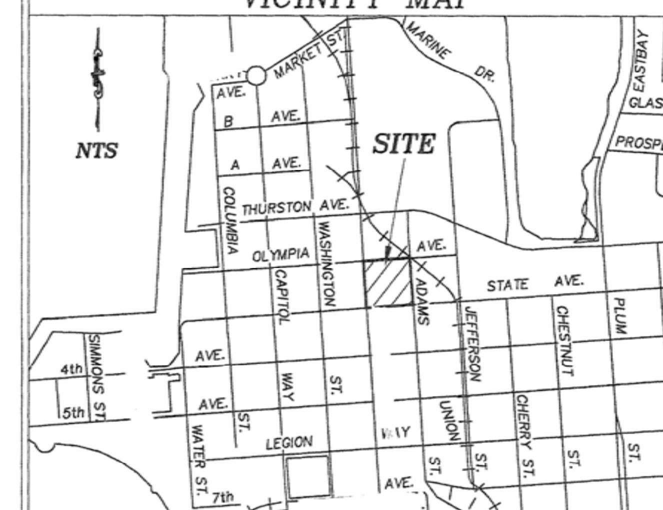
CITY OF OLYMPIA
Approved For Recording

GRAPHIC SCALE
0 60 120
1 INCH=60 FEET

LEGEND
FOUND BRASS CAP SURFACE MONUMENT (APRIL 2015)
SET MAG NAIL & WASHER LS 46310
CALCULATED POINT
CITY MONUMENT LINE
NEW PARCEL LINE
PLATTED LINE
PARCEL IDENTIFIER

APN'S 78503200400 & 78503200500

VICINITY MAP



SURVEYOR CERTIFICATE

I, LADD F. CLUFF DO HEREBY CERTIFY THAT I AM A REGISTERED PROFESSIONAL LAND SURVEY IN THE STATE OF WASHINGTON UNDER REGISTRATION NUMBER 46310, AND THAT THIS MAP CORRECTLY REPRESENTS A SURVEY MADE BY ME OR UNDER MY DIRECTION IN CONFORMANCE WITH THE REQUIREMENTS OF THE SURVEY RECORDING ACT AT THE REQUEST OF THE CITY OF OLYMPIA PUBLIC WORKS DEPARTMENT IN APRIL, 2015.

[signature] 6/11/2015
LADD F. CLUFF, PLS DATE

LADD F. CLUFF STATE OF WASHINGTON 46310 REGISTERED PROFESSIONAL LAND SURVEYOR

CITY OF OLYMPIA APPROVAL

I HEREBY CERTIFY THAT THIS BOUNDARY LINE ADJUSTMENT CONFORMS WITH THE REQUIREMENTS OF SECTION 17.30.030 OF THE OLYMPIA MUNICIPAL CODE.

Paula Smith, Assistant Planner 6.11.15
CITY OF OLYMPIA COMMUNITY PLANNING AND DEVELOPMENT DATE.

AUDITOR'S CERTIFICATE

FILED FOR RECORD THIS 17 DAY OF June, 2015
AT 01:25 P M. UNDER AUDITORS FILE NUMBER 4450222
AT THE REQUEST OF CITY OF OLYMPIA
[signature] BY [signature]
COUNTY AUDITOR DEPUTY

CITY OF OLYMPIA DEPARTMENT OF PUBLIC WORKS

601 4TH AVENUE E.
POST OFFICE BOX 1967
OLYMPIA, WASHINGTON 98507

AUDITOR'S INDEXING DATA

APPENDIX C
Remedial Action Construction Report, 318 State Avenue, Olympia, Washington

Remedial Action Construction Report

318 State Avenue
Olympia, Washington

for
City of Olympia

January 5, 2010

GeoEngineers
Earth Science + Technology

Remedial Action Construction Report

318 State Avenue
Olympia, Washington

File No. 0415-049-05

January 5, 2010

Prepared for:

City of Olympia
P.O. Box 1967
Olympia, Washington 98507-1967

Attention: Sheri Zimny

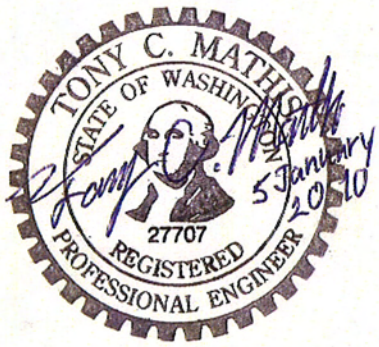
Prepared by:

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

Garrett R. Leque
Environmental Scientist

Tony C. Mathis, PE, LG, LHG
Associate, Environmental Engineer

Iain H. Wingard
Associate, Environmental Scientist



GRL:TCM:IHW:tt

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GeoEngineers

Table of Contents

LIST OF TABLES

LIST OF FIGURES

APPENDICES

1.0 INTRODUCTION

This Remedial Action Construction Report (RACR) documents the remedial action performed at the 318 State Avenue property (Property) located in Olympia, Washington (Figure 1). The remediation was performed as part of an independent remedial action by the City of Olympia (City) at the Property. The remedial action consisted of the excavation and disposal of contaminated soil from the Property and backfilling the excavation with clean soil.

Construction activities were performed by Cowlitz Clean Sweep (CCS) who was selected as the prime contractor (Contractor) to perform the cleanup. GeoEngineers provided construction observation and documentation for the City. Construction activities associated with remedial excavation of the Property were performed between September 7 and October 22, 2009 and included the following:

- Mobilization,
- Removal of contaminated soil and debris,
- Treatment and disposal of water generated during construction,
- Confirmation soil sampling, and
- Backfilling and Property restoration.

The following sections provide the background for the Property and remedial activities and summarize the construction activities.

2.0 BACKGROUND

The Property is approximately 1.1 acres in size and is located within the City of Olympia, Thurston County, Washington. The Property is situated between the southern end of the East and West Bays of Budd Inlet (Figure 1) and is bounded on the south by State Avenue NE, on the east by Adams Street NE and on the west by Franklin Street NE (Figure 2). The Property is bounded on the north by several commercial buildings and Olympia Avenue NE. The Property is generally flat and the ground surface of the Property is at approximately Elevation 11 feet National Geodetic Vertical Datum (NGVD). All elevations described in this report use the NGVD datum.

The Property was undeveloped until at least 1888. The western portion of the Property was part of the shoreline of Budd Inlet and the eastern portion of the Property was part of the submerged marine or intertidal area of Budd Inlet. The Property and surrounding area were filled with material dredged from the Port of Olympia area beginning in the late 1800s. After filling, various Property users occupied the eastern half of the Property, including Olympia Foundry and Machinery Company, Pioneer Iron Works and Capital City Iron Works.

The Property was purchased by the State of Washington Highway Commission (the precursor to the Washington State Department of Transportation or WSDOT) in March 1923 for use as a soils testing and materials laboratory. Various automotive/truck sheds, machine/automotive shops and a materials testing laboratory were located at the Property.

A fire burned and damaged buildings and equipment at the Property in 1936. The WSDOT building was rebuilt and the automotive/truck sheds were replaced with a smaller automotive service facility and an office and testing laboratory. An addition was constructed at the WSDOT building in 1950. In 1968, the automotive facility structures and operations were removed and the office and testing laboratory building was renovated to accommodate a traffic data collections and analysis office. The office was demolished and removed from the Property in 2007.

Multiple environmental investigations have been performed at the Property between 2005 and 2009. Results of investigations are summarized in the Final Draft Remedial Investigation, 318 State Avenue NE Property (RI) (GeoEngineers, 2009). The RI identifies chemicals that were detected in soil and groundwater at the Property at concentrations greater than Model Toxics Control Act (MTCA) criteria for unrestricted land use. The RI identifies metals, solvents and carcinogenic polycyclic aromatic hydrocarbons (cPAHs) that were detected in soil and arsenic and vinyl chloride were detected in groundwater at concentrations greater than MTCA cleanup criteria.

The RI identified Contaminated Soil Zones 1 and 2 (CSZ 1 and CSZ 2) as the two areas of the Property requiring excavation. The deepest portion of the remedial excavation was anticipated to be approximately 9 feet below ground surface (bgs) (i.e., Elevation 2 feet) in CSZ 1. Groundwater at the Property is typically between 4 and 5 feet bgs (i.e., Elevations 6 feet to 7 feet). Therefore, groundwater extraction and treatment was identified as necessary for excavation of contaminated soil in CSZ 1.

Plans and specifications were prepared that outlined the requirements for implementing the remedial action at the Property. The plans and specifications were used for bid solicitations from prospective contractors and as guidance during implementation of the remedial action. These plans and specifications and the record drawings prepared after construction was completed are provided in Appendix A.

3.0 REMEDIAL ACTION CONSTRUCTION

Cowlitz Clean Sweep was selected as the prime Contractor to perform the remedial action at the Property, and the remedial action was performed between September 7 and October 22, 2009. The following sections summarize the activities performed at the Property for this remedial action.

3.1 Mobilization

Mobilization activities for construction were performed between September 7 and 11, 2009 and included the following:

- Transport of a Caterpillar 345 B trackhoe and a Caterpillar 320 D trackhoe to the Property.
- Installing temporary fencing, signage, traffic control, worker facilities, erosion and sediment controls (TESC) and stormwater pollution prevention plan (SWPPP) controls.
- Cutting, demolishing and/or removing portions of asphalt pavement, sidewalks and other obstructions (i.e., abandoned utilities, etc.) (Figure 2).
- Plugging stormwater catch basins to prevent stormwater from leaving the Property.
- Contracting a licensed driller to decommission five groundwater monitoring wells and to cut off a portion of a former artesian well casing at the Property (Drawings C-1 and C-3 in Appendix A).

- Transport and setup of a water treatment system.

Five groundwater monitoring wells (i.e., MW-2, MW-5 through MW-7 and MW-15) were located within the remedial excavation areas (CSZs 1 and 2) that required decommissioning prior to excavation. The groundwater monitoring wells were decommissioned in accordance with Washington Administrative Code (WAC) 173-160 by backfilling the well casings with bentonite chips and placing concrete in the well monuments. The monitoring well decommissioning reports for MW-2, MW-5 through MW-7 and MW-15 are presented in Appendix B.

The well casing for a former artesian well was present at the Property extending above the ground surface. The artesian well had previously been decommissioned by a licensed driller in 2008. A variance request and decommissioning report for the artesian well prepared in 2008 are provided in Appendix B. As part of the construction activities, the portion of the well casing extending above the ground surface was cut off. An excavator was used to remove soil from around the artesian well to expose the well casing. Then the casing was cut off at approximately two feet below the final grade under the supervision of a licensed well driller. The decommissioning report for cutting off of the former artesian well present at the Property is included in Appendix B.

Material generated as part of the demolition and removal of asphalt pavement and concrete sidewalks as well as other obstructions present in CSZs 1 and 2 were stockpiled on site for subsequent disposal or recycling. Approximately 48 tons of concrete resulting from the demolition of sidewalks at CSZ 1 was recycled at Concrete Recyclers in Tumwater, Washington. The concrete recycling receipts are provided in Appendix C. The small quantity of asphalt pavement and other debris generated during construction mobilization activities was stockpiled on site at CSZ 1 and transported and disposed of with soil and fill material removed from the Property as discussed in the following section.

3.2 Excavation, Loading, Transport and Disposal of Soil, Fill Material and Debris

Excavation, loading, transport and disposal of soil, fill material and debris from the Property was performed between September 14 and October 1, 2009.

The Caterpillar trackhoes were used to excavate and load approximately 6,800 tons of material from the Property for transport to a landfill for disposal. The excavated material was predominantly comprised of soil but also included fill material consisting of metal debris, wood debris and general construction debris such as asphalt, brick and concrete material. The excavated material was transported to the Riverbend Landfill in McMinnville, Oregon, a subtitle D landfill permitted to accept the material.

An underground storage tank (UST) and asbestos-insulated piping were encountered in CSZ 1 during remedial excavation. The UST and asbestos piping had not previously been identified to be present on the Property prior to construction. The UST and asbestos piping were also removed from the Property during construction as discussed in Sections 3.2.1 and 3.2.2, respectively.

Excavation of CSZ 1 generally progressed from the southeast to the northwest. During excavation of CSZ 1, excavated material was stockpiled on the northwest side of CSZ 1 and then loaded into dump trucks with trailers (i.e., truck-and-pups) for transport to the landfill. During excavation of CSZ 2, material from CSZ 2 was loaded directly into the truck-and-pups. The loads on the trucks were covered before leaving the Property. The Contractor tracked each loaded truck leaving the Property by recording information for each truck (i.e., trucking company, truck number, license plate number, approximate weight and time of departure) prior to

departure and correlating the truck departure information with the disposal tickets received from the landfill. Excavated material tracking tables, quantity summaries and landfill disposal tickets are provide in Appendix C.

A representative of GeoEngineers collected confirmation samples during excavation of CSZs 1 and 2 to confirm that material with chemicals at concentrations greater than the cleanup levels had been removed at the boundaries of the excavations (Figure 2). The cleanup levels established for the site were MTCA cleanup levels for unrestricted land use. If the confirmation sample analytical results indicated sidewall material with contaminant concentrations greater than cleanup levels, the Contractor was directed to overexcavate the area where the confirmation sample(s) exceeded cleanup levels. Following the overexcavation of a given area, additional confirmation samples were collected and analyzed and the results compared to the cleanup levels. The confirmation sampling and analysis process was repeated until confirmation sample results from the limits of the excavation were less than the cleanup levels. The results of confirmation sampling and analysis are discussed further in Section 3.4. The limits of excavation in CSZs 1 and 2 are presented in Figure 2.

Single wood piling were observed intermittently at the limits of the excavation at CSZ 1 (Figure 2). The piling present in the excavation at CSZ 1 were not observed to be treated. The piling appeared to be untreated cedar logs ranging from approximately 6 inches to 12 inches in diameter.

3.2.1 Underground Storage Tank Removal

A UST and associated piping were discovered north of the decommissioned artesian well on September 14, 2009 during excavation of CSZ 1 (Figure 2). The UST was a single-wall metal tank approximately 6 feet in diameter and 12 feet long with an estimated capacity of approximately 2,500 gallons. The top of the UST was located at approximately 4 feet bgs (i.e., at an approximate Elevation 7 feet). The UST was filled to capacity with a petroleum-based product. Approximately 20 feet of piping was connected to the UST. The piping was located approximately 1 foot bgs. A field report providing additional information concerning the UST is provided in Appendix D.

Eugene Radcliffe, the Washington State Department of Ecology (Ecology) Site Manager for the Property, was notified of the presence of the on September 15, 2009. Additionally, Brett Manning and Dean Phillips of the Ecology UST Program were also notified as requested by Mr. Radcliffe. Dean Phillips indicated that Eugene Radcliffe should be the Ecology contact for work related to the UST. Eugene Radcliffe visited the site on September 16, 2009 to observe the UST prior to removal.

Samples of the product contained within the tank were collected on September 14, 2009 and September 17, 2009 and sent to Analytical Resources Inc. (ARI) in Tukwila, Washington and Spectra Laboratories of Tacoma, Washington. The product sample was analyzed for total petroleum hydrocarbons (NWTPH-Gx and NWTPH-Dx), metals (RCRA 8 metals), volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs) and total organic halogens. The results of the analyses identified that the product was a mixture of gasoline, diesel and heavy oil. The analytical results for the product samples are provided in Appendix D.

After providing appropriate notice and obtaining permits, the UST and approximately 20 feet of piping were decommissioned by complete removal on September 19, 2009. A certified UST decommissioner and UST site assessor oversaw the decommissioning.

Product was removed from the UST using a vactor truck. Based on the analytical results, the product in the tank was designated as non-regulated waste oil and disposed of at PRS in Tacoma, Washington. The UST was triple rinsed, removed and temporarily stored at the Property, until it was disposed of at the Riverbend Landfill on September 27, 2009.

The decommissioning notice, permits, UST decommissioner and site assessor certifications, product disposal profile information and disposal ticket, and tank disposal receipt are provided in Appendix D.

Petroleum hydrocarbon-impacted soil and groundwater were observed in the depression that the UST was removed from. The petroleum-impacted soil was excavated and stockpiled on site in a lined, bermed and covered stockpile. Samples of the stockpiled material were collected and submitted to ARI for petroleum hydrocarbon analyses to include NWTPH-Gx and NWTPH-Dx. These analytical results were submitted to the Riverbend Landfill in support of a request to dispose of this material with other materials being excavated at the Property. The landfill approved this request, for disposal of the material around the UST, with confirmation being provided in an email from Kristin Castner of the Riverbend Landfill (Appendix D). Petroleum-impacted groundwater was removed from the excavation during the UST decommissioning and disposed of at PRS in Tacoma with water resulting from the rinsing of the UST.

Additional confirmation sample analyses required by Washington State UST regulations were performed in the former location of the UST. The UST confirmation sample analyses were performed in accordance with Table 830-1 in MTCA (WAC 173-340), Required Testing for Petroleum Releases, and in consultation with Mr. Radcliffe. The selected additional analyses that were performed on samples collected from the area of the UST were identified in an email from Iain Wingard, GeoEngineers, to Eugene Radcliffe dated September 23, 2009 for review and approval (Appendix D). Additionally, Mr. Radcliffe visited the Property on September 24, 2009 to observe the progress of the overall cleanup, the cleanup related to the UST and the UST confirmation sampling locations.

The locations of samples used to confirm removal of soil potentially impacted by the UST were identified in the field with Mr. Radcliffe based on the former location of the UST and extent of excavation that was performed as part of the original cleanup project. Confirmation samples were selected to evaluate soil in the sidewall and the bottom adjacent to the former UST. One confirmation soil sample (T-B-100109) was collected from beneath the former UST (Figure 2 and Table 1). One confirmation soil sample (C-13-092409-1-6-6.5) was also collected from the only sidewall that remained at the former location of the UST. The sidewall sample was collected north of the former UST location at the approximate water table elevation. No other sidewalls remained nearby the former UST as the excavation for the overall cleanup had removed all other soil in the west, south and east directions to more than 50 feet from the former UST location (Figure 2). Based on the location of the UST and the extent of the remedial excavation, Mr. Radcliffe approved the sample location from beneath the former UST and from the north sidewall of the excavation for confirmation sampling and analysis associated with removal of the UST.

Confirmation samples from the former UST area were submitted for analysis of NWTPH-Gx, NWTPH-Dx, benzene, ethylbenzene, toluene, xylenes, ethylene dibromide, meth-tert-butyl-ether arsenic, lead, VOCs solvents and carcinogenic polycyclic aromatic hydrocarbons (cPAHs). Chemicals were either not detected, or were detected at concentrations less than MTCA Method A cleanup levels. The results for the confirmation samples associated with decommissioning of the UST are presented in Table 1 (samples T-B-100109 and C-13-092409-1-6-6.5).

3.2.2 Asbestos-Insulated Pipe

An unanticipated asbestos-insulated pipe was discovered in the west side of CSZ 1 during excavation on September 22, 2009 (Figure 2). The pipe was a 2-inch-diameter metal pipe wrapped with asbestos insulation. The asbestos-insulated metal pipe was located within a 12-inch-diameter concrete pipe. The insulated metal pipe was located at an approximate Elevation of 9.6 feet in the west sidewall of the remedial excavation.

The Contractor utilized Associated Environmental Group, a subcontractor, to collect three samples of the insulation wrapped around the pipe for analysis. The analytical results for the samples confirmed that the pipe insulation contained asbestos. After obtaining the proper permit, Advanced Environmental, Inc., a subcontractor, abated, removed and properly disposed of approximately 20 feet of pipe and asbestos insulation from CSZ 1 on September 22.

On October 7, 2009, Advanced Environmental, Inc. returned to the Property and the Contractor and subcontractor removed a remaining 8 linear feet of asbestos-insulated pipe from the west sidewall of CSZ 1. The Contractor initially removed asphalt and soil covering the pipe, after which the asbestos abatement subcontractor abated, removed and properly disposed of the asbestos-insulated pipe. No other asbestos wrapped pipe was identified at the Property during the course of the remedial action.

The analytical results, asbestos permit, and disposal record for the asbestos pipe are provided in Appendix E.

3.3 Water Management

The Contractor collected and treated stormwater, decontamination water and groundwater pumped from CSZ 1 during remedial activities at the Property. The treatment process consisted of sedimentation, followed by physical filtration, and then polishing the treated water with activated carbon. A copy of the water treatment system schematic is provided in Appendix F.

The Contractor pumped groundwater from CSZ 1 to the sedimentation tank of the treatment system using one or two electric submersible sump pumps. The Contractor also used a trash pump when necessary to pump stormwater from catch basins to the sedimentation tank. The catch basin outlets had been plugged during mobilization activities so that stormwater would not enter the stormwater system during the remedial action. Decontamination water was transferred directly to the sedimentation tank for treatment.

Treated water was discharged to the City of Olympia's wastewater system operated by LOTT Alliance. A copy of the discharge authorization letter is provided in Appendix F. Samples of treated water were collected during two separate events in accordance with the discharge authorization. One sample was collected on September 15, 2009 prior to discharge to the LOTT Alliance wastewater system and analyzed for VOCs by Environmental Protection Agency (EPA) 624, SVOCs by EPA 625 and total lead and arsenic by EPA 200.8. The second sample was collected on September 29, after two weeks of treatment system operation and was analyzed for VOCs and SVOCs. Chemicals of concern were not detected in either of the treated water samples, and these results were forwarded to LOTT Alliance after receipt and review of the chemical analysis reports. A summary of the analytical data, as well as responses from LOTT Alliance regarding the analytical data are included in Appendix F. Appendix F also includes a copy of the disposal record for solids removed from the settling tank when the water treatment system was decommissioned at the end of the project.

A total of 321,570 gallons of treated water were discharged to the wastewater system between September 17 and October 2, 2009 as part of remedial activities at the Property.

3.4 Confirmation Soil Sampling

Confirmation soil samples were collected and analyzed for the chemicals of concern for each excavation to confirm that soil with chemical concentrations greater than the cleanup levels was removed from CSZs 1 and 2. The confirmation samples were collected as excavation was completed in CSZs 1 and 2. The confirmation samples were collected and analyzed in accordance with the confirmation Sampling and Analysis Plan (SAP). The confirmation SAP is provided in Appendix G.

As previously identified, excavation activities proceeded from southeast to northwest in CSZ 1. As excavation proceeded in CSZ 1, samples were collected when portions of the excavation had reached the limits of excavation identified on the Plans. Overexcavation was performed where analytical results for confirmation soil samples indicated that contamination remained at concentrations greater than the cleanup levels. Following overexcavation, confirmation samples were collected and the process was repeated until the confirmation soil samples indicated that chemical concentrations were less than the cleanup levels at the completed excavation surface and to the limits of the excavation. A total of 19 confirmation samples were collected from sample locations in CSZ 1 (Figure 2). The samples were analyzed for metals including arsenic and lead, solvents, and cPAHs in accordance with the SAP. The results for confirmation samples collected at the limits of the excavation that indicate that soil concentrations at the excavation limits are less than the cleanup levels are presented in Table 1.

At CSZ 2, confirmation samples were collected at the limits of excavation identified on the Plans. Overexcavation was not required at CSZ 2 as chemicals of concern were less than the cleanup levels in confirmation samples collected from limits of the excavation. A total of five confirmation samples were collected from sample locations in CSZ 2 (Figure 2). The confirmation samples were analyzed for lead and benzene in accordance with the SAP. The results for confirmation samples collected at the limits of the excavation that indicate that soil concentrations at the excavation limits are less than the cleanup levels are presented in Table 1.

A data quality review was performed on the confirmation results for samples collected at the limits of the excavations in CSZs 1 and 2. Quality control samples were collected in general accordance with the Sampling and Analysis Plan. The data was found to be acceptable for use. The results of the data quality review are provided in Appendix H. Additionally, the laboratory analytical reports for the confirmation samples are provided in Appendix H.

3.5 Surveying

Final excavation limits at CSZ 1 and CSZ 2 were identified after chemical analytical results had been received for confirmation samples collected at the limits of the excavation that indicated soil concentrations at the excavation limits were less than the cleanup levels. These final excavation limits were surveyed by the City of Olympia. Other features that were surveyed in and around the excavation included confirmation soil sample locations, the location of utilities remaining at the excavation limits, and the location of approximately 20 wood piling remaining in the bottom of the excavation (Figure 2). A stamped copy of the survey is included in Appendix I.

3.6 Pipe and Utility Abandonment

The Contractor abandoned 10 pipes and utilities present around the perimeter of CSZ 1 upon completion of the remedial excavation. The pipes and utilities were plugged by the Contractor by filling the exposed ends of the pipes with concrete in accordance with project plans and specifications. The location and type of pipes and utilities that were abandoned are presented in Figure 2.

3.7 Backfilling

Backfill materials were delivered to the Property in truck-and-pups from the following quarries, operated by Quality Rock Products:

- Quarry spalls were from the K and M Site, Olympia, Washington.
- Ballast/gravel base and top course were from the Little Rock Site, Olympia, Washington.
- Base course was from the Rochester Site, Rochester, Washington.

One sample was collected of the ballast/gravel base and one sample was collected of the top course for chemical analysis on September 3, 2009 to evaluate potential chemical contamination of the backfill material before backfill was brought onto the Property. A summary of the analytes and analytical results for backfill materials is presented in Appendix J. Chemical analytical results for these analytes indentified in Appendix J were either not detected or detected at concentrations less than MTCA Method A and/or B soil criteria.

Prior to backfilling the excavation at CSZ 1, the Contractor placed geotextile fabric along the eastern and southern perimeter of the excavation, which was the approximate boundary of the Property. The Contractor then placed approximately 2 feet of quarry spalls on the bottom of the excavation, which is illustrated as the approximate area outlined by the Elevation 3 feet contour on Figure 2. The Contractor mobilized a John Deere 650 J dozer and a Vibromax VM 75 vibratory drum roller to the Property on September 28, 2009 to use during backfilling at the Property. The Contractor used trackhoes previously mobilized to the Property, the dozer and vibratory roller to place and compact ballast and gravel base backfill in approximately 1-foot thick lifts until the excavation was backfilled to approximately 1 foot below final grade. Removal of groundwater within the excavation at CSZ 1 continued to be performed until backfill had reached an approximate elevation of 7 feet, which is the approximate elevation of the water table.

The Contractor also placed and compacted ballast/gravel base in CSZ 2 to approximately 1 foot below final grade. The excavation at CSZ 2 was backfilled with gravel base backfill, compacted in approximate 1-foot lifts using a walk-behind vibratory plate compactor. Quarry spalls were not placed in the bottom CSZ 2.

The lateral and vertical extents of backfill materials used to bring CSZs 1 and 2 to final grade (i.e., quarry spalls, base course and top course) are shown in the record drawings provided in Appendix A. The delivery tickets for backfill materials are included as Appendix K.

Backfill placement activities in CSZ 1 and CSZ 2 were observed by a qualified representative of the Engineer, and in-place moisture/density tests were performed as necessary using a nuclear density gauge. The in-place moisture/density tests indicated compaction of backfill was in general accordance with project plans and specifications. In our opinion, backfilling was performed in general accordance with project plans and specifications.

3.8 Property Restoration

Property restoration was performed between October 12 through 14, 2009. Property restoration consisted of the following:

- Replacing asphalt paving and concrete sidewalks removed during site remediation
- Installing four parking meters that were previously removed
- Removing TESC/SWPPP controls including the water treatment system
- Removing temporary fencing, ecology blocks, signs and other site controls installed during mobilization
- Disposing of debris resulting from Property restoration activities

Figure 3 shows features at the Property after completion of restoration activities.

Everson Asphalt Paving Inc. was on site on October 8 to place two 4-inch- thick lifts of asphalt in the areas shown on Figure 3. Approximately 90 tons of asphalt was placed at the Property. Weight tickets for the asphalt are provided in Appendix K. Asphalt placement activities in CSZ 1 and CSZ 2 were monitored, and density tests were performed as necessary using a nuclear density gauge. The results of our observations and in-place density testing indicated asphalt had been placed and compacted in general accordance with project plans and specifications.

Wilson Concrete was on site October 13th to replace concrete sidewalks where sidewalks were demolished in the areas shown on Figure 2. Mark Lang with the City of Olympia was also on site on October 13th to observe re-installation of the parking meters, and at this time, Mark indicated the parking meters appeared to have been placed correctly.

Debris remaining upon completion of restoration activities was removed from the Property and disposed of on October 15th. The ticket for disposal of debris resulting from restoration activities is provided in Appendix C.

4.0 CLOSURE

Remediation activities were performed at the 318 State Avenue Property in Olympia, Washington during September and October, 2009. The purpose of the remediation was to remove contaminated soil and debris identified during the RI from the Property. Contaminated soil and debris contained chemicals of concern, which included arsenic, lead, chlorinated solvents, benzene and cPAHs at concentrations greater than MTCA cleanup levels. Approximately 6,800 tons of contaminated soil and debris was excavated from the Property and disposed of at the Riverbend Landfill in McMinnville, Oregon. Additionally, a previously unidentified UST was decommissioned by complete removal and previously unidentified asbestos-containing material was properly abated and disposed of offsite. Confirmation soil samples collected at the limits of the excavations indicate that concentrations of chemicals of concern at the excavation limits were below the MTCA cleanup levels. Following remediation and backfill activities, the ground surface and hard-surfaced areas at the Property was restored to the approximate surface elevation that existed before remediation.

It is our opinion that the remediation activities at the Property were performed in general accordance with the plans and specifications prepared for remediation of the Property.

5.0 LIMITATIONS

This Remedial Action Construction report has been prepared for use by City of Olympia. GeoEngineers has performed this Remedial Action of the 318 State Avenue property, Olympia Washington in general accordance with the scope and limitations of our proposal.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with the generally accepted environmental science practices for Remedial Action Construction reports 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 L titled "Report Limitations and Guidelines for Use" for additional information pertaining to use of this report.

TABLES

GeoEngineers

TABLE 1
SUMMARY OF ANALYTICAL RESULTS FOR CONFIRMATION SOIL SAMPLES COLLECTED AT THE LIMITS OF EXCAVATION
318 STATE AVENUE
OLYMPIA, WASHINGTON

Analyte	MTCA Method A Cleanup Level	MTCA Method B Cleanup Level	C-1[1] C-01-091509-1-4-4.5 4-4.5 9/15/2009	C-2 C-02-092109-2-10-10.5 10-10.5 9/21/2009	C-3 C-03-092909-4-10-10.5 10-10.5 9/29/2009	C-4 C-04-092109-2-9-9.5 9-9.5 9/21/2009	C-5 C-05-091509-1-6-6.5 6-6.5 9/15/2009	C-6 C-06-0901809-1-4-4.5 4-4.5 9/18/2009	C-7 C-07-092909-3-10-10.5 10-10.5 9/29/2009	C-8 C-08-0901809-1-2-2.5 2-2.5 9/18/2009
Metals (mg/kg)										
Arsenic[4]	20	0.67	3.1 U	**8.1**	**4.7**[2]	**16**	3.1 U	3.2 U	**4.8**	2.9 U
Lead	250	NE	1.5 U	1.7 U	1.8 U	1.8 U	1.6 U	**11 J**	1.8 U	1.5 U
Chlorinated Solvents and Benzene (µg/kg)										
Benzene	30	18,000	1 U	0.86 U	1.2 U	0.93 U	1.1 U	0.82 U	1 U	1 U
1,1,1-Trichloroethane	2,000	NE	1 U	0.86 U	1.2 U	0.93 U	1.1 U	0.82 U	1 U	1 U
1,1,2,2-Tetrachloroethane	NE	5,000	2.1 U	1.7 U	2.3 U	1.9 U	2.1 U	1.6 U	2.1 U	2 U
1,1,2-Trichloroethane	NE	18,000	1 U	0.86 U	1.2 U	0.93 U	1.1 U	0.82 U	1 U	1 U
1,1-Dichloroethane	NE	NE	1 U	0.86 U	1.2 U	0.93 U	1.1 U	0.82 U	1 U	1 U
1,1-Dichloroethene	NE	NE	5.2 U	4.3 U	5.8 U	4.6 U	5.3 U	4.1 U	5.2 U	5 U
1,2-Dichlorobenzene	NE	NE	1 U	0.86 U	1.2 U	0.93 U	1.1 U	0.82 U	1 U	1 U
1,2-Dichloroethane	NE	11,000	1 U	0.86 U	1.2 U	0.93 U	1.1 U	0.82 U	1 U	1 U
1,2-Dichloropropane	NE	15,000	1 U	0.86 U	1.2 U	0.93 U	1.1 U	0.82 U	1 U	1 U
1,3-Dichlorobenzene	NE	NE	1 U	0.86 U	1.2 U	0.93 U	1.1 U	0.82 U	1 U	1 U
1,4-Dichlorobenzene	NE	42,000	1 U	0.86 U	1.2 U	0.93 U	1.1 U	0.82 U	1 U	1 U
Bromoform	NE	130,000	1 U	0.86 U	1.2 U	0.93 U	1.1 U	0.82 U	1 U	1 U
Bromomethane	NE	NE	1 U	0.86 U	1.2 U	0.93 U	1.1 U	0.82 U	1 U	1 U
Carbon Tetrachloride	NE	7,700	1 U	0.86 U	1.2 U	0.93 U	1.1 U	0.82 U	1 U	1 U
Chlorobenzene	NE	NE	1 U	0.86 U	1.2 U	0.93 U	1.1 U	0.82 U	1 U	1 U
Chloroethane	NE	350,000	1 U	0.86 U	1.2 U	0.93 U	1.1 U	0.82 U	1 U	1 U
Chloroform	NE	160,000	1 U	0.86 U	1.2 U	0.93 U	1.1 U	0.82 U	1 U	1 U
Chloromethane	NE	77,000	1 U	0.86 U	1.2 U	0.93 U	1.1 U	0.82 U	1 U	1 U
Cis-1,2-Dichloroethene	NE	NE	1 U	0.86 U	1.2 U	0.93 U	1.1 U	0.82 U	1 U	1 U
Cis-1,3-Dichloropropene	NE	NE	1 U	0.86 U	1.2 U	0.93 U	1.1 U	0.82 U	1 U	1 U
Dibromochloromethane	NE	12,000	1 U	0.86 U	1.2 U	0.93 U	1.1 U	0.82 U	1 U	1 U
Dichlorobromomethane	NE	16,000	1 U	0.86 U	1.2 U	0.93 U	1.1 U	0.82 U	1 U	1 U
Methylene Chloride	20	130,000	1 U	0.86 U	1.2 U	0.93 U	1.1 U	0.82 U	1 U	1 U
Tetrachloroethene	50	1,900	1 U	0.86 U	1.2 U	0.93 U	1.1 U	0.82 U	1 U	1 U
Trans-1,2-Dichloroethene	NE	NE	1 U	0.86 U	1.2 U	0.93 U	1.1 U	0.82 U	1 U	1 U
Trans-1,3-Dichloropropene	NE	NE	1 U	0.86 U	1.2 U	0.93 U	1.1 U	0.82 U	1 U	1 U
Trichloroethene	30	2,500	1 U	0.86 U	1.2 U	0.93 U	1.1 U	0.82 U	1 U	1 U
Trichlorofluoromethane (CFC-11)	NE	NE	1 U	0.86 U	1.2 U	0.93 U	1.1 U	0.82 U	1 U	1 U
Vinyl Chloride	NE	670	1 U	0.86 U	1.2 U	0.93 U	1.1 U	0.82 U	1 U	1 U
Additional UST Confirmation Analytes (µg/kg)										
Ethylbenzene	6,000	8,300,000	--	--	--	--	--	--	--	--
Toluene	7,000	6,400,000	--	--	--	--	--	--	--	--
Xylenes	9,000	16,000,000	--	--	--	--	--	--	--	--
Ethylene Dibromide	5	12	--	--	--	--	--	--	--	--
Methyl t-butyl ether	100	560,000	--	--	--	--	--	--	--	--
Carcinogenic Polycyclic Aromatic Hydrocarbons (µg/kg)										
Benzo(a)pyrene	100	140	5.2 U	5.4 U	6.2 U	5.7 U	**14**	5.7 U	6.1 U	5 U
Benzo(a)anthracene	NE	NE	5.2 U	5.4 U	6.2 U	5.7 U	**8**	5.7 U	6.1 U	5 U
Benzo(b)fluoranthene	NE	NE	5.2 U	5.4 U	6.2 U	5.7 U	**11**	5.7 U	6.1 U	5 U
Benzo(k)fluoranthene	NE	NE	5.2 U	5.4 U	6.2 U	5.7 U	5.1 U	5.7 U	6.1 U	5 U
Dibenzo(a,h)anthracene	NE	NE	5.2 U	5.4 U	6.2 U	5.7 U	5.1 U	5.7 U	6.1 U	5 U
Indeno(1,2,3-cd)pyrene	NE	NE	5.2 U	5.4 U	6.2 U	5.7 U	**9.2**	5.7 U	6.1 U	5 U
Chrysene	NE	NE	5.2 U	5.4 U	6.2 U	5.7 U	**7.9**	5.7 U	6.1 U	5 U
cPAH Toxic Equivalency[5]	100	NE	5.2 U	5.4 U	6.2 U	5.7 U	**25.2**	5.7 U	6.1 U	6 U

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Analyte	MTCA Method A Cleanup Level	MTCA Method B Cleanup Level	C-9 C-09-0901809-1-4-4.5 4-4.5 9/18/2009	C-10 C-10-092309-1-8-8.5 8-8.5 9/23/2009	C-10 DUP-02-092309 8-8.5 9/23/09	C-11 C-11-092209-1-3-3.5 3-3.5 9/22/2009	C-12 C-12-092309-1-5-5.5 5-5.5 9/23/2009	C-13 C-13-092409-1-6-6.5 6-6.5 9/24/2009	C-14 C-14-092409-1-4-4.5 4-4.5 9/24/2009	C-15 C-15-092409-1-7-7.5 7-7.5 9/24/2009	C-16 C-16-092409-1-9-9.5 9-9.5 9/24/2009
Metals (mg/kg)											
Arsenic[4]	20	0.67	3.3 U	3.5 U	3.6 U	3.1 U	3.2 U	3.7 U	3.1 U	**17**	**10**
Lead	250	NE	1.7 U	1.7 U	1.8 U	**3.5**	1.6 U	1.8 U	1.6 U	**28**	**4.6**
Chlorinated Solvents and Benzene (µg/kg)											
Benzene	30	18,000	1 U	**1.2**	1.1 U	1.2 U	1.1 U	1.1 U	1.1 U	1.3 U	0.94 U
1,1,1-Trichloroethane	2,000	NE	1 U	1.1 U	1.1 U	1.2 U	1.1 U	1.1 U	1.1 U	1.3 U	0.94 U
1,1,2,2-Tetrachloroethane	NE	5,000	2.1 U	2.2 U	2.2 U	2.4 U	2.1 U	2.1 U	2.3 U	2.6 U	1.9 U
1,1,2-Trichloroethane	NE	18,000	1 U	1.1 U	1.1 U	1.2 U	1.1 U	1.1 U	1.1 U	1.3 U	0.94 U
1,1-Dichloroethane	NE	NE	1 U	1.1 U	1.1 U	1.2 U	1.1 U	1.1 U	1.1 U	1.3 U	0.94 U
1,1-Dichloroethene	NE	NE	5.2 U	5.4 U	5.6 U	6 U	5.3 U	5.3 U	5.7 U	6.4 U	4.7 U
1,2-Dichlorobenzene	NE	NE	1 U	1.1 U	1.1 U	1.2 U	1.1 U	1.1 U	1.1 U	1.3 U	0.94 U
1,2-Dichloroethane	NE	11,000	1 U	1.1 U	1.1 U	1.2 U	1.1 U	1.1 U	1.1 U	1.3 U	0.94 U
1,2-Dichloropropane	NE	15,000	1 U	1.1 U	1.1 U	1.2 U	1.1 U	1.1 U	1.1 U	1.3 U	0.94 U
1,3-Dichlorobenzene	NE	NE	1 U	1.1 U	1.1 U	1.2 U	1.1 U	1.1 U	1.1 U	1.3 U	0.94 U
1,4-Dichlorobenzene	NE	42,000	1 U	1.1 U	1.1 U	1.2 U	1.1 U	1.1 U	1.1 U	1.3 U	0.94 U
Bromoform	NE	130,000	1 U	1.1 U	1.1 U	1.2 U	1.1 U	1.1 U	1.1 U	1.3 U	0.94 U
Bromomethane	NE	NE	1 U	1.1 U	1.1 U	1.2 U	1.1 U	1.1 U	1.1 U	1.3 U	0.94 U
Carbon Tetrachloride	NE	7,700	1 U	1.1 U	1.1 U	1.2 U	1.1 U	1.1 U	1.1 U	1.3 U	0.94 U
Chlorobenzene	NE	NE	1 U	1.1 U	1.1 U	1.2 U	1.1 U	1.1 U	1.1 U	1.3 U	0.94 U
Chloroethane	NE	350,000	1 U	1.1 U	1.1 U	1.2 U	1.1 U	1.1 U	1.1 U	1.3 U	0.94 U
Chloroform	NE	160,000	1 U	1.1 U	1.1 U	1.2 U	1.1 U	1.1 U	1.1 U	1.3 U	0.94 U
Chloromethane	NE	77,000	1 U	1.1 U	1.1 U	1.2 U	1.1 U	1.1 U	1.1 U	1.3 U	0.94 U
Cis-1,2-Dichloroethene	NE	NE	1 U	1.1 U	1.1 U	1.2 U	1.1 U	**1.2**	1.1 U	1.3 U	0.94 U
Cis-1,3-Dichloropropene	NE	NE	1 U	1.1 U	1.1 U	1.2 U	1.1 U	1.1 U	1.1 U	1.3 U	0.94 U
Dibromochloromethane	NE	12,000	1 U	1.1 U	1.1 U	1.2 U	1.1 U	1.1 U	1.1 U	1.3 U	0.94 U
Dichlorobromomethane	NE	16,000	1 U	1.1 U	1.1 U	1.2 U	1.1 U	1.1 U	1.1 U	1.3 U	0.94 U
Methylene Chloride	20	130,000	1 U	1.1 U	1.1 U	1.2 U	1.1 U	1.1 U	1.1 U	1.3 U	0.94 U
Tetrachloroethene	50	1,900	1 U	1.1 U	1.1 U	1.2 U	1.1 U	1.1 U	1.1 U	1.3 U	0.94 U
Trans-1,2-Dichloroethene	NE	NE	1 U	1.1 U	1.1 U	1.2 U	1.1 U	1.1 U	1.1 U	1.3 U	0.94 U
Trans-1,3-Dichloropropene	NE	NE	1 U	1.1 U	1.1 U	1.2 U	1.1 U	1.1 U	1.1 U	1.3 U	0.94 U
Trichloroethene	30	2,500	**1.1**	1.1 U	**1.6**	**6.4**	**1.3**	1.1 U	1.1 U	**3.5**	0.94 U
Trichlorofluoromethane (CFC-11)	NE	NE	1 U	1.1 U	1.1 U	1.2 U	1.1 U	1.1 U	1.1 U	1.3 U	0.94 U
Vinyl Chloride	NE	670	1 U	**1.7**	**2.7**	1.2 U	1.1 U	**3.5**	1.1 U	1.3 U	0.94 U
Additional UST Confirmation Analytes (µg/kg)											
Ethylbenzene	6,000	8,300,000	--	--	--	--	--	1.1 U	--	--	--
Toluene	7,000	6,400,000	--	--	--	--	--	1.1 U	--	--	--
Xylenes	9,000	16,000,000	--	--	--	--	--	2.1 U	--	--	--
Ethylene Dibromide	5	12	--	--	--	--	--	1.1 U	--	--	--
Methyl t-butyl ether	100	560,000	--	--	--	--	--	1.1 U	--	--	--
Carcinogenic Polycyclic Aromatic Hydrocarbons (µg/kg)											
Benzo(a)pyrene	100	140	5.9 U	6 U	6 U	5.4 U	**36**	6.1 U	5.3 U	**27**	7.2 U
Benzo(a)anthracene	NE	NE	5.9 U	6 U	6 U	5.4 U	**33**	6.1 U	5.3 U	**22**	7.2 U
Benzo(b)fluoranthene	NE	NE	5.9 U	6 U	**6.7**	5.4 U	**54**	6.1 U	5.3 U	**35**	7.2 U
Benzo(k)fluoranthene	NE	NE	5.9 U	6 U	6 U	5.4 U	**15**	6.1 U	5.3 U	**16**	7.2 U
Dibenzo(a,h)anthracene	NE	NE	5.9 U	6 U	6 U	5.4 U	**6.9**	6.1 U	5.3 U	7.9 U	7.2 U
Indeno(1,2,3-cd)pyrene	NE	NE	5.9 U	6 U	6 U	5.4 U	**22**	6.1 U	5.3 U	**16**	7.2 U
Chrysene	NE	NE	5.9 U	6 U	**8.5**	5.4 U	**42**	6.1 U	5.3 U	**32**	7.2 U
cPAH Toxic Equivalency[5]	100	NE	5.9 U	6 U	**0.76**	5.4 U	**55.7**	6.1 U	5.3 U	**36.2**	7.2 U

TABLE 1
SUMMARY OF ANALYTICAL RESULTS FOR CONFIRMATION SOIL SAMPLES COLLECTED AT THE LIMITS OF EXCAVATION
318 STATE AVENUE
OLYMPIA, WASHINGTON

Analyte	MTCA Method A Cleanup Level	MTCA Method B Cleanup Level	C-17 C-17-092409-1-9-9.5 9-9.5 9/24/2009	C-18 C-18-092409-1-7-7.5 7-7.5 9/24/2009	T-B T-B-092909 10-10.5 9/29/2009	C-19 C-19-092409-1-3-3.5 3-3.5 9/24/2009	C-20 C-20-092409-1-3-3.5 3-3.5 9/24/2009	C-21 C-21-092409-1-3-3.5 3-3.5 9/24/2009	C-22 C-22-092409-1-3-3.5 3-3.5 9/24/2009	C-23 C-23-092409-1-5-5.5 5-5.5 9/24/2009	C-23 DUP-03-092409-1-6-6.5 6-6.5 9/24/2009
Metals (mg/kg)											
Arsenic[4]	20	0.67	**18**	**4.2**	3.3 U[3]	--	--	--	--	--	--
Lead	250	NE	**7.5**	**26**	1.9 U	1.5 U	1.4 U	1.5 U	1.4 U	**13 J**	**66 J**
Chlorinated Solvents and Benzene (µg/kg)											
Benzene	30	18,000	1.6 U	1.1 U	1.2 U	1.1 U	1 U	1.1 U	0.89 U	0.99 U	1.1 U
1,1,1-Trichloroethane	2,000	NE	1.6 U	1.1 U	1.2 U	--	--	--	--	--	--
1,1,2,2-Tetrachloroethane	NE	5,000	3.2 U	2.2 U	2.4 U	--	--	--	--	--	--
1,1,2-Trichloroethane	NE	18,000	1.6 U	1.1 U	1.2 U	--	--	--	--	--	--
1,1-Dichloroethane	NE	NE	1.6 U	1.1 U	1.2 U	--	--	--	--	--	--
1,1-Dichloroethene	NE	NE	8 U	5.4 U	5.9 U	--	--	--	--	--	--
1,2-Dichlorobenzene	NE	NE	1.6 U	1.1 U	1.2 U	--	--	--	--	--	--
1,2-Dichloroethane	NE	11,000	1.6 U	1.1 U	1.2 U	--	--	--	--	--	--
1,2-Dichloropropane	NE	15,000	1.6 U	1.1 U	1.2 U	--	--	--	--	--	--
1,3-Dichlorobenzene	NE	NE	1.6 U	1.1 U	1.2 U	--	--	--	--	--	--
1,4-Dichlorobenzene	NE	42,000	1.6 U	1.1 U	1.2 U	--	--	--	--	--	--
Bromoform	NE	130,000	1.6 U	1.1 U	1.2 U	--	--	--	--	--	--
Bromomethane	NE	NE	1.6 U	1.1 U	1.2 U	--	--	--	--	--	--
Carbon Tetrachloride	NE	7,700	1.6 U	1.1 U	1.2 U	--	--	--	--	--	--
Chlorobenzene	NE	NE	1.6 U	1.1 U	1.2 U	--	--	--	--	--	--
Chloroethane	NE	350,000	1.6 U	1.1 U	1.2 U	--	--	--	--	--	--
Chloroform	NE	160,000	1.6 U	1.1 U	1.2 U	--	--	--	--	--	--
Chloromethane	NE	77,000	1.6 U	1.1 U	1.2 U	--	--	--	--	--	--
Cis-1,2-Dichloroethene	NE	NE	1.6 U	1.1 U	1.2 U	--	--	--	--	--	--
Cis-1,3-Dichloropropene	NE	NE	1.6 U	1.1 U	1.2 U	--	--	--	--	--	--
Dibromochloromethane	NE	12,000	1.6 U	1.1 U	1.2 U	--	--	--	--	--	--
Dichlorobromomethane	NE	16,000	1.6 U	1.1 U	1.2 U	--	--	--	--	--	--
Methylene Chloride	20	130,000	1.6 U	1.1 U	1.2 U	--	--	--	--	--	--
Tetrachloroethene	50	1,900	1.6 U	1.1 U	1.2 U	--	--	--	--	--	--
Trans-1,2-Dichloroethene	NE	NE	1.6 U	1.1 U	1.2 U	--	--	--	--	--	--
Trans-1,3-Dichloropropene	NE	NE	1.6 U	1.1 U	1.2 U	--	--	--	--	--	--
Trichloroethene	30	2,500	1.6 U	1.1 U	1.2 U	--	--	--	--	--	--
Trichlorofluoromethane (CFC-11)	NE	NE	1.6 U	1.1 U	1.2 U	--	--	--	--	--	--
Vinyl Chloride	NE	670	1.6 U	1.1 U	1.2 U	--	--	--	--	--	--
Additional UST Confirmation Analytes (µg/kg)											
Ethylbenzene	6,000	8,300,000	--	--	1.2 U	--	--	--	--	--	--
Toluene	7,000	6,400,000	--	--	**1.2**	--	--	--	--	--	--
Xylenes	9,000	16,000,000	--	--	**5.4**	--	--	--	--	--	--
Ethylene Dibromide	5	12	--	--	0.91 U	--	--	--	--	--	--
Methyl t-butyl ether	100	560,000	--	--	1.2 U	--	--	--	--	--	--
Carcinogenic Polycyclic Aromatic Hydrocarbons (µg/kg)											
Benzo(a)pyrene	100	140	8.2 U	**6.5**	6.3 U	--	--	--	--	--	--
Benzo(a)anthracene	NE	NE	8.2 U	5.4 U	6.3 U	--	--	--	--	--	--
Benzo(b)fluoranthene	NE	NE	8.2 U	**8.3**	6.3 U	--	--	--	--	--	--
Benzo(k)fluoranthene	NE	NE	8.2 U	5.4 U	6.3 U	--	--	--	--	--	--
Dibenzo(a,h)anthracene	NE	NE	8.2 U	5.4 U	6.3 U	--	--	--	--	--	--
Indeno(1,2,3-cd)pyrene	NE	NE	8.2 U	5.4 U	6.3 U	--	--	--	--	--	--
Chrysene	NE	NE	8.2 U	**9.2**	6.3 U	--	--	--	--	--	--
cPAH Toxic Equivalency[5]	100	NE	8.2 U	7.4	6.3 U	--	--	--	--	--	--

TABLE 1
SUMMARY OF ANALYTICAL DATA IN SOIL
318 STATE AVENUE
OLYMPIA, WASHINGTON

Notes:

[1] The information provided for each sample above the analytical results are the Station name, sample name, sample depth (feet bgs) and date of collection.

[2] The arsenic result shown is for sample C-03-100109-5-11-11.5, which was collected after an approximate 1-foot overexcavation of the general area of station C-03 and T-B. The area was overexcavated because the arsenic results were greater than MTCA Method A cleanup levels in sample C-03-092909-4-10-10.5. However, other chemicals of concern were either not detected or were detected at concentrations less than MTCA Method A Cleanup levels in sample C-03-092909-4-10-10.5.

[3] The arsenic result shown is for sample T-B-100109 which was collected after an approximate 1-foot overexcavation of the general area of station C-03 and T-B. The area was overexcavated because arsenic results were greater than MTCA Method A cleanup levels in Sample T-B-092909. However, other chemicals of concern were either not detected or were detected at concentrations less than MTCA Method A Cleanup levels in sample T-B-092909.

[4] Arsenic concentrations are compared to the Method A cleanup level, which is the background arsenic concentration for soil in the State of Washington.

[5] Total Toxicity Equivalency Concentration (TEC) based on WAC 173-340-900 Table 708-2.

mg/kg = milligram per kilogram

ug/kg = microgram per kilogram

NE = Not Established

-- = Analysis not performed as the analytes identified were specifically performed for evaluation of soil in the former underground storage area.

U = Not detected at the indicated reporting limit

J = The reported concentration is an estimate

Bolding indicates the analyte was detected

FIGURES

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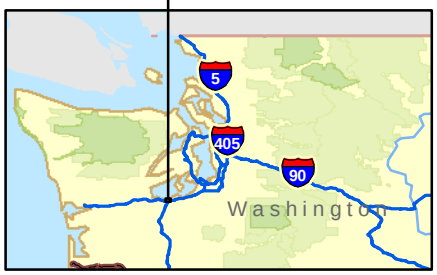

N
W E
S

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: 2008 Shaded Relief from ESRI, 2008 Topographic Maps from National Geographic Society
Projection: NAD_1983_StatePlane_Washington_North_FIPS_4601_Feet
Datum: D_North_American_1983

Vicinity Map

318 State Avenue NE
Olympia, Washington

GeoEngineers

Figure 1

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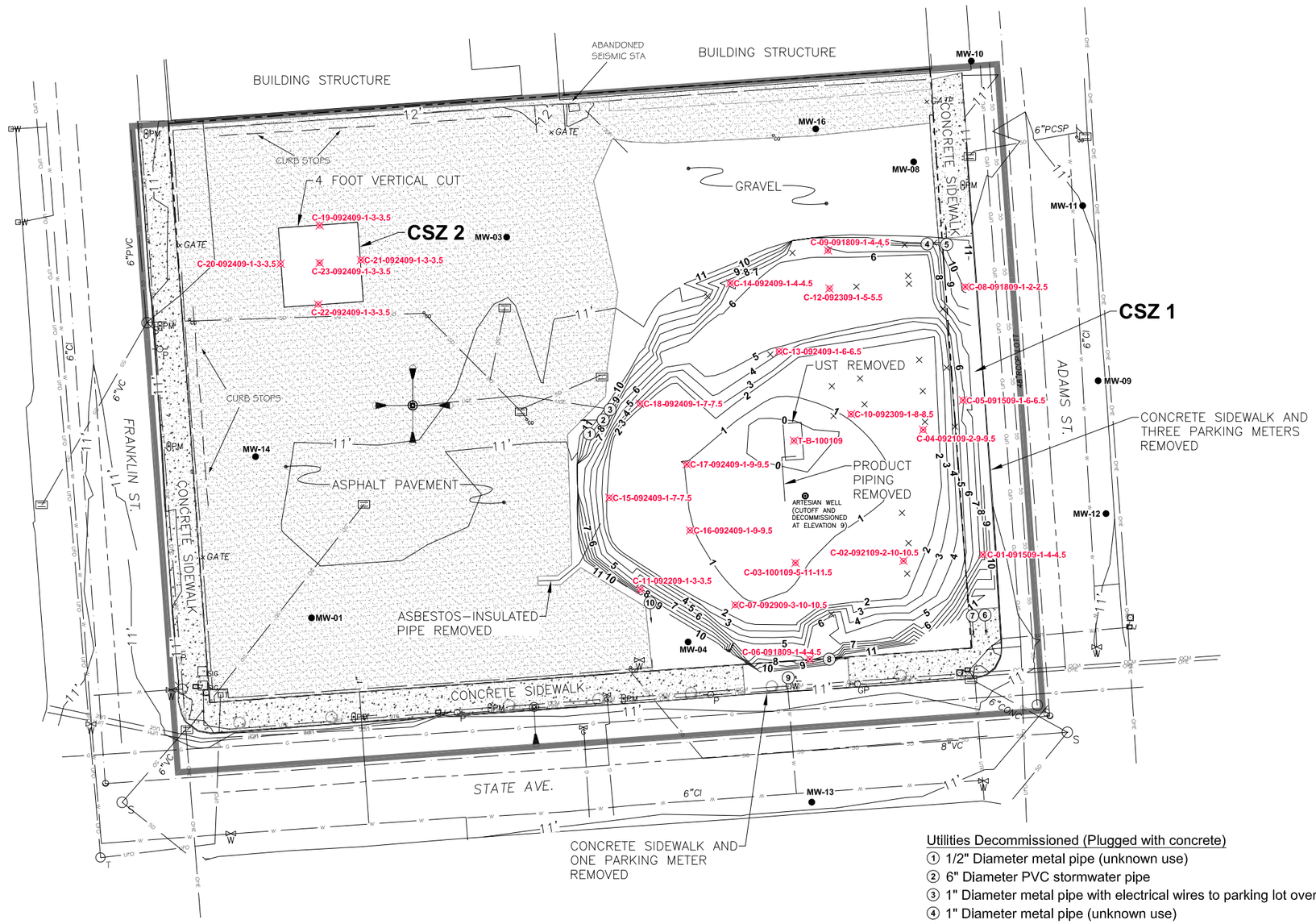

Legend

- C-01-091509-1-4-4.5 — Remedial Excavation Confirmation Soil Sample Location
- Wood Piling
- MW-01 — Monitoring Well Location and Designation
- 11' — Topographic Elevation Contour
- Water Meter
- Water Valve
- Existing Decommissioned Artesian Well Casing
- Sanitary Sewer Manhole
- Sanitary Sewer Clean Out
- Storm Drain Manhole
- Catch Basin
- Tree
- Overhead Light
- Parking Meter
- J-Box
- Power Pole
- Banner Pole
- Fire Hydrant
- Underground Traffic Control
- Overhead Communications
- Overhead Electrical
- Waterline
- Sanitary Sewer
- Underground Fiber Optic
- Storm Line
- Underground Phone
- Underground Electrical
- Underground Gas
- Chainlink Fence
- Survey Monument and Monument Line
- Street Striping Line
- Property Line
- Limits of Work
- Existing Concrete Sidewalk
- Existing Asphalt Pavement

SITE PLAN NOTE:
1. LIMITS OF WORK SHOWN ARE APPROXIMATE.

Utilities Decommissioned (Plugged with concrete)
1. 1/2" Diameter metal pipe (unknown use)
2. 6" Diameter PVC stormwater pipe
3. 1" Diameter metal pipe with electrical wires to parking lot overhead light
4. 1" Diameter metal pipe (unknown use)
5. 4 1/2" Diameter concrete sewer pipe
6. 1/2" Diameter metal pipe (unknown use)
7. 2" Diameter PVC fiber optic conduit
8. 4 1/2" Diameter concrete sewer pipe
9. 2" Diameter metal water pipe
10. 2" Diameter metal pipe (unknown use)

N W E S

0 20 40
Scale in 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. 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 = NAD83 Washington State Planes, South Zone, US Foot. Vertical Datum = NGVD 29 MSL.

Reference: Drawing provided by City of Olympia.

Revision	Description	Date	By	Chk	Rev

DESIGNED: GRL
DRAWN: SCY
CHECKED: NER
DATE: 11/20/09
SCALE: AS NOTED

GeoEngineers
1101 S. Fawcett Avenue, Suite 200
Tacoma, WA 98402
Telephone (253) 383-4940
Fax (253) 383-4923

318 State Avenue NE
Olympia, Washington

Limits of Remedial Excavations and Confirmation Sample Locations

Project No. 0415-049-05
Drawing No. Figure 2

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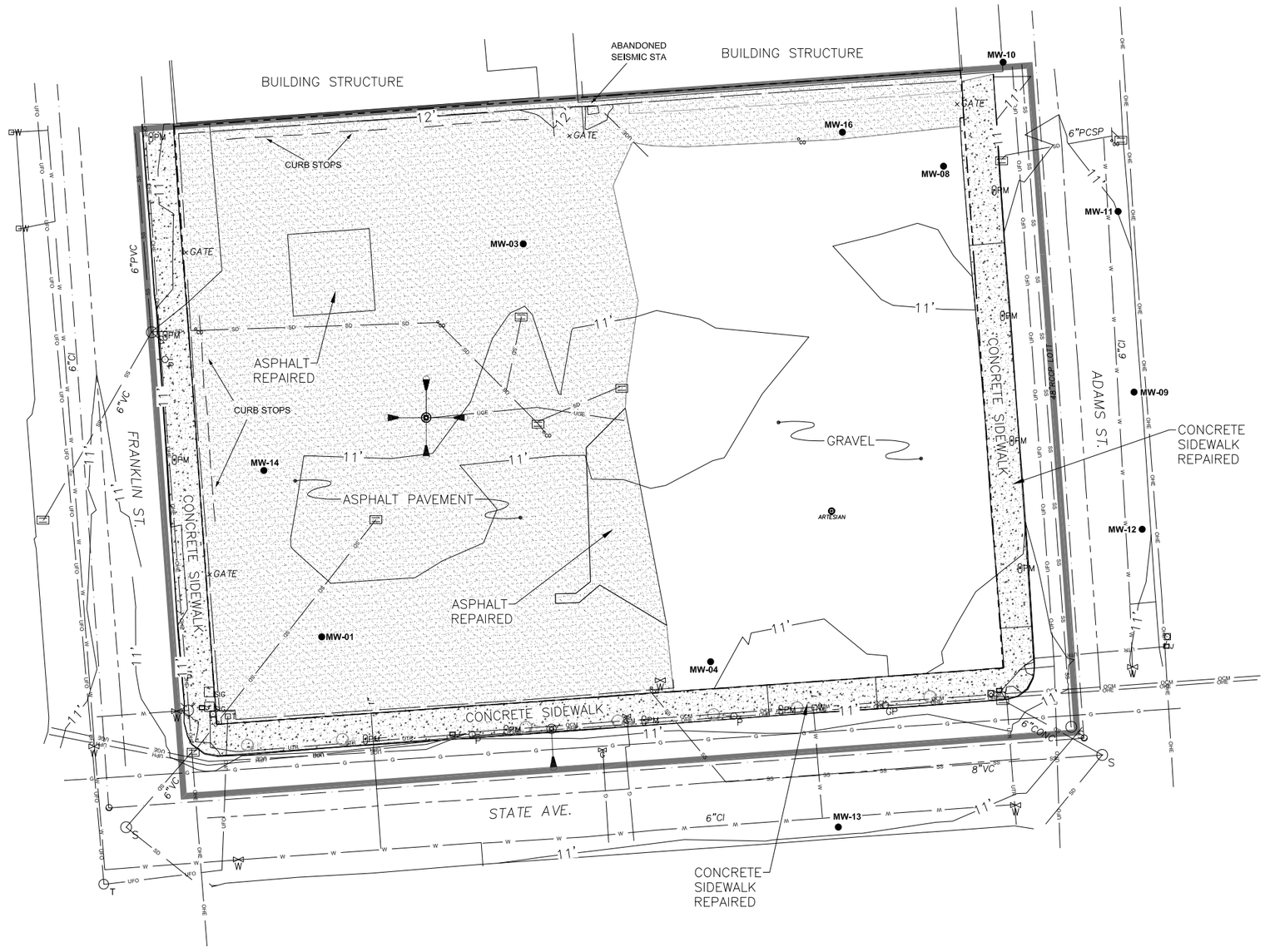

SITE PLAN NOTE:
1. LIMITS OF WORK SHOWN ARE APPROXIMATE.

Legend

- MW-01 ● Monitoring Well Location and Designation
- 11' Topographic Elevation Contour
- W Water Meter
- W Water Valve
- ARTESIAN Existing Decommissioned Artesian Well Casing
- S Sanitary Sewer Manhole
- CO Sanitary Sewer Clean Out
- D Storm Drain Manhole
- Catch Basin
- Tree
- Overhead Light
- PM Parking Meter
- J J-Box
- P Power Pole
- GP Banner Pole
- Fire Hydrant
- UTR Underground Traffic Control
- OCM Overhead Communications
- OHE Overhead Electrical
- W Waterline
- SS Sanitary Sewer
- UFO Underground Fiber Optic
- SD Storm Line
- UPH Underground Phone
- UGE Underground Electrical
- G Underground Gas
- Chainlink Fence
- Survey Monument and Monument Line
- Street Striping Line
- Property Line
- Limits of Work
- Existing Concrete Sidewalk
- Existing Asphalt Pavement

N W E S

0 20 40
Scale in Feet

Notes:
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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 = NAD83 Washington State Planes, South Zone, US Foot. Vertical Datum = NGVD 29 MSL.

Reference: Drawing provided by City of Olympia.

Revision	Description	Date	By	Chk	Rev

DESIGNED: GRL
DRAWN: SCY
CHECKED: NER
DATE: 11/20/09
SCALE: AS NOTED

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318 State Avenue NE
Olympia, Washington

Restored Property Plan

Project No. 0415-049-05
Drawing No. Figure 3

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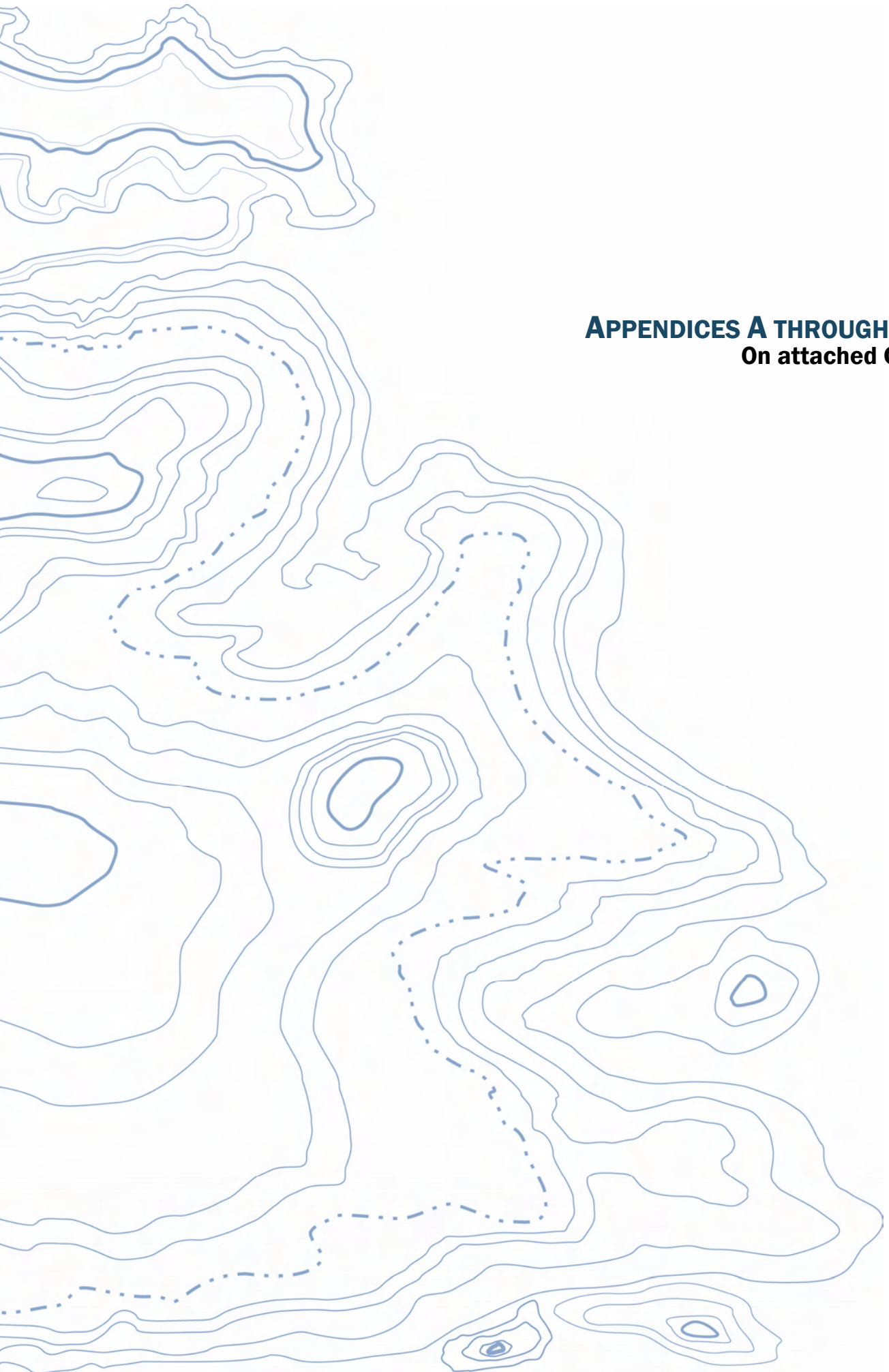
OFFICE:TACO

APPENDICES

GeoEngineers



APPENDICES A THROUGH K

On attached CD

Provided upon Request

APPENDIX L
Report Limitations and Guidelines for Use

APPENDIX L
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

GeoEngineers has performed this Remedial Action Construction report in general accordance with the scope and limitations of our proposal. This report has been prepared for use by the City of Olympia. This report may be made available to others for review. 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 the City of Olympia 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 s Based on a Unique Set of Project-Specific Factors

This report has been prepared for the City of Olympia. 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 to the project or site after the date of this report, GeoEngineers should be retained to review our interpretations and recommendations and to 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.

---

[1] Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

Historical Information Provided by Others

GeoEngineers makes no warranties or guarantees regarding the accuracy or completeness of information provided or compiled by others. The information presented in this report is based on the above-described research and a recent site visit. GeoEngineers has relied upon information provided by others in our description of historical conditions and in our review of regulatory databases and files. The available data do not provide definitive information with regard to all past uses, operations or incidents at the site or adjacent properties.

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.

Site 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 (for example, a Phase I ESA report is typically applicable for 180 days), by events such as a change in property use or occupancy, or by natural events, such as floods, earthquakes, slope instability or ground water fluctuations. Always contact GeoEngineers before applying this report so that GeoEngineers may evaluate reliability of the report to changed conditions.

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.

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 Environmental 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 D

Groundwater Compliance Monitoring Data Summary Report – February 2015, 318 State Avenue NE Property, Olympia, Washington

Groundwater Compliance Monitoring Data Summary Report – February 2015

318 State Avenue NE Property
Olympia, Washington

for
City of Olympia

April 6, 2015

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

Groundwater Compliance Monitoring
Data Summary Report – February 2015

318 State Avenue NE Property
Olympia, Washington

File No. 0415-049-06

April 6, 2015

Prepared for:

City of Olympia
P.O. Box 1967
Olympia, Washington 98507-1967

Attention: Danelle MacEwen

Prepared by:

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

Nick E. Rohrbach
Project Manager, Environmental Scientist

Iain H. Wingard
Associate, Environmental Scientist

NER:IHW:ch

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Table of Contents

LIST OF TABLES

LIST OF FIGURES

APPENDICES

INTRODUCTION

This data summary report presents the results of groundwater compliance monitoring performed by the City of Olympia (City) in February 2015 at the 318 State Avenue NE property in Olympia, Washington (Property) (Figure 1). Groundwater compliance monitoring at the Property is intended to monitor the natural attenuation of chlorinated organic solvents and associated degradation products identified as chemicals of concern (COCs) in groundwater after completion of the soil remedial action performed in September and October 2009. Remediation of soil and groundwater at the Property is being performed to support the goal of achieving a No Further Action (NFA) determination for the Property under the Washington State Department of Ecology (Ecology) Voluntary Cleanup Program (VCP).

The chlorinated solvents being monitored for natural attenuation as part of groundwater compliance monitoring include tetrachloroethene (PCE) and trichloroethene (TCE) as well as associated degradation products. Monitoring also includes measurement of water quality parameters that are indicators of the natural attenuation. Monitoring of chlorinated solvents, degradation products and natural attenuation parameters is being performed in accordance with the Groundwater Compliance Monitoring Plan (CMP) for the Property (GeoEngineers, 2010a).

Groundwater samples were collected on February 25, 2015 from three monitoring wells that included MW-03, MW-16 and MW-18 (Figure 2). These samples were submitted for analysis to TestAmerica Laboratory in Fife, Washington. Groundwater samples and groundwater levels were collected from selected monitoring wells in accordance with the CMP for the Property (GeoEngineers, 2010a).

The following sections summarize the background for compliance monitoring, field sampling activities, groundwater gradients at the Property and results of groundwater sampling and analysis.

BACKGROUND

Remedial actions were performed in September and October 2009 to remove soil and fill material containing volatile organic compounds (VOCs) including chlorinated solvents, metals and carcinogenic polycyclic aromatic compounds (cPAHs) at concentrations greater than the Model Toxics Control Act (MTCA) cleanup levels (CULs). Soil samples were subsequently collected from the boundary of remedial action areas to assess if soil and fill with contaminant concentrations greater than cleanup levels were present at the limits of the remedial excavation. The results of the soil remedial action are presented in the Remedial Action Construction Report prepared for the Property (GeoEngineers, 2010b).

Compliance monitoring is being performed after completion of soil remedial actions to evaluate the concentrations and natural attenuation of chlorinated organic solvents in groundwater at the Property. The concentrations are compared to the MTCA groundwater CULs for unrestricted land use (ULU). The natural attenuation of chlorinated organic solvents has been monitored via quarterly monitoring through February 2012 and semi-annual monitoring starting in August 2012. Monitoring has included the following:

- Installation of two new monitoring wells in May 2010 during the first compliance groundwater monitoring event. Monitoring well MW-17 was installed within Contaminated Soil Zone 1 (CSZ 1) where soil remediation was performed in September and October 2009 and MW-18 was installed north of the CSZ 1 (Figure 2).
- Quarterly groundwater sampling at eight monitoring wells including MW-03, MW-04, MW-08, MW-09, MW-13 and MW-16 through MW-18 in May 2010, August 2010, November 2010 and February 2011.
- Quarterly groundwater sampling at five monitoring wells including MW-03, MW-08 and MW-16 through MW-18 in May 2011, August 2011, November 2011 and February 2012.
- Semi-annual groundwater sampling at five monitoring wells including MW-03, MW-08 and MW-16 through MW-18 in August 2012, February 2013 and August 2013.
- Semi-annual groundwater sampling at three monitoring wells including MW-03, MW-16 and MW-18 in February 2014, August 2014 and February 2015.
- Analysis for chlorinated organic solvents and associated degradation products including PCE, TCE, 1,1-dichloroethene (1,1-DCE), cis-dichloroethene (cis-DCE), trans-dichloroethene (trans-DCE) and vinyl chloride (VC).
- Monitoring for indicators of natural attenuation including ferrous iron, sulfate, dissolved oxygen (DO), pH, electrical conductivity and oxidation-reduction potential (ORP).
- Monitoring of groundwater gradients by measuring water levels at all existing monitoring wells at the site through February 2012. Groundwater level measurements were reduced to five monitoring wells (i.e., MW-03, MW-08 and MW-16 through MW-18) for the monitoring events performed from August 2012 through February 2015.

Additionally, analysis for arsenic was performed in accordance with the CMP between May 2010 and February 2011 to provide additional information concerning arsenic concentrations in the area. Arsenic analysis was discontinued after the February 2011 groundwater compliance monitoring event because the arsenic results for sampling performed between May 2010 and February 2011 indicate that arsenic concentrations are less than the MTCA Method A CUL in groundwater on the Property (Table 1). Arsenic concentrations were detected at concentrations greater than the MTCA CUL in locations upgradient of the Property that are likely related to area-wide groundwater conditions or an upgradient source. Ecology concurrence for discontinuing arsenic analysis was provided in an email from Eugene Radcliff, Ecology to Iain Wingard, GeoEngineers dated May 16, 2011.

Ecology also previously requested that groundwater be analyzed for constituents associated with a petroleum hydrocarbon release during the May 2010 groundwater compliance monitoring event to evaluate the potential impacts from a UST encountered at the Property during the remedial action for soil. The sampling and analysis requirements to assess potential impacts from the former UST were documented in an email from Iain Wingard, GeoEngineers to Eugene Radcliff; Ecology dated May 11, 2010. The additional analyses requested by Ecology were performed during the May 2010 compliance monitoring event (GeoEngineers, 2010c). Only benzene was detected in two samples at concentrations well below the MTCA Method A groundwater CUL. Based on the May 2010 sample results, no additional monitoring was necessary to assess potential impacts from the UST or

petroleum hydrocarbons at the Property. However, Ecology requested in an email from Eugene Radcliff of Ecology to Iain Wingard of GeoEngineers dated July 19, 2010 that compliance groundwater monitoring include benzene analysis. Therefore, groundwater compliance monitoring performed between May 2010 and February 2011 continued to include analysis for benzene. Benzene analysis was discontinued after the February 2011 compliance monitoring event because the results for sampling performed between May 2010 and February 2011 indicate that benzene is not present at concentrations greater than the MTCA Method A CUL (Table 1). Ecology concurrence for discontinuing benzene analysis was provided in an email from Eugene Radcliff, Ecology to Iain Wingard, GeoEngineers dated May 16, 2011.

Eight groundwater wells were sampled during the May 2010, August 2010, November 2010 and February 2011 groundwater compliance monitoring events. The number of groundwater monitoring locations were reduced from eight to five during the May 2011 compliance monitoring event as the results of groundwater compliance monitoring performed between May 2010 and February 2011 indicate that the concentrations of chlorinated organic solvents and associated degradation products are less than the MTCA CULs at monitoring well locations MW-13, MW-04, MW-17 and MW-09 (Table 1). Ecology concurrence for discontinuing groundwater monitoring at monitoring well locations MW-13, MW-04 and MW-09 was provided in an email from Eugene Radcliff, Ecology to Iain Wingard, GeoEngineers dated May 16, 2011. Groundwater compliance monitoring continued to be performed at MW-17 to monitor upgradient/background conditions on the Property.

Quarterly groundwater compliance monitoring was implemented between May 2010 and February 2012. The frequency of groundwater monitoring was reduced from quarterly to semi-annually during the August 2012 compliance monitoring event after the results of previous groundwater compliance monitoring events indicated that the highest and lowest concentrations of chlorinated organic solvents and associated degradation products were detected during the month of February and August (Table 1, Figures 4 through 6). Groundwater gradient mapping has also been discontinued as part of reporting and is not included in this compliance groundwater report because groundwater gradient patterns have generally been established through groundwater measurements collected between May 2010 and February 2012. Ecology concurrence for reducing compliance monitoring frequency and discontinuing groundwater gradient mapping was provided in an email from Eugene Radcliff, Ecology to Iain Wingard, GeoEngineers dated May 8, 2012.

Five groundwater wells were sampled during the August and February 2011, August and February 2012 and August and February 2013 groundwater compliance monitoring events. The number of groundwater monitoring locations were reduced from five to three during the February 2014 compliance monitoring event as the results of groundwater compliance monitoring performed between February 2011 and August 2013 indicate that the concentrations of chlorinated organic solvents and associated degradation products are less than the MTCA CULs at monitoring well locations MW-08 and MW-17 (Table 1). Ecology concurrence for discontinuing groundwater monitoring at monitoring well locations MW-08 and MW-17 were provided in two emails from Eugene Radcliff, Ecology to Iain Wingard, GeoEngineers dated October 3, 2013 and November 4, 2013, respectively.

FIELD ACTIVITIES

Groundwater compliance monitoring samples were collected in February 2015 using low-flow/low-turbidity sampling techniques to minimize the suspension of particulates in the samples. Groundwater samples were obtained from the wells using dedicated submersible electric pumps (Whale Pump Brand) with dedicated flexible vinyl tubing. Groundwater was pumped at approximately 0.5 liters per minute from the approximate mid-point of the screened interval to collect the samples.

Water quality parameters were measured during purging using an YSI 556 MPS water quality meter with a flow-through cell. The measured water quality parameters included electrical conductivity, dissolved oxygen (DO), potential hydrogen (pH), turbidity, reduction potential (ORP), salinity, total dissolved solids (TDS) and temperature. Groundwater samples were collected once the water quality parameters generally varied by less than 10 percent on three consecutive measurements. All field measurements were documented on the field logs.

Following well purging, the flow-through cell was disconnected and the groundwater samples were collected in appropriate laboratory-prepared and -provided containers. The samples were protected and placed into a cooler with ice and delivered to TestAmerica Laboratory in Fife, Washington, for analysis following appropriate chain-of-custody procedures. Purge water was stored in labeled 55-gallon drums for future permitted off-site disposal. The groundwater samples were submitted for the following analyses to provide results for chlorinated organic solvents and associated degradation products as well as water quality parameters as specified in the CMP:

- VOCs by Environmental Protection Agency (EPA) Method 8260
- Sulfate by EPA Method 300.0

Ferrous iron concentrations were evaluated in the field using a Hach field test kit and the results were recorded on the field logs prior to collection of samples for laboratory analysis.

ANALYTICAL RESULTS

The results from groundwater sample collection and analysis performed in February 2015 are summarized in the following sections. Table 1 summarizes the results for the chemical analyses performed as part of groundwater compliance monitoring in February 2015. Table 1 also includes the results from groundwater compliance monitoring performed in: May, August and November 2010; February, May, August and November 2011; August and February 2012; August and February 2013; and February and August 2014 for comparison purposes. Table 2 summarizes water quality and natural attenuation parameter measurements collected in February 2015 and also includes the results from: May, August and November 2010; February, May, August and November 2011; August and February 2012; August and February 2013; and February and August 2014 for comparison. Finally, Appendix A contains the laboratory analytical reports and Appendix B contains the Data Quality Assessment Report presenting the results of data validation of the chemical analyses performed in February 2015.

Groundwater Compliance Monitoring Analyses

Natural Attenuation Parameters

The geochemical indicators of natural attenuation measured in February 2015 indicate slightly more reductive/less oxidative conditions in groundwater downgradient of soil remediation area CSZ 1 than the February 2012, February 2013 and February 2014 compliance events (Table 2). The less oxidative/more reductive conditions are indicated by generally lower ORP in groundwater collected from monitoring wells MW-03, MW-16 and MW-18. Ferrous iron and sulfate concentrations measured in February 2015 are generally similar to the previous February compliance events.

The more reductive/less oxidative conditions measured downgradient of the soil remediation area CSZ 1 are likely related to seasonal groundwater conditions in February resulting from an unusual period of warmer outdoor air temperature, decreased precipitation and associated decrease in stormwater infiltration on and around the Property. The Olympia area received only approximately 5 inches of precipitation in February 2015 with less than 0.5 inches occurring during the 10 days prior to the sampling event. The groundwater conditions in February 2015 appear to generally be more favorable for degradation of TCE at MW-03 and degradation of chlorinated solvent breakdown products (i.e., cis-DCE and trans-DCE) and vinyl chloride at MW-16 and MW-18.

Chlorinated Organic Solvents and Associated Degradation Products

TCE and VC were detected in groundwater samples collected from MW-03, MW16 and MW-18 in February 2015 (Table 1). Cis-DCE was detected in groundwater samples collected from MW-03 and MW-18, and trans-DCE was detected in the groundwater sample collected from MW-18. The detected concentrations of TCE, cis-DCE and trans-DCE at the Property continue to be well below the MTCA groundwater CULs.

VC was detected in the groundwater samples at concentrations greater than the MTCA Method A CUL in groundwater samples collected from MW-3 and MW-18, and at a concentration less than the MTCA Method A CUL in groundwater samples collected from MW-16 during the February 2015 sampling event (Table 1 and Figure 3).

DISCUSSION

Natural Attenuation of Chlorinated Solvents and Associated Degradation Products in Groundwater

Soil remedial actions were performed at CSZ 1 in September and October 2009 to remove material with chemical concentrations greater than soil cleanup levels that was a source of chlorinated compounds in groundwater. Prior to remedial actions for soil, TCE and VC were detected at concentrations greater than CULs in groundwater. VC was detected in groundwater at concentrations greater than the CUL in seven wells present at the Property prior to completion of the remedial actions for soil. VC is the remaining chlorinated compound present in groundwater at the Property at a concentration greater than CULs. VC was detected in groundwater at two locations at a concentration greater than the CUL in February 2015.

Continued temporal analysis of the detected concentrations of chlorinated compounds present in groundwater at the Property was performed to assess trends in chlorinated compound concentrations. The detected chlorinated compound concentrations plotted through time are presented in Figures 4 through 6. The data presented for monitoring wells MW-03 and MW-16 include the results of the groundwater monitoring event performed prior to remedial actions for soil (i.e., March 2009) as well as the groundwater monitoring events that have been performed after the completion of soil remedial. The data presented for monitoring well MW-18 include the groundwater monitoring events performed after the soil remedial actions as this well was installed after completion of the soil remedial actions. The following summarizes the results of the trend analysis:

- MW-03 – Monitoring well MW-03 is located downgradient/crossgradient of soil remedial action area CSZ 1 (Figure 3). The concentrations of chlorinated compounds including VC in groundwater from MW-03 decreased after completion of soil remedial actions at CSZ 1 in the sample collected in May 2010 (Figure 4 and Table 1). The concentrations of chlorinated compounds have fluctuated (i.e., increased and decreased) in groundwater at MW-03 between August 2010 and February 2015. Higher concentrations of chlorinated compounds in groundwater at MW-03 are generally present when groundwater levels are higher in February, including February 2015 (Figure 4 and Tables 1 and 2). The VC concentration in groundwater at MW-03 in February 2015 (3.6 µg/L) was greater than the concentrations during the February 2012 (1.4 µg/L), February 2013 (0.72 µg/L) and February 2014 (0.79 µg/L) monitoring events.
- MW-16 – Monitoring well MW-16 is located downgradient of soil remedial action area CSZ 1 (Figure 3). The concentration of VC in groundwater from MW-16 decreased after completion of soil remedial actions at CSZ 1 (Figure 5 and Table 1). Lower concentrations of chlorinated compounds are generally present in groundwater in MW-16 during February monitoring events. VC was detected at MW-16 at concentrations less than the MTCA Method A CUL during the May 2011 (0.18 µg/L), November 2011 (0.15 µg/L), February 2012 (0.17 µg/L), February 2013 (0.086 µg/L), and February 2014 (0.093 µg/L) monitoring events (Figure 5 and Table 1). VC was again detected at MW-16 at a concentration (0.16 µg/L) less than the MTCA Method A CUL (0.2 µg/L) during the February 2015 monitoring event. The concentration of TCE, cis-DCE and trans-DCE, if detected, continue to be an order of magnitude less than the MTCA CULs.
- MW-18 – Monitoring well MW-18 is located downgradient of soil remedial action area CSZ 1 (Figure 3). The concentration of VC in groundwater from MW-18 decreased between May 2010 and February 2011 after completion of soil remedial actions at CSZ 1 (Figure 6 and Table 1). The VC concentrations in groundwater at monitoring well MW-18 have fluctuated between May 2010 and February 2015. Similar to MW-16, lower concentrations of chlorinated compounds are generally present in groundwater in MW-18 during February monitoring events and higher concentrations are present during August monitoring events. The concentrations of VC detected in groundwater in MW-18 were less than the MTCA Method A CUL during the February 2013 monitoring event (0.15 µg/L), and greater than the MTCA Method A CUL during the February 2014 event (1.3 µg/L) and February 2015 event (1.5 µg/L). The increase in the VC concentration at monitoring well MW-18 between February 2013 and February 2015 is most likely attributed to the migration of VC from the upgradient monitoring well location MW-03 as chlorinated compounds degrade to VC in the groundwater. The concentrations of TCE, cis-DCE and trans-DCE at MW-18 remain less than the MTCA CULs for these compounds.

Overview of Groundwater Compliance Monitoring Results

The results of groundwater compliance monitoring indicate that natural attenuation of chlorinated solvents and associated degradation products generally continue to occur at the Property. The observed concentrations of PCE and TCE and associated degradation products cis-DCE and trans-DCE in groundwater samples collected from the Property remain well below the CULs for these compounds.

Two locations had VC concentrations greater than the MTCA Method A CUL in groundwater during the February 2015 monitoring event (i.e., MW-03 and MW-18) (Figures 4, and 6 and Table 1). One location had a VC concentration less than the MTCA Method A CUL in groundwater during the February 2015 monitoring event (i.e., MW-16) (Figure 5 and Table 1). VC increased in groundwater at MW-03, and decreased at MW-16 and MW-18 during the February 2015 monitoring event.

Geochemical indicators of natural attenuation have fluctuated seasonally between reductive and oxidative conditions during compliance monitoring events performed at the Property. February 2015 conditions were generally observed to be slightly more reductive/less oxidative than for previous February monitoring events, likely due to an unusual period of warmer outdoor air temperature, decreased precipitation and associated decrease in stormwater infiltration on and around the Property. It is anticipated that increased reductive conditions will return during the summer and fall months of 2015. The groundwater conditions observed during the February 2015 event and previously observed at the Property (i.e., fluctuation between reductive and oxidative conditions) are anticipated to be favorable to the continued breakdown of chlorinated solvents and associated degradation products.

Future Groundwater Compliance Monitoring

The next round of semi-annual groundwater compliance monitoring is scheduled to be performed in August 2015. Groundwater compliance monitoring will be performed at groundwater monitoring wells MW-03, MW-16 and MW-18.

REFERENCES

Email from Iain Wingard, GeoEngineers to Eugene Radcliff, Ecology "Subject: City of Olympia Groundwater Compliance Monitoring," dated May 11, 2010.

Email from Eugene Radcliff of Ecology to Iain Wingard of GeoEngineers, "Subject: State Avenue Property May 2010 Groundwater Compliance Monitoring Report," dated July 19, 2010.

Email from Eugene Radcliff, Ecology to Iain Wingard, GeoEngineers, "Subject: Ecology response to the February 2011 Groundwater Monitoring Report," dated May 16, 2011.

Email from Eugene Radcliff, Ecology to Iain Wingard, GeoEngineers, "Subject: Monitoring and Reporting at the City of Olympia 318 State Avenue Property," dated May 8, 2012.

Email from Eugene Radcliff, Ecology to Iain Wingard, GeoEngineers, "Subject: Groundwater Monitoring Report for City of Olympia 318 S State Street Property," dated October 3, 2013.

Email from Eugene Radcliff, Ecology to Iain Wingard, GeoEngineers, "Subject: Groundwater Monitoring Report for City of Olympia 318 S State Street Property," dated November 4, 2013.

GeoEngineers, 2010a, Groundwater Compliance Monitoring Plan, 318 State Avenue NE, Olympia, Washington, April 16, 2010.

GeoEngineers, 2010b, Remedial Action Construction Report, 318 State Avenue NE, Olympia, Washington, January 5, 2010.

GeoEngineers, 2010c, Groundwater Compliance Monitoring Data Summary Report – May 2010, 318 State Avenue NE, Olympia, Washington, July 16, 2010.

LIMITATIONS

This Groundwater Monitoring Report has been prepared for use by the City of Olympia. GeoEngineers has performed these services in general accordance with the scope and limitations of our proposal.

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

TABLE 1

SUMMARY OF GROUNDWATER COMPLIANCE MONITORING PARAMETERS[1] - FEBRUARY 2015

318 STATE AVENUE NE
OLYMPIA, WASHINGTON

			Volatile Organic Compounds							Total Metals
		Analyte	Tetrachloroethene	Trichloroethene	1,1-Dichloroethene	Cis-1,2-Dichloroethene	Trans-1,2-Dichloroethene	Vinyl Chloride	Benzene	Arsenic
		Unit	(µg/l)	(µg/l)	(µg/l)	(µg/l)	(µg/l)	(µg/l)	(µg/l)	(mg/l)
		MTCA Method A Cleanup Level	5	5	4,000,000 [2]	800,000 [2]	1,600,000 [2]	0.2	5	0.005
Location	**Sample ID**	**Sample Date**								
MW-13 [11]	MW13-052510-W	05/25/10	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.02 U	NA	**0.0041 J**
	MW13-082410-W	08/24/10	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.02 U	0.1 U	**0.058 J**
	MW13-112210-W	11/22/10	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.02 U	0.1 U	0.0004 UJ
	MW13-022211-W	02/22/11	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.02 U	0.1 U	**0.0012**
MW-04 [11]	MW4-052510-W	05/25/10	0.1 U	**0.28**	0.1 U	**0.11**	0.1 U	**0.12**	NA	**0.0045 J**
	MW4-082410-W	08/24/10	0.1 U	**0.14**	0.1 U	**0.14**	0.1 U	**0.074**	0.1 U	**0.0051 J**
	MW4-112210-W	11/22/10	0.1 U	**0.34**	0.1 U	0.1 U	0.1 U	**0.065**	0.1 U	**0.00067 J**
	MW4-022211-W	02/22/11	0.1 U	**0.25**	0.1 U	0.1 U	0.1 U	**0.053**	0.1 U	**0.0023**
MW-17 [14]	MW17-052410-W	05/24/10	0.1 UJ	**0.26 J**	0.1 UJ	0.1 UJ	0.1 UJ	**0.084 J**	**0.17 J**	**0.0031 J**
	MW17-082410-W	08/24/10	0.1 U	0.1 U	0.1 U	**0.11**	0.1 U	**0.025**	0.1 U	0.002 UJ
	MW17-112210-W	11/22/10	0.1 U	**0.22**	0.1 U	0.1 U	0.1 U	0.02 U	0.1 U	**0.0016 J**
	MW17-022211-W	02/22/11	0.1 U	**0.18**	0.1 U	0.1 U	0.1 U	0.02 U	0.1 U	**0.0012**
	MW17-052511-W	05/25/11	**0.1**	**0.21**	0.1 U	0.1 U	0.1 U	**0.02**	NA[12]	NA[12]
	MW17-082411-W	08/24/11	0.1 U	**0.18**	0.1 U	0.1 U	0.1 U	0.02 U	NA[12]	NA[12]
	MW17-112911-W	11/29/11	0.1 U	**0.12**	0.1 U	0.1 U	0.1 U	0.02 U	NA[12]	NA[12]
	MW17-022812-W	02/28/12	0.1 U	**0.10**	0.1 U	0.1 U	0.1 U	0.02 U	NA[12]	NA[12]
	MW17-082312-W	08/23/12	0.1 U	**0.14**	0.1 U	0.1 U	0.1 U	0.02 U	NA[12]	NA[12]
	MW17-022813-W	02/28/13	0.1 U	0.1U	0.1 U	0.1 U	0.1 U	0.02 U	NA[12]	NA[12]
	MW17-82213-W	08/22/13	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.020 U	NA[12]	NA[12]
MW-09 [11]	MW9-052510-W	05/25/10	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.02 U	NA	**0.0016 J**
	MW9-082410-W	08/24/10	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.02 U	0.1 U	0.002 UJ
	MW9-112210-W	11/22/10	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.02 U	0.1 U	0.0004 UJ
	MW9-022211-W	02/22/11	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.02 U	0.1 U	**0.00059**
MW-03 [14]	MW3-052410-W	05/24/10	0.1 U	**0.48**	0.1 U	**0.14**	0.1 U	**0.48**	0.1 U	**0.002 J**
	MW3-082510-W	08/25/10	0.1 U	**0.26**	0.1 U	**0.11**	0.1 U	**0.12**	0.1 U	0.002 UJ
	MW3-112410-W	11/24/10	0.1 U	**1.3**	0.1 U	**0.28**	0.1 U	**1.1**	0.1 U	0.0004 UJ
	MW3-022311-W	02/23/11	0.1 U	**1.6**	0.1 U	**0.59**	0.1 U	**0.92**	0.1 U	**0.0010**
	MW3-052511-W	05/25/11	0.1 U	**1.5**	0.1 U	**0.6**	**0.15**	**0.83**	NA[12]	NA[12]
	DUP-052511-W[7]	05/25/11	0.1 U	**1.2**	0.1 U	**0.36**	**0.12**	**0.69**	NA[12]	NA[12]
	MW3-082411-W	08/24/11	0.1 U	**0.64 J**	0.1 U	**0.31**	**0.11**	**0.37 J**	NA[12]	NA[12]
	DUP-082411-W[8]	08/24/11	0.1 U	**0.49 J**	0.1 U	**0.23**	0.1 U	**0.27 J**	NA[12]	NA[12]
	MW3-112911-W	11/29/11	0.1 U	**2.6**	0.1 U	**0.39**	**0.11**	**0.45**	NA[12]	NA[12]
	DUP-112911-W[9]	11/29/11	0.1 U	**2.7**	0.1 U	**0.41**	**0.10**	**0.52**	NA[12]	NA[12]
	MW3-022812-W	02/28/12	0.1 U	**0.99**	0.1 U	**0.63**	**0.18**	**1.4**	NA[12]	NA[12]
	DUP-022812-W[10]	02/28/12	0.1 U	**1.3**	0.1 U	**0.84**	**0.19**	**1.9**	NA[12]	NA[12]
	MW3-082312-W	08/23/12	0.1 U	**0.11**	0.1 U	**0.36**	**0.3**	**0.27**	NA[12]	NA[12]
	DUP-082312-W[13]	08/23/12	0.1 U	**0.11**	0.1 U	**0.34**	**0.33**	**0.26**	NA[12]	NA[12]
	MW3-022813-W	02/28/13	0.1 U	**0.70**	0.1 U	**0.34**	**0.14**	**0.72**	NA[12]	NA[12]
	DUP-022813-W[15]	02/28/13	0.1 U	**0.68**	0.1 U	**0.32**	**0.12**	**0.69**	NA[12]	NA[12]
	MW03-82213-W	08/22/13	0.1 U	0.1 U	0.1 U	**0.24**	**0.28**	**0.15**	NA[12]	NA[12]
	DUP01-82213-W[16]	08/22/13	0.1 U	0.1 U	0.1 U	**0.23**	**0.32**	**0.16**	NA[12]	NA[12]
	MW3-140227-W	02/27/14	0.1 U	**2.5**	0.10 U	**0.75**	**0.12**	**0.79**	NA[12]	NA[12]
	MW03-140825-W	08/25/14	0.1 U	0.1 U	0.1 U	**0.35**	**0.36**	**0.25**	NA[12]	NA[12]
	MW03-150225-W	02/25/15	0.5 U	**0.58**	0.1 U	**1.8**	0.2 U	**3.6**	NA[12]	NA[12]

			Volatile Organic Compounds							Total Metals
	Analyte		Tetrachloroethene	Trichloroethene	1,1-Dichloroethene	Cis-1,2-Dichloroethene	Trans-1,2-Dichloroethene	Vinyl Chloride	Benzene	Arsenic
	Unit		(µg/l)	(µg/l)	(µg/l)	(µg/l)	(µg/l)	(µg/l)	(µg/l)	(mg/l)
	MTCA Method A Cleanup Level		5	5	4,000,000 [2]	800,000 [2]	1,600,000 [2]	0.2	5	0.005
MW-08 [14]	MW8-052410-W	05/24/10	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.21**	0.1 U	**0.0027 J**
	DUP-1-052410-W[3]	05/24/10	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.23**	0.1 U	**0.0027 J**
	MW8-082510-W	08/25/10	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.29**	0.1 U	**0.0045 J**
	DUP-1-082510-W[4]	08/25/10	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.29**	0.1 U	**0.0045 J**
	MW8-112410-W	11/24/10	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.066**	0.1 U	0.0004 UJ
	MW8-022311-W	02/23/11	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.02 U	0.1 U	**0.0019**
	MW8-052511-W	05/25/11	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.04**	NA[12]	NA[12]
	MW8-082411-W	08/24/11	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.21**	NA[12]	NA[12]
	MW08-112911-W	11/29/11	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.02 U	NA[12]	NA[12]
	MW08-022812-W	02/28/12	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.02 U	NA[12]	NA[12]
	MW08-082312-W	08/23/12	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.13**	NA[12]	NA[12]
	MW08-022813-W	02/28/13	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.02U	NA[12]	NA[12]
	MW8-82213-W	08/22/13	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	**0.10**	NA[12]	NA[12]
MW-16 [14]	MW16-052410-W	05/24/10	0.1 U	**0.44**	0.1 U	**0.2**	**0.18**	**0.76**	0.1 U	**0.0019 J**
	MW16-082510-W	08/25/10	0.1 U	**0.46**	0.1 U	**0.32**	**0.34**	**1.0**	**0.12**	0.002 UJ
	MW16-112410-W	11/24/10	0.1 U	**0.49**	0.1 U	**0.17**	**0.19**	**0.33**	0.1 U	**0.0013 J**
	DUP-1-112410-W[5]	11/24/10	0.1 U	**0.50**	0.1 U	**0.16**	**0.21**	**0.38**	0.1 U	0.0004 UJ
	MW16-022311-W	02/23/11	0.1 U	**0.42**	0.1 U	**0.13**	**0.13**	**0.22**	0.1 U	**0.0014**
	DUP-1-022311-W[6]	02/23/11	0.1 U	**0.43**	0.1 U	**0.11**	**0.15**	**0.23**	0.1 U	**0.0015**
	MW16-052511-W	05/25/11	0.1 U	**0.47**	0.1 U	0.1 U	**0.16**	**0.18**	NA[12]	NA[12]
	MW16-082411-W	08/24/11	0.1 U	**0.41**	0.1 U	**0.26**	**0.24**	**0.70**	NA[12]	NA[12]
	MW16-112911-W	11/29/11	0.1 U	**0.35**	0.1 U	**0.10**	**0.12**	**0.15**	NA[12]	NA[12]
	MW16-022812-W	02/28/12	0.1 U	**0.40**	0.1 U	0.1 U	**0.13**	**0.17**	NA[12]	NA[12]
	MW16-082312-W	08/23/12	0.1 U	**0.52**	0.1 U	**0.21**	**0.2**	**0.47**	NA[12]	NA[12]
	MW16-022813-W	02/28/13	0.1 U	**0.28**	0.1 U	0.1 U	0.1 U	**0.086**	NA[12]	NA[12]
	MW16-82213-W	08/22/13	0.1 U	**0.26**	0.1 U	**0.22**	**0.13**	**0.44**	NA[12]	NA[12]
	MW16-140227-W	02/27/14	0.1 U	**0.24**	0.1 U	0.1 U	0.1 U	**0.093**	NA[12]	NA[12]
	DUP01-140227-W[17]	02/27/14	0.1 U	**0.26**	0.1 U	0.1 U	0.1 U	**0.090**	NA[12]	NA[12]
	MW16-140825-W	08/25/14	0.1 U	**0.37**	0.1 U	**0.25**	**0.18**	**0.52**	NA[12]	NA[12]
	DUP01-140825-W[18]	08/25/14	0.1 U	**0.36**	0.1 U	**0.25**	**0.19**	**0.51**	NA[12]	NA[12]
	MW16-150225-W	02/25/15	0.5 U	**0.24**	0.1 U	0.2 U	0.2 U	**0.16**	NA[12]	NA[12]
	DUP01-150225-W[19]	02/25/15	0.5 U	**0.23**	0.1 U	0.2 U	0.2 U	**0.15**	NA[12]	NA[12]
MW-18 [14]	MW18-052410-W	05/24/10	0.1 U	**0.62**	0.1 U	**0.28**	**0.16**	**2.3**	**0.2**	**0.0038 J**
	MW18-082510-W	08/25/10	0.1 U	**0.25**	0.1 U	**0.22**	**0.13**	**1.9**	**0.19**	**0.0028 J**
	MW18-112410-W	11/24/10	0.1 U	**0.81**	0.1 U	**0.34**	**0.23**	**1.7**	**0.11**	**0.0032 J**
	MW18-022311-W	02/23/11	0.1 U	**0.72**	0.1 U	**0.3**	**0.16**	**0.9**	0.1 U	**0.0045**
	MW18-052511-W	05/25/11	0.1 U	**0.63**	0.1 U	**0.21**	**0.14**	**1.2**	NA[12]	NA[12]
	MW18-082411-W	08/24/11	0.1 U	**0.4**	0.1 U	**0.39**	**0.24**	**2.3**	NA[12]	NA[12]
	MW18-112911-W	11/29/11	0.1 U	**0.57**	0.1 U	**0.30**	**0.15**	**0.86**	NA[12]	NA[12]
	MW18-022812-W	02/28/12	0.1 U	**0.49**	0.1 U	**0.20**	**0.16**	**1.20**	NA[12]	NA[12]
	MW18-082312-W	08/23/12	0.1 U	**0.62**	0.1 U	**0.43**	**0.29**	**2.7**	NA[12]	NA[12]
	MW18-022813-W	02/28/13	0.1 U	**0.34**	0.1 U	0.1U	0.1U	**0.15**	NA[12]	NA[12]
	MW18-82213-W	08/22/13	0.1 U	**0.61**	0.1 U	**0.45**	**0.28**	**2.1**	NA[12]	NA[12]
	MW18-140227-W	02/27/14	0.1 U	**0.57**	0.1 U	**0.26**	**0.26**	**1.3**	NA[12]	NA[12]
	MW18-140825-W	08/25/14	0.1 U	**0.48**	0.1 U	**0.51**	**0.43**	**2.7**	NA[12]	NA[12]
	MW18-150225-W	02/25/15	0.5 U	**0.68**	0.1 U	**0.23**	**0.20**	**1.5**	NA[12]	NA[12]

Notes:

[1] The parameters presented are the groundwater compliance monitoring parameters specified in the Groundwater Compliance Monitoring Plan (GeoEngineers 2010) and benzene as requested by Ecology in an email from Eugene Radcliff, Ecology to Iain Wingard, GeoEngineers dated July 19, 2010. Analysis for benzene and arsenic were discontinued as benzene was never detected at a concentration greater than cleanup levels and arsenic concentrations are less than cleanup levels and appear to be associated with regional conditions. Ecology concurrence for discontinuing benzene and arsenic analysis was provided in an email from Eugene Radcliff, Ecology, to Iain Wingard, GeoEngineers, dated May 16, 2011.

[2] A MTCA Method A groundwater cleanup level has not been established; therefore, the MTCA Method B groundwater cleanup level has been provided.

[3] Sample DUP-1-052410-W is a field duplicate of sample MW8-052410-W.

[4] Sample DUP-1-082510-W is a field duplicate of sample MW8-082510-W.

[5] Sample DUP-1-112410-W is a field duplicate of sample MW16-112410-W.

[6] Sample DUP-1-022311-W is a field duplicate of sample MW16-022311-W.

[7] Sample DUP-052511-W is a field duplicate of sample MW3-052511-W.

[8] Sample DUP-082411-W is a field duplicate of sample MW3-082411-W.

[9] Sample DUP-112911-W is a field duplicate of sample MW3-112911-W.

[10] Sample DUP-022812-W is a field duplicate of sample MW3-022812-W.

[11] Groundwater sampling and analysis at this monitoring well location is no longer a part of the compliance monitoring program. Therefore, groundwater samples were not collected during the current monitoring event. Concurrence for discontinuing sampling and analysis at this monitoring well location was provided in an email from Eugene Radcliff, Ecology, to Iain Wingard, GeoEngineers, dated May 16, 2011.

[12] See Footnote 1.

[13] Sample DUP-082312-W is a field duplicate of sample MW3-082312-W.

[14] Groundwater sampling and analysis frequency at this monitoring well location has been reduced from quarterly monitoring to semi-annual monitoring. Concurrence for reducing the sampling and analysis frequency at this monitoring well location was provided in an email from Eugene Radcliff, Ecology, to Iain Wingard, GeoEngineers, dated May 8, 2012.

[15] Sample DUP-022813-W is a field duplicate of sample MW3-022813-W.

[16] Sample DUP01-82213-W is a field duplicate of sample MW03-82213-W.

[17] Sample DUP01-140227-W is a field duplicate of sample MW16-140227-W.

[18] Sample DUP01-140825-W is a field duplicate of sample MW16-140825-W.

[19] Sample DUP01-150225-W is a field duplicate of sample MW16-150225-W.

MTCA = Model Toxics Control Act

µg/l = microgram per liter

U = The analyte was not detected at a concentration greater than the identified reporting limit

UJ = The analyte was not detected at a concentration greater than the identified reporting limit and the reporting limit concentration is estimated

NA = Not analyzed

mg/l = milligram per liter

J = The analyte concentration is estimated

NC = Not Collected

Bold indicates analyte was detected

Green shading indicates sample results for the current monitoring event.

Gray shading indicates concentration is greater than cleanup level

TABLE 2

SUMMARY OF GROUNDWATER QUALITY PARAMETERS[1] - FEBRUARY 2015

318 STATE AVENUE NE
OLYMPIA, WASHINGTON

Location ID	Sample Date	Ferrous Iron (mg/l)	Sulfate (mg/l)	Dissolved Oxygen (mg/l)	pH	Conductivity (mS/m)	Salinity (%)	Total Dissolved Solids (g/l)	Turbidity (NTU)	Temperature (C)	ORP[2] (mv)	Water Level (ft btoc)
MW-13 [3]	05/25/10	2.2	6.0	1.23	8.34	15.6	0.1	1	4.74	14.4	-97	2.91
	08/24/10	3.8	1.6	2.21	6.58	99.9	0	0.72	4.16	21.07	-115	3.82
	11/22/10	1.2	8.1	0.98	6.63	40.0	0	0.26	8.97	14.79	6	2.24
	02/22/11	1.0	6.3	0.81	6.56	40.7	0	0.26	0.8	11.12	-43	2.62
	05/25/11	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	2.85
	08/24/11	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	3.61
	11/29/11	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	2.04
	02/28/12	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	2.30
MW-04 [3]	05/25/10	4.5	6.7	1.34	7.34	59.5	0	0.38	0.99	13.9	-80	3.29
	08/24/10	3.6	1.2 U	0.72	6.15	64.5	0	0.41	1.82	21.12	-75	4.23
	11/22/10	3.8	3.8	1.97	6.52	37.1	0	0.24	1.8	12.64	-57	2.61
	02/22/11	2.2	2.6	0.99	6.56	25.5	0	0.17	1.08	10.11	-70	2.95
	05/25/11	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	3.15
	08/24/11	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	4.11
	11/29/11	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	2.41
	02/28/12	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	2.54
MW-17 [6]	05/24/10	0.0	31	1.78	7	45.7	0	0.3	2.49	13.5	-23	3.83
	08/24/10	0.0	28	0.58	7.04	99.9	0	0.79	9.03	21.5	54	4.53
	11/22/10	0.2	28	0.00	7.16	50.9	0	0.33	10.5	15.64	39	3.32
	02/22/11	0.0	36	0.39	6.78	36.4	0	0.24	7.2	11.39	73	3.62
	05/25/11	0.0	23	0.28	6.65	40.4	NC	NC	5.49	12.48	114	3.67
	08/24/11	0.0	11.9	0.40	6.99	54.9	0	0.35	3.54	19.28	239	4.41
	11/29/11	0.0	28	4.80	6.96	33.8	0	0.22	64.7	13.88	192	3.08
	02/28/12	0.0	58 UJ	6.90	6.91	28.1	0	0.18	132	10.49	200	3.31
	08/23/12	0.0	3.7	0.15	6.5	40.1	0	0.25	2.92	18.3	82	4.47
	02/28/13	0.0	7.2	4.10	6.17	39.0	0	0.26	26.8	10.46	195	3.50
	08/22/13	0.0	6.2	0.20	7.14	34.0	0	0.23	7.1	19.9	-200	4.54
	02/27/14	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	3.07
	08/25/14	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	4.37
	02/25/15	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	3.76
MW-09 [3]	05/25/10	1.6	9.1	1.22	8.8	99.9	0	0.6	0.96	14.8	-157	3.65
	08/24/10	2.2	1.2 U	0.99	6.74	145.0	0.1	0.9	1.48	23.16	-89	4.44
	11/22/10	0.4	1.9	1.32	7.01	44.7	0	0.29	1.99	15.08	-76	2.92
	02/22/11	0.4	1.7	0.15	7.06	47.2	0	0.31	0	12.73	-114	3.35
	05/25/11	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	3.42
	08/24/11	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	4.31
	11/29/11	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	2.60
	02/28/12	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	2.98

Location ID	Sample Date	Ferrous Iron (mg/l)	Sulfate (mg/l)	Dissolved Oxygen (mg/l)	pH	Conductivity (mS/m)	Salinity (%)	Total Dissolved Solids (g/l)	Turbidity (NTU)	Temperature (C)	ORP[2] (mv)	Water Level (ft btoc)
MW-03[4]	05/24/10	0.9	7.5	4.38	9.79	27.2	0.1	1.4	0.89	16.2	-211	4.27
	08/25/10	1.4	1.2 U	0.31	6.96	75.0	0	0.48	0.94	21.32	-133	4.99
	11/24/10	0.8	6.6	0.00	7.04	66.7	0	0.43	0.84	15.53	-94	3.80
	02/23/11	0.6	2.5	0.01	7.10	46.3	0	0.3	2.51	11.26	-117	4.05
	05/25/11	0.8	2.4	0.01	7.07	46.7	NC	NC	0.59	15.12	-130	4.10
	08/24/11	1.1	1 U	0.40	7.20	72.3	0	0.46	0.44	21.02	-90	4.82
	11/29/11	0.6	11	5.00	7.10	59.0	0	0.38	3.06	13.67	89	3.49
	02/28/12	0.8	40 UJ	2.60	7.25	41.5	0	0.27	5.45	10.99	-59	3.75
	08/23/12	1.0	1.2 U	7.14	6.87	53.0	0	0.34	0.59	21.3	-117	4.92
	02/28/13	1.5	2.1	0.78	6.53	48.0	0	0.31	17.6	11.52	-48	3.98
	08/22/13	1.6	1.2 U	0.10	7.61	61.7	0	0.40	37.4[5]	23.2	-156	4.98
	02/27/14	0.0	11	3.80	7.30	33.2	0	0.31	0.63	10.3	204.4	3.44
	08/25/14	1.8	1.2 U	0.68	7.25	52.0	0.26	0.35	2.48	22.99	-108.6	4.78
	02/25/15	0.5	2.1	1.25	7.31	31.9	0.2	0.26	1.56	12.21	-70.3	4.14
MW-08[6]	05/24/10	0.3	10.0	1.30	8.45	24.5	0.1	1.6	0.73	14.9	-145	3.45
	08/25/10	3.0	2.5	0.11	7.06	69.2	0	0.44	1.25	21.68	-155	4.50
	11/24/10	0.6	17	2.33	7.21	54.6	0	0.35	1.24	15.08	-67	3.14
	02/23/11	0.0	7.9	2.04	7.27	33.2	0	0.22	4.98	11.59	-37	3.51
	05/25/11	0.0	8.4	0.73	7.16	37.4	NC	NC	1.02	13.85	37	3.59
	08/24/11	1.4	1.6	0.30	7.25	68.6	0	0.44	0.61	20.04	-117	4.39
	11/29/11	1.6	8.9	6.60	7.20	32.5	0	0.21	2.75	12.81	69	2.82
	02/28/12	0.0	47 UJ	8.20	7.37	29.3	0	0.19	18.6	10.26	33	3.21
	08/23/12	0.0	1.7	0.33	6.40	49.9	0	0.33	9.2	19.5	-99	4.39
	02/28/13	0.0	8.1	8.50	6.55	35.7	0	0.23	21.7	11.08	175	3.32
	08/22/13	7.5	2.1	1.86	7.61	56.5	0	0.36	59.5[5]	23.1	-203	4.39
	02/27/14	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	2.77
	08/25/14	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	4.32
	02/25/15	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	3.58
MW-16[4]	05/24/10	0.0	20.0	2.44	8.19	26.6	0	0.17	2.9	15.1	-116	4.24
	08/25/10	0.4	42.0	0.04	7.26	69.8	0	0.44	1.2	21.91	-106	5.02
	11/24/10	0.0	28	1.93	7.54	49.8	0	0.36	1.16	15.42	-34	3.68
	02/23/11	0.0	17	5.08	7.53	37.5	0	0.24	2.58	11.53	-9	4.04
	05/25/11	0.0	11	1.02	7.55	33.1	NC	NC	2.28	13.87	64	4.06
	08/24/11	1.2	4.9	1.00	7.66	51.0	0	0.33	1.28	20.26	-56	4.86
	11/29/11	0.4	19	6.20	7.60	35.3	0	0.23	4.00	13.82	96	3.33
	02/28/12	0.0	54 UJ	6.80	7.70	29.8	0	0.19	1.87	10.89	87	3.72
	08/23/12	0.0	3.9	3.21	7.02	31.4	0	0.2	1.22	19.7	-109	4.91
	02/28/13	0.0	7.7	5.86	6.84	29.4	0	0.19	0.40	11.36	115	3.86
	08/22/13	0.0	3.5	0.11	7.93	46.5	0	0.3	62[5]	22.9	-177	4.91
	02/27/14	0.0	7.3	2.61	7.24	23.6	0	0.21	0.31	10.9	206.2	3.33
	08/25/14	0.5	3.1	0.72	7.59	42.1	0.21	0.28	0.42	22.35	-30.8	4.73
	02/25/15	0.0	5.7	3.07	7.64	23.1	0.15	0.2	1.39	11.51	-52.2	4.09
MW-18[4]	05/24/10	0.0	34.0	3.92	9.16	9.0	0	0.5	1.9	14.3	-194	4.39
	08/25/10	0.2	11.0	0.00	6.81	71.9	0	0.46	4.12	21.82	-75	5.09
	11/24/10	0.0	38	0.01	7.11	47.9	0	0.31	0.61	15.52	39	3.87
	02/23/11	0.0	23	0.17	7.22	40.3	0	0.26	0.99	11.7	55	4.15
	05/25/11	0.0	17	0.00	7.15	40.8	NC	NC	1.07	12.8	31	4.21
	08/24/11	0.2	18.5	0.50	7.33	74.1	0	0.47	0.48	19.54	-48	4.97
	11/29/11	0.4	23	3.50	6.81	34.3	0	0.22	2.82	13.18	183	3.53
	02/28/12	0.0	67 UJ	8.20	7.21	32.9	0	0.21	1.56	10.33	93	3.87
	08/23/12	1.0	7.5	4.03	7.08	53.4	0	0.34	3	18.2	-110	5.02
	02/28/13	0.0	7.4	5.68	6.05	21.1	0	0.14	7	10.94	182	4.02
	08/22/13	1.1	4.1	1.90	7.72	59.3	0	0.38	54.8[5]	20.9	-153	5.04
	02/27/14	0.0	11	3.00	7.1	22.2	0	0.2	0.48	10.6	201.3	3.52
	08/25/14	0.8	1.2 U	2.02	9.23	46.7	0.25	0.33	2.79	20.37	-102.9	4.85
	02/25/15	0.0	5.9	1.71	7.37	25.4	0.17	0.23	1.81	11.2	-35.2	4.21

Notes:

[1] Groundwater quality parameters include the analytes ferrous iron and sulfate to evaluate and monitor natural attenuation.

[2] ORP field readings are considered to be an estimate.

[3] Groundwater sampling and analysis at this monitoring well location is no longer a part of the compliance monitoring program. Therefore, groundwater quality parameters were not collected during the current monitoring event. However, the water level was collected to monitor the groundwater gradient. Concurrence for discontinuing sampling and analysis at this monitoring well location was provided in an email from Eugene Radcliff, Ecology, to Iain Wingard, GeoEngineers, dated May 16, 2011.

[4] Groundwater sampling and analysis frequency at this monitoring well location has been reduced from quarterly monitoring to semi-annual monitoring. Concurrence for reducing the sampling and analysis frequency at this monitoring well location was provided in an email from Eugene Radcliff, Ecology, to Iain Wingard, GeoEngineers, dated May 8, 2012.

[5] Turbidity measurements collected at this compliance monitoring location are considered to be biased high due to a water quality equipment malfunction. Visual observation made at the time of sampling identified that the sample was clear and free of particulates.

[6] Groundwater sampling and analysis at this monitoring well location is no longer a part of the compliance monitoring program. Therefore, groundwater quality parameters were not collected during the current monitoring event. However, the water level was collected to monitor the groundwater gradient. Concurrence for discontinuing sampling and analysis at this monitoring well location was provided in an email from Eugene Radcliff, Ecology, to Iain Wingard, GeoEngineers, dated November 4, 2013.

ORP = Oxidation/reduction potential

mg/l = milligrams per liter

g/l = grams per liter

% = percent

mv = Millivolts

mS/m = milliSiemens per meter

C = Celsius

U = The analyte was not detected at a concentration greater than the identified reporting limit

NTU = nephelometric turbidity unit

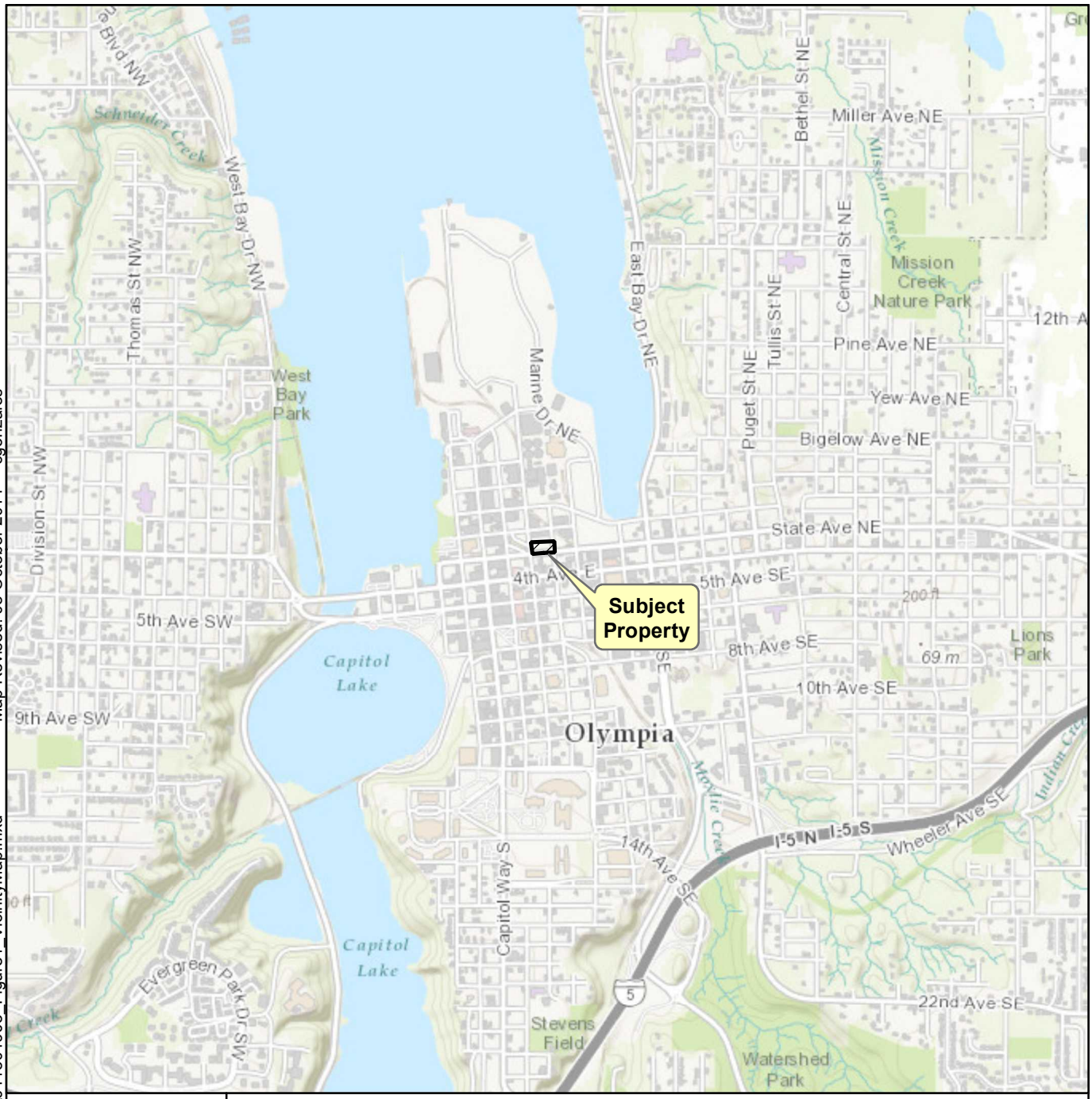
NC = Not Collected

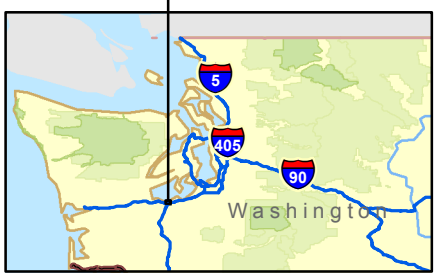
Green shading indicates sample results for current quarter of monitoring.

ft btoc = feet below the top of monitoring well casing

J = Analyte concentration is estimated.

NS = Not Sampled. Monitoring well location no longer a part of compliance monitoring program. See Footnote 3.





3,000 0 3,000

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: 2008 Shaded Relief from ESRI, 2008 Topographic Maps from National Geographic Society
Projection: NAD_1983_StatePlane_Washington_North_FIPS_4601_Feet
Datum: D_North_American_1983

Vicinity Map

318 State Avenue NE
Olympia, Washington

GeoEngineers

Figure 1

Office: TAC Path: \\tac\projects\0\0415049\GIS\MXDs\0415049003_Figure1_VicinityMap.mxd Map Revised: 08 October 2014 cgonzales

Legend

- MW-03 — Existing Monitoring Well Sampled for Groundwater Analysis and used to monitor Groundwater Gradients
- MW-01 — Existing Monitoring Well Previously Sampled for Groundwater Analysis and to Monitor Groundwater Gradients
- CSZ 1 — Contaminated Soil Zones (CSZ) Remediated in September-October 2009
- Approximate Property Boundary

N
W E
S

40 0 40
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. 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.

Data Sources: Approximate Property Boundary from Thurston County parcels (revised by GeoEngineers).
Aerial photograph (2009) from Thurston County Data Center. Data Frame Rotated 356 degrees.

Projection: NAD_1983_StatePlane_Washington_South_FIPS_4602_Feet
Datum: D_North_American_1983

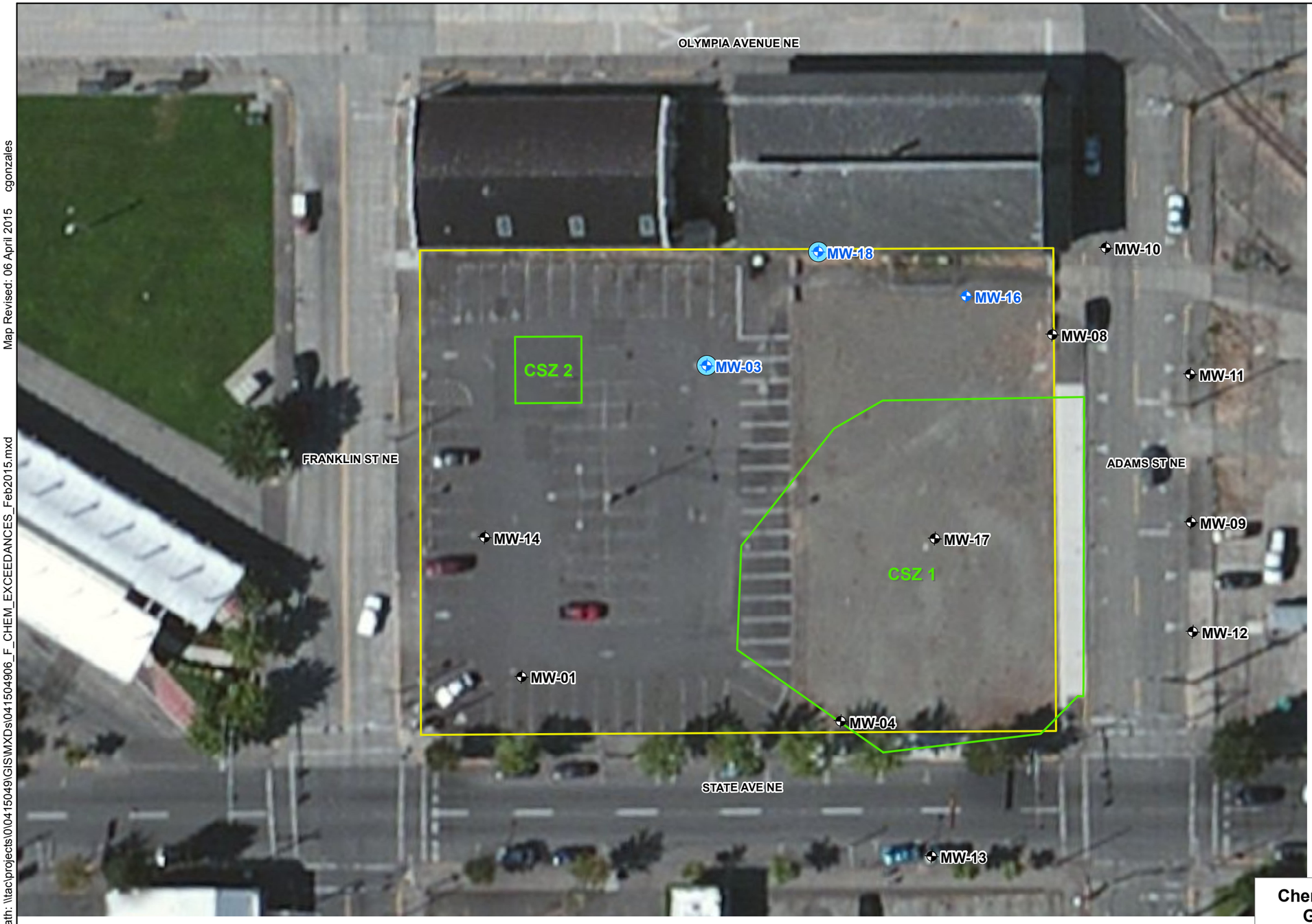
Groundwater Compliance Monitoring Locations

318 State Avenue NE
Olympia, Washington

GeoEngineers

Figure 2

Office: TAC Path: \\tac\projects\0\04150\49\GIS\MXDs\041504906_F2_GW_MW_LOCATIONS_Oct14.mxd Map Revised: 08 October 2014 cgonzales



Legend

- MW-03 — Monitoring Well Sampled for Groundwater Analysis and used to Monitor Groundwater levels
- MW-01 — Existing Monitoring Well Previously Sampled for Groundwater Analysis and to Monitor Groundwater levels
- Vinyl Chloride at concentrations greater than MTCA Method A (0.2 ug/l)
- CSZ 1 — Contaminated Soil Zones (CSZ) Remediated in September-October 2009
- Approximate Property Boundary

Well	Event	Result
MW-3		
Vinyl Chloride	February 2015	3.6 µg/L
MW-18		
Vinyl Chloride	February 2015	1.5 µg/L

N
W E
S

40 0 40
Feet

Notes:
1. MTCA = Model Toxics Control Act, ug/L = micrograms per liter.
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.

Data Sources: Approximate Property Boundary from Thurston County parcels (revised by GeoEngineers).
Aerial photograph 2013 from ESRI. Data Frame Rotated 356 degrees.

Projection: NAD_1983_StatePlane_Washington_South_FIPS_4602_Feet
Datum: D_North_American_1983

Chemical Analytical Results Exceeding Groundwater Compliance Criteria

318 State Avenue NE
Olympia, Washington

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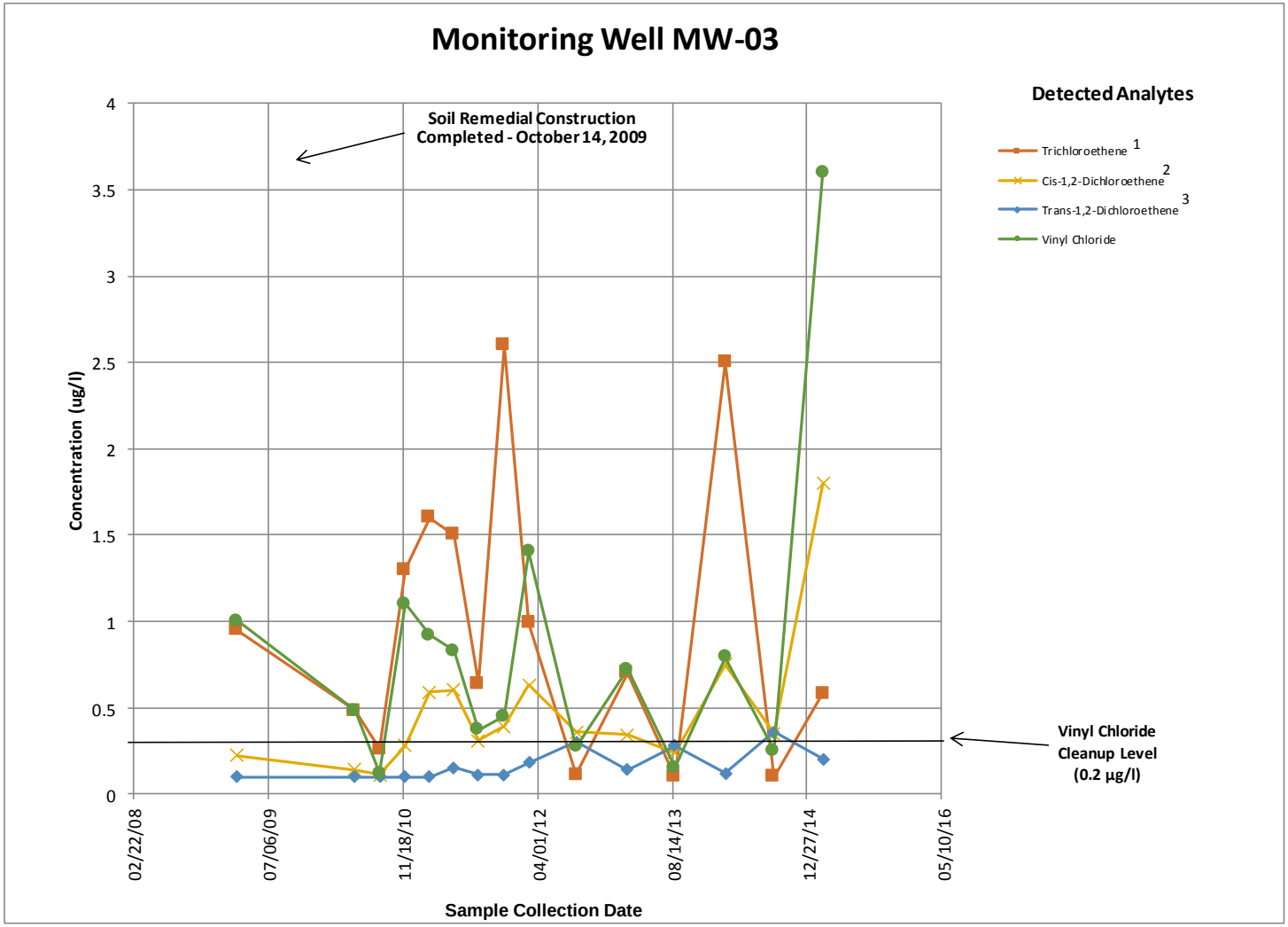
Figure 3

Office: TAC Path: \\tac\projects\0\04150\49\GIS\MXDs\041504906_F_CHEM_EXCEEDANCES_Feb2015.mxd Map Revised: 06 April 2015 cgonzales



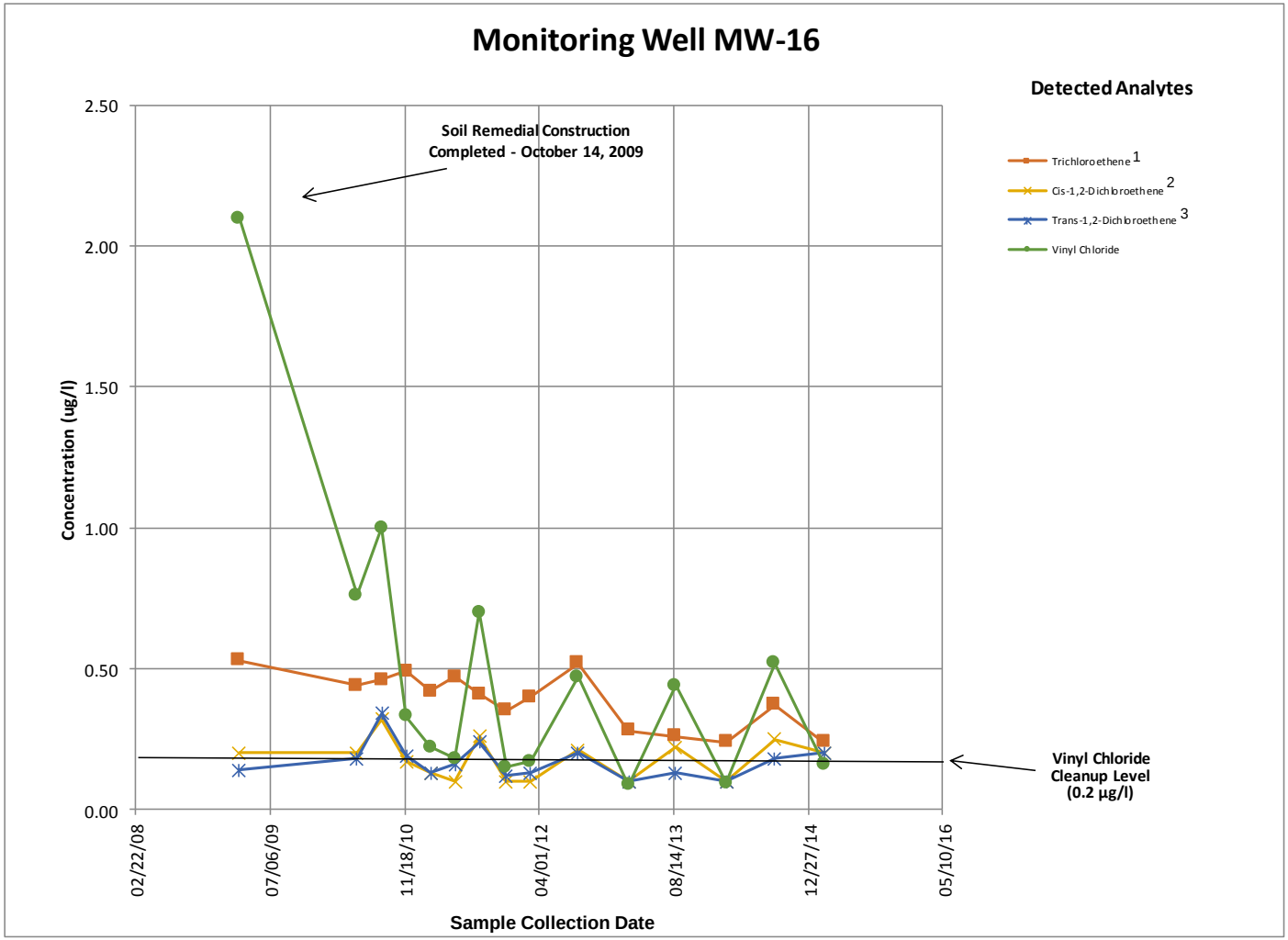
Notes:
[1] The concentrations of trichloroethene (TCE) are less than the TCE cleanup level of 5 µg/l.
[2] The concentrations of Cis-1,2-Dichloroethene (Cis-DCE) are less than the Cis-DCE cleanup level of 800,000 µg/l.
[3] The concentrations of trans-1,2-Dichloroethene (trans-DCE) are less than the trans-DCE cleanup level of 1,600,000 µg/l.

Trend Analysis – February 2015

318 State Avenue NE
Olympia, Washington

GeoEngineers

Figure 4



Notes:
[1] The concentrations of trichloroethene (TCE) are less than the TCE cleanup level of 5 µg/l.
[2] The concentrations of Cis-1,2-Dichloroethene (Cis-DCE) are less than the Cis-DCE cleanup level of 800,000 µg/l.
[3] The concentrations of trans-1,2-Dichloroethene (trans-DCE) are less than the trans-DCE cleanup level of 1,600,000 µg/l.

Trend Analysis – February 2015

318 State Avenue NE
Olympia, Washington

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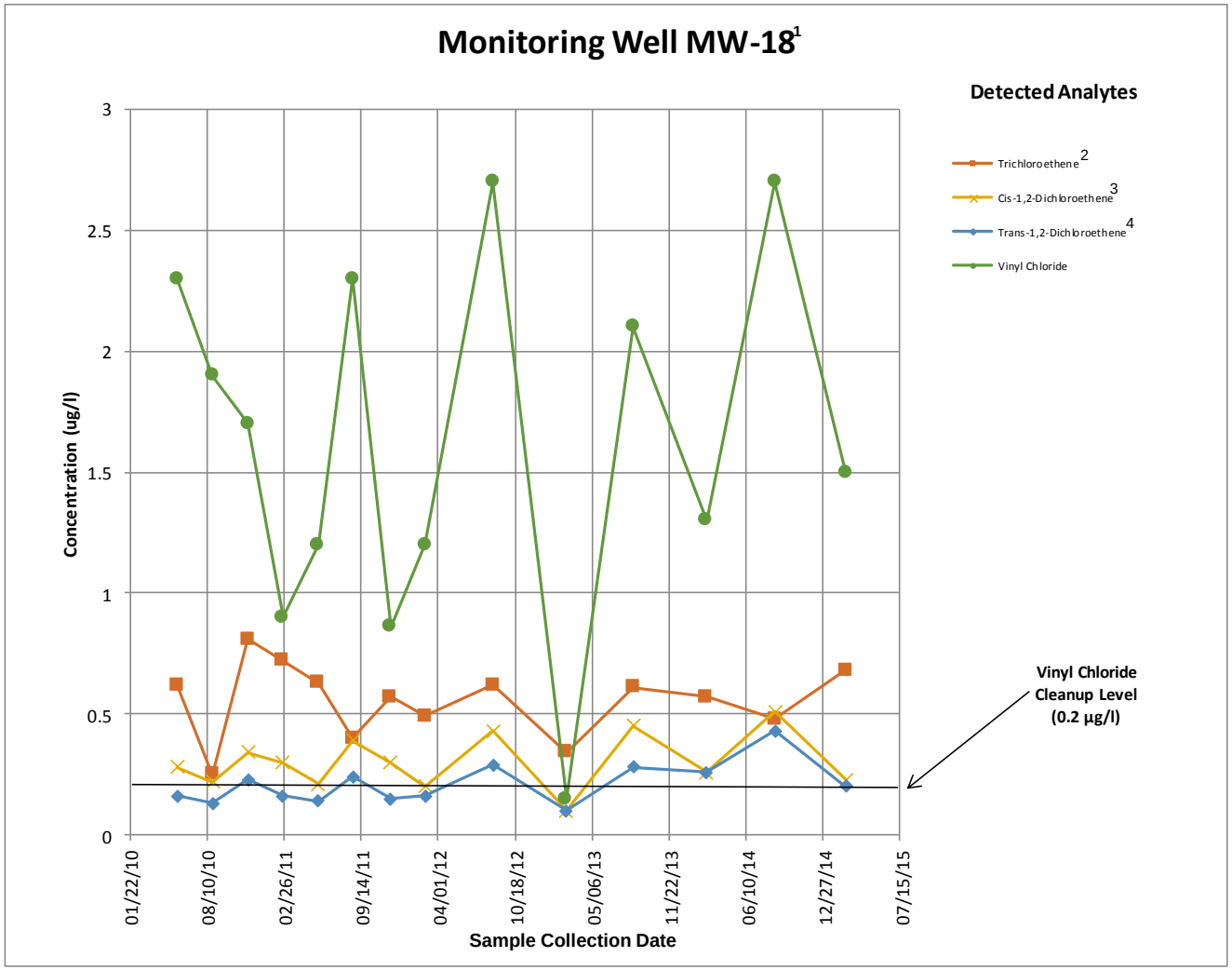
Figure 5



Notes:
[1] MW-18 was installed after remedial actions for soil were completed on October 14, 2009.
[2] The concentrations of trichloroethene (TCE) are less than the TCE cleanup level of 5 µg/l.
[3] The concentrations of Cis-1,2-Dichloroethene (Cis-DCE) are less than the cis-DCE cleanup level of 800,000 µg/l.
[4] The concentrations of trans-1,2-Dichloroethene (trans-DCE) are less than the trans-DCE cleanup level of 1,600,000 µg/l.

Trend Analysis – February 2015

318 State Avenue NE
Olympia, Washington

GeoEngineers

Figure 6

APPENDIX A
Laboratory Reports

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-47675-1
Client Project/Site: 318 State AVE NE (WA)

For:
GeoEngineers Inc
1101 Fawcett, Suite 200
Tacoma, Washington 98402

Attn: Mr. Iain Wingard

Kristine D. Allen

Authorized for release by:
3/11/2015 6:12:32 PM
Kristine Allen, Manager of Project Management
(253)248-4970
kristine.allen@testamericainc.com

Designee for

Melissa Armstrong, Project Manager II
(253)248-4975
melissa.armstrong@testamericainc.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Case Narrative

Client: GeoEngineers Inc
Project/Site: 318 State AVE NE (WA)

TestAmerica Job ID: 580-47675-1

Job ID: 580-47675-1

Laboratory: TestAmerica Seattle

Narrative

Receipt

The samples were received on 2/25/2015 4:45 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 9.9º C.

Except:

The following samples were received at the laboratory outside the required temperature criteria: DUP01-150225-W (580-47675-4), MW16-150225-W (580-47675-1), MW18-150225-W (580-47675-3), MW18-150225-W (580-47675-3 MS), MW18-150225-W (580-47675-3 MSD), MW3-150225-W (580-47675-2), TRIP BLANK-150225 (580-47675-5). The samples are considered acceptable since they were collected and submitted to the laboratory on the same day and there is evidence that the chilling process has begun.

GC/MS VOA

Method(s) 8260B: The laboratory control sample (LCS) and / or laboratory control sample duplicate (LCSD) for batch 183609 recovered outside control limits for the following analytes: Tetrachloroethene. These analytes were biased high in the LCS and were not detected in the associated samples; therefore, the data have been reported.

Method(s) 8260B: Surrogate recovery for the following sample(s) was outside control limits: MW3-150225-W (580-47675-2). Re-extraction and/or re-analysis was performed with concurring results. The original analysis has been reported.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

HPLC/IC

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Client: GeoEngineers Inc
Project/Site: 318 State AVE NE (WA)

TestAmerica Job ID: 580-47675-1

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
*	LCS or LCSD exceeds the control limits
X	Surrogate is outside control limits

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client: GeoEngineers Inc
Project/Site: 318 State AVE NE (WA)

TestAmerica Job ID: 580-47675-1

Client Sample ID: MW16-150225-W
Date Collected: 02/25/15 11:50
Date Received: 02/25/15 16:45

Lab Sample ID: 580-47675-1
Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
cis-1,2-Dichloroethene	ND		0.20	0.20	ug/L			03/04/15 18:21	1
1,1-Dichloroethene	ND		0.10	0.10	ug/L			03/04/15 18:21	1
Tetrachloroethene	ND	*	0.50	0.50	ug/L			03/04/15 18:21	1
trans-1,2-Dichloroethene	ND		0.20	0.20	ug/L			03/04/15 18:21	1
Trichloroethene	**0.24**		0.20	0.20	ug/L			03/04/15 18:21	1
Vinyl chloride	**0.16**		0.020	0.020	ug/L			03/04/15 18:21	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*103*		*75 - 120*		*03/04/15 18:21*	*1*
Trifluorotoluene (Surr)	*95*		*80 - 127*		*03/04/15 18:21*	*1*
Toluene-d8 (Surr)	*96*		*75 - 125*		*03/04/15 18:21*	*1*
Dibromofluoromethane (Surr)	*111*		*85 - 115*		*03/04/15 18:21*	*1*
1,2-Dichloroethane-d4 (Surr)	*123*		*70 - 128*		*03/04/15 18:21*	*1*

Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	**5.7**		1.2	0.60	mg/L			03/07/15 11:25	1

Client: GeoEngineers Inc
Project/Site: 318 State AVE NE (WA)

TestAmerica Job ID: 580-47675-1

Client Sample ID: MW3-150225-W
Date Collected: 02/25/15 12:55
Date Received: 02/25/15 16:45

Lab Sample ID: 580-47675-2
Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
cis-1,2-Dichloroethene	**1.8**		0.20	0.20	ug/L			03/04/15 18:48	1
1,1-Dichloroethene	ND		0.10	0.10	ug/L			03/04/15 18:48	1
Tetrachloroethene	ND	*	0.50	0.50	ug/L			03/04/15 18:48	1
trans-1,2-Dichloroethene	ND		0.20	0.20	ug/L			03/04/15 18:48	1
Trichloroethene	**0.58**		0.20	0.20	ug/L			03/04/15 18:48	1
Vinyl chloride	**3.6**		0.020	0.020	ug/L			03/04/15 18:48	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*97*		*75 - 120*		*03/04/15 18:48*	*1*
Trifluorotoluene (Surr)	*99*		*80 - 127*		*03/04/15 18:48*	*1*
Toluene-d8 (Surr)	*98*		*75 - 125*		*03/04/15 18:48*	*1*
Dibromofluoromethane (Surr)	*110*		*85 - 115*		*03/04/15 18:48*	*1*
1,2-Dichloroethane-d4 (Surr)	*129*	*X*	*70 - 128*		*03/04/15 18:48*	*1*

Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	**2.1**		1.2	0.60	mg/L			03/07/15 11:45	1

Client: GeoEngineers Inc
Project/Site: 318 State AVE NE (WA)

TestAmerica Job ID: 580-47675-1

Client Sample ID: MW18-150225-W
Date Collected: 02/25/15 14:00
Date Received: 02/25/15 16:45

Lab Sample ID: 580-47675-3
Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
cis-1,2-Dichloroethene	**0.23**		0.20	0.20	ug/L			03/04/15 19:15	1
1,1-Dichloroethene	ND		0.10	0.10	ug/L			03/04/15 19:15	1
Tetrachloroethene	ND	*	0.50	0.50	ug/L			03/04/15 19:15	1
trans-1,2-Dichloroethene	**0.20**		0.20	0.20	ug/L			03/04/15 19:15	1
Trichloroethene	**0.68**		0.20	0.20	ug/L			03/04/15 19:15	1
Vinyl chloride	**1.5**		0.020	0.020	ug/L			03/04/15 19:15	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*100*		*75 - 120*		*03/04/15 19:15*	*1*
Trifluorotoluene (Surr)	*100*		*80 - 127*		*03/04/15 19:15*	*1*
Toluene-d8 (Surr)	*97*		*75 - 125*		*03/04/15 19:15*	*1*
Dibromofluoromethane (Surr)	*109*		*85 - 115*		*03/04/15 19:15*	*1*
1,2-Dichloroethane-d4 (Surr)	*126*		*70 - 128*		*03/04/15 19:15*	*1*

Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	**5.9**		1.2	0.60	mg/L			03/07/15 12:05	1

Client: GeoEngineers Inc
Project/Site: 318 State AVE NE (WA)

TestAmerica Job ID: 580-47675-1

Client Sample ID: DUP01-150225-W
Date Collected: 02/25/15 11:00
Date Received: 02/25/15 16:45

Lab Sample ID: 580-47675-4
Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
cis-1,2-Dichloroethene	ND		0.20	0.20	ug/L			03/04/15 19:43	1
1,1-Dichloroethene	ND		0.10	0.10	ug/L			03/04/15 19:43	1
Tetrachloroethene	ND	*	0.50	0.50	ug/L			03/04/15 19:43	1
trans-1,2-Dichloroethene	ND		0.20	0.20	ug/L			03/04/15 19:43	1
Trichloroethene	**0.23**		0.20	0.20	ug/L			03/04/15 19:43	1
Vinyl chloride	**0.15**		0.020	0.020	ug/L			03/04/15 19:43	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*97*		*75 - 120*		*03/04/15 19:43*	*1*
Trifluorotoluene (Surr)	*99*		*80 - 127*		*03/04/15 19:43*	*1*
Toluene-d8 (Surr)	*98*		*75 - 125*		*03/04/15 19:43*	*1*
Dibromofluoromethane (Surr)	*110*		*85 - 115*		*03/04/15 19:43*	*1*
1,2-Dichloroethane-d4 (Surr)	*127*		*70 - 128*		*03/04/15 19:43*	*1*

Method: 300.0 - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	**5.6**		1.2	0.60	mg/L			03/07/15 13:05	1

Client: GeoEngineers Inc
Project/Site: 318 State AVE NE (WA)

TestAmerica Job ID: 580-47675-1

Client Sample ID: TRIP BLANK-150225
Lab Sample ID: 580-47675-5
Date Collected: 02/25/15 00:00
Matrix: Water
Date Received: 02/25/15 16:45

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
cis-1,2-Dichloroethene	ND		0.20	0.20	ug/L			03/04/15 16:05	1
1,1-Dichloroethene	ND		0.10	0.10	ug/L			03/04/15 16:05	1
Tetrachloroethene	ND	*	0.50	0.50	ug/L			03/04/15 16:05	1
trans-1,2-Dichloroethene	ND		0.20	0.20	ug/L			03/04/15 16:05	1
Trichloroethene	ND		0.20	0.20	ug/L			03/04/15 16:05	1
Vinyl chloride	ND		0.020	0.020	ug/L			03/04/15 16:05	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*98*		*75 - 120*		*03/04/15 16:05*	*1*
Trifluorotoluene (Surr)	*102*		*80 - 127*		*03/04/15 16:05*	*1*
Toluene-d8 (Surr)	*96*		*75 - 125*		*03/04/15 16:05*	*1*
Dibromofluoromethane (Surr)	*104*		*85 - 115*		*03/04/15 16:05*	*1*
1,2-Dichloroethane-d4 (Surr)	*122*		*70 - 128*		*03/04/15 16:05*	*1*

Method: 8260B - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-183609/6
Matrix: Water
Analysis Batch: 183609

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
cis-1,2-Dichloroethene	ND		0.20	0.20	ug/L			03/04/15 12:11	1
1,1-Dichloroethene	ND		0.10	0.10	ug/L			03/04/15 12:11	1
Tetrachloroethene	ND		0.50	0.50	ug/L			03/04/15 12:11	1
trans-1,2-Dichloroethene	ND		0.20	0.20	ug/L			03/04/15 12:11	1
Trichloroethene	ND		0.20	0.20	ug/L			03/04/15 12:11	1
Vinyl chloride	ND		0.020	0.020	ug/L			03/04/15 12:11	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*100*		*75 - 120*		*03/04/15 12:11*	*1*
Trifluorotoluene (Surr)	*101*		*80 - 127*		*03/04/15 12:11*	*1*
Toluene-d8 (Surr)	*96*		*75 - 125*		*03/04/15 12:11*	*1*
Dibromofluoromethane (Surr)	*106*		*85 - 115*		*03/04/15 12:11*	*1*
1,2-Dichloroethane-d4 (Surr)	*121*		*70 - 128*		*03/04/15 12:11*	*1*

Lab Sample ID: LCS 580-183609/7
Matrix: Water
Analysis Batch: 183609

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
cis-1,2-Dichloroethene			5.00	4.75		ug/L		95	80 - 130		
1,1-Dichloroethene			5.00	4.52		ug/L		90	70 - 150		
Tetrachloroethene			5.00	10.2	*	ug/L		204	40 - 180		
trans-1,2-Dichloroethene			5.00	4.72		ug/L		94	80 - 140		
Trichloroethene			5.00	6.09		ug/L		122	80 - 130		
Vinyl chloride			5.00	5.40		ug/L		108	65 - 140		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*101*		*75 - 120*
Trifluorotoluene (Surr)	*97*		*80 - 127*
Toluene-d8 (Surr)	*96*		*75 - 125*
Dibromofluoromethane (Surr)	*107*		*85 - 115*
1,2-Dichloroethane-d4 (Surr)	*116*		*70 - 128*

Lab Sample ID: LCSD 580-183609/8
Matrix: Water
Analysis Batch: 183609

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
cis-1,2-Dichloroethene			5.00	5.07		ug/L		101	80 - 130	6	20
1,1-Dichloroethene			5.00	4.54		ug/L		91	70 - 150	1	20
Tetrachloroethene			5.00	10.2	*	ug/L		205	40 - 180	0	20
trans-1,2-Dichloroethene			5.00	4.81		ug/L		96	80 - 140	2	20
Trichloroethene			5.00	6.12		ug/L		122	80 - 130	1	20
Vinyl chloride			5.00	5.45		ug/L		109	65 - 140	1	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*103*		*75 - 120*

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCSD 580-183609/8
Matrix: Water
Analysis Batch: 183609

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
Trifluorotoluene (Surr)	*96*		*80 - 127*
Toluene-d8 (Surr)	*97*		*75 - 125*
Dibromofluoromethane (Surr)	*112*		*85 - 115*
1,2-Dichloroethane-d4 (Surr)	*116*		*70 - 128*

Lab Sample ID: 580-47675-3 MS
Matrix: Water
Analysis Batch: 183609

Client Sample ID: MW18-150225-W
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
cis-1,2-Dichloroethene	0.23		5.00	5.46		ug/L		105	71 - 144
1,1-Dichloroethene	ND		5.00	4.81		ug/L		96	78 - 151
Tetrachloroethene	ND	*	5.00	4.93		ug/L		99	64 - 161
trans-1,2-Dichloroethene	0.20		5.00	5.32		ug/L		106	73 - 135
Trichloroethene	0.68		5.00	5.88		ug/L		104	79 - 131
Vinyl chloride	1.5		5.00	7.01		ug/L		110	47 - 160

Surrogate	MS %Recovery	MS Qualifier	Limits
4-Bromofluorobenzene (Surr)	*97*		*75 - 120*
Trifluorotoluene (Surr)	*103*		*80 - 127*
Toluene-d8 (Surr)	*97*		*75 - 125*
Dibromofluoromethane (Surr)	*97*		*85 - 115*
1,2-Dichloroethane-d4 (Surr)	*94*		*70 - 128*

Lab Sample ID: 580-47675-3 MSD
Matrix: Water
Analysis Batch: 183609

Client Sample ID: MW18-150225-W
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
cis-1,2-Dichloroethene	0.23		5.00	5.30		ug/L		101	71 - 144	3	20
1,1-Dichloroethene	ND		5.00	4.60		ug/L		92	78 - 151	4	30
Tetrachloroethene	ND	*	5.00	5.05		ug/L		101	64 - 161	2	20
trans-1,2-Dichloroethene	0.20		5.00	5.03		ug/L		101	73 - 135	6	20
Trichloroethene	0.68		5.00	5.73		ug/L		101	79 - 131	3	30
Vinyl chloride	1.5		5.00	6.74		ug/L		104	47 - 160	4	20

Surrogate	MSD %Recovery	MSD Qualifier	Limits
4-Bromofluorobenzene (Surr)	*95*		*75 - 120*
Trifluorotoluene (Surr)	*107*		*80 - 127*
Toluene-d8 (Surr)	*99*		*75 - 125*
Dibromofluoromethane (Surr)	*95*		*85 - 115*
1,2-Dichloroethane-d4 (Surr)	*94*		*70 - 128*

Client: GeoEngineers Inc
Project/Site: 318 State AVE NE (WA)

TestAmerica Job ID: 580-47675-1

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 490-231924/3
Matrix: Water
Analysis Batch: 231924

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sulfate	ND		1.2	0.60	mg/L			03/07/15 10:45	1

Lab Sample ID: LCS 490-231924/4
Matrix: Water
Analysis Batch: 231924

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	100	95.0		mg/L		95	90 - 110

Lab Sample ID: 580-47675-3 MS
Matrix: Water
Analysis Batch: 231924

Client Sample ID: MW18-150225-W
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Sulfate	5.9		100	97.6		mg/L		92	80 - 120

Lab Sample ID: 580-47675-3 MSD
Matrix: Water
Analysis Batch: 231924

Client Sample ID: MW18-150225-W
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Sulfate	5.9		100	101		mg/L		95	80 - 120	4	20

Lab Chronicle

Client: GeoEngineers Inc
Project/Site: 318 State AVE NE (WA)

TestAmerica Job ID: 580-47675-1

Client Sample ID: MW16-150225-W — Lab Sample ID: 580-47675-1

Date Collected: 02/25/15 11:50 — **Matrix: Water**
Date Received: 02/25/15 16:45

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	183609	03/04/15 18:21	TL1	TAL SEA
Total/NA	Analysis	300.0		1	231924	03/07/15 11:25	CLN	TAL NSH

Client Sample ID: MW3-150225-W — Lab Sample ID: 580-47675-2

Date Collected: 02/25/15 12:55 — **Matrix: Water**
Date Received: 02/25/15 16:45

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	183609	03/04/15 18:48	TL1	TAL SEA
Total/NA	Analysis	300.0		1	231924	03/07/15 11:45	CLN	TAL NSH

Client Sample ID: MW18-150225-W — Lab Sample ID: 580-47675-3

Date Collected: 02/25/15 14:00 — **Matrix: Water**
Date Received: 02/25/15 16:45

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	183609	03/04/15 19:15	TL1	TAL SEA
Total/NA	Analysis	300.0		1	231924	03/07/15 12:05	CLN	TAL NSH

Client Sample ID: DUP01-150225-W — Lab Sample ID: 580-47675-4

Date Collected: 02/25/15 11:00 — **Matrix: Water**
Date Received: 02/25/15 16:45

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	183609	03/04/15 19:43	TL1	TAL SEA
Total/NA	Analysis	300.0		1	231924	03/07/15 13:05	CLN	TAL NSH

Client Sample ID: TRIP BLANK-150225 — Lab Sample ID: 580-47675-5

Date Collected: 02/25/15 00:00 — **Matrix: Water**
Date Received: 02/25/15 16:45

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	183609	03/04/15 16:05	TL1	TAL SEA

Laboratory References:

TAL NSH = TestAmerica Nashville, 2960 Foster Creighton Drive, Nashville, TN 37204, TEL (615)726-0177

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Certification Summary

Client: GeoEngineers Inc
Project/Site: 318 State AVE NE (WA)

TestAmerica Job ID: 580-47675-1

Laboratory: TestAmerica Seattle

The certifications listed below are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Washington	State Program	10	C553	02-17-16

Laboratory: TestAmerica Nashville

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
A2LA	A2LA		NA: NELAP & A2LA	12-31-15
A2LA	ISO/IEC 17025		0453.07	12-31-15
Alaska (UST)	State Program	10	UST-087	10-31-15
Arizona	State Program	9	AZ0473	05-05-15
Arkansas DEQ	State Program	6	88-0737	04-25-15
California	State Program	9	2938	10-31-16
Connecticut	State Program	1	PH-0220	12-31-15
Florida	NELAP	4	E87358	06-30-15
Illinois	NELAP	5	200010	12-09-15
Iowa	State Program	7	131	04-01-16
Kansas	NELAP	7	E-10229	03-31-15 *
Kentucky (UST)	State Program	4	19	06-30-15
Kentucky (WW)	State Program	4	90038	12-31-15
Louisiana	NELAP	6	30613	06-30-15
Maryland	State Program	3	316	03-31-16
Massachusetts	State Program	1	M-TN032	06-30-15
Minnesota	NELAP	5	047-999-345	12-31-15
Mississippi	State Program	4	N/A	06-30-15
Montana (UST)	State Program	8	NA	02-24-20
Nevada	State Program	9	TN00032	07-31-15
New Hampshire	NELAP	1	2963	10-09-15
New Jersey	NELAP	2	TN965	06-30-15
New York	NELAP	2	11342	03-31-15
North Carolina (WW/SW)	State Program	4	387	12-31-15
North Dakota	State Program	8	R-146	06-30-15
Ohio VAP	State Program	5	CL0033	10-16-15
Oklahoma	State Program	6	9412	08-31-15
Oregon	NELAP	10	TN200001	04-29-15
Pennsylvania	NELAP	3	68-00585	06-30-15
Rhode Island	State Program	1	LAO00268	12-30-15
South Carolina	State Program	4	84009 (001)	02-28-15 *
South Carolina (DW)	State Program	4	84009 (002)	02-23-17
Tennessee	State Program	4	2008	02-23-17
Texas	NELAP	6	T104704077	08-31-15
USDA	Federal		S-48469	10-30-16
Utah	NELAP	8	TN00032	07-31-15
Virginia	NELAP	3	460152	06-14-15
Washington	State Program	10	C789	07-19-15
West Virginia DEP	State Program	3	219	02-28-16
Wisconsin	State Program	5	998020430	08-31-15
Wyoming (UST)	A2LA	8	453.07	12-31-15

* Certification renewal pending - certification considered valid.

Sample Summary

Client: GeoEngineers Inc
Project/Site: 318 State AVE NE (WA)

TestAmerica Job ID: 580-47675-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-47675-1	MW16-150225-W	Water	02/25/15 11:50	02/25/15 16:45
580-47675-2	MW3-150225-W	Water	02/25/15 12:55	02/25/15 16:45
580-47675-3	MW18-150225-W	Water	02/25/15 14:00	02/25/15 16:45
580-47675-4	DUP01-150225-W	Water	02/25/15 11:00	02/25/15 16:45
580-47675-5	TRIP BLANK-150225	Water	02/25/15 00:00	02/25/15 16:45

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Seattle
5755 8th Street E.
Tacoma, WA 98424
Tel. 253-922-2310
Fax 253-922-5047
www.testamericainc.com

☐ Rush
☐ Short Hold

Chain of Custody Record

3/11/2015

Client	Client Contact	Date	Chain of Custody Number
G&I	Nick Lohrbach	2/25/15	27873
Address	**Telephone Number (Area Code)/Fax Number**	**Lab Number**	**Page 1 of 1**
1101 S. Fawcett Ave	253-383-4940	47675	
City / State / Zip Code	**Sampler**	**Lab Contact**	
Tacoma / WA / 98402	Brb		
Project Name and Location (State)	**Billing Contact**		
318 State Ave NE			
Contract/Purchase Order/Quote No.			

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed.	Soil	Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	Analysis (Attach list if more space is needed): Sulfate (EPA 300)	VOCs 8260B	MS	MSD	Special Instructions/ Conditions of Receipt
1 MW16-150225-W	2/25/15	1150		X			1			3			X	X			* Reporting Limits
2 MW3-150225-W	2/25/15	1255		X			1			3			X	X			Analyte List, QA/QC
3 MW18-150225-W	2/25/15	1400		X			1			3			X	X			To be Achieved
MW18-150225-MS	2/25/15	1402		X			1			3					X		See Table B.1
MW18-150225-MSD	2/25/15	1405		X			1			3						X	Through B.4 of
4 DUP01-150225-W	2/25/15	1100		X			1			3			X	X			Compliance
5 TRIP BLANK-150225	2/25/15									3				X			Monitoring Plan

Page 16 of 18

580-47675 Chain of Custody

Cooler/TB Dig/IR cor 9.9 unc 9.6
Cooler Dsc'd Blu Wht @Lab
(Wet)/Packs Packing Bs None
Client d.o. w/o C.S.

Cooler	Possible Hazard Identification	Sample Disposal	(A fee may be assessed if samples are retained longer than 1 month)
☐ Yes ☐ No Cooler Temp: _____	☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown	☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months	

Turn Around Time Required (business days)
☐ 24 Hours ☐ 48 Hours ☐ 5 Days ☐ 10 Days ☐ 15 Days ☐ Other _____

QC Requirements (Specify)

	Relinquished By Sign/Print	Date	Time	Received By Sign/Print	Date	Time
1.	Brandon Brailsford	2/25/15	4:45pm		2/25/15	16:45
2.						
3.						

Comments

DISTRIBUTION: WHITE – Stays with the Samples; CANARY – Returned to Client with Report; PINK – Field Copy

TAL-8274-580 (0210)

Login Sample Receipt Checklist

Client: GeoEngineers Inc

Job Number: 580-47675-1

Login Number: 47675

List Source: TestAmerica Seattle

List Number: 1

Creator: Abello, Andrea N

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	Received same day of collection; chilling process has begun.
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Login Sample Receipt Checklist

Client: GeoEngineers Inc

Job Number: 580-47675-1

Login Number: 47675
List Number: 2
Creator: Ford, Easton

List Source: TestAmerica Nashville
List Creation: 03/03/15 03:40 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

APPENDIX B
Data Quality Assessment Summary

GeoEngineers

1101 Fawcett Avenue, Suite 200, Tacoma, Washington 98402, Telephone: 253.383.4940, Fax: 253.383.4923 www.geoengineers.com

Data Validation Report

Project: City of Olympia – 318 State Avenue NE Property
Sixth Semi-Annual Groundwater Monitoring, February 2015

GEI File No: 0415-049-06

Date: March 16, 2015

This report documents the results of a United States Environmental Protection Agency (USEPA)-defined Stage 2A data validation (USEPA Document 540-R-08-005; USEPA, 2009) of analytical data from the analyses of groundwater samples collected as part of the sixth semi-annual groundwater monitoring sampling event, and the associated laboratory and field quality control (QC) samples. The samples were obtained from the 318 State Avenue NE Property located in Olympia, Washington.

OBJECTIVE AND QUALITY CONTROL ELEMENTS

GeoEngineers, Inc. (GeoEngineers) completed the data validation consistent with the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (USEPA, 2008) and Inorganic Superfund Data Review (USEPA 2010) (National Functional Guidelines) to determine if the laboratory analytical results meet the project objectives and are usable for their intended purpose. Data usability was assessed by determining if:

- The samples were analyzed using well-defined and acceptable methods that provide reporting limits below applicable regulatory criteria;
- The precision and accuracy of the data are well-defined and sufficient to provide defensible data; and
- The quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

In accordance with the Quality Assurance Project Plan (QAPP), Appendix B of the Groundwater Compliance Monitoring Plan (GeoEngineers, 2010), the data validation included review of the following QC elements:

- Data Package Completeness
- Chain-of-Custody Documentation
- Holding Times and Sample Preservation
- Surrogate Recoveries
- Method and Trip Blanks
- Matrix Spikes/Matrix Spike Duplicates
- Laboratory Control Samples/Laboratory Control Sample Duplicates
- Field Duplicates

VALIDATED SAMPLE DELIVERY GROUPS

This data validation included review of the sample delivery group (SDG) listed below in Table 1.

TABLE 1: SUMMARY OF VALIDATED SAMPLE DELIVERY GROUPS

Laboratory SDG	Samples Validated
580-47675-1	MW3-150225-W, MW16-150225-W, DUP01-150225-W, MW18-150225-W, TRIP BLANK-150225

CHEMICAL ANALYSIS PERFORMED

TestAmerica Laboratories, Inc. (TestAmerica), located in Tacoma, Washington, performed laboratory analysis on the groundwater samples using the following methods:

- Volatile Organic Compounds (VOCs) by Method SW8260B; and
- Sulfate Anions by Method EPA300.0.

DATA VALIDATION SUMMARY

The results for each of the QC elements are summarized below.

Data Package Completeness

TestAmerica provided all required deliverables for the data validation according to the National Functional Guidelines. The laboratory followed adequate corrective action processes and all identified anomalies were discussed in the relevant laboratory case narrative.

Chain-of-Custody Documentation

Chain-of-custody (COC) forms were provided with the laboratory analytical reports. The COCs were accurate and complete when submitted to the laboratory.

Holding Times and Sample Preservation

The sample holding time is defined as the time that elapses between sample collection and sample analysis. Maximum holding time criteria exist for each analysis to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. Established holding times were met for all analyses. The sample cooler arrived at the laboratory outside the appropriate temperatures of between two and six degrees Celsius. The out-of-compliance temperature is detailed below.

SDG 580-47675-1: The sample cooler temperature recorded at the laboratory was 9.6 degrees Celsius. It was determined through professional judgment that since the samples were received by the laboratory the same day they were collected, this temperature should not affect the sample analytical results.

Surrogate Recoveries

A surrogate compound is a compound that is chemically similar to the organic analytes of interest, but unlikely to be found in any environmental sample. Surrogates are used for organic analyses and are

added to all samples, standards, and blanks to serve as an accuracy and specificity check of each analysis. The surrogates are added to the samples at a known concentration and percent recoveries are calculated following analysis. All surrogate percent recoveries for field samples were within the laboratory control limits, with the following exception:

SDG 580-47675-1: (VOCs) The percent recovery for surrogate 1,2-Dichloroethane-d4 was greater than the control limits in Sample MW3-150225-W; however, the sample was spiked with four additional surrogates, all within their respective control limits. No action was required for this outlier.

Method and Trip Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. A method blank was analyzed with each batch of samples, at a frequency of 1 per 20 samples. For all sample batches, method blanks for all applicable methods were analyzed at the required frequency. None of the analytes of interest were detected above the reporting limits in any of the method blanks.

Trip blanks are analyzed to assess whether field sampling or sample transport processes may have introduced measurable concentrations of volatile analytes of interest into project samples. None of the analytes of interest were detected above the reporting limits in the trip blank.

Matrix Spikes/Matrix Spike Duplicates

Since the actual analyte concentration in an environmental sample is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis on one sample from the associated batch, known as the parent sample. One aliquot of the sample is analyzed in the normal manner and then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a percent recovery is calculated. Matrix spike duplicate (MSD) analyses are generally performed for organic analyses as a precision check and analyzed in the same sequence as a matrix spike. Using the result values from the MS and MSD, the relative percent difference (RPD) is calculated. The percent recovery control limits for MS and MSD analyses are specified in the laboratory documents, as are the RPD control limits for MS/MSD sample sets.

One MS/MSD analysis should be performed for every analytical batch or every 20 field samples, whichever is more frequent. The frequency requirements were met for all analyses and the percent recovery and RPD values were within the proper control limits.

Laboratory Control Samples/Laboratory Control Sample Duplicates

A laboratory control sample (LCS) is a blank sample that is spiked with a known amount of analyte and then analyzed. An LCS is similar to an MS, but without the possibility of matrix interference. Given that matrix interference is not an issue, the LCS/LCSD control limits for accuracy and precision are usually more rigorous than for MS/MSD analyses. Additionally, data qualification based on LCS/LCSD analyses would apply to all samples in the associated batch, instead of just the parent sample. The percent recovery control limits for LCS and LCSD analyses are specified in the laboratory documents, as are the RPD control limits for LCS/LCSD sample sets.

One LCS/LCSD analysis should be performed for every analytical batch or every 20 field samples, whichever is more frequent. The frequency requirements were met for all analyses and the percent recovery and RPD values were within the proper control limits, with the following exceptions:

SDG 580-47675-1: (VOCs) The percent recoveries for tetrachloroethene were greater than the control limits in both the LCS and LCSD extracted on 3/4/2015. There were no positive results for this target analyte in the associated field samples; therefore, no action was required for this outlier.

Field Duplicates

In order to assess precision, a field duplicate sample was collected and analyzed along with the reviewed sample batches. The duplicate sample was analyzed for the same parameters as the associated parent sample. Precision is determined by calculating the RPD of sample concentrations between each pair of samples. If one or more of the sample analytes has a concentration greater than five times the reporting limit for that sample, then the absolute difference is used instead of the RPD. The RPD control limit for water samples is 35 percent.

SDG 580-47675-1: One field duplicate sample pair, MW16-150225-W and DUP01-150225-W, was submitted with this SDG. The precision criteria for all target analytes were met for this sample pair.

OVERALL ASSESSMENT

As was determined by this data validation, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the surrogate, LCS/LCSD, and MS/MSD percent recovery values, with the exceptions noted above. Precision was acceptable, as demonstrated by the LCS/LCSD, MS/MSD, and field duplicate RPD values.

No analytical results were qualified. All data are acceptable for the intended use.

REFERENCES

U.S. Environmental Protection Agency (USEPA). "Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use," EPA-540-R-08-005. January 2009.

U.S. Environmental Protection Agency (USEPA). "Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review," EPA-540-R-08-01. June 2008.

U.S. Environmental Protection Agency (USEPA). "Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review," EPA-540-R-10-011. January 2010.

GeoEngineers, Inc. "Groundwater Compliance Monitoring Plan," prepared for City of Olympia. April 16, 2010.

APPENDIX E

Supplemental Site Investigation Report – Soil Gas and Temporary Monitoring Well Sampling and Analysis, 318 State Avenue NE Property, Olympia, Washington

Supplemental Site Investigation Report – Soil Gas and Temporary Monitoring Well Sampling and Analysis

318 State Avenue NE Property
Olympia, Washington

for
City of Olympia

August 25, 2015

GeoEngineers
Earth Science + Technology

Supplemental Site Investigation Report – Soil Gas and Temporary Monitoring Well Sampling and Analysis

318 State Avenue NE Property
Olympia, Washington

for
City of Olympia

August 25, 2015

GeoEngineers

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Supplemental Site Investigation Report
Soil Gas and Temporary Monitoring Well Sampling and Analysis

318 State Avenue NE Property
Olympia, Washington

File No. 0415-049-06

August 25, 2015

Prepared for:

City of Olympia
P.O. Box 1967
Olympia, Washington 98507-1967

Attention: Danelle MacEwen

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Table of Contents

LIST OF TABLES

LIST OF FIGURES

APPENDICES

INTRODUCTION

This report presents the results of soil gas sampling and groundwater sampling from a temporary monitoring well at the City of Olympia (City) 318 State Avenue NE property in Olympia, Washington (Property) (Figure 1).The sampling was performed to support the goal of achieving a No Further Action (NFA) determination for the southeastern portion of the Property under the Washington State Department of Ecology (Ecology) Voluntary Cleanup Program (VCP). The soil gas sampling was performed to evaluate the potential for vapor intrusion into indoor air and the groundwater sampling was performed to evaluate whether chlorinated solvents are present at concentrations greater than cleanup levels in the area of a proposed redevelopment on the southeast corner of the Property (Figure 2).

Soil gas samples were collected on April 21, 2015 from four locations in the area of the proposed development of a housing complex. In addition, one temporary monitoring well was installed on the northern edge of the proposed redevelopment area. Soil gas samples were submitted for analysis to Eurofin Labs in Folsom, California and the water sample was submitted for analysis to Test America Laboratory in Fife, Washington. Soil gas and groundwater samples were collected in accordance with the Soil Vapor Sampling Work Plan (GeoEngineers, 2015) provided in Appendix A.

BACKGROUND

Remedial actions were performed in September and October 2009 to remove soil and fill containing contaminants including chlorinated solvents at concentrations greater than the Model Toxics Control Act (MTCA) cleanup levels (CULs). Soil and fill with contaminant concentrations greater than CULs were excavated and disposed of offsite as part of cleanup activities. The results of the soil remedial action are presented in the Remedial Action Construction Report prepared for the Property (GeoEngineers, 2010).

Groundwater compliance monitoring was initiated following completion of soil remedial actions to monitor the concentrations and natural attenuation of residual chlorinated solvents in groundwater at the Property. Residual chlorinated solvents include tetrachloroethene (PCE), trichloroethene (TCE), 1,1-dichloroethene (DCE), cis and trans isomers of 1,2-dichloroethene (cis-1,2-DCE and trans-1,2-DCE) and vinyl chloride (VC). The results of groundwater compliance monitoring indicate that natural attenuation of chlorinated solvents and associated degradation products continue to occur at the Property. The detected concentrations of PCE, TCE and associated degradation products cis-1,2-DCE and trans-1,2-DCE in groundwater samples collected from the Property remain below the CULs for these compounds. Detected concentrations of VC in groundwater samples collected from wells MW-03, MW-16, and MW-18 were greater than the MTCA Method A CUL during the August 2014 groundwater monitoring event (Figure 2) (GeoEngineers, 2014).

The southeast portion of the Property is to be redeveloped (Figure 2) by constructing a residential housing complex. The soil gas sampling, analysis and evaluation was performed to assess the presence and, if present, the concentration of residual chlorinated solvents in soil gas in the area of the proposed redevelopment. The results of the soil gas sampling and analysis were compared to soil gas screening level criteria, which is protective of indoor air, provided in Ecology's Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State (Ecology, 2009) as updated in April 2015 to revise the soil gas screening levels provided in Appendix B of the guidance document (Ecology, 2015). The groundwater sampling from the temporary monitoring well, groundwater analysis and evaluation was performed to assess the

concentrations of residual chlorinated solvents in the area of the proposed redevelopment. The results of the groundwater sampling and analysis were compared to MTCA groundwater cleanup levels protective of the highest beneficial use for groundwater. Ecology does not consider groundwater at the property as a likely potable water source (Ecology, 2015). Therefore, the highest beneficial use for groundwater is as marine surface water. The results were also compared to the MTCA Method B groundwater screening level protective of indoor air provided in Ecology's Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State (Ecology, 2009) as updated in April 2015 (Ecology, 2015).

FIELD ACTIVITIES

Soil gas and groundwater sample locations were identified within the proposed redevelopment area on the northern and western boundaries adjacent to where chlorinated solvents have previously been detected in groundwater (i.e., MW-03, MW-16 and MW-18) as well as in the center of the proposed redevelopment area. Soil gas and groundwater sample locations are shown on Figure 2. Field activities performed during the April 2015 supplemental site investigation are discussed in the following sections.

Soil Gas Sampling

Direct-push tooling was advanced to 3 feet below ground surface (bgs) at each of the four soil gas sample locations, which was approximately 1 foot above the groundwater level as measured in the temporary well (TW-1) and monitoring well MW-17. The depth to groundwater was also measured to be approximately 4 feet bgs in MW-17 on the day of sampling.

Leak detection procedures were implemented at each sample location, including placing a sampling shroud containing helium over each sampling location. At sampling probe locations SG-1 and SG-2, a 2.5-foot radius of bentonite was also applied across the surface of the gravel backfill in an effort to reduce the potential for breakthrough between the surface and the sampling probe prior to being covered by a shroud. Soil gas sample location SG-2 was advanced at three separate locations in the vicinity of the proposed sample location due to the concentrations of helium measured in the sample train prior to or following sample collection during the first two attempts. The third and final sample (SG-2-ALT-2) appeared to be acceptable based on field measurements for leak detection.

Each soil gas sample was collected using a laboratory-provided individually certified 1-liter summa canister set to a flow rate of less than or equal to approximately 200 milliliters per minute (ml/m). The canister was filled with soil gas for approximately five minutes or until the remaining canister vacuum was approximately 5 inches of mercury. Soil gas samples were submitted for analysis of chlorinated solvents including PCE, TCE, 1,1-DCE, cis-1,2-DCE, trans-1,2-DCE, and VC as well as helium (leak detection tracer gas) and methane by United Stated Environmental Protection Agency (EPA) Method TO-15LL and ASTM International (ASTM) D 1946, respectively. Soil gas sampling procedures, including tracer gas testing, are presented in the Soil Vapor Sampling Work Plan (GeoEngineers, 2015) (Appendix A).

The barometric pressure measured on the three days prior to sampling was reviewed to evaluate the potential effect on the soil gas results. The barometric pressure on the three days prior to soil gas sampling appeared to be on a downward trend with a slight increase in pressure on the day of sampling. A downward trend in vapor pressure may enhance vapor intrusion from the subsurface. The daily barometric pressure readings are as follows (National Oceanic and Atmosphere Administration [NOAA], 2015):

Date	Barometric Pressure (Inches of Mercury)
April 18, 2015	30.08
April 19, 2015	29.88
April 20, 2015	29.68
April 21, 2015	29.78

Temporary Well Groundwater Sampling

One temporary monitoring well, TW-1, was installed adjacent to the north boundary and within the area of the proposed redevelopment (Figure 2). The temporary well was installed by advancing a 1.5-inch-diameter soil core with a solid point at the tip, using a direct-push drill rig, to 12 feet bgs. Since a solid point was used no soil cuttings were generated. A 10-foot section of ¾-inch-diameter polyvinyl chloride (PVC) slotted well casing with 5 feet of blank PVC (i.e., not slotted) to extend the well above the ground surface was inserted into the core. The core was then removed leaving the temporary well casing and blank in the boring.

A depth to groundwater measurement was taken and the depth to groundwater was measured to be 4 feet bgs. Then groundwater was purged from the well until the groundwater was relatively clear. Approximately 1 gallon of groundwater was purged from the well using a peristaltic pump. The temporary well was left in place for approximately six hours, while soil gas sampling was performed, before groundwater sampling was performed.

The groundwater sample was collected using low-flow/low-turbidity sampling techniques to minimize the suspension of particulates in the sample. The groundwater sample was obtained from the temporary well using new vinyl tubing and a peristaltic pump. Groundwater was pumped at approximately 0.5 liters per minute from the approximate mid-point of the saturated screened interval to collect the sample.

Water quality parameters were measured during purging using an YSI 556 MPS water quality meter with a flow-through cell. The measured water quality parameters included electrical conductivity, dissolved oxygen (DO), potential hydrogen (pH), reduction potential (ORP), and temperature. Turbidity measurements were collected using a Hach 2100Q turbidity meter. The groundwater sample was collected once the water quality parameters generally varied by less than 10 percent (pH, turbidity, and DO), 3 percent (conductivity), and/or 10 units (ORP) on three consecutive measurements. The purge water was stored in labeled 30-gallon drums for future permitted off-site disposal.

Following well purging, the flow-through cell was disconnected and the groundwater sample was collected in appropriate laboratory prepared and provided containers. The sample was protected and placed into a cooler with ice and picked up by a courier for delivery to TestAmerica Laboratory in Fife, Washington, for analysis following appropriate chain-of-custody procedures. The groundwater sample was submitted for analyses of chlorinated solvents including PCE, TCE, 1,1-DCE, cis-1,2-DCE, trans-1,2-DCE, and VC by EPA Method 8260.

ANALYTICAL RESULTS

The results from the soil gas and groundwater sample collection and analysis performed in April 2015 are summarized in the following sections. Table 1 presents the results of soil gas sample analyses. Table 2 summarizes the results for the chemical analysis of the groundwater sample collected from the temporary well. Appendix B contains the laboratory analytical reports and Appendix C contains the Data Quality Assessment Reports presenting the results of data validation of the chemical analyses.

Soil Gas

Chlorinated Solvents

Chlorinated solvents and degradation products were detected in the soil gas samples collected for analysis (SG-1, SG-2-ALT-2, SG-3, SG-4 and DUP 1) (Table 1). PCE was detected in the samples collected from SG-2 and SG-4 at concentrations less than the screening level. TCE was detected in the samples collected from all four sample locations. The concentrations of TCE detected in samples SG-2-ALT-2 and SG-4 were greater than the MTCA Method B soil gas screening level. VC was detected in samples collected from SG-1 and SG-3 at concentrations less that the screening level. 1,1-DCE and trans 1,2-DCE were not detected in any of the samples. Cis 1,2-DCE was detected in samples collected from SG-Alt-2 and SG-4. A screening level is not available for Cis 1,2-DCE.

Based on the results of the soil gas sample collection and analysis, TCE concentrations in soil vapor in the proposed redevelopment area are greater than the MTCA Method B screening level. Sample SG-2-ALT-2 collected from the approximate center of the proposed redevelopment area and SG-4 located on the northwest portion of the proposed redevelopment area exceeded the screening level. Based on leak detection results (i.e., helium concentrations) (see in both samples SG-2-ALT-2 and SG-3 are likely slightly diluted due to breakthrough (as discussed in the helium section above). Based on the results, the redevelopment of the property will need to include engineered controls to mitigate the potential for vapor intrusion in structures constructed at the Site.

Helium (leak detection gas) was detected in the soil gas samples collected from SG-1, SG-2-ALT-2, SG-3 and DUP 1 ranging from 7 to 16 percent by volume. Helium was not detected in SG-4. Methane was detected in samples collected from all sample locations at concentrations ranging from 0.00095 to 0.016 percent by volume.

Groundwater Sampling

Only VC was detected in the groundwater sample collected from temporary well TW-1 (Table 2). The detected concentration of VC was greater than the MTCA groundwater cleanup level for protection of the highest beneficial use of groundwater. The highest beneficial use for groundwater is as marine surface water. The detected concentration of VC was also greater than groundwater cleanup level based on protection of indoor air (Table 2). However, as described in the previous section, the results from analysis of soil gas samples collected from the southeast portion of the property were less than soil gas screening levels that are protective of indoor air, indicating that the VC in groundwater may not be causing soil gas concentrations that would exceed criteria for indoor air. PCE, TCE, 1,1 DCE and cis- and trans-1,2-DCE were not detected above laboratory detection limits in groundwater which were less than the cleanup levels.

DISCUSSION

Soil Gas

Helium

Helium is used as a tracer gas to evaluate the potential for leaks in the sample train and/or soil gas probe entry point. The goal is for the helium concentration is to be less than 5 percent by volume (%/vol.) in the sample. Sample SG-4 did not have helium detected in the sample above the laboratory detection limit (0.12%/vol). Sample SG-2-ALT-2 had 7%/vol which was slightly above the target of 5%/vol. Sample SG-1, the duplicate sample collected at SG-1 (Dup 1) and SG-3 had helium concentrations of 13 and 16%/vol indicating that there likely was some breakthrough between the sample point in the ground (i.e., approximately 3 feet bgs) and surface which may have caused the soil gas sample to be partially diluted by air. Sampling locations SG-1 through SG-3 were within the previous soil remedial action area that was backfilled with granular fill that is more permeable than the soil at SG-4. The increase permeability likely increased breakthrough at these locations.

Chlorinated Solvents

Based on the results of the soil gas sample collection and analysis, TCE concentrations in soil vapor in the proposed redevelopment area are greater than the MTCA Method B screening level (Table 1). Sample SG-2-ALT-2 collected from the approximate center of the proposed redevelopment area and SG-4 located on the northwest portion of the proposed redevelopment area exceeded the screening level. Based on leak detection results (i.e., helium concentrations) in samples collected from SG 1 and SG-3, and to a lesser extent SG-2-ALT-2, are likely slightly diluted due to breakthrough (as discussed in the helium section above). Based on the results, redevelopment of the property will need to include an evaluation of possible mitigation (i.e., engineered controls) for the potential for vapor intrusion in structures constructed at the Property.

Methane

The analysis for methane was added based on field screening results which indicated methane was present in soil gas. Detected methane concentrations in soil gas at the property were low (Table 1).

Groundwater

Chlorinated Solvents

VC was the only chlorinated compound detected in the groundwater sample collected from temporary monitoring well TW-1. VC is the last chlorinated compound in the degradation of chlorinated solvents including PCE and TCE as well as DCE which is an initial degradation compound. Because only VC was detected, the results indicate that the VC at TW-1 was the result of groundwater migration from areas with residual concentrations of PCE, TCE and DCE such as in the vicinity of monitoring well MW-03.

REFERENCES

GeoEngineers, 2010, "Remedial Action Construction Report, 318 State Avenue NE, Olympia, Washington," January 5, 2010.

GeoEngineers, 2014, "Groundwater Compliance Monitoring Data Summary Report – August 2014, 318 State Avenue NE Property, Olympia, Washington," October 17, 2014.

GeoEngineers, 2015, "Draft Soil Vapor Sampling Work Plan, 318 State Avenue NE, Olympia, Washington," April 1, 2015.

National Oceanic and Atmospheric Administration, 2015, http://www.ncdc.noaa.gov

Washington State Department of Ecology, 2009, "Draft Guidance for Evaluating of Soil Vapor Intrusion in Washington State," October 2009.

Washington State Department of Ecology, March 27, 2015, Email from Eugene Radcliff to Iain H. Wingard, City of Olympia RI.

Washington State Department of Ecology, 2015, "Revised Table B-1 from Appendix B of the Draft Guidance for Evaluating of Soil Vapor Intrusion in Washington State," http://www.ecy.wa.gov/programs/tcp/policies/VaporIntrusion/2015-changes.html, April 2015.

LIMITATIONS

This Groundwater Monitoring Report has been prepared for use by the City of Olympia. GeoEngineers has performed these services in general accordance with the scope and limitations of our proposal.

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

TABLE 1

SUMMARY OF SOIL GAS SAMPLE RESULTS

318 STATE AVENUE NE
OLYMPIA, WASHINGTON

			Volatile Organic Compounds							
		Analyte	Tetrachloroethene (PCE)	Trichloroethene (TCE)	1,1-Dichloroethene (1,1-DCE)	Cis-1,2-Dichloroethene (cis 1,2-DCE)	Trans-1,2-Dichloroethene (trans 1,2-DCE)	Vinyl Chloride (VC)	Methane[2]	Helium[3]
		Unit	(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)	(%)	(%)
		MTCA Method B Screening Level[1]	321	12.3	3,050	NE	NE	9.33	NA	NA
Location	Sample ID	Sample Date								
SG-1	SG-1	4/21/15	1.6 U	1.6 U	0.94 U	0.94 U	0.94 U	1.9	0.0033	16
	DUP 1	4/21/15	1.6 U	1.5	0.94 U	0.94 U	0.94 U	2.1	0.0038	13
SG-2-ALT-2	SG-2-ALT-2	4/21/15	3.3	220	0.90 U	1.2	0.90 U	0.58 U	0.0082	7
SG-3	SG-3	4/21/15	1.5 U	10	0.87 U	0.87 U	0.87 U	1.1	0.016	13
SG-4	SG-4	4/21/15	30	2,500	4.6 U	13	4.6 U	3.0 U	0.00095	0.12 U

Notes:

[1] MTCA Method B shallow soil (sub-slab) gas screening levels. The shallow soil gas screening levels are from updated Table B-1 in Appendix B of the Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State (Ecology, 2009).

[2] Methane was analyzed based on field instrument reading, that indicated the presence of methane in the soil gas.

[3] Helium is used as a leak detection tracer gas. In general, the target is to have less than 5% helium.

MTCA = Model Toxics Control Act

µg/m^3 = microgram per cubic meter

U = The analyte was not detected at a concentration greater than the identified reporting limit

J = The analyte concentration is estimated

Bold indicates analyte was detected

Gray shading indicates concentration is greater than screening level

NA = Not Applicable

NE = Not Established

TABLE 2

SUMMARY OF GROUNDWATER SAMPLE RESULTS[1]

318 STATE AVENUE NE

OLYMPIA, WASHINGTON

			Volatile Organic Compounds					
		Analyte	**Tetrachloroethene (PCE)**	**Trichloroethene (TCE)**	**1,1-Dichloroethene (1,1-DCE)**	**Cis-1,2-Dichloroethene (cis 1,2-DCE)**	**Trans-1,2-Dichloroethene (trans 1,2-DCE)**	**Vinyl Chloride (VC)**
		Unit	**(µg/l)**	**(µg/l)**	**(µg/l)**	**(µg/l)**	**(µg/l)**	**(µg/l)**
		MTCA Groundwater Cleanup Levels[2]	**8.85**	**7**	**3.2**	**NE**	**4,000**	**1.6**
		Groundwater Screening Level for Soil Vapor Intrusion[3]	**22.9**	**1.55**	**130.0**	**NE**	**NE**	**0.347**
Location	**Sample ID**	**Sample Date**						
TW1	TW1-042115	04/21/15	0.5 U	0.2 U	0.1 U	0.2 U	0.2 U	**2.6**

Notes:

[1] The parameters presented are the groundwater compliance monitoring parameters specified in the Groundwater Compliance Monitoring Plan (GeoEngineers, 2010).

[2] MTCA groundwater cleanup levels based on the highest beneficial use of groundwater as marine surface water. The cleanup levels provided are the lowest of the available marine surface water criteria including MTCA Method B surface water (Chapter 173-340 WAC). Water Quality Standards for Surface Waters of the State of Washington (Chapter 173-201A WAC), National Recommended Water Quality Criteria (Clean Water Act Section 304) and National Toxics Rule (40 CFR 131).

[3] Groundwater Screening Level based on Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation on Remedial Action (Ecology, 2009) as updated in 2015 (Ecology, 2015) to revise screening levels in Appendix B.

MTCA = Model Toxics Control Act

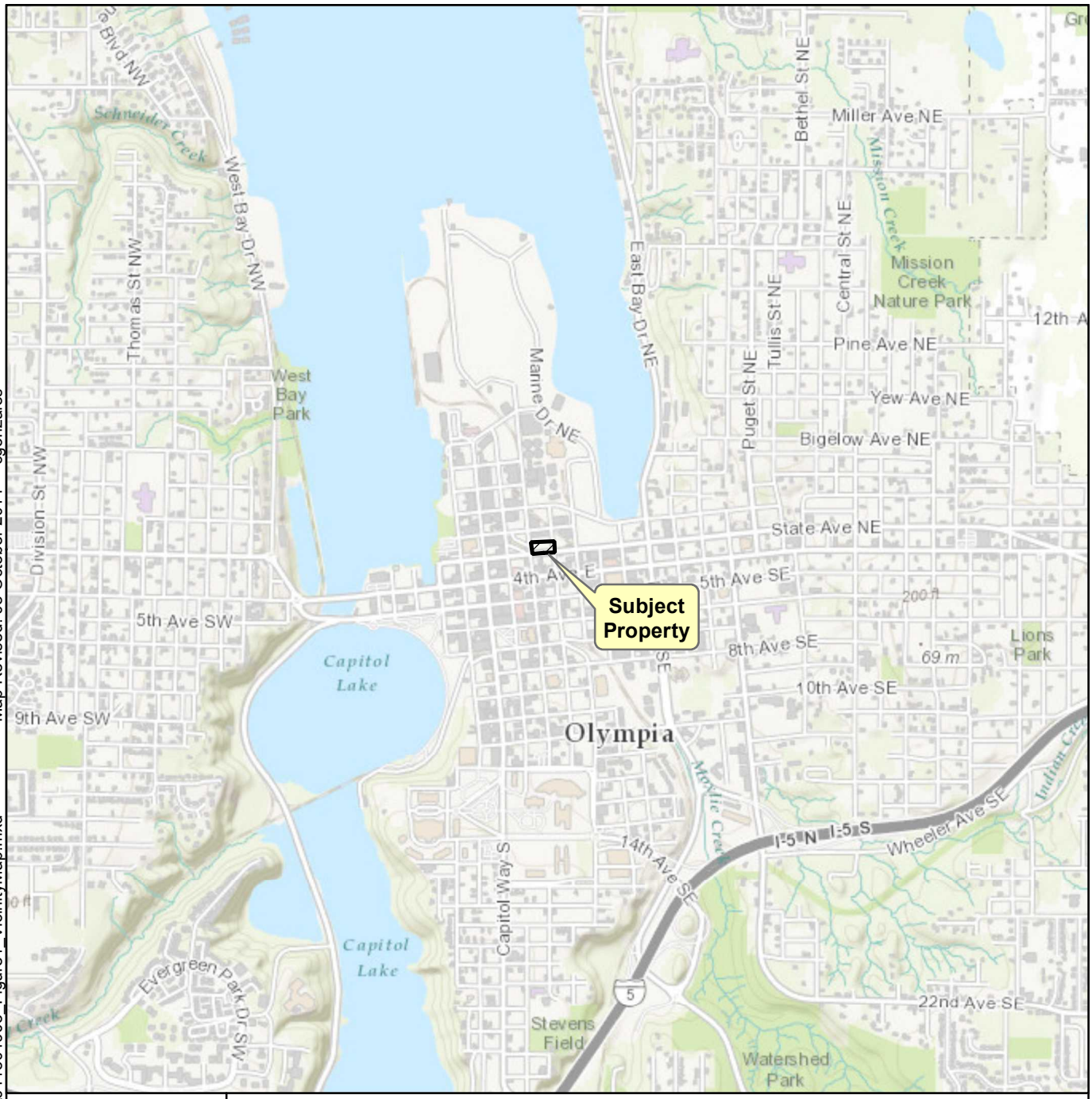
NE = Not Established

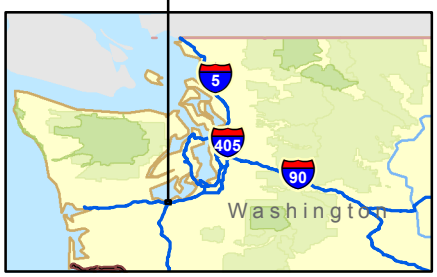
µg/l = microgram per liter

U = The analyte was not detected at a concentration greater than the identified reporting limit

Bold indicates analyte was detected

Gray shading indicates concentration is greater than the cleanup level





3,000 0 3,000

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.
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Data Sources: 2008 Shaded Relief from ESRI, 2008 Topographic Maps from National Geographic Society
Projection: NAD_1983_StatePlane_Washington_North_FIPS_4601_Feet
Datum: D_North_American_1983

Vicinity Map

318 State Avenue NE
Olympia, Washington

GeoEngineers

Figure 1

Office: TAC Path: \\tac\projects\0\0415049\GIS\MXDs\0415049003_Figure1_VicinityMap.mxd Map Revised: 08 October 2014 cgonzales

Legend

- SG-4 — Soil Gas Exploration Location
- TW-1 — Temporary Groundwater Monitoring Well Location
- MW-03 — Monitoring Well Sampled for Groundwater Analysis and used to Monitor Groundwater levels
- MW-01 — Existing Monitoring Well Previously Sampled for Groundwater Analysis and to Monitor Groundwater levels
- Vinyl Chloride at concentrations greater than MTCA Method A (0.2 ug/l)
- CSZ 1 — Contaminated Soil Zones (CSZ) Remediated in September-October 2009
- Approximate Property Boundary
- Parcel Boundary
- Approximate Limits of Proposed Property Redevelopment

Well	Event	Result
MW-3		
Vinyl Chloride	August 2014	0.25 µg/L
MW-16		
Vinyl Chloride	August 2014	0.52 µg/L
MW-18		
Vinyl Chloride	August 2014	2.7 µg/L

N W E S

40 0 40
Feet

Notes:
1. MTCA = Model Toxics Control Act, ug/L = micrograms per liter.
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.

Data Sources: Approximate Property Boundary from Thurston County parcels (revised by GeoEngineers). Aerial photograph 2013 from ESRI. Data Frame Rotated 356 degrees.

Projection: NAD_1983_StatePlane_Washington_South_FIPS_4602_Feet
Datum: D_North_American_1983

Soil Gas and Temporary Groundwater Well Locations

318 State Avenue NE
Olympia, Washington

GeoEngineers

Figure 2

Map Revised: 22 May 2015 ccabrera
Path: \\tac\projects\0\04150\49\GIS\MXDs\041504906_SoilGasExplorations.mxd
Office: TAC

APPENDIX A
Soil Gas Sampling and Analysis Plan

Soil Vapor Sampling Work Plan

318 State Avenue NE Property
Olympia, Washington

for
City of Olympia

April 1, 2015

GeoEngineers

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

Soil Vapor Sampling Work Plan

318 State Avenue NE Property
Olympia, Washington

File No. 0415-049-06

April 1, 2015

Prepared for:

City of Olympia
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Table of Contents

LIST OF FIGURES

APPENDICES

1.0 INTRODUCTION

This Work Plan (WP) has been prepared to describe the procedures for performing soil gas sampling, analysis and evaluation to support achieving a No Further Action (NFA) designation under the Washington State Department of Ecology (Ecology) Voluntary Cleanup Program (VCP) for the southeastern portion of the City of Olympia's (City's) 318 State Avenue property (Property). The location of the Property is shown in Figure 1 and Property features are shown in Figure 2. The scope of investigation activities presented in this WP are based on discussions with the Washington State Department of Ecology (Ecology) in a meeting held on March 12, 2015.

Soil gas sampling, analysis and evaluation are being performed to assess the migration of residual chlorinated solvents from groundwater at the Property. Groundwater compliance monitoring performed since the completion of remedial activities to remove contaminated soil at the Property indicates that residual chlorinated solvents are present in groundwater on the northern portion of the Property. A proposal has been advanced to redevelop the southeast portion of the Property to construct a new mixed-use (i.e., commercial and residential) building. The purpose of the soil gas sampling, analysis and evaluation described in this WP is to assess the presence and, if present, the concentration of residual chlorinated solvents in soil gas in the area of the proposed redevelopment. The results of the soil gas sampling and analysis will be compared to the criteria provided in Ecology's Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action (Ecology, 2009/Appendix A).

The following sections of this Work Plan present the protocols to be used to perform soil gas sampling and analysis, quality assurance/quality control (QA/QC) and evaluation of the results.

2.0 BACKGROUND SUMMARY

Remedial actions were performed in September and October 2009 to remove soil and fill containing contaminants including chlorinated solvents at concentrations greater than the Model Toxics Control Act (MTCA) cleanup levels (CULs). Soil and fill with contaminant concentrations greater than CULs were excavated and disposed of offsite as part of cleanup activities. The results of the soil remedial action are presented in the Remedial Action Construction Report prepared for the Property (GeoEngineers, 2010).

Groundwater compliance monitoring was initiated following completion of soil remedial actions to monitor the concentrations and natural attenuation of residual chlorinated solvents in groundwater at the Property. Residual chlorinated solvents include tetrachloroethene (PCE), trichloroethene (TCE), 1,1-dichloroethene (DCE), cis and trans isomers of 1,2-dichloroethene (cis-1,2-DCE and trans-1,2-DCE) and vinyl chloride (VC). The results of groundwater compliance monitoring indicate that natural attenuation of chlorinated solvents and associated degradation products continue to occur at the Property. The detected concentrations of PCE, TCE and associated degradation products cis-1,2-DCE and trans-1,2-DCE in groundwater samples collected from the Property remain below the CULs for these compounds. Detected concentrations of vinyl chloride (VC) in groundwater samples collected from wells MW-03, MW-16, and MW-18 were greater than the MTCA Method A CUL during the August 2014 groundwater monitoring event (Figure 2) (GeoEngineers, 2014). Groundwater monitoring to evaluate the natural attenuation of chlorinated organic solvents is performed on a semi-annual basis.

A proposal has been advanced to re-develop the southeast portion of the Property to construct a new mixed-use (i.e., commercial and residential) building (Figure 2). The soil gas sampling, analysis and evaluation is being performed to assess the presence and, if present, the concentration of residual chlorinated solvents in soil gas in the area of the proposed redevelopment. The results of the soil gas sampling and analysis will be compared to the soil gas screening level criteria, which is protective of indoor air, provided in Ecology's Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action (Ecology, 2009/Appendix A) and Ecology's updated Cleanup Levels and Risk Calculations (CLARC) database.

3.0 SOIL GAS INVESTIGATION TASKS

The soil vapor sampling activities are organized into four tasks that include the following:

- Pre-field activities;
- Soil gas sampling;
- Laboratory analysis; and
- Data evaluation and reporting.

The following sections describe the activities to be performed as part of each task.

3.1. Pre-Field Investigation Activities

Several activities are necessary in order to prepare for soil gas sampling. The pre-field activities include the following:

- Coordination and scheduling of field activities with subcontractors (private utility locator, drilling contractor and analytical laboratory);
- Prepare a Health and Safety Plan to be used by GeoEngineers' field employees.
- Conducting a site visit prior to drilling to collect soil gas samples to mark the proposed exploration locations;
- Completing a "One-Call" utility locate;
- Meeting with a private utility locate contractor prior to drilling to clear each proposed exploration location; and
- Recording barometric pressure for up to three days prior to sampling and the day of sampling.

3.2. Soil Gas Sampling

Soil gas sampling will be performed to assess the presence of chlorinated solvents including PCE, TCE, 1,1-DCE, cis-1,2-DCE, trans-1,2-DCE, and VC in shallow, vadose zone soil. Soil gas samples will be collected from four locations from 1-inch-diameter cores installed using direct-push drilling equipment. The cores installed for soil gas sampling will be advanced to within approximately 1.0 foot of the current groundwater level at the Property. Soil gas samples will be collected from each location for analysis of chlorinated solvents. Soil gas sampling setup and sample collection will be completed in general accordance with Ecology's Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and

Remedial Action, Appendix C.2 (Ecology, 2009/Appendix A). It should be noted that the soil gas samples will be collected at depths shallower than recommended in Ecology's guidance (i.e., <5 feet below ground surface [bgs]). Precautionary measures, as identified below, will be taken to best collect a representative soil gas sample given the Property conditions at each sample location.

Sample locations were identified within the proposed redevelopment area on the northern and western boundaries adjacent to where chlorinated solvents have been detected in groundwater (i.e., MW-03, MW-16 and MW-18) as well as in the center of the proposed redevelopment area. The proposed sampling locations are shown on Figure 2. Soil gas samples will be collected using the following protocol:

- Direct-push tooling will be advanced to approximately one foot above the groundwater level which is estimated to be approximately two to three feet below ground surface (bgs) at four locations. The depth of sampling was determined based on the most recent compliance groundwater monitoring results which indicate the groundwater may be shallow as approximately three feet bgs. A separate, initial core will be advanced at the beginning of soil gas sampling to identify the depth to groundwater at the Property at the time of sampling.
- The Geoprobe Post-Run Tubing (PRT) System sampling protocol presented in Appendix B will be used to collect the soil gas sample. New fluoropolymer (Teflon®) tubing will be attached to a Geoprobe® PRT adaptor. The PRT adaptor will be lowered through the Geoprobe® tooling and engaged to an Expendable Point Adaptor.
- The tubing (aboveground) will be connected to a sampling manifold and "summa" type (summa) canister. The summa canister sampling protocol presented in Appendix C will be used to collect the soil gas sample.
- Hydrated bentonite will be placed around the soil-gas probe where it enters the ground surface and in an approximately a 5-foot diameter around the soil gas sampling probe. The 5-foot diameter of hydrated bentonite will be placed in an effort to prevent ambient air interaction and to obtain the most representative soil gas sample at the shallow sample depth.
- Each probe will remain in place for a minimum of 20 to 30 minutes prior to sampling (per Oregon Guidance for Assessing and Remediating Vapor Intrusion in Buildings, 2010) to allow for soil vapor to equilibrate.
- The sampling manifold will be vacuum tested by briefly introducing a vacuum to the aboveground portion of the sampling train and checking for loss of vacuum. If vacuum loss is observed, connections and fittings in the sample train will be checked and adjusted.
- A plastic shroud will be placed over the sample container and soil-gas probe where it enters the ground surface.
- The shroud will be charged with helium gas and the helium concentration inside of the shroud will be measured using a hand-held helium monitor.
- The sampling train (above and below ground components) will be purged using a landfill gas meter, peristaltic pump, evacuated summa canister or disposable syringe. After purging three sampling train volumes, the helium concentration within the sampling train will be measured and recorded. If helium is measured at a concentration greater than 10 percent of the shroud concentration the fittings will be tightened, the bentonite seal will be checked and the previous purging and measurement tests will be repeated.

- The soil-gas sample will be collected using a laboratory provided individually certified 1-liter summa canister set to a flow rate of less than or equal to approximately 200 milliliters per minute. The 1-liter canister was selected to collect a soil gas sample as quickly as possible and to achieve method reporting limits that would meet Ecology's soil gas screening level criteria. The canister will be filled with soil gas for approximately five minutes or until the remaining canister vacuum is approximately five inches of mercury. The initial and final canister vacuum will be recorded.
- Following the sample collection, the sample train will be re-evaluated for the presence of helium.
- Soil-gas samples will be submitted to the laboratory for analysis.
- Following collection of each soil-gas sample, the tooling will be removed from the ground and each boring will be backfilled with bentonite and hydrated in accordance with the state's guidance for decommissioning borings (Washington Administrative Code [WAC] 173-160-381).

3.3. Laboratory Analysis

GeoEngineers will utilize the services of Air Toxics (Eurofins) to complete the soil-gas analyses on the samples from the Property. The following analytical methods will be used to meet the soil gas screening levels and to provide the appropriate analytical QA/QC:

- PCE, TCE, 1,1- DCE, cis-1,2-DCE, trans-1,2-DCE, and VC in soil gas using a modified Environmental Protection Agency (EPA) Method TO-15 low level; and
- Helium in soil gas using method ASTM 1946.

The soil gas reporting limits to be achieved for this investigation are presented in Appendix D.

Upon receipt of the final analytical data, a data quality review will be completed for all the sample results. The data will be tabulated to facilitate screening and evaluation utilizing Ecology's Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action (Ecology, 2009) and Ecology's updated Cleanup Levels and Risk Calculations (CLARC) database. The soil gas screening levels are presented in Appendix D.

4.0 QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

The following sections describe the field and laboratory QA/QC procedures to be implemented during the soil gas sampling and analysis activities.

4.1. Location Control

GeoEngineers will record the location of each exploration with a handheld global positioning system (GPS) meter or each location will be measured to physical features at the property if GPS measurements cannot be obtained.

4.2. Sample Custody

4.2.1. Sample Containers and Storage

All samples obtained for chemical analysis will be collected in laboratory-prepared individually SIM certified summa canisters. The summa canisters will be filled until the remaining vacuum is approximately five inches of mercury. Samples will be stored prior to and following sampling in the laboratory provided shipping containers.

4.2.2. Field Custody Procedures

Possession of samples will be documented using chain-of-custody procedures. Proper sample handling procedures, including security and integrity of the samples, will be the responsibility of the individual/company identified on the chain-of-custody. The chain-of-custody form will be signed and dated in the appropriate places by parties involved with a transfer of custody of the samples.

4.2.3. Laboratory Custody Procedures

Upon receipt of the samples at the laboratory, the custody seals will be broken, the chain-of-custody form will be signed by the laboratory personnel, and the conditions of the samples will be recorded on a sample receipt form. The original chain-of-custody form will remain with the laboratory and copies will be returned to the relinquishing party.

4.3. Quality Assurance and Quality Control

4.3.1. Field Duplicates

One field duplicate will be collected during the soil vapor sampling event. The field duplicate will be one of two samples collected concurrently (utilizing a laboratory-provided sampling 'T') from one sample location to assess data variability. The field duplicate will be analyzed by the same analytical methods used for primary samples. Relative percent differences (RPDs) for the field duplicate will be calculated to assess the data precision and accuracy and potential variability caused by sample handling.

4.3.2. Laboratory Quality Assurance and Quality Control

The laboratory maintains an internal quality assurance program as documented in its laboratory quality assurance manual. The laboratory uses a combination of laboratory blanks, surrogate recoveries, and duplicates to evaluate the analytical data quality. The laboratory also uses data quality goals for individual chemicals or groups of chemicals based on the long-term performance of the test methods. The laboratory analytical report will provide the results for QA/QC analyses so that a Level II data quality review can be performed. The results of the Level II data quality review will be provided in the report presenting the results of soil gas analyses.

5.0 REPORTING

GeoEngineers will prepare a soil vapor sampling report following completion of field activities, receipt of the laboratory analytical data and data quality review. The soil vapor sampling report will include a summary of the field activities, analytical data and a comparison of the chemical analytical data to MTCA Method B soil gas screening levels in Ecology's Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action (Appendix A/Ecology, 2009) and Ecology's updated Cleanup Levels and

Risk Calculations (CLARC) database. If needed, recommendations will be provided for additional assessment and/or soil gas intrusion mitigation options to be implemented during Property redevelopment activities.

6.0 LIMITATIONS

We have prepared this Work Plan for use by the City of Olympia. This Work Plan is not intended for use by others and the information contained herein is not applicable to other sites.

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 work plan was prepared. No warranty or other conditions express or implied should be understood.

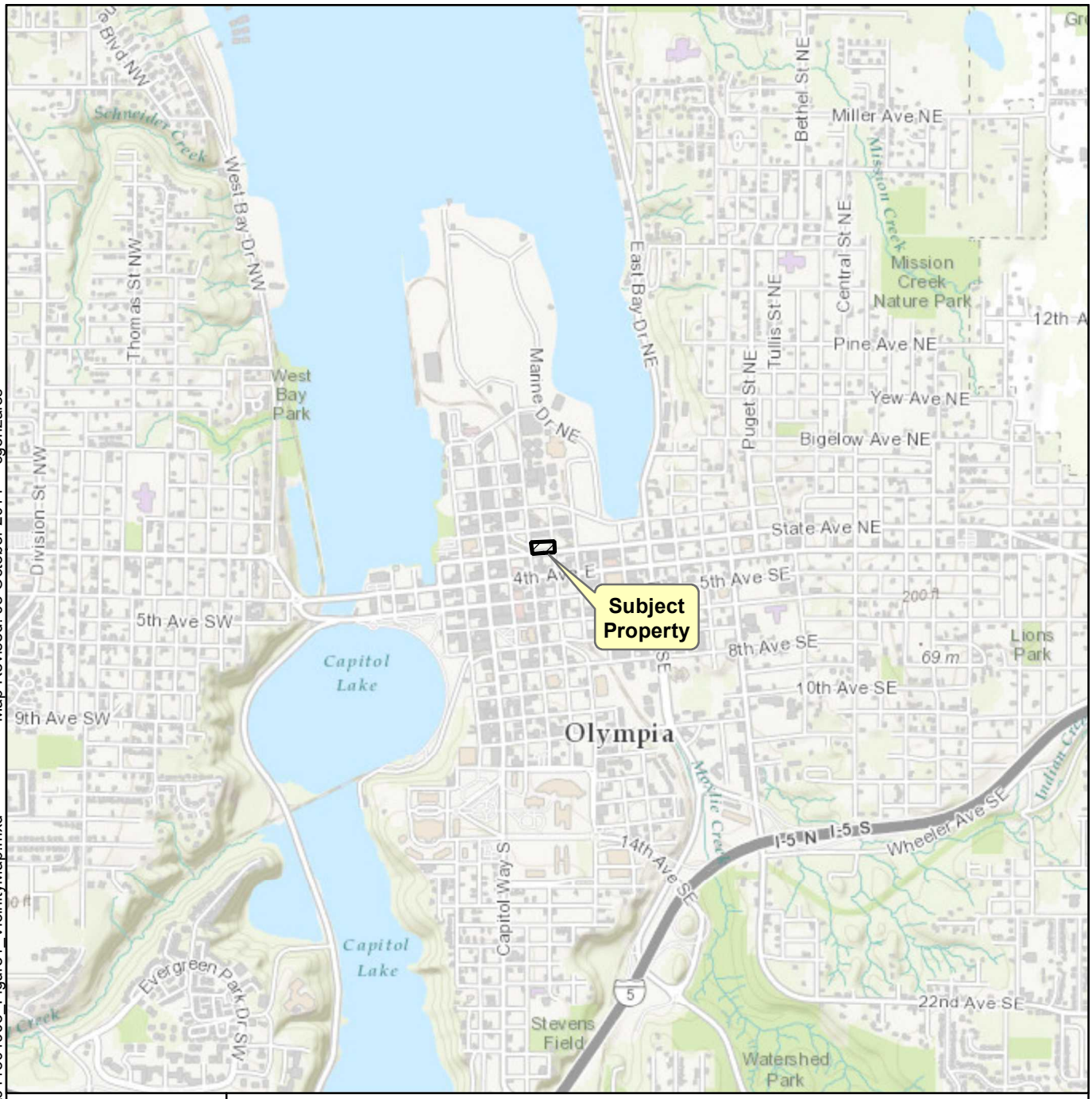
Any electronic form, facsimile or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by GeoEngineers, Inc.

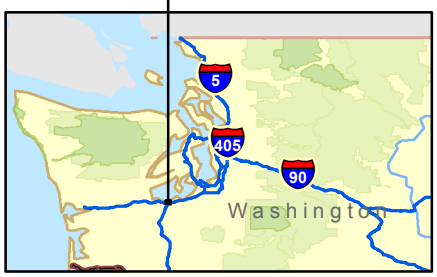
7.0 REFERENCES

Ecology, 2009, Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action, Publication No. 09-09-047. October 2009.

GeoEngineers, 2010, Remedial Action Construction Report, 318 State Avenue NE, Olympia, Washington, January 5, 2010.

GeoEngineers, 2014, Draft Groundwater Compliance Monitoring Data Summary Report, August 2014, 318 State Avenue NE, Olympia, Washington, April 16, 2015.





3,000 0 3,000

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: 2008 Shaded Relief from ESRI, 2008 Topographic Maps from National Geographic Society
Projection: NAD_1983_StatePlane_Washington_North_FIPS_4601_Feet
Datum: D_North_American_1983

Vicinity Map

318 State Avenue NE
Olympia, Washington

GeoEngineers

Figure 1

Office: TAC Path: \\tac\projects\0\0415049\GIS\MXDs\0415049003_Figure1_VicinityMap.mxd Map Revised: 08 October 2014 cgonzales

Legend

- Proposed Soil Gas Exploration Location
- MW-03 — Monitoring Well Sampled for Groundwater Analysis and used to Monitor Groundwater levels
- MW-01 — Existing Monitoring Well Previously Sampled for Groundwater Analysis and to Monitor Groundwater levels
- Vinyl Chloride at concentrations greater than MTCA Method A (0.2 ug/l)
- CSZ 1 — Contaminated Soil Zones (CSZ) Remediated in September-October 2009
- Approximate Property Boundary
- Parcel Boundary
- Approximate Limits of Proposed Property Redevelopment

Well	Event	Result
MW-3		
Vinyl Chloride	August 2014	0.25 µg/L
MW-16		
Vinyl Chloride	August 2014	0.52 µg/L
MW-18		
Vinyl Chloride	August 2014	2.7 µg/L

N W E S

40 0 40
Feet

Notes:
1. MTCA = Model Toxics Control Act, ug/L = micrograms per liter.
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.

Data Sources: Approximate Property Boundary from Thurston County parcels (revised by GeoEngineers).
Aerial photograph 2013 from ESRI. Data Frame Rotated 356 degrees.

Projection: NAD_1983_StatePlane_Washington_South_FIPS_4602_Feet
Datum: D_North_American_1983

Proposed Soil Gas Explorations

318 State Avenue NE
Olympia, Washington

GeoEngineers

Figure 2

Map Revised: 01 April 2015 cgonzales
Path: \\tac\projects\0\0415049\GIS\MXDs\041504906_ProposedSoilGasExplorations.mxd
Office: TAC

APPENDIX B
Laboratory Reports

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5/1/2015
Mr. Nick Rohrbach
GeoEngineers, Inc.
1101 Fawcett
Suite 200
Tacoma WA 98402

Project Name: 318 State Ave
Project #: 0415-049-06
Workorder #: 1504464A

Dear Mr. Nick Rohrbach

The following report includes the data for the above referenced project for sample(s) received on 4/24/2015 at Air Toxics Ltd.

The data and associated QC analyzed by Modified TO-15 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Air Toxics Ltd. for your air analysis needs. Air Toxics Ltd. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Kelly Buettner at 916-985-1000 if you have any questions regarding the data in this report.

Regards,

Kelly Buettner

Project Manager

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WORK ORDER #: 1504464A

Work Order Summary

CLIENT:	Mr. Nick Rohrbach GeoEngineers, Inc. 1101 Fawcett Suite 200 Tacoma, WA 98402	**BILL TO:**	CORP Accounts Payables GeoEngineers, Inc. 8410 154th Avenue NE Redmond, WA 98052
PHONE:	253.383.4940	**P.O. #**	
FAX:		**PROJECT #**	0415-049-06 318 State Ave
DATE RECEIVED:	04/24/2015	**CONTACT:**	Kelly Buettner
DATE COMPLETED:	05/01/2015		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	SG-1	Modified TO-15	4.3 "Hg	15 psi
03A	SG-2-AIT 2	Modified TO-15	3.7 "Hg	14.7 psi
04A	SG-3	Modified TO-15	2.4 "Hg	14.9 psi
05A	SG-4	Modified TO-15	4.1 "Hg	15 psi
06A	DUP 1	Modified TO-15	4.9 "Hg	14.6 psi
07A	Lab Blank	Modified TO-15	NA	NA
07B	Lab Blank	Modified TO-15	NA	NA
08A	CCV	Modified TO-15	NA	NA
08B	CCV	Modified TO-15	NA	NA
09A	LCS	Modified TO-15	NA	NA
09AA	LCSD	Modified TO-15	NA	NA
09B	LCS	Modified TO-15	NA	NA
09BB	LCSD	Modified TO-15	NA	NA

CERTIFIED BY:  DATE: 05/01/15

Technical Director

Certification numbers: AZ Licensure AZ0775, NJ NELAP - CA016, NY NELAP - 11291,
TX NELAP - T104704343-14-7, UT NELAP CA009332014-5, VA NELAP - 460197, WA NELAP - C935
Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
Accreditation number: CA300005, Effective date: 10/18/2014, Expiration date: 10/17/2015.
Eurofins Air Toxics Inc.. certifies that the test results contained in this report meet all requirements of the NELAC standards

This report shall not be reproduced, except in full, without the written approval of Eurofins Air Toxics, Inc.

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 9563
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
Modified TO-15
GeoEngineers, Inc.
Workorder# 1504464A

Five 1 Liter Summa Canister (100% Certified) samples were received on April 24, 2015. The laboratory performed analysis via modified EPA Method TO-15 using GC/MS in the full scan mode.

This workorder was independently validated prior to submittal using 'USEPA National Functional Guidelines' as generally applied to the analysis of volatile organic compounds in air. A rules-based, logic driven, independent validation engine was employed to assess completeness, evaluate pass/fail of relevant project quality control requirements and verification of all quantified amounts.

Method modifications taken to run these samples are summarized in the table below. Specific project requirements may over-ride the ATL modifications.

Requirement	***TO-15***	***ATL Modifications***
Initial Calibration	</=30% RSD with 2 compounds allowed out to < 40% RSD	</=30% RSD with 4 compounds allowed out to < 40% RSD
Blank and standards	Zero Air	UHP Nitrogen provides a higher purity gas matrix than zero air

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

Dilution was performed on sample SG-4 due to the presence of high level target species.

Definition of Data Qualifying Flags

Eight qualifiers may have been used on the data analysis sheets and indicates as follows:

B - Compound present in laboratory blank greater than reporting limit (background subtraction not performed).

J - Estimated value.

E - Exceeds instrument calibration range.

S - Saturated peak.

Q - Exceeds quality control limits.

U - Compound analyzed for but not detected above the reporting limit, LOD, or MDL value. See data page for project specific U-flag definition.

UJ- Non-detected compound associated with low bias in the CCV

N - The identification is based on presumptive evidence.

File extensions may have been used on the data analysis sheets and indicates as follows:

a-File was requantified

b-File was quantified by a second column and detector

r1-File was requantified for the purpose of reissue

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Summary of Detected Compounds
MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

Client Sample ID: SG-1

Lab ID#: 1504464A-01A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.24	0.73	0.60	1.9

Client Sample ID: SG-2-AIT 2

Lab ID#: 1504464A-03A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
cis-1,2-Dichloroethene	0.23	0.30	0.90	1.2
Trichloroethene	0.23	41	1.2	220
Tetrachloroethene	0.23	0.49	1.5	3.3

Client Sample ID: SG-3

Lab ID#: 1504464A-04A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.22	0.43	0.56	1.1
Trichloroethene	0.22	1.9	1.2	10

Client Sample ID: SG-4

Lab ID#: 1504464A-05A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
cis-1,2-Dichloroethene	1.2	3.4	4.6	13
Trichloroethene	1.2	460	6.3	2500
Tetrachloroethene	1.2	4.4	7.9	30

Client Sample ID: DUP 1

Lab ID#: 1504464A-06A

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.24	0.82	0.61	2.1
Trichloroethene	0.24	0.28	1.3	1.5

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Client Sample ID: SG-1

Lab ID#: 1504464A-01A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**20042717**	**Date of Collection: 4/21/15 10:00:00 AM**	
Dil. Factor:	**2.36**	**Date of Analysis: 4/27/15 09:03 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.24	0.73	0.60	1.9
1,1-Dichloroethene	0.24	Not Detected	0.94	Not Detected
trans-1,2-Dichloroethene	0.24	Not Detected	0.94	Not Detected
cis-1,2-Dichloroethene	0.24	Not Detected	0.94	Not Detected
Trichloroethene	0.24	Not Detected	1.3	Not Detected
Tetrachloroethene	0.24	Not Detected	1.6	Not Detected

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	80	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	103	70-130

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Client Sample ID: SG-2-AIT 2

Lab ID#: 1504464A-03A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**20042718**	**Date of Collection: 4/21/15 3:40:00 PM**	
Dil. Factor:	**2.28**	**Date of Analysis: 4/27/15 10:56 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.23	Not Detected	0.58	Not Detected
1,1-Dichloroethene	0.23	Not Detected	0.90	Not Detected
trans-1,2-Dichloroethene	0.23	Not Detected	0.90	Not Detected
cis-1,2-Dichloroethene	0.23	0.30	0.90	1.2
Trichloroethene	0.23	41	1.2	220
Tetrachloroethene	0.23	0.49	1.5	3.3

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	82	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	102	70-130

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Client Sample ID: SG-3

Lab ID#: 1504464A-04A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**20042719**	**Date of Collection:**	**4/21/15 1:25:00 PM**
Dil. Factor:	**2.19**	**Date of Analysis:**	**4/28/15 05:31 AM**

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.22	0.43	0.56	1.1
1,1-Dichloroethene	0.22	Not Detected	0.87	Not Detected
trans-1,2-Dichloroethene	0.22	Not Detected	0.87	Not Detected
cis-1,2-Dichloroethene	0.22	Not Detected	0.87	Not Detected
Trichloroethene	0.22	1.9	1.2	10
Tetrachloroethene	0.22	Not Detected	1.5	Not Detected

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	106	70-130
Toluene-d8	100	70-130
4-Bromofluorobenzene	103	70-130

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Client Sample ID: SG-4

Lab ID#: 1504464A-05A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**20042813**	**Date of Collection: 4/21/15 2:00:00 PM**	
Dil. Factor:	**11.7**	**Date of Analysis: 4/28/15 04:54 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	1.2	Not Detected	3.0	Not Detected
1,1-Dichloroethene	1.2	Not Detected	4.6	Not Detected
trans-1,2-Dichloroethene	1.2	Not Detected	4.6	Not Detected
cis-1,2-Dichloroethene	1.2	3.4	4.6	13
Trichloroethene	1.2	460	6.3	2500
Tetrachloroethene	1.2	4.4	7.9	30

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	78	70-130
Toluene-d8	95	70-130
4-Bromofluorobenzene	96	70-130

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Client Sample ID: DUP 1

Lab ID#: 1504464A-06A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**20042814**	**Date of Collection: 4/21/15 4:00:00 PM**	
Dil. Factor:	**2.38**	**Date of Analysis: 4/28/15 05:54 PM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.24	0.82	0.61	2.1
1,1-Dichloroethene	0.24	Not Detected	0.94	Not Detected
trans-1,2-Dichloroethene	0.24	Not Detected	0.94	Not Detected
cis-1,2-Dichloroethene	0.24	Not Detected	0.94	Not Detected
Trichloroethene	0.24	0.28	1.3	1.5
Tetrachloroethene	0.24	Not Detected	1.6	Not Detected

Container Type: 1 Liter Summa Canister (100% Certified)

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	79	70-130
Toluene-d8	97	70-130
4-Bromofluorobenzene	101	70-130

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Client Sample ID: Lab Blank

Lab ID#: 1504464A-07A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**20042707**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/27/15 10:43 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.10	Not Detected	0.26	Not Detected
1,1-Dichloroethene	0.10	Not Detected	0.40	Not Detected
trans-1,2-Dichloroethene	0.10	Not Detected	0.40	Not Detected
cis-1,2-Dichloroethene	0.10	Not Detected	0.40	Not Detected
Trichloroethene	0.10	Not Detected	0.54	Not Detected
Tetrachloroethene	0.10	Not Detected	0.68	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	81	70-130
Toluene-d8	94	70-130
4-Bromofluorobenzene	100	70-130

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Client Sample ID: Lab Blank

Lab ID#: 1504464A-07B

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**20042806**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/28/15 09:47 AM**	

Compound	Rpt. Limit (ppbv)	Amount (ppbv)	Rpt. Limit (ug/m3)	Amount (ug/m3)
Vinyl Chloride	0.10	Not Detected	0.26	Not Detected
1,1-Dichloroethene	0.10	Not Detected	0.40	Not Detected
trans-1,2-Dichloroethene	0.10	Not Detected	0.40	Not Detected
cis-1,2-Dichloroethene	0.10	Not Detected	0.40	Not Detected
Trichloroethene	0.10	Not Detected	0.54	Not Detected
Tetrachloroethene	0.10	Not Detected	0.68	Not Detected

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	79	70-130
Toluene-d8	95	70-130
4-Bromofluorobenzene	100	70-130

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Client Sample ID: CCV

Lab ID#: 1504464A-08A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**20042703**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/27/15 07:05 AM**	

Compound	%Recovery
Vinyl Chloride	96
1,1-Dichloroethene	102
trans-1,2-Dichloroethene	95
cis-1,2-Dichloroethene	98
Trichloroethene	97
Tetrachloroethene	101

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	75	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	100	70-130

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Client Sample ID: CCV

Lab ID#: 1504464A-08B

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**20042802**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/28/15 06:37 AM**	

Compound	%Recovery
Vinyl Chloride	95
1,1-Dichloroethene	102
trans-1,2-Dichloroethene	93
cis-1,2-Dichloroethene	101
Trichloroethene	96
Tetrachloroethene	100

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	73	70-130
Toluene-d8	98	70-130
4-Bromofluorobenzene	100	70-130

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Client Sample ID: LCS

Lab ID#: 1504464A-09A

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**20042704**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/27/15 07:53 AM**	

Compound	%Recovery	Method Limits
Vinyl Chloride	101	70-130
1,1-Dichloroethene	107	70-130
trans-1,2-Dichloroethene	86	70-130
cis-1,2-Dichloroethene	112	70-130
Trichloroethene	100	70-130
Tetrachloroethene	101	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	77	70-130
Toluene-d8	101	70-130
4-Bromofluorobenzene	101	70-130

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Client Sample ID: LCSD

Lab ID#: 1504464A-09AA

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**20042705**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/27/15 08:54 AM**	

Compound	%Recovery	Method Limits
Vinyl Chloride	101	70-130
1,1-Dichloroethene	106	70-130
trans-1,2-Dichloroethene	87	70-130
cis-1,2-Dichloroethene	114	70-130
Trichloroethene	100	70-130
Tetrachloroethene	104	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	74	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	102	70-130

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Client Sample ID: LCS

Lab ID#: 1504464A-09B

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**20042803**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/28/15 07:21 AM**	

Compound	%Recovery	Method Limits
Vinyl Chloride	100	70-130
1,1-Dichloroethene	104	70-130
trans-1,2-Dichloroethene	82	70-130
cis-1,2-Dichloroethene	110	70-130
Trichloroethene	97	70-130
Tetrachloroethene	102	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	74	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	101	70-130

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Client Sample ID: LCSD

Lab ID#: 1504464A-09BB

MODIFIED EPA METHOD TO-15 GC/MS FULL SCAN

File Name:	**20042804**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/28/15 08:05 AM**	

Compound	%Recovery	Method Limits
Vinyl Chloride	99	70-130
1,1-Dichloroethene	104	70-130
trans-1,2-Dichloroethene	84	70-130
cis-1,2-Dichloroethene	110	70-130
Trichloroethene	98	70-130
Tetrachloroethene	103	70-130

Container Type: NA - Not Applicable

Surrogates	%Recovery	Method Limits
1,2-Dichloroethane-d4	73	70-130
Toluene-d8	99	70-130
4-Bromofluorobenzene	103	70-130

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5/1/2015
Mr. Nick Rohrbach
GeoEngineers, Inc.
1101 Fawcett
Suite 200
Tacoma WA 98402

Project Name: 318 State Ave
Project #: 0415-049-06
Workorder #: 1504464B

Dear Mr. Nick Rohrbach

The following report includes the data for the above referenced project for sample(s) received on 4/24/2015 at Air Toxics Ltd.

The data and associated QC analyzed by Modified ASTM D-1946 are compliant with the project requirements or laboratory criteria with the exception of the deviations noted in the attached case narrative.

Thank you for choosing Air Toxics Ltd. for your air analysis needs. Air Toxics Ltd. is committed to providing accurate data of the highest quality. Please feel free to contact the Project Manager: Kelly Buettner at 916-985-1000 if you have any questions regarding the data in this report.

Regards,

Kelly Buettner

Project Manager

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WORK ORDER #: 1504464B

Work Order Summary

CLIENT:	Mr. Nick Rohrbach GeoEngineers, Inc. 1101 Fawcett Suite 200 Tacoma, WA 98402	**BILL TO:**	CORP Accounts Payables GeoEngineers, Inc. 8410 154th Avenue NE Redmond, WA 98052
PHONE:	253.383.4940	**P.O. #**	
FAX:		**PROJECT #**	0415-049-06 318 State Ave
DATE RECEIVED:	04/24/2015	**CONTACT:**	Kelly Buettner
DATE COMPLETED:	05/01/2015		

FRACTION #	NAME	TEST	RECEIPT VAC./PRES.	FINAL PRESSURE
01A	SG-1	Modified ASTM D-1946	4.3 "Hg	15 psi
03A	SG-2-AIT 2	Modified ASTM D-1946	3.7 "Hg	14.7 psi
04A	SG-3	Modified ASTM D-1946	2.4 "Hg	14.9 psi
05A	SG-4	Modified ASTM D-1946	4.1 "Hg	15 psi
06A	DUP 1	Modified ASTM D-1946	4.9 "Hg	14.6 psi
07A	Lab Blank	Modified ASTM D-1946	NA	NA
07B	Lab Blank	Modified ASTM D-1946	NA	NA
08A	LCS	Modified ASTM D-1946	NA	NA
08AA	LCSD	Modified ASTM D-1946	NA	NA

CERTIFIED BY: Heidi Mayo DATE: 05/01/15

Technical Director

Certification numbers: AZ Licensure AZ0775, NJ NELAP - CA016, NY NELAP - 11291,
TX NELAP - T104704343-14-7, UT NELAP CA009332014-5, VA NELAP - 460197, WA NELAP - C935
Name of Accreditation Body: NELAP/ORELAP (Oregon Environmental Laboratory Accreditation Program)
Accreditation number: CA300005, Effective date: 10/18/2014, Expiration date: 10/17/2015.
Eurofins Air Toxics Inc.. certifies that the test results contained in this report meet all requirements of the NELAC standards

This report shall not be reproduced, except in full, without the written approval of Eurofins Air Toxics, Inc.

180 BLUE RAVINE ROAD, SUITE B FOLSOM, CA - 9563
(916) 985-1000 . (800) 985-5955 . FAX (916) 985-1020

LABORATORY NARRATIVE
Modified ASTM D-1946
GeoEngineers, Inc.
Workorder# 1504464B

Five 1 Liter Summa Canister (100% Certified) samples were received on April 24, 2015. The laboratory performed analysis via Modified ASTM Method D-1946 for Methane and Helium in air using GC/FID or GC/TCD. The method involves direct injection of 1.0 mL of sample.

Method modifications taken to run these samples are summarized in the table below. Specific project requirements may over-ride the ATL modifications.

Requirement	***ASTM D-1946***	***ATL Modifications***
Calibration	A single point calibration is performed using a reference standard closely matching the composition of the unknown.	A minimum of 5-point calibration curve is performed. Quantitation is based on average Response Factor.
Reference Standard	The composition of any reference standard must be known to within 0.01 mol % for any component.	The standards used by ATL are blended to a >/= 95% accuracy.
Sample Injection Volume	Components whose concentrations are in excess of 5 % should not be analyzed by using sample volumes greater than 0.5 mL.	The sample container is connected directly to a fixed volume sample loop of 1.0 mL on the GC. Linear range is defined by the calibration curve. Bags are loaded by vacuum.
Normalization	Normalize the mole percent values by multiplying each value by 100 and dividing by the sum of the original values. The sum of the original values should not differ from 100% by more than 1.0%.	Results are not normalized. The sum of the reported values can differ from 100% by as much as 15%, either due to analytical variability or an unusual sample matrix.
Precision	Precision requirements established at each concentration level.	Duplicates should agree within 25% RPD for detections > 5 X's the RL.

Receiving Notes

There were no receiving discrepancies.

Analytical Notes

There were no analytical discrepancies.

Definition of Data Qualifying Flags

Seven qualifiers may have been used on the data analysis sheets and indicate as follows:
B - Compound present in laboratory blank greater than reporting limit.
J - Estimated value.
E - Exceeds instrument calibration range.
S - Saturated peak.
Q - Exceeds quality control limits.
U - Compound analyzed for but not detected above the detection limit.
M - Reported value may be biased due to apparent matrix interferences.
File extensions may have been used on the data analysis sheets and indicates as follows:
a-File was requantified
b-File was quantified by a second column and detector
r1-File was requantified for the purpose of reissue

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Summary of Detected Compounds
NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

Client Sample ID: SG-1

Lab ID#: 1504464B-01A

Compound	Rpt. Limit (%)	Amount (%)
Methane	0.00024	0.0033
Helium	0.12	16

Client Sample ID: SG-2-AIT 2

Lab ID#: 1504464B-03A

Compound	Rpt. Limit (%)	Amount (%)
Methane	0.00023	0.0082
Helium	0.11	7.0

Client Sample ID: SG-3

Lab ID#: 1504464B-04A

Compound	Rpt. Limit (%)	Amount (%)
Methane	0.00022	0.016
Helium	0.11	13

Client Sample ID: SG-4

Lab ID#: 1504464B-05A

Compound	Rpt. Limit (%)	Amount (%)
Methane	0.00023	0.00095

Client Sample ID: DUP 1

Lab ID#: 1504464B-06A

Compound	Rpt. Limit (%)	Amount (%)
Methane	0.00024	0.0038
Helium	0.12	13

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Client Sample ID: SG-1

Lab ID#: 1504464B-01A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	**10043012**	**Date of Collection: 4/21/15 10:00:00 AM**	
Dil. Factor:	**2.36**	**Date of Analysis: 4/30/15 02:29 PM**	

Compound	Rpt. Limit (%)	Amount (%)
Methane	0.00024	0.0033
Helium	0.12	16

Container Type: 1 Liter Summa Canister (100% Certified)

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Client Sample ID: SG-2-AIT 2

Lab ID#: 1504464B-03A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	**10043013**	**Date of Collection: 4/21/15 3:40:00 PM**	
Dil. Factor:	**2.28**	**Date of Analysis: 4/30/15 03:20 PM**	

Compound	Rpt. Limit (%)	Amount (%)
Methane	0.00023	0.0082
Helium	0.11	7.0

Container Type: 1 Liter Summa Canister (100% Certified)

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Client Sample ID: SG-3

Lab ID#: 1504464B-04A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	**10043014**	**Date of Collection: 4/21/15 1:25:00 PM**	
Dil. Factor:	**2.19**	**Date of Analysis: 4/30/15 03:44 PM**	

Compound	Rpt. Limit (%)	Amount (%)
Methane	0.00022	0.016
Helium	0.11	13

Container Type: 1 Liter Summa Canister (100% Certified)

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Client Sample ID: SG-4

Lab ID#: 1504464B-05A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	**10043015**	**Date of Collection: 4/21/15 2:00:00 PM**	
Dil. Factor:	**2.34**	**Date of Analysis: 4/30/15 04:06 PM**	

Compound	Rpt. Limit (%)	Amount (%)
Methane	0.00023	0.00095
Helium	0.12	Not Detected

Container Type: 1 Liter Summa Canister (100% Certified)

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Client Sample ID: DUP 1

Lab ID#: 1504464B-06A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	**10043016**	**Date of Collection: 4/21/15 4:00:00 PM**	
Dil. Factor:	**2.38**	**Date of Analysis: 4/30/15 04:33 PM**	

Compound	Rpt. Limit (%)	Amount (%)
Methane	0.00024	0.0038
Helium	0.12	13

Container Type: 1 Liter Summa Canister (100% Certified)

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Client Sample ID: Lab Blank

Lab ID#: 1504464B-07A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	**10043005**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/30/15 10:38 AM**	

Compound	**Rpt. Limit (%)**	**Amount (%)**
Methane	0.00010	Not Detected

Container Type: NA - Not Applicable

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Client Sample ID: Lab Blank

Lab ID#: 1504464B-07B

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	**10043004c**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/30/15 10:02 AM**	

Compound	**Rpt. Limit (%)**	**Amount (%)**
Helium	0.050	Not Detected

Container Type: NA - Not Applicable

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Client Sample ID: LCS

Lab ID#: 1504464B-08A

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	**10043002**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/30/15 09:00 AM**	

Compound	%Recovery	Method Limits
Methane	105	85-115
Helium	102	85-115

Container Type: NA - Not Applicable

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Client Sample ID: LCSD

Lab ID#: 1504464B-08AA

NATURAL GAS ANALYSIS BY MODIFIED ASTM D-1946

File Name:	**10043022**	**Date of Collection: NA**	
Dil. Factor:	**1.00**	**Date of Analysis: 4/30/15 07:03 PM**	

Compound	%Recovery	Method Limits
Methane	104	85-115
Helium	101	85-115

Container Type: NA - Not Applicable

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-49217-1
Client Project/Site: 318 State AVE NE (WA)

For:
GeoEngineers Inc
1101 Fawcett, Suite 200
Tacoma, Washington 98402

Attn: Mr. Iain Wingard

Authorized for release by:
4/27/2015 3:09:43 PM

Robert Greer, Project Manager I
(253)922-2310
robert.greer@testamericainc.com

LINKS

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Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Client: GeoEngineers Inc
Project/Site: 318 State AVE NE (WA)

TestAmerica Job ID: 580-49217-1

Job ID: 580-49217-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative
580-49217-1

Comments
No additional comments.

Receipt
The samples were received on 4/21/2015 3:50 PM; the samples arrived in good condition, properly preserved and, where required, on ice.
The temperature of the cooler at receipt was 6.3º C.

Except:

A trip blank was submitted for analysis with these samples; however, it was not listed on the Chain of Custody (COC).

GC/MS VOA
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client: GeoEngineers Inc
Project/Site: 318 State AVE NE (WA)

TestAmerica Job ID: 580-49217-1

Client Sample ID: TW1-042115
Date Collected: 04/21/15 15:00
Date Received: 04/21/15 15:50

Lab Sample ID: 580-49217-1
Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
cis-1,2-Dichloroethene	ND		0.20	0.20	ug/L			04/23/15 17:45	1
1,1-Dichloroethene	ND		0.10	0.10	ug/L			04/23/15 17:45	1
Tetrachloroethene	ND		0.50	0.50	ug/L			04/23/15 17:45	1
trans-1,2-Dichloroethene	ND		0.20	0.20	ug/L			04/23/15 17:45	1
Trichloroethene	ND		0.20	0.20	ug/L			04/23/15 17:45	1
Vinyl chloride	**2.6**		0.020	0.020	ug/L			04/23/15 17:45	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*104*		*75 - 120*		*04/23/15 17:45*	*1*
Trifluorotoluene (Surr)	*108*		*80 - 127*		*04/23/15 17:45*	*1*
Toluene-d8 (Surr)	*98*		*75 - 125*		*04/23/15 17:45*	*1*
Dibromofluoromethane (Surr)	*105*		*85 - 115*		*04/23/15 17:45*	*1*
1,2-Dichloroethane-d4 (Surr)	*103*		*70 - 128*		*04/23/15 17:45*	*1*

Client: GeoEngineers Inc
Project/Site: 318 State AVE NE (WA)

TestAmerica Job ID: 580-49217-1

Client Sample ID: Trip Blank
Date Collected: 04/21/15 00:01
Date Received: 04/21/15 15:50

Lab Sample ID: 580-49217-2
Matrix: Water

Method: 8260B - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
cis-1,2-Dichloroethene	ND		0.20	0.20	ug/L			04/22/15 16:37	1
1,1-Dichloroethene	ND		0.10	0.10	ug/L			04/22/15 16:37	1
Tetrachloroethene	ND		0.50	0.50	ug/L			04/22/15 16:37	1
trans-1,2-Dichloroethene	ND		0.20	0.20	ug/L			04/22/15 16:37	1
Trichloroethene	ND		0.20	0.20	ug/L			04/22/15 16:37	1
Vinyl chloride	ND		0.020	0.020	ug/L			04/22/15 16:37	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*105*		*75 - 120*		*04/22/15 16:37*	*1*
Trifluorotoluene (Surr)	*113*		*80 - 127*		*04/22/15 16:37*	*1*
Toluene-d8 (Surr)	*101*		*75 - 125*		*04/22/15 16:37*	*1*
Dibromofluoromethane (Surr)	*104*		*85 - 115*		*04/22/15 16:37*	*1*
1,2-Dichloroethane-d4 (Surr)	*96*		*70 - 128*		*04/22/15 16:37*	*1*

Method: 8260B - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 580-187507/5
Matrix: Water
Analysis Batch: 187507

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
cis-1,2-Dichloroethene	ND		0.20	0.20	ug/L			04/22/15 13:33	1
1,1-Dichloroethene	ND		0.10	0.10	ug/L			04/22/15 13:33	1
Tetrachloroethene	ND		0.50	0.50	ug/L			04/22/15 13:33	1
trans-1,2-Dichloroethene	ND		0.20	0.20	ug/L			04/22/15 13:33	1
Trichloroethene	ND		0.20	0.20	ug/L			04/22/15 13:33	1
Vinyl chloride	ND		0.020	0.020	ug/L			04/22/15 13:33	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*104*		*75 - 120*		*04/22/15 13:33*	*1*
Trifluorotoluene (Surr)	*114*		*80 - 127*		*04/22/15 13:33*	*1*
Toluene-d8 (Surr)	*101*		*75 - 125*		*04/22/15 13:33*	*1*
Dibromofluoromethane (Surr)	*102*		*85 - 115*		*04/22/15 13:33*	*1*
1,2-Dichloroethane-d4 (Surr)	*91*		*70 - 128*		*04/22/15 13:33*	*1*

Lab Sample ID: LCS 580-187507/6
Matrix: Water
Analysis Batch: 187507

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
cis-1,2-Dichloroethene			5.00	4.84		ug/L		97	80 - 130		
1,1-Dichloroethene			5.00	4.67		ug/L		93	70 - 150		
Tetrachloroethene			5.00	5.62		ug/L		112	40 - 180		
trans-1,2-Dichloroethene			5.00	5.07		ug/L		101	80 - 140		
Trichloroethene			5.00	5.11		ug/L		102	80 - 130		
Vinyl chloride			5.00	5.11		ug/L		102	65 - 140		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*100*		*75 - 120*
Trifluorotoluene (Surr)	*112*		*80 - 127*
Toluene-d8 (Surr)	*97*		*75 - 125*
Dibromofluoromethane (Surr)	*99*		*85 - 115*
1,2-Dichloroethane-d4 (Surr)	*90*		*70 - 128*

Lab Sample ID: LCSD 580-187507/7
Matrix: Water
Analysis Batch: 187507

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
cis-1,2-Dichloroethene			5.00	5.17		ug/L		103	80 - 130	7	20
1,1-Dichloroethene			5.00	4.90		ug/L		98	70 - 150	5	20
Tetrachloroethene			5.00	6.13		ug/L		123	40 - 180	9	20
trans-1,2-Dichloroethene			5.00	5.49		ug/L		110	80 - 140	8	20
Trichloroethene			5.00	5.25		ug/L		105	80 - 130	3	20
Vinyl chloride			5.00	5.77		ug/L		115	65 - 140	12	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*101*		*75 - 120*

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCSD 580-187507/7
Matrix: Water
Analysis Batch: 187507

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
Trifluorotoluene (Surr)	*107*		*80 - 127*
Toluene-d8 (Surr)	*99*		*75 - 125*
Dibromofluoromethane (Surr)	*104*		*85 - 115*
1,2-Dichloroethane-d4 (Surr)	*91*		*70 - 128*

Lab Sample ID: MB 580-187604/5
Matrix: Water
Analysis Batch: 187604

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
cis-1,2-Dichloroethene	ND		0.20	0.20	ug/L			04/23/15 14:16	1
1,1-Dichloroethene	ND		0.10	0.10	ug/L			04/23/15 14:16	1
Tetrachloroethene	ND		0.50	0.50	ug/L			04/23/15 14:16	1
trans-1,2-Dichloroethene	ND		0.20	0.20	ug/L			04/23/15 14:16	1
Trichloroethene	ND		0.20	0.20	ug/L			04/23/15 14:16	1
Vinyl chloride	ND		0.020	0.020	ug/L			04/23/15 14:16	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*104*		*75 - 120*		*04/23/15 14:16*	*1*
Trifluorotoluene (Surr)	*107*		*80 - 127*		*04/23/15 14:16*	*1*
Toluene-d8 (Surr)	*99*		*75 - 125*		*04/23/15 14:16*	*1*
Dibromofluoromethane (Surr)	*103*		*85 - 115*		*04/23/15 14:16*	*1*
1,2-Dichloroethane-d4 (Surr)	*101*		*70 - 128*		*04/23/15 14:16*	*1*

Lab Sample ID: LCS 580-187604/6
Matrix: Water
Analysis Batch: 187604

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
cis-1,2-Dichloroethene	5.00	5.21		ug/L		104	80 - 130
1,1-Dichloroethene	5.00	4.77		ug/L		95	70 - 150
Tetrachloroethene	5.00	6.59		ug/L		132	40 - 180
trans-1,2-Dichloroethene	5.00	5.64		ug/L		113	80 - 140
Trichloroethene	5.00	5.57		ug/L		111	80 - 130
Vinyl chloride	5.00	5.44		ug/L		109	65 - 140

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*103*		*75 - 120*
Trifluorotoluene (Surr)	*109*		*80 - 127*
Toluene-d8 (Surr)	*97*		*75 - 125*
Dibromofluoromethane (Surr)	*107*		*85 - 115*
1,2-Dichloroethane-d4 (Surr)	*98*		*70 - 128*

Method: 8260B - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCSD 580-187604/7
Matrix: Water
Analysis Batch: 187604

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
cis-1,2-Dichloroethene			5.00	5.02		ug/L		100	80 - 130	4	20
1,1-Dichloroethene			5.00	4.92		ug/L		98	70 - 150	3	20
Tetrachloroethene			5.00	5.70		ug/L		114	40 - 180	14	20
trans-1,2-Dichloroethene			5.00	5.28		ug/L		106	80 - 140	7	20
Trichloroethene			5.00	5.58		ug/L		112	80 - 130	0	20
Vinyl chloride			5.00	5.26		ug/L		105	65 - 140	3	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*103*		*75 - 120*
Trifluorotoluene (Surr)	*109*		*80 - 127*
Toluene-d8 (Surr)	*96*		*75 - 125*
Dibromofluoromethane (Surr)	*103*		*85 - 115*
1,2-Dichloroethane-d4 (Surr)	*97*		*70 - 128*

Lab Chronicle

Client: GeoEngineers Inc
Project/Site: 318 State AVE NE (WA)

TestAmerica Job ID: 580-49217-1

Client Sample ID: TW1-042115

Lab Sample ID: 580-49217-1

Date Collected: 04/21/15 15:00

Matrix: Water

Date Received: 04/21/15 15:50

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	187604	04/23/15 17:45	D1R	TAL SEA

Client Sample ID: Trip Blank

Lab Sample ID: 580-49217-2

Date Collected: 04/21/15 00:01

Matrix: Water

Date Received: 04/21/15 15:50

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8260B		1	187507	04/22/15 16:37	CJ	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Certification Summary

Client: GeoEngineers Inc
Project/Site: 318 State AVE NE (WA)

TestAmerica Job ID: 580-49217-1

Laboratory: TestAmerica Seattle

The certifications listed below are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Washington	State Program	10	C553	02-17-16

Sample Summary

Client: GeoEngineers Inc
Project/Site: 318 State AVE NE (WA)

TestAmerica Job ID: 580-49217-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-49217-1	TW1-042115	Water	04/21/15 15:00	04/21/15 15:50
580-49217-2	Trip Blank	Water	04/21/15 00:01	04/21/15 15:50

TestAmerica Portland
9405 SW Nimbus Avenue
Beaverton, OR 97008
Phone: 503.906.9200 Fax:

Chain of Custody Record

091069
4921?

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
TestAmerica Laboratories, Inc.
TAL-8210 (0713)

4/27/2015

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

Client Contact	Project Manager: Nick Rohrbach	Site Contact:	Date: 4/21/15	COC No:
Company Name: GeoEngineers	Tel/Fax: 253 732 2138	Lab Contact:	Carrier:	1 of 1 COCs
Address:	Analysis Turnaround Time			Sampler: Chris Watkins
City/State/Zip: Tacoma WA.	☐ CALENDAR DAYS ☐ WORKING DAYS			For Lab Use Only:
Phone: 253-732-2138	TAT if different from Below			Walk-in Client:
Fax:	☒ Standard 2 weeks			Lab Sampling:
Project Name: 318 State Ave.	☐ 1 week			
Site: 0415-049-06	☐ 2 days			Job / SDG No.:
PO#	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	VOCs 8260C *	Sample Specific Notes:
TW1-042115	4-21	1500	G	H2O	6		X		* Project specific POC list. Check w/ PM Nick Rohrbach
TRIP BLANK ana 4/21/15									

580-49217 Chain of Custody

Cooler/TB Dig/IR cor 6.3 °C unc 6.0 °C
Cooler Dsc 5m Blue/White @ Lab 1630
Wet/Packs Packing Bubble
w/o LC

Preservation Used: 1= Ice, 2= HCl, 3= H2SO4, 4=HNO3, 5=NaOH, 6= Other

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return to Client ☐ Disposal by Lab ☐ Archive for _____ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.: | Cooler Temp. (°C): Obs'd: _____ Corr'd: _____ Therm ID No.: _____

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
	GeoEngineers	4/21/15 1550		TASEA	4/21/15 1550
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

Login Sample Receipt Checklist

Client: GeoEngineers Inc

Job Number: 580-49217-1

Login Number: 49217

List Source: TestAmerica Seattle

List Number: 1

Creator: Abello, Andrea N

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	False	Received Trip Blanks not listed on COC.
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

APPENDIX C
Data Quality Assessment Summary

Data Validation Report

1101 Fawcett Avenue, Suite 200, Tacoma, Washington 98402, Telephone: 253.383.4940, Fax: 253.383.4923 www.geoengineers.com

Project:	City of Olympia – 318 NE State Avenue Site April 2015 Temporary Well Groundwater Sample
GEI File No:	0415-049-06
Date:	April 29, 2015

This report documents the results of a United States Environmental Protection Agency (USEPA)-defined Stage 2A data validation (USEPA Document 540-R-08-005; USEPA, 2009) of analytical data from the analyses of one groundwater sample collected on April 21, 2015, and the associated laboratory and field quality control (QC) samples. The sample was obtained from the 318 NE State Avenue Site located in Olympia, Washington.

OBJECTIVE AND QUALITY CONTROL ELEMENTS

GeoEngineers, Inc. (GeoEngineers) completed the data validation consistent with the USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (USEPA, 2008) (National Functional Guidelines) to determine if the laboratory analytical results meet the project objectives and are usable for their intended purpose. Data usability was assessed by determining if:

- The samples were analyzed using well-defined and acceptable methods that provide reporting limits below applicable regulatory criteria;
- The precision and accuracy of the data are well-defined and sufficient to provide defensible data; and
- The quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

In accordance with the Quality Assurance Project Plan (QAPP), Appendix B of the Groundwater Compliance Monitoring Plan (GeoEngineers, 2010), the data validation included review of the following QC elements:

- Data Package Completeness
- Chain-of-Custody Documentation
- Holding Times and Sample Preservation
- Surrogate Recoveries
- Method and Trip Blanks
- Matrix Spikes/Matrix Spike Duplicates
- Laboratory Control Samples/Laboratory Control Sample Duplicates

VALIDATED SAMPLE DELIVERY GROUPS

This data validation included review of the sample delivery group (SDG) listed below in Table 1.

TABLE 1: SUMMARY OF VALIDATED SAMPLE DELIVERY GROUPS

Laboratory SDG	Samples Validated
580-49217-1	TW1-042115, Trip Blank

CHEMICAL ANALYSIS PERFORMED

TestAmerica Laboratories, Inc. (TestAmerica), located in Tacoma, Washington, performed laboratory analysis on the groundwater sample using the following method:

- Volatile Organic Compounds (VOCs) by Method SW8260B

DATA VALIDATION SUMMARY

The results for each of the QC elements are summarized below.

Data Package Completeness

TestAmerica provided all required deliverables for the data validation according to the National Functional Guidelines. The laboratory followed adequate corrective action processes and all identified anomalies were discussed in the relevant laboratory case narrative.

Chain-of-Custody Documentation

Chain-of-custody (COC) forms were provided with the laboratory analytical reports. The COCs were accurate and complete when submitted to the laboratory, with the following exception:

SDG 580-49217-1: The laboratory noted that the trip blank sample was not written on the COC. It was added by TestAmerica and VOC analysis was performed.

Holding Times and Sample Preservation

The sample holding time is defined as the time that elapses between sample collection and sample analysis. Maximum holding time criteria exist for each analysis to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. Established holding times were met for all analyses. The sample cooler arrived at the laboratory outside the appropriate temperatures of between two and six degrees Celsius. The out-of-compliance temperature is detailed below.

SDG 580-49217-1: The sample cooler temperature recorded at the laboratory was 6.3 degrees Celsius. It was determined through professional judgment that since the cooler temperature was just outside the control limits and the samples were received by the laboratory the same day they were collected, this temperature should not affect the sample analytical results.

Surrogate Recoveries

A surrogate compound is a compound that is chemically similar to the organic analytes of interest, but unlikely to be found in any environmental sample. Surrogates are used for organic analyses and are added to all samples, standards, and blanks to serve as an accuracy and specificity check of each analysis. The surrogates are added to the samples at a known concentration and percent recoveries are

calculated following analysis. All surrogate percent recoveries for field samples were within the laboratory control limits.

Method and Trip Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. A method blank was analyzed with each batch of samples, at a frequency of 1 per 20 samples. For all sample batches, method blanks for all applicable methods were analyzed at the required frequency. None of the analytes of interest were detected above the reporting limits in any of the method blanks.

Trip blanks are analyzed to assess whether field sampling or sample transport processes may have introduced measurable concentrations of volatile analytes of interest into project samples. None of the analytes of interest were detected above the reporting limits in the trip blank.

Matrix Spikes/Matrix Spike Duplicates

Since the actual analyte concentration in an environmental sample is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis on one sample from the associated batch, known as the parent sample. One aliquot of the sample is analyzed in the normal manner and then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a percent recovery is calculated. Matrix spike duplicate (MSD) analyses are generally performed for organic analyses as a precision check and analyzed in the same sequence as a matrix spike. Using the result values from the MS and MSD, the relative percent difference (RPD) is calculated. The percent recovery control limits for MS and MSD analyses are specified in the laboratory documents, as are the RPD control limits for MS/MSD sample sets.

There were no MS/MSD analyses performed on any of the associated field samples.

Laboratory Control Samples/Laboratory Control Sample Duplicates

A laboratory control sample (LCS) is a blank sample that is spiked with a known amount of analyte and then analyzed. An LCS is similar to an MS, but without the possibility of matrix interference. Given that matrix interference is not an issue, the LCS/LCSD control limits for accuracy and precision are usually more rigorous than for MS/MSD analyses. Additionally, data qualification based on LCS/LCSD analyses would apply to all samples in the associated batch, instead of just the parent sample. The percent recovery control limits for LCS and LCSD analyses are specified in the laboratory documents, as are the RPD control limits for LCS/LCSD sample sets.

One LCS/LCSD analysis should be performed for every analytical batch or every 20 field samples, whichever is more frequent. The frequency requirements were met for all analyses and the percent recovery and RPD values were within the proper control limits.

OVERALL ASSESSMENT

As was determined by this data validation, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the surrogate and LCS/LCSD percent recovery values. Precision was acceptable, as demonstrated by the LCS/LCSD RPD values.

No analytical results were qualified. All data are acceptable for the intended use.

REFERENCES

U.S. Environmental Protection Agency (USEPA). "Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use," EPA-540-R-08-005. January 2009.

U.S. Environmental Protection Agency (USEPA). "Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review," EPA-540-R-08-01. June 2008.

GeoEngineers, Inc. "Groundwater Compliance Monitoring Plan," prepared for City of Olympia. April 16, 2010.

Data Validation Report

1101 Fawcett Avenue, Suite 200, Tacoma, Washington 98402, Telephone: 253.383.4940, Fax: 253.383.4923 www.geoengineers.com

Project:	City of Olympia – 318 NE State Avenue Site April 2015 Soil Gas Samples
GEI File No:	0415-049-06
Date:	May 4, 2015

This report documents the results of a United States Environmental Protection Agency (USEPA)-defined Stage 2A data validation (USEPA Document 540-R-08-005; USEPA, 2009) of analytical data from the analyses of soil gas samples collected on April 21, 2015, and the associated laboratory and field quality control (QC) samples. The samples were obtained from the 318 NE State Avenue Site located in Olympia, Washington.

OBJECTIVE AND QUALITY CONTROL ELEMENTS

GeoEngineers, Inc. (GeoEngineers) completed the data validation consistent with Eurofins Air Toxics Standard Operating Procedures (SOPs) 38 and 100, guidance in the USEPA Contract Laboratory Program *National Functional Guidelines for Organic Data Review* (USEPA, 2008), and USEPA Method TO-15 SIM.

- Data usability was assessed by determining if: The samples were analyzed using well-defined and acceptable methods that provide detection limits and reporting limits below applicable regulatory criteria;
- The precision and accuracy of the data are well defined and sufficient to provide defensible data; and
- The quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

In accordance with the Soil Vapor Sampling Work Plan (GeoEngineers, 2015), the data validation included review of the following QC elements:

- Data Package Completeness
- Chain-of-Custody Documentation
- Holding Times and Sample Preservation
- Surrogate Recoveries
- Method Blanks
- Matrix Spikes/Matrix Spike Duplicates
- Laboratory Control Samples/Laboratory Control Sample Duplicates
- Field Duplicates

VALIDATED SAMPLE DELIVERY GROUPS

This data validation included review of the sample delivery group (SDG) listed below in Table 1.

TABLE 1: SUMMARY OF VALIDATED SAMPLE DELIVERY GROUPS

Laboratory SDG	Samples Validated
1504464 (A and B)	SG-1, DUP 1, SG-2-AIT-2, SG-3, & SG-4

CHEMICAL ANALYSIS PERFORMED

Eurofins Air Toxics, Inc. (Eurofins), located in Folsom, California, performed laboratory analysis on the soil vapor samples using the following methods:

- Volatile Organic Compounds (VOCs) by modified method TO-15
- Methane and Helium by modified method ASTM 1946

DATA VALIDATION SUMMARY

The results for each of the QC elements are summarized below.

Data Package Completeness

Eurofins analyzed the soil vapor samples evaluated as part of this data quality assessment. The laboratory provided all required deliverables for the assessment. The laboratory followed adequate corrective action processes and all identified anomalies were discussed in the case narrative.

Chain-of-Custody Documentation

Chain-of-custody (COC) forms were provided with the laboratory analytical reports. All COC documentation parameters were met.

Holding Times and Canister Vacuum

The holding time is defined as the time that elapses between sample collection and sample analysis. Maximum holding time criteria exist for each analysis to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. Established holding times were met for all analyses.

The Soil Vapor Monitoring Work Plan states that final summa canister vacuums will be approximately 5 inches of mercury (in. Hg). The reason for this is to show that the canister did not complete the intake of the target analyte before the sampler measured the time interval of the initial volume of the sample. Also, the measurement of 5 in. Hg shows that the flow controllers used to regulate air flow into the canisters function properly when the summa canister vacuum is greater than 4 in. Hg. The final vacuum on the summa canisters were all greater than 5 in. Hg as noted at the time of sampling.

Eurofins Air Toxics indicated that they evaluate sample integrity by (1) comparing field and laboratory final vacuum measurements, (2) checking to see that the valve assembly on the canister is shut and that a brass cap has been secured to the inlet on the valve assembly, and (3) leak checking the valve assembly. Based on these sample integrity assessments, no data qualification is warranted with regard to the final canister vacuums observed in the field and at the laboratory.

Surrogate Recoveries

A surrogate compound is a compound that is chemically similar to the organic analytes of interest, but unlikely to be found in any environmental sample. Surrogates are used for organic analyses and are

added to all samples, standards, and blanks to serve as an accuracy and specificity check of each analysis. The surrogates are added to the samples at a known concentration and percent recoveries are calculated following analysis. All surrogate percent recoveries for field samples were within the laboratory control limits.

Method Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. A method blank was analyzed with each batch of samples, at a frequency of 1 per 20 samples. For all sample batches, method blanks for all applicable methods were analyzed at the required frequency. None of the analytes of interest were detected above the reporting limits in any of the method blanks.

Matrix Spikes/Matrix Spike Duplicates

Since the actual analyte concentration in an environmental sample is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis on one sample from the associated batch, known as the parent sample. One aliquot of the sample is analyzed in the normal manner and then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a percent recovery is calculated. Matrix spike duplicate (MSD) analyses are generally performed for organic analyses as a precision check and analyzed in the same sequence as a matrix spike. Using the result values from the MS and MSD, the relative percent difference (RPD) is calculated. The percent recovery control limits for MS and MSD analyses are specified in the laboratory documents, as are the RPD control limits for MS/MSD sample sets.

There were no MS/MSD analyses performed on any of the associated field samples.

Laboratory Control Samples/Laboratory Control Sample Duplicates

A laboratory control sample (LCS) is a blank sample that is spiked with a known amount of analyte and then analyzed. An LCS is similar to an MS, but without the possibility of matrix interference. Given that matrix interference is not an issue, the LCS/LCSD control limits for accuracy and precision are usually more rigorous than for MS/MSD analyses. Additionally, data qualification based on LCS/LCSD analyses would apply to all samples in the associated batch, instead of just the parent sample. The percent recovery control limits for LCS and LCSD analyses are specified in the laboratory documents, as are the RPD control limits for LCS/LCSD sample sets.

One LCS/LCSD analysis should be performed for every analytical batch or every 20 field samples, whichever is more frequent. The frequency requirements were met for all analyses and the percent recovery and RPD values were within the proper control limits.

Field Duplicates

In order to assess precision, field duplicate samples were collected and analyzed along with the reviewed sample batches. The duplicate samples were analyzed for the same parameters as the associated parent samples. Precision is determined by calculating the RPD between each pair of samples. If one or more of the sample analytes has a concentration greater than five times the reporting limit for that sample, then the absolute difference is used instead of the RPD. The RPD control limit for air samples is 20 percent.

SDG 1504464: One field duplicate sample pair, SG-1 and DUP 1, was submitted with this SDG. The precision criteria for all target analytes were met for this sample pair.

OVERALL ASSESSMENT

As was determined by this data validation, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the surrogate and LCS/LCSD percent recovery values. Precision was acceptable, as demonstrated by the LCS/LCSD RPD values.

No analytical results were qualified. All data are acceptable for the intended use.

REFERENCES

U.S. Environmental Protection Agency (USEPA). "Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use," EPA-540-R-08-005. January 2009.

U.S. Environmental Protection Agency (USEPA). "Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review," EPA-540-R-08-01. June 2008.

GeoEngineers, Inc. "Soil Vapor Sampling Work Plan," prepared for City of Olympia. April 1, 2015.