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Draft – Issued for Ecology Review

Revised Draft Remedial Investigation Report

sound environmental strategies corporation

Property:

Former Olympia Dry Cleaners
606 Union Avenue Southeast
Olympia, Washington

Prepared for:

Mrs. Katherine Burleson
1115 Bigelow Street Northeast
Olympia, Washington

October 9, 2009

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Prepared for:

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Revised Draft Remedial Investigation Report
Former Olympia Dry Cleaners
606 Union Avenue Southeast
Olympia, Washington 98501

SES Project No.: 0566-001-03

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October 9, 2009

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ACRONYMS AND ABBREVIATIONS

ADESA	ADESA Environmental Investigations, LLC
Artesian Supply Well	private water supply well exhibiting artesian conditions, located along the west side of the Former Olympia Dry Cleaners Building
Aspect	Aspect Consulting, LLC
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and total xylenes
Cherry Street Q-Tip Trust Building	the building located on the western portion of the Cherry Street Q-Tip Trust Property
Cherry Street Q-Tip Trust Property	Thurston County Assessor Parcel Number 78204000100 located at 1000 Cherry Street Southeast in Olympia, Washington; the property adjacent to the north of the Former Olympia Dry Cleaners Property
COCs	chemicals of concern
CONREX	CONREX, Inc.
DCE	dichloroethene
DRPH	TPH as diesel-range petroleum hydrocarbons
Former Olympia Dry Cleaners Building	a one-story, slab-on-grade building operating as a dry cleaner facility located on the western portion of the Former Olympia Dry Cleaners Property
Ecology	Washington State Department of Ecology
EPA	United States Environmental Protection Agency
Farallon	Farallon Consulting, LLC
Former Olympia Dry Cleaners Property	the property located on Thurston County Assessor Parcel Number 78204000800 located at 606 Union Avenue Southeast in Olympia, Washington
FS	feasibility study
GRPH	TPH as gasoline-range petroleum hydrocarbons
HVOCs	halogenated volatile organic compounds
KTA	KTA Associates, Inc.
LOTT	LOTT Alliance
mg/kg	milligrams per kilogram
MTCA	Washington State Model Toxics Control Act
North Alley	an unpaved alley approximately 6 feet in width that borders the north side of the Former Olympia Dry Cleaners Building

north manhole	manhole located approximately 215 feet to the north of the intersection of Cherry Street Southeast and Union Avenue South and within Cherry Street Southeast
NWTPH	Northwest Total Petroleum Hydrocarbon
ORPH	TPH as oil-range petroleum hydrocarbons
PCE	tetrachloroethene
PGG	Pacific Groundwater Group
PID	photoionization detector
PQL	practical quantitation limit
Qgof	latest Vashon fine-grained sediments
Qgos	latest Vashon recessional sand and minor silt (Tumwater Sand)
RI	remedial investigation
SES	Sound Environmental Strategies Corporation
south manhole	manhole located at the intersection of Cherry Street Southeast and Union Avenue Southeast
Stemen	Stemen Environmental, Inc.
TCE	trichloroethene
TEE	Terrestrial Ecological Evaluation
TSD	treatment, storage, and disposal
the Site	the full lateral and vertical extent of contamination that has resulted from the operation of a dry cleaning facility on the Former Olympia Dry Cleaners Property
TPH	total petroleum hydrocarbons
USCS	Unified Soil Classification System
WAC	Washington Administrative Code
WSDNR	Washington State Department of Natural Resources

1.0 INTRODUCTION

Sound Environmental Strategies Corporation (SES) has prepared this draft Remedial Investigation (RI) Report on behalf of Mrs. Katherine Burleson, owner of the Former Olympia Dry Cleaners Property located on one parcel (Thurston County Assessor Parcel Number 78204000800) located at 606 Union Avenue Southeast (herein referred to as the Former Olympia Dry Cleaners Property) in Olympia, Washington (Figure 1). The RI was performed pursuant to Agreed Order Number DE00TCPHQ-1408 dated February 28, 2001, and in accordance with the Washington State Model Toxics Control Act (MTCA) as established in Chapter 173-340 of the Washington Administrative Code (WAC 173-340). The RI was completed in accordance with the sequential scopes of work described by SES (SES 2008b; SES 2008c; and SES 2008d) and approved by the Washington State Department of Ecology (Ecology 2008b; Ecology 2008c; and Ecology 2008d). The specific references in which these scopes of work were described are listed in Section 4.0. Deviations from the approved scope of work are specified in this RI Report.

SES conducted the RI to address remaining data gaps identified following previous subsurface investigations and cleanup work conducted by others that had confirmed the release of the dry-cleaning solvent tetrachloroethene (PCE) to the environment at the Former Olympia Dry Cleaners Property. The PCE release has resulted in the migration of contamination off the Former Olympia Dry Cleaners Property in soil, groundwater, and surface water, with concentrations of PCE and/or its degradation compounds, including trichloroethene (TCE), cis-1,2-dichloroethene (DCE), and vinyl chloride, that exceed established MTCA cleanup levels. The suspected source of PCE is associated with former dry-cleaning operations and historical unreported spills outside of the building that occupies the Former Olympia Dry Cleaners Property (Figure 2).

The focus of the RI was to locate the source area(s) and to sufficiently define the nature and extent of PCE contamination in soil and groundwater for the purpose of evaluating potential feasible remedial technologies as part of the subsequent feasibility study (FS), and in order to support a cleanup action for the maximum extent of contaminated media originating from the Former Olympia Dry Cleaners Property. As established in WAC 173-340, the "Site" is defined by the full lateral and vertical extent of contamination that has resulted from the operation of a dry cleaning facility on the Former Olympia Dry Cleaners Property. Based on the information gathered to date, the Site extends beneath portions of the Former Olympia Dry Cleaners Property, the parcel located adjacent to the north, and the Cherry Street Southeast right-of-way.

1.1 PURPOSE

The purpose of the RI was to collect and evaluate sufficient information to develop and evaluate the potential cleanup alternatives from which the final remedy will be selected as part of the cleanup action. The RI was conducted by SES in accordance with WAC 173-340-350. According to the letter titled *Schedule for Submittal of the Draft Remedial Investigation Report, Former Olympia Dry Cleaners, 606 East Union Avenue, Olympia, WA. Agreed Order #DE00TCPHQ-1408* dated January 7, 2009, Ecology agrees that sufficient data have been collected during the RI to prepare this RI report and to refine the Conceptual Site Model for use in developing and evaluating the feasibility of potential remedial technologies (Ecology 2009). The potential cleanup alternatives evaluated for the Site and the proposed cleanup action selected will be provided in the subsequent FS under separate cover.

1.2 REPORT ORGANIZATION

The RI Report has been prepared to meet the requirements specified in WAC 173-340-350(7) and WAC 173-340-350 (8). The sources of information used in the RI Report include previous reports prepared by others that are cited in the text and listed in Section 7.0 of the RI Report. Some of the historical sources used in compiling previous Site data are obscure and/or incomplete. As a result, some historical information is conflicting, uncertain and/or unknown; this includes (but is not limited to) the purpose of previous investigations, chronologies, sample locations and methodologies, and geologic descriptions. Some historical data (e.g., sample locations) have been approximated (and noted as such) when a certain degree of certainty exists.

The RI Report has been organized into the following sections:

- **Section 2.0, Site Background.** This section provides a description of the Site and features, historical and current use of the Site and surrounding properties, the physical setting, and the hydrogeology.
- **Section 3.0, Previous Investigations and Interim Remedial Actions.** This section describes the previous investigations conducted by others at the Site and on adjacent properties and previous and ongoing interim remedial actions conducted at the Site.
- **Section 4.0, Remedial Investigation.** This section summarizes the data gaps prior to initiating the RI, the RI field programs and results, and an assessment of potential ecological risk associated with contamination at the Site.
- **Section 5.0, Conceptual Site Model.** This section provides a summary of the Conceptual Site Model developed for the Site based on the completion of the RI conducted by SES, and previous investigations performed by others. This section includes a discussion of the confirmed and suspected source areas, affected media, fate of PCE in the environment and transport mechanisms, and the preliminary exposure assessment.
- **Section 6.0, Planned Work.** This section presents a description of work planned for the Site following completion of the RI.
- **Section 7.0, References.** This section provides a list of the source materials used in preparing the RI Report.
- **Section 8.0, Limitations.** This section presents SES' standard limitations associated with conducting the work reported herein and preparing the RI Report.

2.0 SITE BACKGROUND

This section provides a description of the Site and features, historical and current use of the Site and surrounding properties, the physical setting, and the hydrogeology of the area.

2.1 SITE DESCRIPTION

The Site covers an approximate area of 3,700 square feet, based on the extent of PCE in affected media. The Site is located on portions of the following parcels (Figure 3):

- One parcel (Thurston County Assessor Parcel Number 78204000800) comprises the Former Olympia Dry Cleaners Property located at 606 Union Avenue Southeast in Olympia, Washington. Parcel Number 78204000800 contains approximately 7,623 square

feet. Former Olympia Dry Cleaners Property is developed with a one-story, 2,550-square-foot, slab-on-grade building operating as a dry cleaner facility (herein referred to as the Former Olympia Dry Cleaners Building). The western and southern perimeters of the Former Olympia Dry Cleaners Property is asphalt-paved and serves as parking areas. An unpaved alley (herein referred to as the North Alley), approximately 6 feet in width, borders the north side of the Former Olympia Dry Cleaners Building.

- One parcel (Thurston County Assessor Parcel Number 78204000700) located east of the Former Olympia Dry Cleaners Property is approximately 6,400 square feet. The southern portion of this parcel is asphalt-paved and serves as parking area. The north portion of this parcel is unpaved and vegetated. The parcel is currently owned by Mrs. Katherine Burleson.
- One parcel (Thurston County Assessor Parcel Number 78204000100) located at 1000 Cherry Street Southeast, which is located to the adjacent north of the Former Olympia Dry Cleaners Property (Cherry Street Q-Tip Trust Property). The western portion of this parcel is developed with a one-story building (Cherry Street Q-Tip Trust Building) that includes a basement beneath its northern portion. The building has historically been used as office space. The eastern and northern portions of this parcel are asphalt paved and serve as parking areas. The North Alley borders the south side of the building (Figure 2). This parcel is currently owned by the Cherry Street Q-Tip Trust.

The Former Olympia Dry Cleaners Property occupies 7,623 square feet (0.18 acres) of land and is located on the northeast corner of the intersection of Union Avenue Southeast and Cherry Street Southeast. The Former Olympia Dry Cleaners Property is bordered to the north by the Cherry Street Q-Tip Trust Property; to the east by paved and unpaved areas beyond which lies a parking lot; to the south by Union Avenue Southeast beyond which lies a parking lot; and to the west by Cherry Street Southeast beyond which lies a two-story building and parking lots.

The locations of identified subsurface and overhead utilities at the Site are shown on Figure 2. Utility locations were identified based on public utility locates by the Northwest Utility Notification Center, private utility locates using electromagnetic and video methods, and field observations. Subsurface utilities identified on the Former Olympia Dry Cleaners Property include water, sanitary sewer, stormwater, natural gas, electric, and a private water supply well. Overhead utilities include electrical lines and telephone service.

Municipal water service enters the Former Olympia Dry Cleaners Property near its southwestern corner and enters the east side of the Former Olympia Dry Cleaners Building. Additional water lines are located along the western perimeter of the Former Olympia Dry Cleaners Property and beneath the concrete walkway on the northwest side of the Former Olympia Dry Cleaners Building. The sanitary side sewer line at the Former Olympia Dry Cleaners Property is located in the northern portion of the Former Olympia Dry Cleaners Building and exits the northwestern corner of the Former Olympia Dry Cleaners Property before it discharges to a combined stormwater and sanitary sewer line beneath Cherry Street Southeast. Several stormwater drainage lines are located beneath the northern, southern, and western portions of the Former Olympia Dry Cleaners Property. Natural gas service runs beneath the North Alley and enters the northeastern corner of the Former Olympia Dry Cleaners Building, and an inactive natural gas line is located approximately 2 to 3 feet south and parallel to the active natural gas line. An electrical line runs beneath the southeastern portion of the Former Olympia Dry Cleaners Property and enters the east side of the Former Olympia Dry Cleaners Building. Overhead telephone service is located in

the southeastern portion of the Former Olympia Dry Cleaners Property and also enters the east side of the Former Olympia Dry Cleaners Building. A utility pole is located near the southwestern corner of the Former Olympia Dry Cleaners Property. Overhead electrical and telephone lines run above the western portion of the Former Olympia Dry Cleaners Property to the southwest corner utility pole.

The private water supply well is located along the west side of the Former Olympia Dry Cleaners Building and exhibits artesian conditions (Artesian Supply Well on Figure 2). The Artesian Supply Well is not currently used as a potable water source on the Former Olympia Dry Cleaners Property. Additional information regarding this Artesian Supply Well is provided in subsequent sections of the RI Report.

2.2 SITE HISTORY AND LAND USE

The historical and current use information presented herein for the Former Olympia Dry Cleaners Property and surrounding properties was compiled from several informational resources. These resources included interviews and communications with the property owners and their representatives and historical and current lessees by SES and others; Thurston County Assessor's website; historical Polk and Cole directories between 1936 to 2005 available at the Washington State Library in Olympia, Washington; and previous reports prepared by others (Stemen Environmental, Inc. [Stemen 2005]). A summary of historical and current land uses for the Former Olympia Dry Cleaners Property and surrounding properties is provided below.

2.2.1 Former Olympia Dry Cleaners Property

The Former Olympia Dry Cleaners Property is zoned commercial and located within the City of Olympia, Downtown Business District. In 1970, Mr. Frank Burleson purchased the Former Olympia Dry Cleaners Property. Improvements to the Former Olympia Dry Cleaners Property included the Former Olympia Dry Cleaners Building (2,584 square feet in area) and asphalt pavement (1,616 square feet area including paved area on adjacent east parcel). Prior to construction, imported fill was placed in the northern portion of the Former Olympia Dry Cleaner Property to bring the property to its present grade (Stemen 2005). Mr. Burleson operated a full service dry cleaner business from 1970 to 1981. A dry cleaning machine that used PCE was installed in 1970 in the north-central portion of the Former Olympia Dry Cleaners Building at a location approximately 1 foot north of the existing dry cleaning machine (Figure 2).

In 1981, Mr. Gaylor Bolton began leasing the Former Olympia Dry Cleaners Property from Mr. Burleson and operated a full-service dry cleaner under the name Olympia Dry Cleaners. Mr. Bolton continued operating Olympia Dry Cleaners until 1995 (Stemen 2005). The cleaning methods and chemicals used at the cleaners are unknown during Mr. Bolton's operations. Mr. Howard McCullough leased the Former Olympia Dry Cleaners Property from 1996 to approximately 2002 and operated a clothes washing and pressing service under the name Howard's Cleaners. In addition, Mr. McCullough reportedly used the Former Olympia Dry Cleaners Property as a drop shop for dry-cleaning services to be performed off the property. Mr. McCullough reportedly did not operate the dry cleaning machine that was present in the Former Olympia Dry Cleaners Building (Stemen 2005).

In 2002, Mr. Tony Anderson leased the Former Olympia Dry Cleaners Property to operate a full service dry cleaner under the name TMC Cleaners (Stemen 2005). In August 2004,

Mr. Anderson reportedly discontinued use of PCE as the active dry-cleaning agent on the Former Olympia Dry Cleaners Property and began using unspecified aliphatic hydrocarbons as part of his operations (Stemen 2005). The current dry cleaning machine was located approximately 1 foot south of the former dry cleaning machine (Figure 2). According to Stemen 2005, TCE was used as a stain remover in conjunction with the new dry-cleaning process. Mr. Anderson continued operating TMC Cleaners until approximately 2007. In 2007, Mr. McCullough began leasing the Former Olympia Dry Cleaners Property and operates a full service dry cleaner called Howard's Cleaners. Howard's Cleaners utilizes the same dry cleaning machine used by TMC Cleaners.

2.2.2 Surrounding Properties

A description of surrounding properties, including tax parcel number, property owners, and improvements, is provided below. The location of each parcel relative to the Site is shown on Figure 3. These parcels are zoned for commercial use with the exception of the adjacent south property, which is zoned for residential use. The adjacent south property is located upgradient of the Site.

Thurston County Assessor Parcel Number 78204000700 is located directly east of the Former Olympia Dry Cleaners Property. This parcel is 0.15 acre in area. Mrs. Katherine Burleson currently owns the parcel. The property was first developed in 1970 by Mr. Frank Burleson with asphalt-pavement in the southern and center portions of the parcel. The northern parking spaces are currently leased to private individuals who work at nearby businesses.

Thurston County Assessor Parcel Number 78204000300 is located at 624 Union Avenue Southeast and adjacent east of the Parcel Number 78204000700. This parcel is 0.3 acre in area. Vine Street Investors, LLC currently own the parcel. The parcel was developed in 1988 with an asphalt pavement parking lot, approximately 2,000 square feet in area. No structures occupy the parcel, and no listings of the parcel were identified in the historical directories.

Thurston County Assessor Parcel Number 78203700400 does not have an address and is located northeast of the Former Olympia Dry Cleaners Property. The parcel is 0.55 acre in area and also owned by Vine Street Investors, LLC. The parcel is undeveloped, and its legal description indicates that it is an abandoned railroad right-of-way. The parcel borders an active railway to the east operated by Burlington Northern Railroad (Stemen 2005). No listings of the parcel were identified in the historical directories.

Thurston County Assessor Parcel Number 78204000100 is located at 1000 Cherry Street Southeast and is 0.76 acre in area. This parcel is located to the adjacent north of the Former Olympia Dry Cleaners Property, and the southwestern portion of the parcel is part of the Site. The parcel is currently owned by Cherry Street Q-Tip Trust. This parcel was first developed in 1963 with approximately 10,000 square feet of asphalt pavement, and an additional 7,855 square feet were surfaced with concrete or asphalt pavement in 1972. The existing building was also constructed in 1972 and is 6,400 square feet. The building occupies the western portion of the parcel, and the eastern portion is paved and used for parking. The Polk directories indicate that the Washington State Energy Office was a tenant

of the office building in 1980. The Washington State Traffic Safety Commission was listed as a tenant of the building from 1985 to 2005. The building is currently unoccupied.

Thurston County Assessor Parcel Number 78203900400 is located at 400 Union Avenue Southeast and is 0.17 acre in area. This parcel is northwest of the Former Olympia Dry Cleaners Property, which is separated by Cherry Street Southeast. The parcel was first developed in 1963 with an asphalt parking lot. No buildings have reportedly occupied the parcel. The Polk directories from 1995 listed Washington State Employee Credit Union as operators of the parcel. In addition, the parcel is currently owned by Washington State Employee Credit Union.

Thurston County Assessor Parcel Number 78203900500 is located at 520 Union Avenue Southeast and is 0.52 acre in area. This parcel is to the adjacent west of the Former Olympia Dry Cleaners Property and separated by Cherry Street Southeast. The parcel was first developed in 1968 with a 9,580-square-foot, asphalt parking lot and a 9,634-square-foot, two-story building. The first listing of the parcel in the Polk directories was a residence in 1941 until approximately 1970. In 1970, the Washington State Employee Credit Union was listed as operators of the parcel. The current owners of the parcel are Ali and Sandra Raad.

Thurston County Assessor Parcel Number 78205600400 is located at 521 Union Avenue Southeast and is 0.16 acre in area. This parcel is southwest of the Former Olympia Dry Cleaners Property and is separated by Cherry Street Southeast and 10th Avenue Southeast. The parcel was developed in 1940 with a 3,000-square-foot, asphalt parking and a 1,809-square-foot, two-story building. The first listing of this parcel was in 1942 as a residence. It was listed residential for various individuals between 1942 and 1975. In 2000, the parcel was listed as office space. There was no listing for this parcel from 1975 to 2000. The parcel is currently owned by Sans and Tamela Gilmore.

Thurston County Assessor Parcel Numbers 78205500100 and 78205500200 (no addresses) are contiguous parcels located to the adjacent south of the Former Olympia Dry Cleaners Property. These parcels are separated by Union Avenue Southeast. These parcels are 0.32 acre in total area and are undeveloped. Harold and Carol Wolfe currently own the two parcels.

2.3 PHYSICAL SETTING AND HYDROGEOLOGY

A summary of the Site physical setting and local geology and hydrology is provided below.

2.3.1 Physical Setting

The Site is located in Section 23, Township 18 South, Range 2 West in the City of Olympia, Thurston County, Washington (Figure 1). The latitude of the Site is approximately 47 degrees, 2 minutes, 22 seconds North, and the longitude of the Site is approximately 122 degrees, 53 minutes, 39 seconds West. The topography of the Site slopes downward toward the north. The slope is greater in the north-central and northwestern portions at the Former Olympia Dry Cleaners Property. Based on the survey performed during the RI, the ground surface elevation at the Site ranges from approximately 32 feet above mean sea level near Union Avenue Southeast down to approximately 26 feet above mean sea level near 10th Avenue Southeast.

2.3.2 Geology

According to a letter titled *Deep Aquifer Hydrogeology, Cascade Pole Site, Olympia, Washington* prepared by Pacific Groundwater Group (PGG) on October 11, 2007 (PGG 2007), and the *Geologic Map of the Lacey 7.5-minute Quadrangle, Thurston County, Washington* dated 2003 prepared by the Washington State Department of Natural Resources (WSDNR 2003), the uppermost native soils in the local area consist of the Latest Vashon fine-grained sediments (Qgof) geologic unit. The Qgof unit consists predominantly of silt and clay with interbeds of silt, clay, clayey silt, and silty sand. The soil types that comprise the Qgof unit are indicative of a relatively low-energy depositional environment and are characteristic of lacustrine and/or glacio-lacustrine deposits. In addition, these soil types generally have relatively low hydraulic conductivity ranges from 10^{-3} to 10^{-6} centimeters per second (Freeze and Cherry 1979). The Qgof unit is reported to have been deposited as recessional outwash during the Vashon glaciation approximately 12,000 years ago. The maximum thickness of the Qgof unit in the region is approximately 95 feet (PGG 2007).

Underlying the Qgof unit is a geologic unit referenced as the Latest Vashon recessional sand and minor silt (Qgos). This geologic unit is also referred as the Tumwater Sand (PGG 2007; WDNR 2003). The Qgos unit consists predominantly of fine- to medium-grained sand with interbedded silt. The soil types that comprise the Qgos unit are indicative of a relatively moderate-energy depositional environment and are characteristic of fluvial or glacio-fluvial deposits. These soil types generally have moderate hydraulic conductivity ranges from 10^{-1} to 10^{-5} centimeters per second (Freeze and Cherry 1979). The Qgos unit is reported to have been deposited as recessional outwash during the Vashon glaciation prior to the Qgof unit. The thickness of the Qgos unit may exceed 400 feet (PGG 2007). A summary of the soil profile encountered at the Site during the RI field program and a geologic interpretation relative to the local geology described above is provided in Section 4.3.

2.3.3 Hydrology

The nearest surface water body to the Site is Capitol Lake, which is a freshwater lake located approximately 2,400 feet to the west (Figure 1). Regional groundwater reportedly flows toward Budd Inlet, which is a saltwater inlet located approximately 3,000 feet to the north (PGG 2007).

A shallow groundwater-bearing zone is observed in the native soils at the Site. The native soils consist of silt and clay, silty sand, and sandy silt from approximately 0 to 50 feet below ground surface (bgs). These soil types are characteristic of the Qgof unit, which is considered an aquitard due to its limited capacity to transmit groundwater (i.e., low hydraulic conductivity) (PGG 2007). A groundwater seep (Seep) is located approximately 13 feet west of the southwest corner of the Cherry Street Q-Tip Trust Building (Figure 2). In addition, artesian conditions are observed in five monitoring wells (MW07 through MW10, and MW14) and the Artesian Supply Well at the Site. The artesian conditions present at the Site are attributed to pressure applied by the Qgof unit that confines or partially confines groundwater in the underlying Qgos unit (PGG 2007). A summary of groundwater conditions for the Site, including groundwater flow direction and gradient and artesian observations, is provided in Section 4.3.2.

3.0 PREVIOUS INVESTIGATIONS AND INTERIM REMEDIAL ACTIONS

This section describes a summary of activities and results from previous investigations conducted at the Site and on adjacent properties and interim remedial actions conducted at the Site by SES and others. Additional information on the previous investigation activities, procedures, and results are provided in the referenced reports (Appendix A).

3.1 1995 SUBSURFACE INVESTIGATION

CONREX, Inc. (CONREX) conducted a subsurface investigation at the Site on behalf Mr. Bolton, former tenant of the Former Olympia Dry Cleaner Property. The subsurface investigation was reportedly performed to assess the subsurface conditions prior to Mr. McCullough purchasing the dry cleaning business that Mr. Bolton operated at the Former Olympia Dry Cleaner Property. The subsurface investigation was conducted in two phases from May 19 to 26, 1995. The subsurface investigation included advancing eight borings to collect soil and/or reconnaissance groundwater samples at the locations shown on Figure 2. The borings were advanced using a hand auger or direct-push drill rig up to a depth of 9 feet bgs. The subsurface investigation activities, field procedures, and results are provided in the *Phase II Environmental Site Assessment* dated June 13, 1995 (CONREX 1995) (Appendix A).

CONREX reportedly observed silt and clay in each boring. CONREX did not specify the soil profile observations with depth in each boring. Groundwater was encountered at 1 to 3 feet bgs. Selected soil and reconnaissance groundwater samples collected from the borings were submitted for laboratory analyses for halogenated volatile organic compounds (HVOCs); total petroleum hydrocarbons (TPH) as diesel-range petroleum hydrocarbons (DRPH), oil-range petroleum hydrocarbons (ORPH), and gasoline-range petroleum hydrocarbons (GRPH); and/or benzene, toluene, ethylbenzene, and total xylenes (BTEX). The approximate depths of the samples analyzed, soil and reconnaissance groundwater analytical results, and associated analytical methods are summarized in Tables 1 through 4. Figures 4 and 5 present the boring locations and associated analytical results for PCE and its degradation compounds in soil and groundwater, respectively, from this investigation and subsequent investigations.

The analytical results of soil samples and reconnaissance groundwater samples collected during this initial subsurface investigation indicated the following:

- Concentrations of PCE that exceeded the MTCA Method A cleanup level were detected in two soil samples collected from borings BH-1 and BH-2. These borings were located near the northeast corner of the Former Olympia Dry Cleaners Building (Figure 4).
- Concentrations of TCE and ORPH that exceeded the MTCA cleanup levels were detected in a soil sample collected from boring Borehole A, located in the North Alley near the northeast corner of the Former Olympia Dry Cleaners Building at a depth of approximately 1 foot bgs.
- Concentrations of PCE that exceeded the MTCA cleanup level were detected in two reconnaissance groundwater samples from borings BH-3 and BH-6. Boring BH-3 was located near the northeast corner of the Former Olympia Dry Cleaners Building and monitoring well MW-08. Boring BH-6 was located near the northwest corner of the Former Olympia Dry Cleaners Building and within the former excavation area advanced as part of an interim remedial action summarized below.

- Concentrations of TCE and/or cis-1,2-DCE isomers that exceeded the MTCA cleanup levels were detected in the reconnaissance groundwater samples collected from borings Borehole B, BH-3, and BH-6. Boring Borehole B was located near the northeast corner of the Former Olympia Dry Cleaners Building.
- Concentrations of ORPH that exceeded the MTCA Method A cleanup level were also detected in the reconnaissance groundwater samples collected from boring Borehole B, BH-3, and BH-6.

CONREX also collected a groundwater sample from the Artesian Supply Well at the Former Olympia Dry Cleaners Property and submitted the sample for laboratory analysis for HVOCs, DRPH, and ORPH. The analytical results for the groundwater sample collected from the Artesian Supply Well were below the laboratory analytical practical quantitation limits for PCE and its degradation compounds, DRPH, and ORPH (Tables 5 and 6).

3.2 2001–2005 SUPPLEMENTAL SUBSURFACE INVESTIGATIONS AND GROUNDWATER MONITORING EVENTS

Stemen conducted four supplemental subsurface investigations at the Site and surrounding properties. In addition, Stemen conducted six groundwater monitoring events. The supplemental subsurface investigations and groundwater monitoring events were performed from 2001 through 2005. The subsurface investigations included advancing 22 borings to collect soil and/or reconnaissance groundwater samples and installing 7 monitoring wells. The locations of the borings and monitoring wells are shown on Figure 2. Stemen also collected reconnaissance surface water samples at selected locations shown on Figure 2. The field activities and procedures and results for the supplemental subsurface investigations and groundwater monitoring events are provided in the *Draft Remedial Investigations and Associated Interim Remedial/Corrective Actions Report* dated January 10, 2005 (Stemen 2005) (Appendix A).

Selected soil and reconnaissance groundwater samples collected from the borings, and reconnaissance surface water samples were submitted for laboratory analyses for HVOCs, DRPH, ORPH, GRPH, and/or BTEX based on Stemen's field observations and approved scope of work. The approximate depths of samples, analytical results, and analytical methods for the samples analyzed are presented in Tables 1 through 4, 7, and 8.

The available laboratory analytical reports and chain-of-custody forms are provided in Appendix B. The analytical results of soil samples and reconnaissance groundwater and surface water samples collected during the supplemental subsurface investigation indicated the following:

- Concentrations of PCE and TCE that exceeded the MTCA Method A cleanup levels were detected in two soil samples collected from borings S-2 (4/9/01) and S-3 (4/9/01). Boring S-2 (4/9/01) was located within the interim remedial action excavation area, and boring S-3 (4/9/01) was located in the southwest corner of the Cherry Street Q-Tip Trust Building (Figure 2).
- Concentrations of PCE that exceeded the MTCA Method A cleanup level were detected in four soil samples collected from borings S-4, S-10, S-2 (12/7/02), and S-3 (12/7/02). Boring S-4 was located next to monitoring well MW-04, and boring S-10 was located in the North Alley. Borings S-2 (12/7/02) and S-3 (12/7/02) were located west of the Cherry Street Q-Tip Trust Building within the landscape area.

- Concentrations of DRPH, ORPH, GRPH, and BTEX were not detected in the 26 soil samples collected from 16 borings located throughout the remainder of the Site (Table 2).
- Concentrations of PCE and its degradation compounds that exceeded the MTCA cleanup levels were detected in five reconnaissance groundwater samples collected from borings S-2 (4/9/01), S-9, S-12, S-13, and S-14. Boring S-9 was located next to monitoring well MW-07. Borings S-12 through S-14 were located in the North Alley or inside the northern portion of the Former Olympia Dry Cleaners Building (Figure 5).
- A concentration of DRPH that exceeded the MTCA Method A cleanup level was detected in one reconnaissance groundwater sample collected from boring S-2 (4/9/01).
- Concentrations of PCE that exceeded the MTCA Method A cleanup level were detected in three reconnaissance surface water samples collected at grab sample locations DW-1, S-10, and IFD. Reconnaissance surface water sample DW-1 was collected from the drainage ditch located along the abandoned railroad right-of-way on Thurston County Assessor Parcel Number 78203700400 (Figures 2 and 3). Reconnaissance surface water sample S-10 was collected near surface within boring S-10 (Figure 2, Table 7). Reconnaissance surface water sample IFD was collected from the interior floor drain directly next to monitoring well MW-03, labeled "3" diameter steel drain filled with concrete" (Figure 2).
- A concentration of ORPH of 19,000 micrograms per liter was detected in reconnaissance surface water sample S-10. Reconnaissance surface water sample S-10 is located in very close proximity to boring Borehole B, which also had detectable concentrations of ORPH (Figure 2). These results indicate a release of ORPH has occurred to the surface and subsurface within a limited area.

Stemen performed six groundwater monitoring events from April 2001 through October 2005. Details of the groundwater monitoring events, including laboratory analytical reports and chain-of-custody forms, are provided in Appendix B. Selected groundwater samples collected from the monitoring wells were submitted for laboratory analyses for HVOCs, DRPH, ORPH, and/or BTEX based on Stemen's approved scope of work. The analytical results are presented in Tables 5 and 6. The locations of monitoring wells MW01 through MW07 installed by Stemen are shown on Figure 2. The analytical results of groundwater samples collected during the groundwater monitoring events indicated the following:

- Concentrations of PCE and its degradation compounds were detected below the MTCA cleanup levels or were not detected at the practical quantitation limits in groundwater samples collected from monitoring wells MW01, MW03, MW04, MW05, MW06, and MW07 during the last groundwater monitoring events conducted in October 2005. These results are consistent with the recent results from groundwater monitoring events conducted by SES (Table 5).
- Concentrations of PCE and its degradation compounds were consistently detected above the MTCA cleanup levels in groundwater samples collected monitoring well MW02. This monitoring well was located within the interim remedial action excavation area (Figure 2).
- Concentrations of DRPH and ORPH were not detected at the practical quantitation limits in groundwater sample collected from monitoring well MW02 in April 2001 (Table 6).

- Concentrations of BTEX were detected below the MTCA cleanup levels or were not detected at the practical quantitation limits in groundwater samples collected from monitoring wells MW01 through MW07 (Table 6).

3.3 2007 INTERIM INVESTIGATION ACTIVITIES

In January 2007, SES began performing interim investigation activities at the Site after Stemen completed an Interim Remedial Action, as described in Section 3.4. The SES interim investigation activities included collecting a total of four reconnaissance surface water samples from the Seep and catch basin located within the interim remedial action 2006 excavation area, shown on Figure 2. SES also collected two groundwater samples from the Artesian Supply Well (Figure 2). The groundwater and reconnaissance surface water samples were submitted for laboratory analyses for HVOCs. The groundwater and reconnaissance surface water analytical results and associated analytical methods are summarized in Tables 6 and 8.

The analytical results of groundwater samples and reconnaissance surface water samples collected during the interim investigation activities indicated the following:

- Concentrations of PCE and TCE that exceeded the MTCA cleanup levels were detected in three reconnaissance surface water samples collected in January through March 2007 from the Seep. In addition, concentrations of vinyl chloride were detected above the MTCA cleanup level in two reconnaissance surface water samples collected during the January and February 2007 sampling events.
- Concentrations of PCE and its degradation compounds were not detected above the laboratory practical quantitation limits in the one reconnaissance surface water sample collected from the catch basin located within the interim remedial action excavation area.
- Concentrations of PCE and its degradation compounds were not detected above the laboratory practical quantitation limits in the two groundwater samples collected in March 2007 from the Artesian Supply Well (Table 6).

3.4 INTERIM REMEDIAL ACTIONS

Two interim remedial actions have been conducted at the Site. A summary of the interim remedial actions is provided below.

3.4.1 2006 Source Removal Soil Excavation

In September 2006, Aspect Consulting, LLC (Aspect) observed an interim remedial action conducted by Stemen near the northwest corner of the Former Olympia Dry Cleaners Property. The objective of the interim remedial action was to reduce the primary source and predominant mass of PCE and its degradation compounds located in proximity to the Seep and monitoring well MW02 (Figure 2). The interim remedial action included the excavation and removal of accessible soil with concentrations of PCE and its degradation compounds and the transportation and disposal of PCE-impacted soil to an approved treatment, storage, and disposal (TSD) facility. A summary of this interim remedial action is provided in the letter report *Interim Action Report* prepared by SES dated January 26, 2007 (SES 2007a).

Prior to performing the soil excavation, KTA Associates, Inc. (KTA) prepared a technical memorandum dated May 18, 2006, requesting a Contained-In Determination for generated

soil with concentrations of PCE and its degradation compounds below the land disposal restrictions for F002-listed dangerous waste (KTA 2006). Ecology issued a Contained-In Determination for the soil excavation activities in a letter titled *Disposal of Soils Contaminated with F002-Listed Dangerous Waste Constituents* dated June 27, 2006 (Ecology 2006).

The location and approximate lateral extent of the soil excavation is depicted on Figure 6. The depth of the excavation ranged from approximately 8 to 10 feet bgs (SES 2007a). The limits of the excavation were constrained by existing aboveground structures and Cherry Street Southeast and associated concerns related to the integrity of these structures. During the soil excavation, monitoring wells MW02 and MW05 were decommissioned by removal. The interim remedial action included the removal of PCE-impacted soil identified in borings BH-6 and S-2 (4/9/01) advanced by others (Tables 1 and 2).

Aspect analyzed a total of 30 soil samples collected from the bottom and sidewalls of the excavation limits (Figure 6). The analytical results from the excavation soil samples indicated that residual soil with concentrations of PCE was left in place due to the excavation restrictions. The highest concentrations of PCE in soil was 96 milligrams per kilogram (mg/kg), detected in soil sample 06-C21@8FT located along the western sidewall adjacent to Cherry Street Southeast (Figure 6).

Upon achieving the practical limits of excavation, the excavation was backfilled with well-graded pit run (i.e., silty fine- to course-grained sand and gravel) and restored to the surrounding surface grade (SES 2007a). Excavated soil was temporarily stockpiled on plastic and covered in the north-northeast portion of the Former Olympia Dry Cleaners Property. In December 2007, a total of 47.08 tons of F-listed dangerous waste generated from the soil excavation was transported to Chemical Waste Management's Subtitle C TSD facility in Arlington, Oregon, for biotreatment and disposal. A total of 233.57 tons of non-dangerous, Contained-In waste generated from the soil excavation was transported to Waste Management's Columbia Ridge Subtitle D TSD facility in Arlington, Oregon, for disposal in accordance with the Contain-In Determination from Ecology. In January 2008, an additional 30.57 tons of non-dangerous waste generated from the soil excavation was transported to Waste Management's Columbia Ridge Subtitle D TSD facility in Arlington, Oregon, for disposal in accordance with the Contain-In Determination.

3.4.2 Seep Collection and Treatment System

SES constructed a Seep Collection and Treatment System in February 2007. The purpose of the treatment system is to prevent the migration of surface water from the Seep to the eastern curb located along Cherry Street Southeast. Surface water within the curb flows down to the catch basin located approximately 15 feet west of the northeast corner of the Cherry Street Q-Tip Trust Building. In March 2007, LOTT Alliance (LOTT) issued a Discharge Authorization Letter dated March 5, 2007 (SES 2007b), which allows batch discharges of treated water from the treatment system to the sanitary sewer system.

Details of the initial design, operation, and supporting documentation for the treatment system are provided in the *Summary of Seep Collection System* letter prepared by SES dated August 10, 2007 (SES 2007b). In December 2008, SES made treatment system modifications at the request of Ecology. The treatment system modifications are

summarized in an email titled *Former Olympia Dry Cleaners – System Modifications* prepared by Mr. Tim Brown dated December 15, 2008 (SES 2008g).

ADESA Environmental Investigations, LLC (ADESA) performs the monthly treatment system operation and maintenance activities with the assistance of Mr. Greg Burleson, representative of the owner of the Former Olympia Dry Cleaners Property. Monthly discharge reports documenting the analytical results of treated water and discharge volumes are prepared by ADESA and forwarded to LOTT and Ecology.

3.5 INDOOR AIR SAMPLING

Indoor air sampling was performed in the Cherry Street Q-Tip Trust Building by the Washington State Department of Health in 2002 and 2004. Additional indoor air sampling was performed in 2007 by Farallon Consulting, LLC (Farallon). Details of these air sampling events are provided in *Health Consultation, Evaluation of Follow-Up Indoor Air Sampling Results (January – March 2007) at the Washington Traffic Safety Commission Offices, TMC Cleaners (a/k/a Howard's Cleaners and Olympia Cleaners), Olympia, Thurston County, Washington*, dated August 31, 2007, prepared the United States Department of Health and Human Services (USDHHS 2007) and in *Indoor Air Sampling Results* prepared by Farallon dated March 16, 2007 (Farallon 2007). A discussion of the potential exposure risk via inhalation is provided in Section 5.4.2.

4.0 REMEDIAL INVESTIGATION

SES performed several phases of the RI field work at the Site between May 2008 and January 2009 to address the data gaps identified during the previous investigations and to provide sufficient information to support the evaluation of technically feasible cleanup alternatives for the Site. A summary of the data gaps, field activities, and RI results are provided below. This section also includes a discussion of the Terrestrial Ecological Evaluation (TEE) requirements under MTCA.

4.1 DATA GAPS

The previous investigations performed by others did not provide sufficient information to meet the requirements under MTCA for a remedial investigation. Specific data gaps identified by Ecology for the Site were reported in a letter titled *Draft Remedial Investigation and Associated Interim Remedial/Corrective Actions Report, Former Olympia Dry Cleaners, 606 East Union Avenue, Olympia, Washington, Agreed Order #DE00TCPHQ-1408*, dated July 28, 2005 (Ecology 2005). A summary of these data gaps is as follows:

- The data on historical operations conducted on the Site and surrounding properties were incomplete in identifying potential contaminant sources. Additional information requested included specific details of Site operations within the Former Olympia Dry Cleaners Building, historic property ownership and development, land use of adjoining properties, and maps showing cumulative investigation sample locations at the Site.
- The characterization of the geology and hydrology at the Site was inadequate. Data gaps associated with the Site hydrogeology included the groundwater gradient and flow direction, as well as the depth, thickness, and lateral extent of a potential aquitard beneath the Site.
- The delineation of the extent of contamination at the Site was inadequate. Additional information requested included tabulation of cumulative investigation data collected, the

vertical and horizontal extent of PCE in soil and groundwater, and estimated volumes and mass of contaminated soil and groundwater media.

- The data to evaluate potential exposure concerns at the Site were incomplete. Additional information requested included preferential anthropogenic and natural pathways, impacts to biological receptors and proximal water supply wells, calculated risk assessments, and the potential for contamination to cause a public nuisance.

4.2 REMEDIAL INVESTIGATION FIELD PROGRAM

The RI field program was divided into five work elements that include: utility reconnaissance; soil and reconnaissance groundwater sample collection; monitoring well installation and development; groundwater monitoring, and surface water sampling. SES coordinated the performance of RI fieldwork with Ecology. A summary of the scope of work completed for each work element is provided below.

4.2.1 Utility Reconnaissance

On May 15, 2008, Underground Detection Service, Inc. of Seattle, Washington, performed a private utility locate across the entire Former Olympia Dry Cleaners Property. The locate was performed to supplement the information from public utility markings coordinated through the Northwest Utility Notification Center. The locations of private utilities on the Former Olympia Dry Cleaners Property and public utilities in the vicinity of the Site are shown on Figure 2. In addition, the sewer line beneath the northern portion of the Former Olympia Dry Cleaners Building was video-scoped via an access point through the bathroom toilet. The location of the sewer line was confirmed to the southwest to a point near the western wall of the Former Olympia Dry Cleaners Building where an unknown obstruction was encountered. An assessment by Underground Detection Service of other features likely connected to the sewer yielded no other access points for video scoping to be performed. The confirmed location of the sewer line beneath the existing Former Olympia Dry Cleaners Building is shown on Figure 2.

As requested by Ecology, SES and ADESA made efforts to investigate the depth and screened interval of the Artesian Supply Well located along the west side of the Former Olympia Dry Cleaners Building (Figure 2). The investigation efforts included a Site visit by ADESA on September 4, 2007, where all surface fittings were disassembled to provide access into the well. The use of a pipe snake and water level indicator were unsuccessful in advancing beyond approximately 2 feet where subsurface elbows were encountered within piping of the Artesian Supply Well. No historical information regarding the Artesian Supply Well construction was available from the public record (e.g., Ecology well logs) or from the property owner. Ecology was satisfied with the efforts made to investigate the Artesian Supply Well (Ecology 2008a).

4.2.2 Soil and Reconnaissance Groundwater Sample Collection

This work element included the advancement of direct-push and hollow-stem auger borings between May 15 and November 5, 2008, and the collection of soil and reconnaissance groundwater samples from each boring at various depths. Prior to drilling, a private utility locating survey was conducted by Underground Detection Services to locate utilities in the vicinity of the proposed boring locations, and the Northwest Utility Notification Center was contacted for utility locations. Exploration activities and well installations within the public

right-of-way were performed in accordance with applicable permits issued by the City of Olympia prior to commencing work. The terms and conditions of access to the Cherry Street Q-Tip Trust Property were negotiated by the respective property owners prior to commencing work.

Prior to advancing borings within the Cherry Street Southeast right-of-way, the sanitary sewer running through the center of Cherry Street Southeast was visually confirmed and the approximate diameter (14 to 16 inches) measured from manholes located at the intersection of Cherry Street Southeast and Union Avenue Southeast (herein referred to as the south manhole), and approximately 215 feet to the north and within Cherry Street Southeast (herein referred to as the north manhole) (Figure 2). The sanitary sewer line lies approximately 11.5 feet bgs at the south manhole and approximately 4.5 feet bgs at the north manhole. Based on a conversation with Mr. Eric Christensen of the City of Olympia Public Works Department on November 3, 2008 (SES 2008e), the sanitary sewer is suspected of being laid within a trench composed of native soil. No information on the installation or construction of the sanitary sewer was available from the City of Olympia.

Drilling services were provided by ESN Northeast of Olympia, Washington, and Cascade Drilling, Inc. of Woodinville, Washington. An SES geologist observed drilling activities and collected soil and/or reconnaissance groundwater samples for potential laboratory analysis at each boring location. The borings were advanced at the following locations:

- Direct-push borings B01 through B03 were advanced to approximately 20 feet bgs in the northern interior of the Former Olympia Dry Cleaners Building and in the vicinity of the dry-cleaning machine and sewer line to evaluate these features as potential sources of PCE released at the Site (Figure 2).
- Direct-push borings B04 through B12 were advanced to depths ranging from approximately 16 to 20 feet bgs at exterior locations on the Site to further delineate the vertical and lateral extent of PCE in soil and groundwater. Boring locations included the northern and western portions of the Former Olympia Dry Cleaners Property, the southwestern portion of the Cherry Street Q-Tip Trust Property, and within the Cherry Street Southeast right-of-way (Figure 2).
- Hollow-stem auger borings B13, B15, and B16 were advanced to depths of 11.5 feet bgs at exterior locations at the Site to evaluate the lateral and vertical profile of soil and groundwater quality at the Site (Figure 2).
- Boring B14 was advanced to 6 feet bgs with the use of a vactor truck due to the proximity-restricted access and presence of an active natural gas line. Refusal was encountered at 6 feet bgs. Boring B14 was advanced in the North Alley to evaluate the lateral profile of soil and groundwater quality at the Site (Figure 2).
- Hollow-stem auger boring B17 was advanced to depth 51.5 feet bgs next to B15 to evaluate the vertical profile of soil and groundwater quality at the Site (Figure 2).
- Direct-push borings B18 through B20 were advanced to depths ranging from approximately 7 to 10 feet bgs within the Cherry Street Southeast right-of-way to further assess the extent of PCE within the eastern portion of the right-of-way, as well as evaluate if the sanitary sewer line within the Cherry Street Southeast right-of-way served as a preferential pathway for contaminant migration (Figure 2).

- Hollow-stem auger borings B21 and B22 were advanced to approximately 39 and 15 feet bgs, respectively. Boring B21 was advanced to assess the groundwater quality on the west side of Cherry Street Southeast. Boring B22 was advanced to evaluate the groundwater quality downgradient of the suspected source area located in the northwest corner of the Former Olympia Dry Cleaners Property (Figure 2).
- Three borings HB-1A, HB-1B, HB-2 were advanced using a hand auger at three locations within the western landscaped area on the Cherry Street Q-Tip Trust Property. These hand-auger borings were advanced to assess the soil quality at the Site (Figure 2). Refusal was encountered at approximately 0.3 feet bgs in hand auger borings HB-1A and HB-1B due to the presence of tree roots within the landscaped area. Groundwater was not encountered in these borings. A third hand-auger boring (HB-2) was attempted in the North Alley, and groundwater was observed at approximately 0.8 foot bgs in boring HB-2. Boring HB-2 was terminated at 1.5 feet bgs due to the presence of groundwater.

Soil samples were collected in accordance with the Unified Soil Classification System (USCS) and were screened in the field for potential evidence of contamination using visual observations and notations of odor and by conducting headspace analysis using a photoionization detector (PID) to detect the presence of volatile organic vapors. Headspace analysis was conducted by placing soil from each sample interval into a resealable plastic bag and allowing the sample to warm for several minutes. The probe of the PID was then inserted into the bag, and the highest reading obtained over an approximately 30-second interval was recorded. The USCS symbol, visual and olfactory notations for the samples, and PID readings were recorded on boring log forms and are provided in Appendix C.

Direct-push borings were continually sampled from the ground surface to the maximum depth explored, using a 4-foot probe rod driven with 140-pounds-per-square-inch hydraulics powered by nitrogen gas. The sampler was lined with disposable acetate sleeves that were removed and opened to reveal the sample after each 4-foot sample interval driven. Hollow-stem auger borings were sampled at approximate 2.5-foot intervals to the maximum depth explored, with the exception boring B17 which had no sample collection from ground surface to 12.5 feet bgs due to the proximity to boring B15. Blow counts and sample recovery percentages were logged at each sample interval. Selected soil samples from each boring were submitted for laboratory analysis of HVOCs by United States Environmental Protection Agency (EPA) Method 8260B and/or TPH by Northwest Total Petroleum Hydrocarbon (NWTPH) Method NWTPH-HCID (Tables 1 and 2).

A 2-inch-outer-diameter stainless steel casing was driven to 2 to 3 feet below the depth where groundwater was encountered to collect a reconnaissance groundwater sample in the direct-push borings. The outer casing was then partially withdrawn, exposing a discrete portion of the water-bearing unit to a temporary well screen. The same temporary well screen installation method was used to collect reconnaissance groundwater samples from boring B21 advanced using a hollow-stem auger.

Temporary wells were also installed in boring B17 within the hollow-stem auger using 2-inch-inner-diameter, polyvinyl chloride blank casing, flush-threaded to 5 feet of 2-inch-inner-diameter 0.010-inch slotted well screen. The temporary well screens in boring B17 were placed at the bottom of each sample interval within the hollow-stem auger.

Groundwater was observed near the surface and potentially migrated down the auger flights as they were advanced to collect the reconnaissance groundwater samples in boring B17.

Groundwater was purged through the 0.25-inch-diameter tubing inserted down the 2-inch-diameter casing using a peristaltic pump with a flow rate of less than 500 milliliters per minute until approximately 0.5 to 2 gallons of water were removed. Following the temporary well purging, SES collected the reconnaissance groundwater samples. The depths of the reconnaissance groundwater samples are provided in Tables 3 and 4. The reconnaissance groundwater samples were submitted for laboratory analysis of HVOCs by EPA Method 8260B and/or TPH by NWTPH Method NWTPH-HCID.

Soil and reconnaissance groundwater samples collected for potential laboratory analysis were placed directly into laboratory-prepared sample containers. The containers were placed on ice in a cooler and transported for laboratory analysis to Friedman & Bruya, Inc. of Seattle, Washington, or Libby Environmental Incorporated of Olympia, Washington, under standard chain-of-custody protocols. Direct-push and hand-auger borings were backfilled with bentonite. All soil cuttings were placed into labeled, 30- to 55-gallon steel drums and transported to the designated staging area along the west wall of the Former Olympia Dry Cleaners Building. The staging area is paved and located beneath a canopy. Representatives of the Former Olympia Dry Cleaners Property are coordinating the disposal of the generated waste with an approved TSD service provider. Wastewater generated during equipment decontamination was transferred on the day of generation to a storage tank used as part of the Seep Collection and Treatment System described below. The wastewater was treated and directly discharged to the sanitary sewer in accordance with the LOTT discharge permit.

4.2.3 Monitoring Well Installation and Development

A total of seven new monitoring wells (MW08 through MW14) were installed and developed at the Site between August 5 and November 7, 2008 (Figure 2). Monitoring wells MW08 through MW12 were installed in the boreholes corresponding with soil borings B13 through B17, and wells MW13 and MW14 were installed in the boreholes corresponding with soil borings B21 and B22. The monitoring wells were installed to assess hydrogeologic characteristics, such as groundwater flow direction and hydraulic gradient; to assess basic groundwater geochemistry; and to define the vertical and lateral extent of PCE and its degradation compounds in groundwater.

The monitoring wells were constructed inside boreholes drilled with 8.25-inch-diameter augers. Well construction materials for each well included flush-threaded, 2-inch-diameter Schedule 40 PVC with 0.010-inch-slotted screens. A filter pack consisting of 2/12 silica sand was placed around each screened interval. Continuous depth measurements were taken during placement of the filter pack. Bentonite chips (3/8-inch) were hydrated and placed atop the filter pack up to approximately 2 feet bgs. A concrete monument was placed atop the bentonite and extends to the surrounding ground surface. Based on the presence (or potential presence) of artesian conditions and the location of each monitoring well (e.g., sidewalk), surface completions of the monitoring wells include both flush-mount (MW11, MW13, and MW14) and stick-up (MW08, MW09, MW10, and MW12) protective

covers. The approximate screen intervals for the monitoring wells installed during the RI are provided in Table 9.

The monitoring wells were developed with the use of a submersible pump. Monitoring well development consisted of surging and purging the wells until a minimum of five submerged well volumes was removed. All non-dedicated field sampling equipment was cleaned and decontaminated between uses and prior to leaving the Site. Wastewater generated during well development was transferred on the day of generation to an aboveground storage tank used as part of the Seep Collection and Treatment System. The wastewater was treated and directly discharged to the sanitary sewer in accordance with the LOTT discharge permit.

The monitoring well locations and elevations were surveyed by ESM Consulting Engineers of Bothell, Washington. The monitoring well tops-of-casings were surveyed to an accuracy of 0.01 foot, using a NAVD 88 benchmark.

4.2.4 Groundwater Monitoring

Groundwater monitoring and sampling was completed on August 13, 2008, at monitoring wells MW01, MW03, MW04, and MW06 through MW12, and on November 12, 2008, at monitoring wells MW13 and MW14. In addition, a complete round of depth-to-groundwater measurements was performed at the Site on January 14, 2009. The depths to groundwater and groundwater elevations from the RI field program are presented in Table 9.

Prior to collecting depth-to-groundwater measurements, monitoring wells were uncapped and allowed to equilibrate with atmospheric pressure for a minimum of 15 minutes before groundwater level measurements were obtained. Groundwater levels were measured to an accuracy of 0.01 foot using an electronic water level meter.

Purging and sampling of each monitoring well was performed using a peristaltic pump and dedicated polyethylene tubing at flow rates ranging from 100 to 300 milliliters per minute. The tubing intake was placed at approximately the middle of the screen interval in each monitoring well. During purging, water quality was monitored using a HORIBA U-22 water quality system (or equivalent) equipped with a flow-through cell. The water quality parameters that were monitored and recorded included temperature, pH, specific conductance, dissolved oxygen, turbidity, and oxidation-reduction potential. Each monitoring well was purged until, at a minimum, pH, specific conductivity, and dissolved oxygen or turbidity stabilized.

Following purging, groundwater samples were collected from the pump outlet tubing located upstream of the flow-through cell and placed directly into laboratory-prepared sample containers. The containers were placed on ice in a cooler and transported for laboratory analysis to Friedman & Bruya, Inc. of Seattle, Washington, under standard chain-of-custody protocols. The groundwater samples collected from each monitoring event were submitted for analysis of HVOCs by EPA Method 8260B. Wastewater generated during groundwater monitoring was transferred each day of generation to an aboveground storage tank used as part of the Seep Collection and Treatment System.

4.2.5 Surface Water Sampling

A surface water sample was collected from the Seep on July 10, 2008. The surface water sample was collected with a disposable bailer and placed directly into laboratory-prepared sample containers. The containers were placed on ice in a cooler and transported for laboratory analysis to Friedman & Bruya, Inc. under standard chain-of-custody protocols. The surface water sample was submitted for laboratory analysis of HVOCs by EPA Method 8260B.

Ecology collected two surface water samples on October 15, 2008. Surface water sample Street-1 was collected directly down gradient of the Seep and within the eastern curb located along Cherry Street Southeast. Street -2 was collected from surface water near the storm water catch basin located approximately 15 feet west of the northeast corner of the Cherry Street Q-Tip Trust Building. The two surface water samples were submitted to the Ecology Manchester Environmental Laboratory under standard chain-of-custody protocols for laboratory analysis of volatile organic carbons by Method SW8260.

4.2.6 Terrestrial Ecological Evaluation

A TEE is intended to assess potential risk to plants and animals that live entirely or primarily on affected land. A simplified TEE was required under MTCA to assess the potential ecological risk posed by chemicals of concern (COCs) at the Site and whether a more detailed investigation of potential ecological risk would be required. SES conducted a simplified TEE in accordance with Table 749.1 of WAC 173-340-7492 to document the potential ecologic risk associated with the presence of COCs at the Site. The results of the simplified TEE are summarized in section 4.3.4.

4.3 REMEDIAL INVESTIGATION RESULTS

This section presents the results of the RI field program performed by SES. The results include a description of the soil and groundwater conditions; summaries of groundwater monitoring data; soil, groundwater, and surface water analytical data; and a brief narrative of the analytical results obtained during the RI.

4.3.1 Soil

The soil profile observed in borings advanced by SES consisted of silt with clay, sandy silt, silty fine-grained sand, and fill material overlying the native deposits. The maximum depth explored during the RI was approximately 51.5 feet bgs. The Site geology is shown on geologic cross sections included in this RI Report (Figures 7 through 9). Boring logs are provided in Appendix C.

Fill material observed at the Site consisted of gravelly silt with clay to well-graded silty sand with gravel. The fill material was observed from approximately 0 to 4 feet bgs with the exception of the soil excavation area where backfill material was placed to a depth of approximately 9 feet bgs. The soil profile observed in the native deposits from approximately 4 up to 15 feet bgs is consistent with the characteristics of the Qgof geologic unit, which is comprised of fine-grained soil, including silt and clay and fine-grained sand. The Qgof geologic unit is considered an aquitard.

The soil profile observed in native deposits below 12 to 15 feet bgs consisted of silty sand overlying a sandy silt. These soil types have characteristics of both the Qgof and Qgos geologic units. The Qgos geologic unit consists predominately of fine- to medium-grained sand with interbedded silt (PGG 2007). Soils below approximately 12 to 15 feet bgs transition from the Qgof geologic unit to the Qgos geologic unit, based on the artesian conditions observed in existing monitoring wells at the Site.

Soil samples collected from the borings completed during the RI were submitted for laboratory analysis of HVOCs by EPA Method 8260B and/or TPH by NWTPH Method NWTPH-HCID. A summary of soil analytical data is provided in Tables 1 and 2, and concentrations of PCE and the degradation compounds TCE, cis-1,2-DCE, and vinyl chloride are shown on Figure 4. Copies of the laboratory analytical reports for the soil samples collected during the RI are provided in Appendix B.

Concentrations of PCE exceeding the MTCA Method A cleanup level, ranging from 0.062 to 6.0 mg/kg, were detected in soil samples collected from depths ranging from 0.75 to 8 feet bgs from borings B05 through B07, B10, B11, B15, and HB2. The highest PCE concentrations in soil were detected in borings located in or immediately adjacent to the North Alley (B10, B11, HB-2) and in Cherry Street Southeast (B05) near the western extent of the North Alley. PCE was not detected above the laboratory practical quantitation limit (PQL) in soil samples collected from borings B01 through B04, B06, B08, B09, B12, B13, B14, and B16 through B22.

Concentrations of TCE exceeding the MTCA method A cleanup level, ranging from 0.07 to 2.0 mg/kg, were detected in soils samples collected from depths ranging from 0.75 to 8 feet bgs from borings B05 through B07, B10, B11, and HB2. The highest TCE concentrations in soil were detected in borings located in the North Alley (HB-2) and near the western extent of the North Alley within Cherry Street Southeast (B05). Concentrations of PCE degradation compounds cis-1,2-DCE, trans-1,2-DCE, 1,1-DCE, and vinyl chloride were not detected above the applicable MTCA Method A or B cleanup levels or the laboratory PQL in the analyzed soil samples.

Concentrations of TPH were not detected above the laboratory PQL in the soil samples collected from borings B01, B03, B05, B12, or HB2, between 0.75 and 11 feet bgs. These borings were located in areas at the Site where TPH had been previously detected in soil.

4.3.2 Groundwater

Reconnaissance groundwater samples collected from borings during the RI were submitted for laboratory analysis of HVOCs by EPA Method 8260B and/or TPH by NWTPH Method NWTPH-HCID. Groundwater monitoring well samples collected during the RI were submitted for laboratory analysis of HVOCs by EPA Method 8260B. A summary of reconnaissance groundwater sample analytical data is provided in Tables 3 and 4, and shown on Figure 5. Groundwater monitoring well analytical data is provided in Table 6 and shown on Figure 5. Copies of the laboratory analytical reports for the reconnaissance groundwater and groundwater monitoring well samples collected during the RI are provided in Appendix B.

Reconnaissance Groundwater Sampling

Analytical results for the reconnaissance groundwater samples collected during the RI indicated the following:

- Concentrations of PCE that exceeded the MTCA Method A cleanup level were detected in the reconnaissance groundwater samples collected from borings B05, B07, B10, B12, and B17 at depths ranging from 3 feet to 18 feet bgs.

- Concentrations of PCE that exceeded the MTCA Method A cleanup level were detected in the two deeper reconnaissance groundwater samples collected from boring B17 at depths of 28 and 38 feet bgs. The analytical results from these two reconnaissance groundwater samples are likely biased high due to carry down or the downward migration of groundwater observed near the surface, which was present within the auger flights.

- Concentrations of TCE that exceeded the MTCA Method A cleanup level were detected in the reconnaissance groundwater samples collected from borings B05, B07, and B10 at depths ranging from 3 feet to 9.5 feet bgs.

- Concentrations of cis-1,2-DCE that exceeded the MTCA Method A cleanup level were detected in the reconnaissance groundwater samples collected from borings B06, B07, and B10 at depths ranging from 3 feet to 6.5 feet bgs.

- Concentrations of vinyl chloride that exceeded the MTCA Method A cleanup level were detected in the reconnaissance groundwater samples collected from borings B05 through B08, B10, B17 through B19, and B22 at depths ranging from 3 feet to 18 feet bgs.

- Concentrations of trans-1,2-DCE and 1-1-DCE in the reconnaissance groundwater samples were below the laboratory PQL or the MTCA Method B cleanup level.

Groundwater Monitoring Well Sampling

A shallow groundwater-bearing zone was observed in the native soils from approximately 0 to 15 feet bgs within the Qgof geologic unit. The Qgof geologic unit is considered an aquitard (PGG 2007). The shallow groundwater-bearing zone is underlain by a semi-confined to confined groundwater-bearing zone known as the Qgos geologic unit.

A summary of the potentiometric surface for the existing monitoring wells at the Site are presented in Table 9. Five of the eleven monitoring wells installed in the shallow groundwater-bearing zone exhibit artesian conditions (MW07 through MW10, and MW14). The potentiometric surface contours for the shallow groundwater-bearing zone are shown on Figures 10 and 11. The potentiometric surface contours indicate a groundwater flow direction to the north and west with an average lateral hydraulic gradient of 0.05 feet per foot.

Monitoring well MW12 was installed in the main source area next to monitoring well MW10 to assess the groundwater quality and conditions with depth at the Site. Monitoring well

MW12 was installed from approximately 45 to 50 feet bgs within the Qgos geologic unit. The potentiometric surface measured in monitoring well MW12 exhibited artesian conditions and was approximately 6 feet above the potentiometric surface measured in monitoring well MW10 in August 2008 and January 2009 (Table 9). The potentiometric surface levels between monitoring wells MW10 and MW12 indicate an upward vertical hydraulic gradient of 0.17 feet per foot.

Analytical results for the groundwater monitoring well samples collected during the RI indicated the following:

- Concentrations of PCE were not detected exceeding the MTCA Method A cleanup level in the ground water samples collected from monitoring wells MW01, MW03, MW04, MW07 through MW09, and MW11 through MW13, with the exception of the groundwater samples collected from monitoring wells MW10 and MW14 during the August and November 2008 monitoring events, respectively.

- Concentrations of TCE and cis-1,2-DCE that exceeded the MTCA Method A or B cleanup levels were detected only in the groundwater sample collected from monitoring well MW10 during the August 2008 monitoring event.

- Concentrations of vinyl chloride that exceeded the MTCA Method A cleanup level were detected in the groundwater samples collected from monitoring wells MW09 and MW10 during the August 2008 monitoring event and in the groundwater sample collected from monitoring well MW14 during the November 2008 monitoring event.

- Concentrations of trans-1,2-DCE in the groundwater samples were below the laboratory PQL or the MTCA Method B cleanup level for both monitoring events.

4.3.3 Surface Water

A reconnaissance surface water sample was collected from the Seep and submitted for laboratory analysis of HVOCs by EPA Method 8260B. Analytical results for the reconnaissance surface water sample Seep-20080710 collected during the RI indicated concentrations of PCE, TCE, and vinyl chloride exceeded the MTCA Method B surface water cleanup levels. Concentrations trans-1,2-DCE and 1,1-DCE in the surface water sample were below the MTCA Method B surface water cleanup levels.

Ecology collected two surface water samples on October 15, 2008. Surface water sample Street-1 was collected directly down gradient of the Seep and within the eastern curb located along Cherry Street Southeast. Street-2 was collected from surface water near the storm water catch basin located approximately 15 feet west of the northeast corner of the Cherry Street Q-Tip Trust Building. The analytical results for surface water samples Street-1 and Street–2 collected by Ecology on October 15, 2008 were below the laboratory PQL for PCE and its degradation compounds.

The surface water analytical data is provided in Tables 7 and 8. A copy of the laboratory analytical report for the reconnaissance surface water sample collected during the RI is provided in Appendix B.

4.3.4 TERRESTRIAL ECOLOGICAL EVALUATION

As specified in WAC 173-340-7490, a TEE is required for any Site where a release of a hazardous substance has been confirmed. The regulation requires that one of the following actions be taken:

- Documenting that a site qualifies for a TEE exclusion using the criteria presented in WAC 173-340-7491;
- Conducting a simplified TEE in accordance with WAC 173-340-7492; or
- Conducting a site-specific TEE in accordance with WAC 173-340-7493.

Based on the criteria specified in WAC 173-340-7491, the Site qualifies for a TEE exclusion under the criteria set forth in WAC 173-340-7491. A copy of the TEE exclusion form is provided in Appendix D.

5.0 CONCEPTUAL SITE MODEL

A Conceptual Site Model identifies confirmed and suspected sources of contamination, affected media, transport mechanisms, fate of contaminants in the environment, and exposure pathways for potential receptors. The Conceptual Site Model is the basis for developing technically feasible cleanup alternatives from which a final cleanup action approach is selected. A Conceptual Site Model is dynamic and may be refined when additional information becomes available during the implementation of the feasibility study and cleanup action.

This section presents the components of the Conceptual Site Model developed for the Site based on the completion of the RI conducted by SES and various previous phases of investigation performed by others. This section includes a discussion of the confirmed and suspected source areas, affected media, contaminant fate and transport, and the preliminary exposure assessment.

5.1 CONFIRMED AND SUSPECTED SOURCE AREAS

A source area is the location of a release of a hazardous substance (i.e., PCE) that has affected soil, surface water, groundwater, and/or air quality at the Site. The observed distribution of PCE concentrations in soil and groundwater at the Site is inferred to be evidence of one or more historical surface releases of PCE in the northwest corner of the Former Olympia Dry Cleaners Property and along the North Alley. The lateral extent of PCE and its degradation compound vinyl chloride in soil is depicted on Figures 12 and 13, respectively. Additionally, the lateral extent of PCE and vinyl chloride in groundwater above the applicable MTCA cleanup levels is shown on Figures 14 and 15.

A minor source area of ORPH is suspected to be present near the northeast corner of the Former Olympia Dry Cleaners Building, based on the analytical results from soil and reconnaissance groundwater samples collected from borings Borehole A, Borehole B, and BH-3 (Figure 2, Tables 2 and 4). The lateral extent of residual ORPH in soil that exceeds the MTCA Method A cleanup level of 2,000 mg/kg is shown on Figure 16.

5.2 AFFECTED MEDIA

Concentrations of PCE and its degradation compounds have been detected above the MTCA cleanup levels in soil, groundwater, and surface water (i.e., Seep) at the Site. Historically, soil and groundwater with concentrations of ORPH have been detected above the MTCA Method A cleanup level in a limited area located near the northeast corner of the Former Olympia Dry Cleaners Building. The distribution of the PCE and its degradation compounds and ORPH in the affected media has been investigated sufficiently for definition of the Site under MTCA, identification of the media of concern for future cleanup action, and evaluation and recommendation of a cleanup action alternative.

Indoor air has been retained as a medium of potential concern based on the concentrations of PCE in soil located beneath the southern portion of the Cherry Street Q-Tip Trust Building. Previous air monitoring performed by others resulted in detectable concentrations of PCE, TCE, and cis-1,2-DCE in the indoor air samples collected in the Cherry Street Q-Tip Trust Building. The cleanup of the affected soil and groundwater is expected to result in the elimination of indoor air as a future medium of concern. Further evaluation of indoor air quality will be performed during the upcoming FS for the Site. Appropriate air quality standards and, if necessary, engineering controls to mitigate potential vapor intrusion from concentrations of PCE and its degradation compounds in shallow soil or groundwater located beneath the Cherry Street Q-Tip Trust Building will be determined as part of the FS.

5.3 CONTAMINANT FATE AND TRANSPORT

The fate and transport characteristics of the PCE and its degradation compounds in the affected media at the Site that are relevant to the evaluation of potentially feasible remedial technologies are discussed below. The primary COC for the Site is PCE due to the historical uses of PCE as a cleaning agent for the dry cleaning operations at the Former Olympia Dry Cleaners Property. The presence of TCE, cis-1,2-DCE, and vinyl chloride in the affected media indicates that biological or chemical degradation processes are occurring due to the subsurface environment or the original PCE product containing chemical impurities. PCE and its degradation compounds share similar environmental fate and transport characteristics and are present in the same media. Therefore, PCE will be the focus of the discussion of contaminant fate and transport.

The RI conducted by SES and historical investigations conducted by others at the Site have demonstrated the following:

- The highest concentration of PCE was detected at a concentration of 96 mg/kg in soil and is present approximately 8 feet bgs beneath the eastern portion of Cherry Street Southeast (Figure 6). Concentrations of PCE in soil are present at approximately 5 to 8 feet bgs along the western portion of the North Alley near the northwest corner of the Former Olympia Dry Cleaners Property. In addition, moderately high concentrations of PCE in soil are also present in the eastern portion of the North Alley at depths of approximately 1 to 5 feet bgs.
- The lateral extent of soil with concentrations of PCE that exceed the MTCA Method A cleanup level covers an area of approximately 1,575 square feet (Figure 12). The vertical thickness of soil with concentrations of PCE in this area ranges from approximately 0 to 10 feet bgs. Based on the lateral extent of soil with concentrations of PCE depicted on Figure 12 and the average thickness ranges of PCE concentration in soil shown on Figures 8 and 9, the estimated total volume of soil with concentrations of PCE that exceed the MTCA Method A cleanup level is 266 bank cubic yards (Table 10). Additionally, based on the total

soil volume percentage ranges and total mass of soil with concentrations of PCE above the MTCA Method A cleanup level presented in Table 10, the estimated mass of PCE in soil at the Site is approximately 2,062 pounds.

- The highest concentrations of PCE in groundwater are present near the northwest corner of the Former Olympia Dry Cleaners Property and rapidly attenuate laterally and vertically away from the northwest corner of the Former Olympia Dry Cleaners Property (Figures 8, 9, and 14).
- The lateral extent of groundwater with concentrations of PCE that exceed the MTCA Method A cleanup level covers an area of approximately 3,100 square feet (dissolved-phase PCE plume) (Figure 14). The vertical thickness of the dissolved-phase PCE plume ranges from approximately 0 to 20 feet (Figures 8 and 9). The estimated total volume of groundwater with concentrations of PCE that exceed the MTCA Method A cleanup level is 11,918 cubic feet, based on an assumed porosity of 35 percent, the lateral extent of dissolved-phase PCE plume shown on Figure 14, and the average thickness ranges of PCE concentration in groundwater depicted on Figures 8 and 9 and listed in Table 10. In addition, the estimated mass of PCE in groundwater at the Site is approximately 0.45 pounds, based on the total groundwater volume percentage ranges and total mass of groundwater with concentrations of PCE above the MTCA Method A cleanup level presented in Table 10.

A discussion of the specific fate and transport mechanisms that have resulted in the distribution of PCE in the subsurface follows.

5.3.1 Transport Mechanisms Affecting Distribution of PCE in the Subsurface

The lateral distribution of PCE concentrations in soil is likely a result of transport via direct contact from historical surface releases of PCE and transport over time via movement of dissolved-phase PCE in groundwater and sorptive capacity of the soil matrix.

Dissolved-phase PCE in groundwater will migrate with the horizontal and vertical groundwater gradients. The lateral groundwater flow direction is to the north and west (Figures 10 and 11). Concentrations of PCE in groundwater are typically highest in the source areas and decrease along the groundwater flow path due to dilution with unaffected groundwater and sorption onto soil particles. The vertical hydraulic gradient at the Site is upward due to the artesian conditions. The upward vertical hydraulic gradient will significantly reduce the vertical migration of dissolved concentrations of PCE in groundwater with depth.

The transport of vapor-phase PCE in the subsurface is a result of volatilization of PCE released in confirmed and suspected source areas to the subsurface and dispersion through the unsaturated subsurface via natural mechanisms, such as barometric fluctuations.

5.3.2 Environmental Fate of PCE in the Subsurface

Once PCE enters the subsurface, chemical attenuation processes, such as hydrolysis, direct mineralization, and reductive dehalogenation, may affect the PCE in soil and groundwater, resulting in a natural reduction or breakdown of the PCE into non-toxic components, such as chloride and carbon dioxide. Biological attenuation processes, such

as reductive dechlorination and cometabolic degradation, also may affect the reduction of PCE in soil and groundwater under conducive subsurface conditions. If biodegradation of PCE is occurring, the first line of evidence is the presence of degradation compounds that include TCE, cis-1,2-DCE, and vinyl chloride. The soil and groundwater analytical data for the Site indicate the presence of TCE, cis-1,2-DCE, and vinyl chloride, suggesting that biological and/or other chemical attenuation processes are occurring at the Site. The vinyl chloride groundwater plume depicted on Figure 15 indicates that the source of PCE is degrading and the subsurface conditions are naturally reductive.

PCE is a volatile organic compound and will volatilize into a gaseous state when released to an unsaturated subsurface environment (vadose zone). In areas of the Site where the ground surface does not have an impermeable cover, some PCE in its vapor phase will escape to the atmosphere. Once in the atmosphere, the PCE will rapidly disperse and break down via photodegradation.

5.4 PRELIMINARY EXPOSURE ASSESSMENT

The two types of potential receptors at risk from exposure associated with the presence of PCE and its degradation compounds at the Site are human health risk and terrestrial ecological risk. The Site qualifies for a TEE exclusion in accordance with WAC 173-340-7491 (Appendix D). Therefore, mitigating the potential human health risk associated with exposure to PCE and its degradation compounds in the affected media at the Site will be the primary objective of any cleanup action implemented.

This section presents the evaluation and conclusions pertaining to the exposure pathways and routes, and potential receptors at the Site. An illustration of the preliminary exposure conceptual model including contaminant sources, release mechanisms and exposed media, exposure routes, and associated potential receptors is presented on Figure 17. The objective of this section is to identify potential exposure scenarios that will assist in the evaluation of potential feasible cleanup alternatives that are protective of human health.

5.4.1 Soil – Direct Contact Pathway

Direct contact of soil with concentrations of PCE and its degradation compounds above the applicable MTCA cleanup levels is limited to potential human receptors via dermal contact or ingestion. The standard point of compliance for the direct contact pathway for soil is 15 feet bgs for human receptors (e.g., construction worker), which represents a reasonable depth that could be accessed during normal Site redevelopment activities (WAC 173-340-740[6][d]).

Concentrations of PCE and its degradation compounds are present in shallow soil within 15 feet of the ground surface and located in the northwest corner of the Former Olympia Dry Cleaners Property and the North Alley. These areas are not paved. Temporary fencing has been placed around the northwest corner of the Former Olympia Dry Cleaners Property and on the western side of the North Alley to restrict access to these areas. Other portions of the Site where shallow soil is known to have detectable concentrations of PCE and its degradation compounds above the applicable MTCA cleanup levels are covered by Cherry Street Southeast and existing structures. The unpaved areas with concentrations of PCE in soil will require additional controls to mitigate this potential exposure pathway, such as permanent fencing or capping. In addition, future cleanup action or redevelopment in these

areas of the Site could represent an exposure risk to a potential human receptor. A work plan would be developed to govern the handling of soil and/or groundwater during future subsurface activities when working in areas with concentrations of PCE in soil and groundwater at the Site. Although the exposure risk of direct contact of soil has been minimized by access limitations via paved surfaces and/or temporary fencing, the direct contact pathway for soil is complete for construction workers until a cleanup action is implemented and/or institutional or engineering control measures are in place.

5.4.2 Vapor Pathway

The presence of PCE and its degradation compounds in shallow soil and/or groundwater has the potential to result in exposure via inhalation from vaporization to indoor and outdoor air. PCE contamination in soil and/or groundwater located within uncovered portions of the Site (e.g., North Alley, Seep) are unlikely to result in an exposure risk due to the vapors being dispersed, diluted, and/or degraded (via photodegradation) once in the atmosphere. The exposure risk posed by the vapor pathway in these areas of the Site is minimal, as is the probability that outdoor air concentrations of PCE and its degradation compounds would exceed applicable cleanup levels.

Portions of the Site where PCE contamination is located beneath buildings present the potential for vapor accumulation inside the buildings. Concentrations of PCE have been detected in indoor air samples collected from the Cherry Street Q-Tip Trust Building. The exposure risk posed by vapor pathway beneath buildings at the Site will be addressed in the selected cleanup action following the results of the FS, including establishing cleanup standards and/or installing engineering controls. The vapor pathway is considered complete for construction and office workers until a cleanup action is implemented and/or institutional or engineering control measures are in place.

5.4.3 Soil to Groundwater Pathway

Analytical results of groundwater samples collected at the Site indicate that contamination of groundwater via soil leaching appears to be complete. This pathway results in a source of contamination and associated potential exposure routes including surface water and drinking water through the groundwater media to potential receptors.

5.4.4 Groundwater to Surface Water Pathway

Analytical results of groundwater samples collected at the Site indicate the lateral and vertical extent of the dissolved-phase PCE plume is limited in area and thickness (Figures 8, 9, and 14). The nearest surface water body to the Site is Capitol Lake, which is located approximately 2,400 feet to the west (Figure 1). Regional groundwater reportedly flows toward Budd Inlet, which is located approximately 3,000 feet to the north of the Site (PGG 2007). The groundwater to surface water pathway is considered incomplete for these surface water bodies, based on the dissolved-phase PCE plume does not migrate to these surface water bodies.

Vertical leakage of groundwater through the backfill material in the soil excavation area and underlying Qgof geologic unit at the Site is due to the artesian conditions observed throughout the regional area. This vertical leakage formed the Seep and associated surface water located within the soil excavation area, approximately 13 feet west of the southwest

corner of the Cherry Street Q-Tip Trust Building. Analytical results of surface water samples collected at the Seep indicate that contamination of surface water via vertical groundwater migration appears to be complete. The groundwater to surface water pathway in the vicinity of the Seep resulted in a source of contamination.

SES constructed a Seep Collection and Treatment System in February 2007 and modified the treatment system in December 2008. The purpose of the treatment system is to prevent the migration of surface water from the Seep to the eastern curb located along Cherry Street Southeast, and treat surface water with concentrations of PCE and its degradation compounds. The continuous operation of the treatment system prevents the migration of surface water from the Seep area. The treated surface water is discharged to the sanitary sewer in accordance with the LOTT discharge permit and is considered an incomplete pathway for surface water from the pretreatment activities. In addition, temporary fencing is placed around the Seep and associated surface water to prevent direct exposure until a cleanup action is completed at the Site to address the potential for direct contact exposure. Although the exposure risk of direct contact of surface water from the Seep has been minimized by operation of the treatment system and access limitations via temporary fencing, the groundwater to surface water pathway is complete for construction workers until a cleanup action is implemented and/or institutional or engineering control measures are in place.

5.4.5 Groundwater to Drinking Water Pathway

The potential exposure pathways for groundwater consist of direct exposure via dermal contact, ingestion and/or inhalation of groundwater with concentrations of PCE and its degradation compounds. The shallow groundwater-bearing zone at the Site is located within the Qgof geologic unit, which is characterized as an aquitard (PGG 2007). Therefore, the shallow groundwater-bearing zone is not used as a drinking water source and does not represent a potable water resource as defined in WAC 173-340-720(2)(b)(i). The groundwater to drinking water pathway for the shallow groundwater-bearing zone is considered incomplete due to the shallow groundwater-bearing zone does not represent a potable water resource.

The Qgos geologic unit underlying the Qgof geologic unit may qualify as a future potential source of potable water. The analytical results from groundwater samples collected from monitoring well MW12 and the Artesian Supply Well screened in the Qgos geologic unit indicate groundwater quality has not been affected by the historical releases of PCE to the subsurface at the Site (Table 5). The Artesian Supply Well is not currently used as a potable water source at the Site. Although, the Artesian Supply Well may present a potential risk for future exposure if used as a potable water source prior to completion of the cleanup action at the Site. Future cleanup action or redevelopment involving excavation in areas of groundwater with concentrations of PCE could represent an exposure risk. Therefore, the groundwater to drinking water pathway for the deeper groundwater-bearing zone is considered complete for construction and office workers, as well as residents.

5.5 SUMMARY OF CONCEPTUAL SITE MODEL

Data compiled during the RI, including the geology encountered, the potentiometric surface of shallow groundwater, and laboratory analytical data, are provided on cross sections of the Site to illustrate the Conceptual Site Model (Figures 8 and 9). In addition, exposure pathways for potential

receptors are depicted on Figure 17. The soil profile observed in borings advanced by SES consisted of silt with clay, sandy silt, silty fine-grained sand, and fill material overlying the native deposits. Fill material observed at the Site consisted of gravelly silt with clay to well-graded silty sand with gravel. The fill material was observed from approximately 0 to 4 feet bgs with the exception of the soil excavation area where backfill material was placed to a depth of approximately 9 feet bgs. The soil profile observed in the native deposits from approximately 4 up to 15 feet bgs is consistent with the characteristics of the Qgof geologic unit, which is comprised of fine-grained soil, including silt and clay and fine-grained sand. The soil profile observed in native deposits below 12 to 15 feet bgs to a maximum depth explored of 51.5 feet bgs consisted of silty sand and sandy silt. These soil types have characteristics of both the Qgof and Qgos geologic units. The Qgos geologic unit consists predominately of fine- to medium-grained sand with interbedded silt (PGG 2007). Soils below approximately 12 to 15 feet bgs transition from the Qgof geologic unit to the Qgos geologic unit, based on the artesian conditions observed in existing monitoring wells at the Site.

The shallow groundwater-bearing zone was observed in the native soils from approximately 0 to 15 feet bgs within the Qgof geologic unit. The Qgof geologic unit is considered an aquitard. The shallow groundwater-bearing zone is underlain by a semi-confined to confined groundwater-bearing zone known as the Qgos geologic unit. The potentiometric surface contours for the shallow groundwater-bearing zone are shown on Figures 10 and 11. The potentiometric surface contours indicate a groundwater flow direction to the north and west with an average lateral hydraulic gradient of 0.05 feet per foot. The potentiometric surface measured in monitoring well MW12 installed in the Qgos geologic unit exhibits artesian conditions and is approximately 6 feet above the potentiometric surface measured in monitoring well MW10, which is installed in the Qgof geologic unit. The potentiometric surface levels between monitoring wells MW10 and MW12 indicate an upward vertical hydraulic gradient of 0.17 feet per foot.

Concentrations of ORPH that exceeded the MTCA Method A cleanup level were detected in one soil sample collected at 1 foot bgs from boring Borehole A located in the North Alley (Table 2). Figure 16 depicts the lateral extent of ORPH in soil above the MTCA Method A cleanup level of 2,000 mg/kg. The remaining 26 soil samples collected from 16 borings located throughout the Site indicate that concentrations of DRPH, ORPH, and GRPH were below the PQLs (Table 2). Concentrations of ORPH that exceeded the MTCA Method A cleanup level were detected in three reconnaissance groundwater samples collected from borings Borehole B, BH-3, and BH-6. The remaining 10 reconnaissance groundwater samples collected from 15 borings located throughout the Site indicate that concentrations of DRPH, ORPH, and GRPH were below the PQLs with the exception of the boring S-2(4/9/01) which had detectable concentrations of GRPH. Boring S-2(4/9/01) was located within the limits of the 2006 soil excavation area. A concentration of ORPH of 19,000 micrograms per liter was detected in reconnaissance surface water sample S-10. Reconnaissance surface water sample S-10 is located in very close proximity to boring Borehole B, which also had detectable concentrations of ORPH (Figure 2). The analytical results from soil, groundwater, and surface water samples indicate a release of ORPH has occurred to the surface and shallow subsurface within a limited area near the northeast corner of the Former Olympia Dry Cleaners Building and North Alley.

The soil analytical data collected from the RI and previous investigations and interim remedial actions demonstrate the concentrations of PCE in soil dramatically decrease with distance away from the confirmed and suspected source areas (Figures 4 and 12). Concentrations of PCE exceeding the MTCA Method A cleanup level, ranging from 0.062 to 96 mg/kg, were detected in

soil samples collected from depths ranging from 0.75 to 8 feet bgs (Figures 4, 6, 8, and 9). In addition, concentrations of PCE in soil attenuate to less than the PQLs at depths greater than 10 feet bgs (Table 1).

The groundwater analytical data collected from reconnaissance borings and monitoring wells indicate concentrations of PCE and its degradation compounds significantly decrease both laterally and vertically with distance from the confirmed and suspected source areas (Figures 5, 8, 9, and 13). The presence of PCE degradation compounds in groundwater indicates that biological and/or chemical attenuation processes are occurring at the Site (Tables 3 and 5). Additionally, the vertical migration of PCE from the source areas appears to be restricted by the upward vertical hydraulic gradient caused by artesian conditions at the Site.

Vertical leakage of groundwater through the backfill material in the soil excavation area and underlying Qgof geologic unit at the Site is due to the artesian conditions observed throughout the regional area. This vertical leakage formed the Seep and associated surface water located within the 2006 soil excavation area, approximately 13 feet west of the southwest corner of the Cherry Street Q-Tip Trust Building (Figure 2). Concentrations of PCE and its degradation compounds were detected in surface water samples collected from the Seep. The concentrations of PCE and its degradation compounds are similar to concentrations detected in monitoring well MW10 indicating that residual PCE contamination located in the main source area is the source of elevated concentrations of PCE in the Seep. SES constructed a Seep Collection and Treatment System in February 2007 and modified the treatment system in December 2008 to collect and treat the surface water from the Seep. The continuous operation of the treatment system prevents the migration of surface water from the Seep area. In addition, temporary fencing is placed around the Seep and associated surface water to prevent direct contact until a cleanup action is completed at the Site.

Indoor air has been retained as a medium of potential concern based on the concentrations of PCE in soil located beneath the southern portion of the Cherry Street Q-Tip Trust Building. Previous air monitoring performed by others resulted in detectable concentrations of PCE, TCE, and cis-1,2-DCE in the indoor air samples collected in the Cherry Street Q-Tip Trust Building. The cleanup of the affected soil and groundwater is expected to result in the elimination of indoor air as a future medium of concern.

The RI addressed data gaps, identified the source areas and affected media, and sufficiently defined the nature and extent of PCE and ORPH contamination in soil, groundwater, surface water, and/or air to define the Conceptual Site Model. In addition, the Conceptual Site Model supports the evaluation of potential feasible remedial technologies as part of the subsequent FS that will identify appropriate cleanup actions for the maximum extent of contaminated media originating from the Former Olympia Dry Cleaners Property. The target media for the cleanup action will be soil, soil vapor, surface water (Seep), and groundwater because these affected media represent the highest probable exposure risk to human health and the environment based on the preliminary exposure assessment presented in this RI report (Figure 17).

6.0 PLANNED WORK

The information collected during the RI is sufficient to provide a refined Conceptual Site Model and meets the specific MTCA requirements in WAC 173-340-350 for an RI. Based on the refined Conceptual Site Model, an FS will be conducted for the Site to develop and evaluate feasible

cleanup alternatives in accordance with WAC 173-340-360 through 173-340-390. The FS will include performing a groundwater and surface water monitoring event to collect additional groundwater and surface water data to confirm the current groundwater and surface water quality conditions. Pursuant to the terms and conditions of Agreed Order Number DE00TCPHQ-1408 dated February 28, 2001, the scope and schedule of the planned FS for the Site will be coordinated with Ecology, and the results of future work will be provided to Ecology in subsequent deliverables.

7.0 REFERENCES

CONREX, Inc. (CONREX). 1995. *Phase II Environmental Site Assessment for the site located at: Olympia Dry Cleaners, 606 E. Union Ave., Olympia, Washington*. June 13.

Farallon Consulting, LLC (Farallon). 2007. *Indoor Air Sampling Results, 1000 Cherry Street Southeast, Olympia, Washington.* March 16.

Freeze, Allan and John A. Cherry (Freeze and Cherry). 1979. *Groundwater*. Prentice-Hall, Inc., Englewood, Cliffs, NJ.

KTA Associates, Inc. (KTA). 2006. Letter Regarding *Submittal of Interim Action Waste Profile, Former Olympia Dry Cleaners, 606 East Union Avenue, Olympia, Washington*. From Ken Taylor, KTA Associates, to Robert Warren and Steve Teel, Washington State Department of Ecology Toxics Cleanup Program. May 18.

Pacific Groundwater Group (PGG). 2007. Letter Regarding *Deep Aquifer Hydrogeology, Cascade Pole Site, Olympia, Washington*. From Stephen Swope, PGG, to Don Bache, Port of Olympia. October 11.

Sound Environmental Strategies Corporation (SES). 2007a. Letter Report Regarding *Interim Action Report, Former Olympia Dry Cleaners, 606 East Union Avenue, Olympia, Washington*. From SES to Steve Teel, Washington State Department of Ecology, Toxics Cleanup Program. January 26.

_____. 2007b. Letter Regarding *Summary of Seep Collection System, Former Olympia Dry Cleaners, 606 East Union Avenue, Olympia, Washington*, Agreed Order #DEOOTCPHQ-1408. From SES to Steve Teel, Washington State Department of Ecology, Toxics Cleanup Program. August 10.

_____. 2008a. Telephone Conversation Regarding *Washington State Department of Ecology Comment Letter* dated April 4, 2008 (Draft Remedial Investigation Work Plan), between David Buser and Steve Teel, Washington State Department of Ecology. April 9.

_____. 2008b. *Work Plan Remedial Investigation, Former Olympia Dry Cleaners, 606 East Union Avenue, Olympia, Washington*. April 15.

_____. 2008c. Telephone Conversation Regarding Proposed Reconnaissance Boring and Well Locations, between Tim Brown, SES, and Steve Teel, Washington State Department of Ecology. August 4.

_____. 2008d. Email Correspondence Regarding Former Olympia Dry Cleaners - Proposed Reconnaissance Boring and Well Locations. From Tim Brown, SES, to Steve Teel, Washington State Department of Ecology. October 29.

_____. 2008e. In-Person Conversation Regarding Sanitary Sewer Location, between David Buser, SES, and Eric Christensen, City of Olympia Public Works Department. November 3.

_____. 2008f. Telephone Conversation Regarding Reconnaissance Sampling and Well Installations to Complete the Remedial Investigation, between by Steve Teel, Washington State Department of Ecology, to Tim Brown, SES. November 6.

_____. 2008g. Email Correspondence Regarding *Olympia Dry Cleaners - Recommended System Modifications*. From Tim Brown, SES, to Steve Teel, Washington State Department of Ecology. December 15.

_____. 2009. Letter Regarding *Schedule for Submittal of the Draft Remedial Investigation Report, Former Olympia Dry Cleaners, 606 East Union Avenue, Olympia, WA. Agreed Order #DE00TCPHQ-1408*. From Steve Teel, Washington State Department of Ecology, to Tim Brown, SES. January 7.

Stemen Environmental, Inc. (Stemen). 2005. *Draft Remedial Investigations and Associated Interim Remedial/Corrective Actions Report, Former Olympia Dry Cleaners, 606 East Union Avenue, Olympia, Washington*. January 10.

Thurston County Assessor. 2009. Assessor Records for Parcel Numbers 78204000300, 78204000700, 78204000800, 78204000100, 78203900500, 78205600400, 78205500100, 78205500200, 78203700400, and 78203900400. Reviewed online at <http://www.co.thurston.wa.us/assessor/process-Aplus.html>. January 30.

United States Department of Health and Human Services. 2007. *Health Consultation, Evaluation of Follow-Up Indoor Air Sampling Results, (January–March 2007) at the Washington Traffic Safety Commission Offices, TMC CLEANERS (a/k/a Howard's Cleaners And Olympia Cleaners), Olympia, Thurston County, Washington, EPA Facility 10: WAH000017277.* August 31.

Washington State Department of Ecology (Ecology). 2005. Letter Regarding *Draft Remedial Investigation and Associated Interim Remedial/Corrective Actions Report, Former Olympia Dry Cleaners, 606 East Union Avenue, Olympia, Washington, Agreed Order #DE00TCPHQ-1408*. From Robert Warren, Toxics Cleanup Program Unit Manager, to Steven C. Marshall. July 28.

_____. 2006. Letter Regarding *Disposal of Soils Contaminated with F002-Listed Dangerous Waste Constituents*. From K Seiler, Section Supervisor, Hazardous Waste and Toxics Reduction Program, to Steven C. Marshall. June 27.

_____. 2008a. Telephone Conversation Regarding Artesian Supply Well Construction Investigation Between David Buser, SES, and Steve Teel, Ecology. April 9.

_____. 2008b. Email Correspondence, Reply to *Email Regarding Olympia Dry Cleaners*. From Steve Teel to David Buser, Project Manager, SES. April 21.

_____. 2008c. Email Correspondence Regarding *Meeting Summary for Former Olympia Dry Cleaner*. From Steve Teel to Tim Brown, Senior Hydrogeologist, SES. August 4.

_____. 2008d. Email Correspondence, Reply to *Email Regarding Olympia Dry Cleaners - Recommended System Modifications*. From Steve Teel to Tim Brown, Senior Hydrogeologist, SES. October 27.

_____. 2009. Letter Regarding *Schedule for Submittal of the Draft Remedial Investigation Report, Former Olympia Dry Cleaners, 606 East Union Avenue, Olympia, WA. Agreed Order #DE00TCPHQ-1408*. From Steve Teel, Ecology, to Tim Brown, SES. January 7.

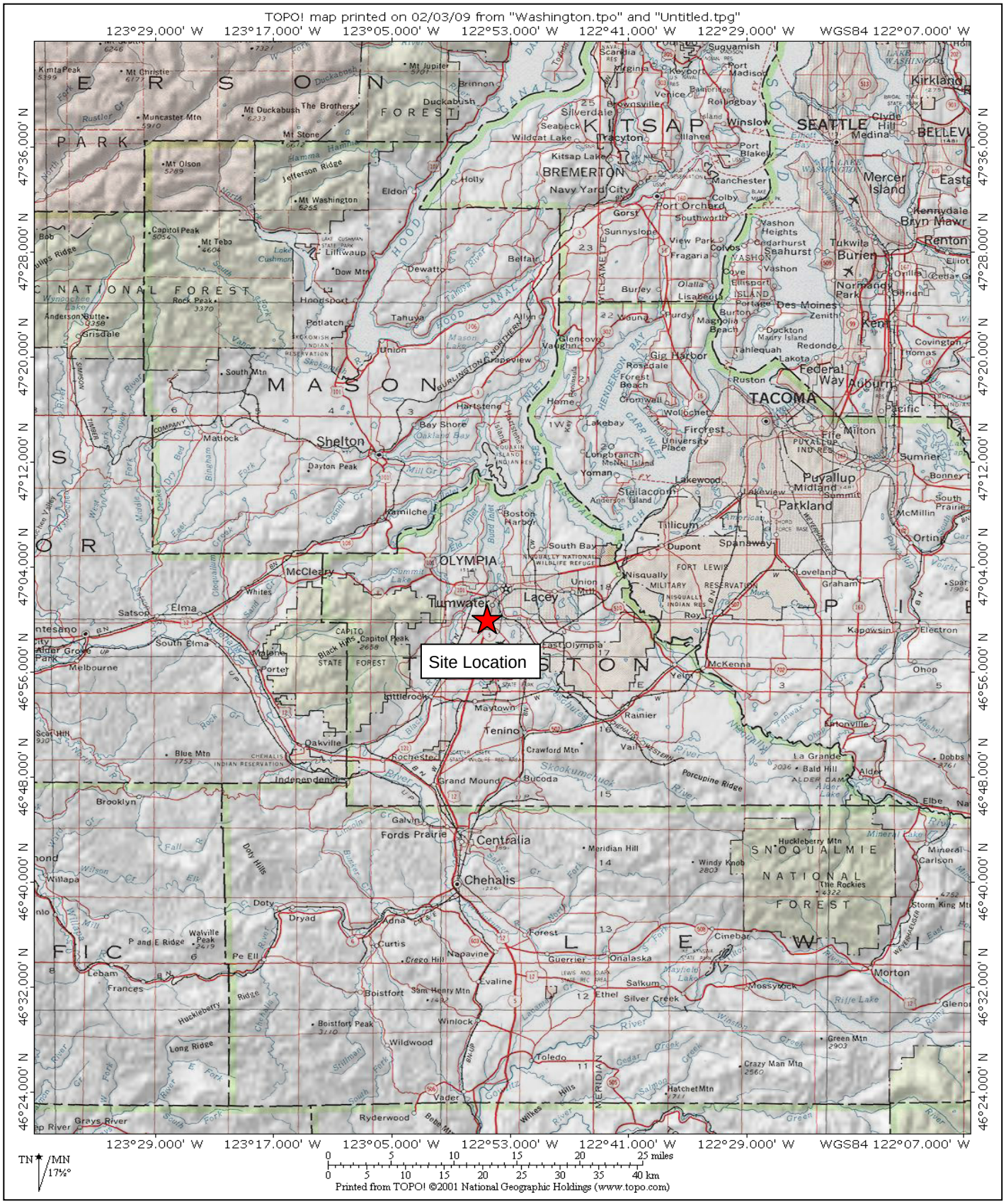
Washington State Department of Natural Resources (WSDNR). 2003. *Geologic Map of the Lacey 7.5-minute Quadrangle, Thurston County, Washington.*

8.0 LIMITATIONS

The services described in this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, expressed or implied, is made. These services were performed consistent with our agreement with our client. This report is solely for the use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

Opinions and recommendations contained in this report apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this report.

FIGURES



Draft – Issued for Ecology Review

SOUND ENVIRONMENTAL STRATEGIES	N	Date: February 3, 2009 Drawn By: NAC Chk By DMB/TSB SES Project No.: 0566-001 File ID: 0566-001_Fig1	Former Olympia Dry Cleaners 606 Union Avenue Southeast Olympia, Washington	**FIGURE 1** Site Location Map

01/19/2009

LEGEND

- MW-04 — MONITORING WELL LOCATION (STEMEN, 2001-2002 & SES 2008)
- MW-02 — FORMER MONITORING WELL LOCATION (ABANDONED SEPTEMBER 2006)
- B-08 — SOIL BORING LOCATION (SES, 2008)
- BH-6 — SOIL BORING LOCATION (CONREX, 1995)
- S-12 — BORING (STEMEN, 2001-2002)
- DW-3 — SURFACE SAMPLE LOCATION (STEMEN, 2002)
- SEEP LOCATION
- CATCH BASIN
- APPROXIMATE LATERAL EXTENT OF INTERIM REMEDIAL ACTION EXCAVATION (SEPTEMBER 2006)
- PROPERTY BOUNDARY
- GAS — UNDERGROUND NATURAL GAS LINE
- W — UNDERGROUND WATER LINE
- SW — UNDERGROUND STORMWATER LINE
- SS — UNDERGROUND SANITARY SEWER LINE
- E — UNDERGROUND ELECTRIC LINE
- T — OVERHEAD TELEPHONE LINE
- OE — OVERHEAD ELECTRIC LINE
- SHRUBS/TREES

N

DW-1
DW-2
DW-3
MW-06
MW-04
S-4
MW-07
S-9
ASPHALT
GRASS
CATCH BASIN
ASPHALT
SIDEWALK
UNION AVENUE SOUTHEAST
BH-4
BH-3
MW-08/B-13
BH-2
S-8
S-10
BH-1
SS-1
BH-5
BOREHOLE B
BOREHOLE A
HB-2
FORMER ROOF DRAIN PIPE
BOILER ROOM
B-01
DRY CLEANER MACHINE
FORMER OLYMPIA DRY CLEANERS BUILDING
ROOF LINE
S-14
B-02
S-15
MW-05
3" Ø STEEL DRAIN FILLED WITH CONCRETE
ARTESIAN SUPPLY WELL
B-03
MW-09/B-14
CHERRY STREET Q-TIP TRUST BUILDING
NORTH ALLEY
ABOVEGROUND STORAGE TANK
B-10
S-1 (12/7/02)
B-11
B-21
S-3 (4/3/01)
MW-10/B-15
MW-12/B-17
B-04
ASPHALT
B-12
ABOVEGROUND STORAGE TANK
S-2 (4/3/01)
MW-01
S-9 (4/3/01)
B-09
SIDEWALK/ENTRY
SIDEWALK/ENTRY RAMP
S-11
MW14/B-22
HB-1B
HB-1A
B-23
S-13 (12/7/02)
SIDEWALK
MW-11/B-16
SEEP
B-08
B-05
CHERRY SW
B-06
B-07
B-20
MANHOLE
B-19
B-18
MANHOLE
CHERRY STREET SOUTHEAST
DRIVEWAY
MANHOLE
MANHOLE
UTILITY POLE
STORM DRAIN
SIDEWALK
MW13/B-21
S-1 (7/18/01)
S-2 (7/18/01)
ASPHALT
S-3 (7/18/01)
520 SOUTHEAST UNION AVENUE (RAAD PROPERTY)

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SOUND ENVIRONMENTAL STRATEGIES
SOUNDENVIRONMENTAL.COM

DATE: 01/27/2009
DRAWN BY: NAC
CHECKED BY: TSB
CAD FILE: 0566-001_2009_SFD

PROJECT NAME: FORMER OLYMPIA DRY CLEANERS
SES PROJECT NUMBER: 0566-001-03
STREET ADDRESS: 606 UNION AVE SOUTH EAST
CITY, STATE: OLYMPIA, WASHINGTON

REGION:

0 10 20 40 80
APPROXIMATE SCALE IN FEET

FIGURE 2
SITE FEATURES MAP

P:\0566 Former Olympia Dry Cleaners\Technical\CAD\Revised 2009_R\0566-001_2009_SFD_DFER.dwg

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10/7/2009

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RAILROAD SPURS

PARCEL: 78203700400
NO ADDRESS
(ABANDONED RAILROAD
RIGHT OF WAY)

PARCEL: 78204000300
624 UNION AVENUE SOUTHEAST

PARCEL: 78204000700

PARCEL: 78204000100
1000 CHERRY STREET SOUTHEAST
(CHERRY STREET Q-TIP
TRUST PROPERTY)

PARCEL: 78204000800
606 UNION AVENUE SOUTHEAST
(FORMER OLYMPIA DRY CLEANERS PROPERTY)

UNION AVENUE SOUTHEAST

PARCEL: 78205500200
NO ADDRESS

PARCEL: 78205500100
NO ADDRESS

11TH AVENUE SOUTH EAST

N

CHERRY STREET SOUTHEAST

PARCEL: 78203900400
400 10TH AVENUE SOUTHEAST

10TH AVENUE SOUTHEAST

PARCEL: 78203900500
520 SOUTHEAST UNION AVENUE
(RAAD PROPERTY)

PARCEL: 78205600400
521 UNION AVENUE SOUTHEAST

LEGEND

LOT LINES

PROPERTY BOUNDARY

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SOUND ENVIRONMENTAL STRATEGIES
SOUNDENVIRONMENTAL.COM

DATE: 09/07/2009
DRAWN BY: NAC
CHECKED BY: TSB
CAD FILE: 0566-001_2009_VIC3

PROJECT NAME: FORMER OLYMPIA DRY CLEANERS
SES PROJECT NUMBER: 0566-001-03
STREET ADDRESS: 606 UNION AVENUE SOUTH EAST
CITY: OLYMPIA, WASHINGTON

REGION:

0 25 50 100
APPROXIMATE SCALE IN FEET

FIGURE 3
FORMER OLYMPIA DRY CLEANERS
AND SURROUNDING PROPERTIES

SOUNDENVIRONMENTAL.COM

01/19/2009

LEGEND

- MW-04 — MONITORING WELL LOCATION (STEMEN, 2001-2002 & SES 2008)
- MW-02 — FORMER MONITORING WELL LOCATION (ABANDONED SEPTEMBER 2006)
- B-08 — SOIL BORING LOCATION (SES, 2008)
- BH-6 — SOIL BORING LOCATION (CONREX, 1995)
- S-12 — BORING (STEMEN, 2001-2002)
- SEEP LOCATION
- CATCH BASIN
- APPROXIMATE LATERAL EXTENT OF INTERIM REMEDIAL ACTION EXCAVATION (SEPTEMBER 2006)
- PROPERTY BOUNDARY
- 6.0 — INDICATES CONCENTRATION EXCEEDING MTCA CLEANUP LEVEL FOR SOIL
- NR — NOT REPORTED

- GAS — UNDERGROUND NATURAL GAS LINE
- W — UNDERGROUND WATER LINE
- SW — UNDERGROUND STORMWATER LINE
- SS — UNDERGROUND SANITARY SEWER LINE
- E — UNDERGROUND ELECTRIC LINE
- T — OVERHEAD TELEPHONE LINE
- OE — OVERHEAD ELECTRIC LINE
- SHRUBS/TREES

PCE — TETRACHLOROETHENE
TCE — TRICHLOROETHENE
MTCA — MODEL TOXICS CONTROL ACT

Sample Location	Sampled By	Sample Date	Sample Depth (feet bgs)	PCE	TCE	cis-1,2-Dichloroethene	Vinyl Chloride
MTCA Cleanup Levels for Soil				0.05	0.03	800	0.0667

Z — Z

ASPHALT
GRASS
CATCH BASIN
SIDEWALK
UNION AVENUE SOUTHEAST
BOILER ROOM
FORMER ROOF DRAIN PIPE
FORMER OLYMPIA DRY CLEANERS BUILDING
DRY CLEANER MACHINE
CONCRETE PAD
WITH CONCRETE
ARTESIAN SUPPLY WELL
NORTH ALLEY
CHERRY STREET Q-TIP TRUST BUILDING
REFER TO FIGURE 6
SIDEWALK/ENTRY
SIDEWALK/ENTRY RAMP
SIDEWALK
SEEP
ASPHALT
CHERRY STREET SOUTHEAST
DRIVEWAY
ASPHALT
520 SOUTHEAST UNION AVENUE (RAAD PROPERTY)
MANHOLE
MANHOLE
UTILITY POLE
STORM DRAIN
MANHOLE

S-1 (12/7/02)
S-1 (4/9/01)
S-2 (12/7/02)
S-3 (4/9/01)
S-4
S-8
S-9
S-10
S-11
S-12
S-13
S-14
S-15
S-16
SS-1
MW-09B-14
MW-10/B-15
MW-12/B-17
MW11/B-16
MW13/B-21
MW14/B-22
HB-2
BOREHOLE A
B-01
B-02
B-03
B-04
B-05
B-06
B-07
B-08
B-09
B-10
B-11
B-12
B-18
B-19
B-20
BH-1
BH-2
BH-3
BH-4
BH-5

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SOUND ENVIRONMENTAL STRATEGIES
SOUNDENVIRONMENTAL.COM

DATE: 01/27/2009
DRAWN BY: NAC
CHECKED BY: TSB
CAD FILE: 0566-001_2009_SD

PROJECT NAME: FORMER OLYMPIA DRY CLEANERS
SES PROJECT NUMBER: 0566-001-03
STREET ADDRESS: 606 UNION AVE SOUTH EAST
CITY, STATE: OLYMPIA, WASHINGTON

REGION:

0 15 30 60
APPROXIMATE SCALE IN FEET

FIGURE 4
SOIL ANALYTICAL RESULTS FOR SELECTED HVOCS

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01/19/2009

LEGEND

- MW-04 — MONITORING WELL LOCATION (STEMEN, 2001-2002 & SES 2008)
- MW-02 — FORMER MONITORING WELL LOCATION (ABANDONED SEPTEMBER 2006)
- B-08 — SOIL BORING LOCATION (SES, 2008)
- BH-6 — SOIL BORING LOCATION (CONREX, 1995)
- S-12 — BORING (STEMEN, 2001-2002)
- SEEP LOCATION
- CATCH BASIN
- APPROXIMATE LATERAL EXTENT OF INTERIM REMEDIAL ACTION EXCAVATION (SEPTEMBER 2006)
- PROPERTY BOUNDARY
- 72 — INDICATES CONCENTRATION EXCEEDING MTCA CLEANUP LEVEL FOR GROUNDWATER
- NR — NOT REPORTED

- GAS — UNDERGROUND NATURAL GAS LINE
- W — UNDERGROUND WATER LINE
- SW — UNDERGROUND STORMWATER LINE
- SS — UNDERGROUND SANITARY SEWER LINE
- E — UNDERGROUND ELECTRIC LINE
- T — OVERHEAD TELEPHONE LINE
- OE — OVERHEAD ELECTRIC LINE
- SHRUBS/TREES

PCE TETRACHLOROETHENE
TCE TRICHLOROETHENE
MTCA MODEL TOXICS CONTROL ACT

Sample Location	Sampled By	Sample Date	Sample Depth (feet bgs)	PCE	TCE	cis-1,2-Dichloroethene	Vinyl Chloride
MTCA Cleanup Levels for Groundwater				5	5	80	<0.2

Z

MW-04
MW-07
S-9
GRASS
ASPHALT
CATCH BASIN
SIDEWALK
UNION AVENUE SOUTHEAST
BH-3
MW-08/B-13
BH-1
BH-5
BOILER ROOM
FORMER ROOF DRAIN PIPE
B-01
FORMER OLYMPIA DRY CLEANERS BUILDING
DRY CLEANER MACHINE
B-02
MW-03
B-03
3" Ø STEEL DRAIN FILLED WITH CONCRETE
ARTESIAN SUPPLY WELL
BOREHOLE A
MW-09/B-14
S-14
CONCRETE PAD
NORTH ALLEY
MW-06
CHERRY STREET Q-TIP TRUST BUILDING
B-10
MW-10/B-15
MW-12/B-17
ASPHALT
B-12
MW-01
B-09
B-08
SIDEWALK/ENTRY RAMP
SIDEWALK/ENTRY
S-11
MW14/
B-22
SIDEWALK
MW-11/B-16
SEEP
B-07
CHERRY STREET SOUTHEAST
B-20
MANHOLE
B-05
B-06
B-19
B-18
MANHOLE
MANHOLE
UTILITY POLE
STORM DRAIN
DRIVEWAY
MW13/B-21
SIDEWALK
ASPHALT
S-1 (7/18/01)
S-2 (7/18/01)
S-3 (7/18/01)
520 SOUTHEAST UNION AVENUE (RAAD PROPERTY)

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SOUND ENVIRONMENTAL STRATEGIES
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DATE: 01/27/2009
DRAWN BY: NAC
CHECKED BY: TSB
CAD FILE: 0566-001_2009_GD

PROJECT NAME: FORMER OLYMPIA DRY CLEANERS
SES PROJECT NUMBER: 0566-001-03
STREET ADDRESS: 606 UNION AVE SOUTH EAST
CITY, STATE: OLYMPIA, WASHINGTON

REGION:

0 15 30 60
APPROXIMATE SCALE IN FEET

FIGURE 5
GROUNDWATER ANALYTICAL RESULTS FOR SELECTED HVOCS

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LEGEND

- 06-C19@10FT — SOIL SAMPLE LOCATION
- ⊞ — STORM SEWER CATCH BASIN (REPLACED)
- AREA OF INTERIM REMEDIAL ACTION EXCAVATION
- (0.58) — REPORTED PCE CONCENTRATION EXCEEDS MTCA METHOD A CLEANUP LEVEL FOR SOIL
- (<0.02) — REPORTED PCE CONCENTRATION IS BELOW METHOD DETECTION LIMIT
- SD — STORM SEWER DRAIN
- W — WATER LINE

N

NORTH ALLEY

FORMER OLYMPIA
DRY CLEANERS BUILDING

CHERRY STREET
Q-TIP TRUST BUILDING

GAS

SD

06-C32@8FT (1.5)
06-C11@4FT (<0.02)
06-C12@8FT (0.20)
06-C31@4FT (6.7)
06-C35@8FT (0.84)
06-C34@4FT (0.06)
06-C36@8FT (17)
06-E07@8FT (19)
06-C02@5FT (0.72)
06-C01@8FT (0.33)
06-C04@4FT (0.11)
06-C03@8FT (0.19)
06-C09@10FT (<0.02)
06-E08@10FT (2.4)
06-C05@8FT (<0.02)
06-C07@4FT (<0.02)
06-C08@10FT (<0.02)
06-C27@10FT (<0.02)
BH-6
S-2 (4/9/01)
06-C17@4FT (<0.02)
06-C22@8FT (0.13)
06-C23@10FT (0.32)
06-C24@8FT (0.81)
06-C25@10FT (0.15)
06-C19@10FT (0.13)
06-C18@8FT (13)
06-C28@8FT (<0.02)
06-C29@4FT (<0.02)
06-C20@4FT (3.0)
06-C16@4FT (0.50)
06-C21@8FT (96)

ASPHALT

SIDEWALK

SIDEWALK

CHERRY STREET SOUTHEAST

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SOUND ENVIRONMENTAL STRATEGIES
SOUNDENVIRONMENTAL.COM

DATE: 01/16/07
DRAWN BY: BAD
CHECKED BY: TSB
CAD FILE: FIG 6 AREA OF EXC.

PROJECT NAME: FORMER OLYMPIA DRY CLEANERS
SES PROJECT NUMBER: 0556-001-01
STREET ADDRESS: 606 UNION AVE SOUTH EAST
CITY, STATE: OLYMPIA, WASHINGTON

REGION:

0 1 2 4 8
APPROXIMATE SCALE IN FEET

FIGURE 6
SOIL EXCAVATION AND SAMPLE LOCATIONS
INTERIM REMEDIAL ACTION
(SEPTEMBER 2006)

01/19/2009

LEGEND

- MW-04 — MONITORING WELL LOCATION (STEMEN, 2001-2002 & SES 2008)
- MW-02 — FORMER MONITORING WELL LOCATION (ABANDONED SEPTEMBER 2006)
- B-08 — SOIL BORING LOCATION (SES, 2008)
- BH-6 — SOIL BORING LOCATION (CONREX, 1995)
- S-12 — BORING (STEMEN, 2001-2002)
- SEEP LOCATION
- CATCH BASIN
- APPROXIMATE LATERAL EXTENT OF INTERIM REMEDIAL ACTION EXCAVATION (SEPTEMBER 2006)
- PROPERTY BOUNDARY
- GAS — UNDERGROUND NATURAL GAS LINE
- W — UNDERGROUND WATER LINE
- SW — UNDERGROUND STORMWATER LINE
- SS — UNDERGROUND SANITARY SEWER LINE
- E — UNDERGROUND ELECTRIC LINE
- T — OVERHEAD TELEPHONE LINE
- OE — OVERHEAD ELECTRIC LINE
- SHRUBS/TREES
- A — A' CROSS-SECTION LOCATION

N

MW-06

CHERRY STREET Q-TIP TRUST BUILDING

ASPHALT

MW-04

S-4

A'

MW-07

S-9

GRASS

CATCH BASIN

ASPHALT

SIDEWALK

UNION AVENUE SOUTHEAST

S-8

BH-4

BH-3

MW-08/B-13

BH-2

SS-1

BH-5

S-10

BH-1

BOREHOLE B

HB-2

BOREHOLE A

MW-09/B-14

FORMER ROOF DRAIN PIPE

BOILER ROOM

B-01

B'

FORMER OLYMPIA DRY CLEANERS BUILDING

DRY CLEANER MACHINE

S-14

B-02

S-15

MW-03

B-03

3" Ø STEEL DRAIN FILLED WITH CONCRETE

ARTESIAN SUPPLY WELL

ROOF LINE

CONCRETE PAD

NORTH ALLEY

B-10

S-1 (12/7/02)

B-11

S-2 (4/9/01)

MW-10/B-15

MW-12/B-17

B-04

ASPHALT

B-12

S-1 (4/9/01)

MW-01

B-09

SIDEWALK/ENTRY

SIDEWALK/ENTRY RAMP

S-11

MW14

B-22

HB-1B

HB-1A

S-2 (12/7/02)

S-3 (12/7/02)

SIDEWALK

MW-11/B-16

B

SEEP

SIDEWALK

B-05

B-08

B-06

B-07

B-20

MANHOLE

B-19

B-18

MANHOLE

MANHOLE

MANHOLE

UTILITY POLE

STORM DRAIN

CHERRY STREET SOUTHEAST

DRIVEWAY

MW13/B-21

A

SIDEWALK

ASPHALT

S-1 (7/18/01)

S-2 (7/18/01)

S-3 (7/18/01)

520 SOUTHEAST UNION AVENUE (RAAD PROPERTY)

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SOUND ENVIRONMENTAL STRATEGIES
SOUNDENVIRONMENTAL.COM

DATE: 01/27/2009
DRAWN BY: NAC
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CAD FILE: 0566-001_2009_XSLOC

PROJECT NAME: FORMER OLYMPIA DRY CLEANERS
SES PROJECT NUMBER: 0566-001-03
STREET ADDRESS: 606 UNION AVE SOUTH EAST
CITY, STATE: OLYMPIA, WASHINGTON

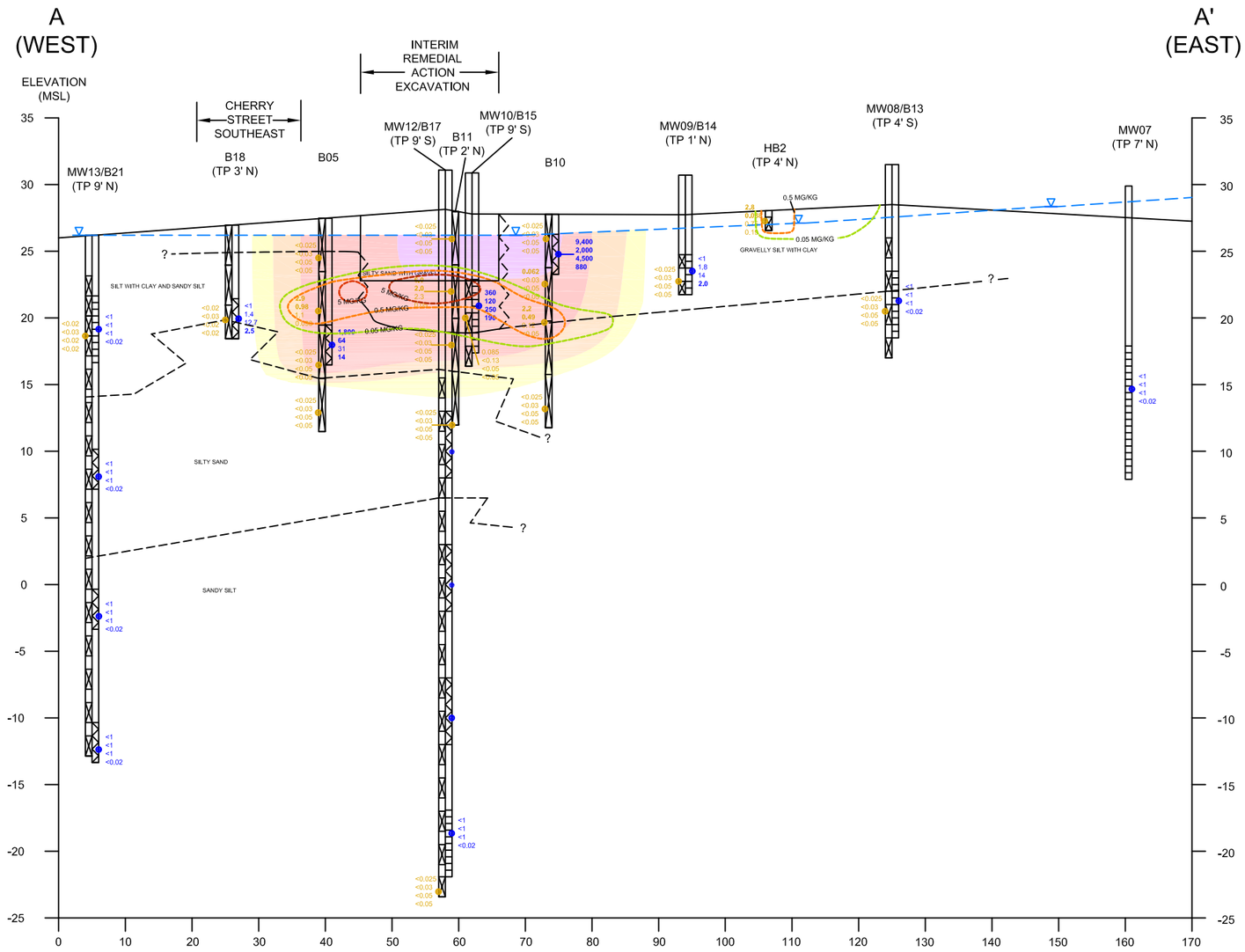
REGION:

0 15 30 60
APPROXIMATE SCALE IN FEET

FIGURE 7
CROSS SECTION TRANSECT LOCATIONS MAP

P:\0566 Former Olympia Dry Cleaners\Technical\CAD\Revised 2009_RI\0566-001_2009_XSLOC_DFER.dwg

SOUNDENVIRONMENTAL.COM



NOTE: RECONNAISSANCE GROUNDWATER SAMPLES COLLECTED FROM WELL/BORING MW12/B17 AT DEPTHS OF 18, 28, AND 38 FEET BGS ARE NOT INCLUDED IN THE PCE CONCENTRATION CONTOURS BECAUSE THE ANALYTICAL RESULTS ARE LIKELY BIASED HIGH AND NOT REPRESENTATIVE OF GROUNDWATER QUALITY DUE TO CARRY DOWN OR THE DOWNWARD MIGRATION OF GROUNDWATER OBSERVED NEAR THE SURFACE, WHICH WAS PRESENT WITHIN THE AUGER FLIGHTS.

LEGEND:

MW08/B13 (TP 4' S) — MONITORING WELL/BORING LOCATION TRANSPOSED (TP) IN FEET, NORTH (N), SOUTH (S), EAST (E), OR WEST (W), OF CROSS SECTION LINE

- BLANK CASING
- SOIL SAMPLE INTERVAL
- GROUNDWATER LEVEL (1/14/2009)
- TEMPORARY WELL SCREEN INTERVAL
- GROUNDWATER SAMPLE LOCATION
- SOIL SAMPLE LOCATION
- WELL SCREEN INTERVAL

BGS = BELOW GROUND SURFACE

PCE = TETRACHLOROETHENE

TCE = TRICHLOROETHENE

< = NON DETECT AT THE LABORATORY PRACTICAL QUANTITATION LIMIT

NA = EITHER NO GROUNDWATER ENCOUNTERED OR NO ANALYTICAL DATA AVAILABLE

MG/KG = MILLIGRAMS PER KILOGRAM

µg/L = MICROGRAMS PER LITER

MSL = FEET BELOW MEAN SEA-LEVEL

SOIL CONCENTRATION IN MILLIGRAMS PER KILOGRAM (MG/KG)

6.0	PCE
2.0	TCE
2.3	CIS - 1,2 - DICHLOROETHENE
<0.05	VINYL CHLORIDE

GROUNDWATER CONCENTRATION IN MICROGRAMS PER LITER (µg/L)

<1	PCE
1.8	TCE
14	CIS - 1,2 - DICHLOROETHENE
2.0	VINYL CHLORIDE

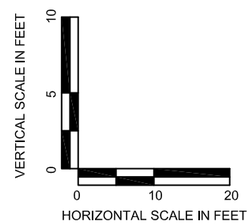
14 — BOLD INDICATES CONCENTRATION EXCEEDING MTCA CLEANUP LEVEL

PCE CONCENTRATION IN GROUNDWATER

- >5,000 µg/L
- 500-5,000 µg/L
- 50-500 µg/L
- 5-50 µg/L

PCE CONCENTRATION IN SOIL

- 5 MG/KG
- 0.5 MG/KG
- 0.05 MG/KG



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SOUND ENVIRONMENTAL STRATEGIES
SOUNDENVIRONMENTAL.COM

DATE: 04/02/2009
DRAWN BY: NAC
CHECKED BY: TSB
CAD FILE: 0566-001_2009_XAA

PROJECT NAME: FORMER OLYMPIA DRY CLEANERS
SES PROJECT NUMBER: 0566-001-03
STREET ADDRESS: 606 UNION AVENUE SOUTH EAST
CITY: OLYMPIA, WASHINGTON

REGION:

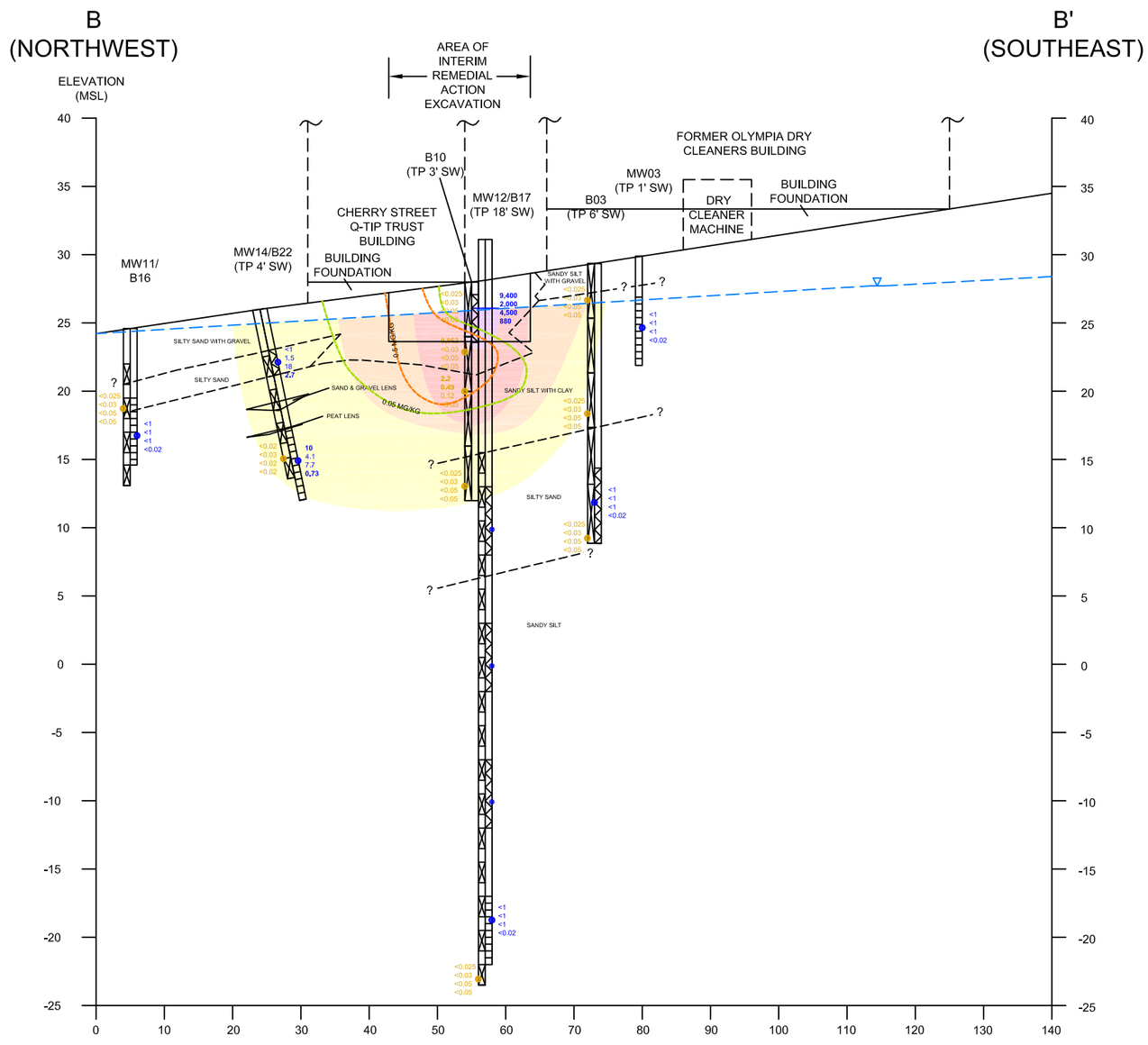
SCALE DEPICTED ABOVE

FIGURE 8
CROSS SECTION A-A'

10/9/2009

P:\0566 FORMER OLYMPIA DRY CLEANERS\TECHNICAL\CAD\REVISED 2009 RI\0566-001 2009 XAA DFER.DWG

SOUNDENVIRONMENTAL.COM



LEGEND:

MW08/B13 (TP 4' S) — MONITORING WELL/BORING LOCATION TRANSPOSED (TP) IN FEET, NORTH (N), SOUTH (S), EAST (E), OR WEST (W), OF CROSS SECTION LINE

- BLANK CASING
- SOIL SAMPLE INTERVAL
- GROUNDWATER LEVEL (1/14/2009)
- TEMPORARY WELL SCREEN INTERVAL
- GROUNDWATER SAMPLE LOCATION
- SOIL SAMPLE LOCATION
- WELL SCREEN INTERVAL

BGS = BELOW GROUND SURFACE

PCE = TETRACHLOROETHENE

TCE = TRICHLOROETHENE

< = NON DETECT AT THE LABORATORY PRACTICAL QUANTITATION LIMIT

NA = EITHER NO GROUNDWATER ENCOUNTERED OR NO ANALYTICAL DATA AVAILABLE

MG/KG = MILLIGRAMS PER KILOGRAM

µg/L = MICROGRAMS PER LITER

MSL = FEET BELOW MEAN SEA-LEVEL

SOIL CONCENTRATION IN MILLIGRAMS PER KILOGRAM (MG/KG)

6.0	PCE
2.0	TCE
2.3	CIS - 1,2 - DICHLOROETHENE
<0.05	VINYL CHLORIDE

GROUNDWATER CONCENTRATION IN MICROGRAMS PER LITER (µg/L)

<1	PCE
1.8	TCE
14	CIS - 1,2 - DICHLOROETHENE
2.0	VINYL CHLORIDE

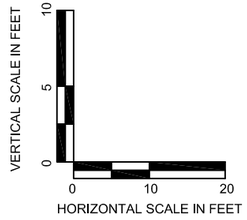
14 — BOLD INDICATES CONCENTRATION EXCEEDING MTCA CLEANUP LEVEL

PCE CONCENTRATION IN GROUNDWATER

- >5,000 µg/L
- 500-5,000 µg/L
- 50-500 µg/L
- 5-50 µg/L

PCE CONCENTRATION IN SOIL

- 5 MG/KG
- 0.5 MG/KG
- 0.05 MG/KG



NOTE: RECONNAISSANCE GROUNDWATER SAMPLES COLLECTED FROM WELL/BORING MW12/B17 AT DEPTHS OF 18, 28, AND 38 FEET BGS ARE NOT INCLUDED IN THE PCE CONCENTRATION CONTOURS BECAUSE THE ANALYTICAL RESULTS ARE LIKELY BIASED HIGH AND NOT REPRESENTATIVE OF GROUNDWATER QUALITY DUE TO CARRY DOWN OR THE DOWNWARD MIGRATION OF GROUNDWATER OBSERVED NEAR THE SURFACE, WHICH WAS PRESENT WITHIN THE AUGER FLIGHTS.

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SOUND ENVIRONMENTAL STRATEGIES
SOUNDENVIRONMENTAL.COM

DATE:	04/02/2009
DRAWN BY:	NAC
CHECKED BY:	TSB
CAD FILE:	0566-001_2009_XBB
PROJECT NAME:	FORMER OLYMPIA DRY CLEANERS
SES PROJECT NUMBER:	0566-001-03
STREET ADDRESS:	606 UNION AVENUE SOUTH EAST
CITY:	OLYMPIA, WASHINGTON

REGION:

SCALE DEPICTED ABOVE

FIGURE 9
CROSS SECTION B-B'

01/19/2009

LEGEND

- MW-04 — MONITORING WELL LOCATION (STEMEN, 2001-2002 & SES 2008)
- MW-02 — FORMER MONITORING WELL LOCATION (ABANDONED SEPTEMBER 2006)
- SEEP LOCATION
- CATCH BASIN
- APPROXIMATE LATERAL EXTENT OF INTERIM REMEDIAL ACTION EXCAVATION (SEPTEMBER 2006)
- PROPERTY BOUNDARY
- APPROXIMATE DIRECTION OF GROUNDWATER FLOW (GROUNDWATER FLOW IS PERPENDICULAR TO GROUNDWATER CONTOUR LINES) (AUGUST 2008)
- GROUNDWATER CONTOUR LINE, DASHED WHEN INFERRED
- GAS — UNDERGROUND NATURAL GAS LINE
- W — UNDERGROUND WATER LINE
- SW — UNDERGROUND STORMWATER LINE
- SS — UNDERGROUND SANITARY SEWER LINE
- E — UNDERGROUND ELECTRIC LINE
- T — OVERHEAD TELEPHONE LINE
- OE — OVERHEAD ELECTRIC LINE
- SHRUBS/TREES
- (29,18') — GROUNDWATER ELEVATION IN FEET ABOVE SEA LEVEL (AUGUST 13, 2008)

N

MW-06 (19.42')

MW-04 (24.70')

MW-07 (29,18')

MW-08/B-13 (27.33')

MW-09/B-14 (26.78')

MW-03 (27.40')

MW-10/B-15 (26.97')

BH-6

MW-12/B-17 (32.28')

MW-11/B-16 (24,49')

MW-01 (25.30')

SEEP

MANHOLE

MANHOLE

MANHOLE

MANHOLE

UTILITY POLE

STORM DRAIN

20'

22'

24'

26'

28'

ASPHALT

GRASS

CATCH BASIN

ROOF LINE

FORMER ROOF DRAIN PIPE

BOILER ROOM

DRY CLEANER MACHINE

FORMER OLYMPIA DRY CLEANERS BUILDING

3" Ø STEEL DRAIN FILLED WITH CONCRETE

ARTESIAN SUPPLY WELL

CONCRETE PAD

NORTH ALLEY

CHERRY STREET Q-TIP TRUST BUILDING

SIDEWALK/ENTRY

SIDEWALK/ENTRY RAMP

SIDEWALK

SIDEWALK

SIDEWALK

DRIVEWAY

CHERRY STREET SOUTHEAST

UNION AVENUE SOUTHEAST

520 SOUTHEAST UNION AVENUE
(RAAD PROPERTY)

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SOUND ENVIRONMENTAL STRATEGIES
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DATE: 01/27/2009
DRAWN BY: NAC
CHECKED BY: TSB
CAD FILE: 0566-001_2009_CM

PROJECT NAME: FORMER OLYMPIA DRY CLEANERS
SES PROJECT NUMBER: 0566-001-03
STREET ADDRESS: 606 UNION AVE SOUTH EAST
CITY, STATE: OLYMPIA, WASHINGTON

REGION:

0 15 30 60
APPROXIMATE SCALE IN FEET

FIGURE 10
POTENTIOMETRIC SURFACE MAP
(AUGUST 2008)

P:\0566 Former Olympia Dry Cleaners\Technical\CAD\Revised 2009_R\0566-001_2009_CM_DFER.dwg

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LEGEND

- MW-04 — MONITORING WELL LOCATION (STEMEN, 2001-2002 & SES 2008)
- MW-02 — FORMER MONITORING WELL LOCATION (ABANDONED SEPTEMBER 2006)
- SEEP LOCATION
- CATCH BASIN
- APPROXIMATE LATERAL EXTENT OF INTERIM REMEDIAL ACTION EXCAVATION (SEPTEMBER 2006)
- PROPERTY BOUNDARY
- APPROXIMATE DIRECTION OF GROUNDWATER FLOW (GROUNDWATER FLOW IS PERPENDICULAR TO GROUNDWATER CONTOUR LINES) (JANUARY 2009)
- GROUNDWATER CONTOUR LINE, DASHED WHEN INFERRED
- GAS — UNDERGROUND NATURAL GAS LINE
- W — UNDERGROUND WATER LINE
- SW — UNDERGROUND STORMWATER LINE
- SS — UNDERGROUND SANITARY SEWER LINE
- E — UNDERGROUND ELECTRIC LINE
- T — OVERHEAD TELEPHONE LINE
- OE — OVERHEAD ELECTRIC LINE
- SHRUBS/TREES
- (19.29') — GROUNDWATER ELEVATION IN FEET ABOVE SEA LEVEL (JANUARY 14, 2009)

N

20'
21'
22'
23'
24'
25'
26'
27'
28'

MW-06 (19.29')
MW-07 (28.82')
MW-04 (24.37')
MW-08/B-13 (27.73')
MW-09/B-14 (26.73')
MW-03 (27.26')
MW-10/B-15 (26.19')
MW-12/B-17 (32.02')
MW-14/B-22
MW-11/B-16 (24.57')
MW-13/B-21 (26.08')
MW-01 (25.86')

CHERRY STREET Q-TIP TRUST BUILDING
FORMER OLYMPIA DRY CLEANERS BUILDING
BOILER ROOM
FORMER ROOF DRAIN PIPE
DRY CLEANER MACHINE
3" Ø STEEL DRAIN FILLED WITH CONCRETE
ARTESIAN SUPPLY WELL
CONCRETE PAD
NORTH ALLEY
ROOF LINE
GRASS
ASPHALT
CATCH BASIN
SIDEWALK
UNION AVENUE SOUTHEAST
SIDEWALK/ENTRY
SIDEWALK/ENTRY RAMP
SEEP
MANHOLE
UTILITY POLE
STORM DRAIN
CHERRY STREET SOUTHEAST
DRIVEWAY
520 SOUTHEAST UNION AVENUE (RAAD PROPERTY)

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SOUND ENVIRONMENTAL STRATEGIES
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DATE: 01/27/2009
DRAWN BY: NAC
CHECKED BY: TSB
CAD FILE: 0566-001_2009_CM2

PROJECT NAME: FORMER OLYMPIA DRY CLEANERS
SES PROJECT NUMBER: 0566-001-03
STREET ADDRESS: 606 UNION AVE SOUTH EAST
CITY, STATE: OLYMPIA, WASHINGTON

REGION:

0 15 30 60
APPROXIMATE SCALE IN FEET

FIGURE 11
POTENTIOMETRIC SURFACE MAP
(JANUARY 2009)

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01/19/2009

LEGEND

- MW-04 — MONITORING WELL LOCATION (STEMEN, 2001-2002 & SES 2008)
- MW-02 — FORMER MONITORING WELL LOCATION (ABANDONED SEPTEMBER 2006)
- B-08 — SOIL BORING LOCATION (SES, 2008)
- BH-6 — SOIL BORING LOCATION (CONREX, 1995)
- S-12 — BORING (STEMEN, 2001-2002)
- SEEP LOCATION
- CATCH BASIN
- APPROXIMATE LATERAL EXTENT OF INTERIM REMEDIAL ACTION EXCAVATION (SEPTEMBER 2006)
- PROPERTY BOUNDARY
- UNDERGROUND NATURAL GAS LINE
- UNDERGROUND WATER LINE
- UNDERGROUND STORMWATER LINE
- UNDERGROUND SANITARY SEWER LINE
- UNDERGROUND ELECTRIC LINE
- OVERHEAD TELEPHONE LINE
- OVERHEAD ELECTRIC LINE
- SHRUBS/TREES
- PCE > 50 MG/KG
- PCE 5-50 MG/KG
- PCE 0.5-5 MG/KG
- PCE 0.05-0.5 MG/KG

N

MW-07
S-9
MW-04
S-4
GRASS
CATCH BASIN
ASPHALT
SIDEWALK
UNION AVENUE SOUTHEAST
ASPHALT
BH-4
BH-3
MW-08/B-13
S-8
BH-2
SS-1
BH-5
S-10
BH-1
BOREHOLE B
FORMER ROOF DRAIN PIPE
BOILER ROOM
B-01
HB-1B
FORMER OLYMPIA DRY CLEANERS BUILDING
BOREHOLE A
DRY CLEANER MACHINE
ROOF LINE
MW-09/B-14
S-14
B-02
MW-06
CHERRY STREET Q-TIP TRUST BUILDING
NORTH ALLEY
CONCRETE PAD
S-15
MW-03
3" Ø STEEL DRAIN FILLED WITH CONCRETE
ARTESIAN SUPPLY WELL
B-03
B-10
S-1 (12/7/02)
B-11
MW-10/B-15
B-04
ASPHALT
B-12
S-1 (4/9/01)
MW-01
MW-12/B-17
S-3 (4/9/01)
B-09
SIDEWALK/ENTRY RAMP
S-11
MW14/
B-22
HB-1B
HB-1A
S-2 (12/7/02)
SIDEWALK/ENTRY
S-3 (12/7/02)
SIDEWALK
MW-11/B-16
SEEP
B-08
B-05
B-06
B-07
B-20
MANHOLE
B-19
B-18
MANHOLE
CHERRY STREET SOUTHEAST
MANHOLE
MANHOLE
DRIVEWAY
UTILITY POLE
STORM DRAIN
SIDEWALK
MW13/B-21
ASPHALT
520 SOUTHEAST UNION AVENUE (RAAD PROPERTY)

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SOUND ENVIRONMENTAL STRATEGIES
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DATE: 01/27/2009
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CAD FILE: 0566-001_2009_SD_ISO

PROJECT NAME: FORMER OLYMPIA DRY CLEANERS
SES PROJECT NUMBER: 0566-001-03
STREET ADDRESS: 606 UNION AVE SOUTH EAST
CITY, STATE: OLYMPIA, WASHINGTON

REGION:

0 15 30 60
APPROXIMATE SCALE IN FEET

FIGURE 12
PCE CONCENTRATIONS IN SOIL

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LEGEND

- MW-04 — MONITORING WELL LOCATION (STEMEN, 2001-2002 & SES 2008)
- MW-02 — FORMER MONITORING WELL LOCATION (ABANDONED SEPTEMBER 2006)
- B-08 — SOIL BORING LOCATION (SES, 2008)
- BH-6 — SOIL BORING LOCATION (CONREX, 1995)
- S-12 — BORING (STEMEN, 2001-2002)
- SEEP LOCATION
- CATCH BASIN
- APPROXIMATE LATERAL EXTENT OF INTERIM REMEDIAL ACTION EXCAVATION (SEPTEMBER 2006)
- PROPERTY BOUNDARY
- UNDERGROUND NATURAL GAS LINE
- UNDERGROUND WATER LINE
- UNDERGROUND STORMWATER LINE
- UNDERGROUND SANITARY SEWER LINE
- UNDERGROUND ELECTRIC LINE
- OVERHEAD TELEPHONE LINE
- OVERHEAD ELECTRIC LINE
- SHRUBS/TREES
- VINYL CHLORIDE > 1,9 MG/KG
- VINYL CHLORIDE 0,67-1.9 MG/KG

N

MW-07, S-9, MW-04, S-4, GRASS, ASPHALT, CATCH BASIN, SIDEWALK, UNION AVENUE SOUTHEAST, BH-4, BH-3, MW-08/B-13, BH-2, SS-1, BH-5, S-8, S-10, BH-1, BOREHOLE B, HB-2, BOREHOLE A, MW-09/B-14, MW-06, CHERRY STREET Q-TIP TRUST BUILDING, NORTH ALLEY, CONCRETE PAD, FORMER ROOF DRAIN PIPE, BOILER ROOM, B-01, FORMER OLYMPIA DRY CLEANERS BUILDING, DRY CLEANER MACHINE, ROOF LINE, S-14, B-02, S-15, MW-03, 3" Ø STEEL DRAIN FILLED WITH CONCRETE, ARTESIAN SUPPLY WELL, B-03, B-10, S-1 (12/7/02), B-11, S-1 (4/9/01), MW-10/B-15, B-04, ASPHALT, B-12, MW-01, MW-12/B-17, B-09, SIDEWALK/ENTRY, SIDEWALK/ENTRY RAMP, S-11, MW14/B-22, HB-1B, HB-1A, S-2 (12/7/02), S-3 (12/7/02), SIDEWALK, MW-11/B-16, SEEP, B-05, B-08, B-06, B-07, B-20, MANHOLE, B-19, B-18, CHERRY STREET SOUTHEAST, DRIVEWAY, UTILITY POLE, STORM DRAIN, MW13/B-21, 520 SOUTHEAST UNION AVENUE (RAAD PROPERTY)

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SOUND ENVIRONMENTAL STRATEGIES
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DATE: 01/27/2009
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CAD FILE: 0566-001_2009_SD_ISO_VC

PROJECT NAME: FORMER OLYMPIA DRY CLEANERS
SES PROJECT NUMBER: 0566-001-03
STREET ADDRESS: 606 UNION AVE SOUTH EAST
CITY, STATE: OLYMPIA, WASHINGTON

REGION:

0 15 30 60
APPROXIMATE SCALE IN FEET

FIGURE 13
VINYL CHLORIDE CONCENTRATIONS IN SOIL

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01/19/2009

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LEGEND

- MW-04 — MONITORING WELL LOCATION (STEMEN, 2001-2002 & SES 2008)
- MW-02 — FORMER MONITORING WELL LOCATION (ABANDONED SEPTEMBER 2006)
- B-08 — SOIL BORING LOCATION (SES, 2008)
- BH-6 — SOIL BORING LOCATION (CONREX, 1995)
- S-12 — BORING (STEMEN, 2001-2002)
- SEEP LOCATION
- CATCH BASIN
- APPROXIMATE LATERAL EXTENT OF INTERIM REMEDIAL ACTION EXCAVATION (SEPTEMBER 2006)
- PROPERTY BOUNDARY
- APPROXIMATE DIRECTION OF GROUNDWATER FLOW (GROUNDWATER FLOW IS PERPENDICULAR TO GROUNDWATER CONTOUR LINES) (JANUARY 2009)
- GROUNDWATER CONTOUR LINE, DASHED WHEN INFERRED
- GAS — UNDERGROUND NATURAL GAS LINE
- W — UNDERGROUND WATER LINE
- SW — UNDERGROUND STORMWATER LINE
- SS — UNDERGROUND SANITARY SEWER LINE
- E — UNDERGROUND ELECTRIC LINE
- T — OVERHEAD TELEPHONE LINE
- OE — OVERHEAD ELECTRIC LINE
- SHRUBS/TREES
- (19.29') — GROUNDWATER ELEVATION IN FEET ABOVE SEA LEVEL (JANUARY 14, 2009)
- PCE >5,000 µg/L
- PCE 500-5,000 µg/L
- PCE 50-500 µg/L
- PCE 5-50 µg/L

N

MW-06 (19.29')
MW-07 (28,82')
MW-04 (24,37')
MW-08/B-13 (27,73')
MW-09/B-14 (26,73')
MW-10/B-15 (26,19')
MW-12/B-17 (32,02')
MW-03 (27,29')
MW-11/B-16 (24,57')
MW13/B-21 (26,08')
MW-01 (25,86')
MW14/B-22

CHERRY STREET Q-TIP TRUST BUILDING
FORMER OLYMPIA DRY CLEANERS BUILDING
520 SOUTHEAST UNION AVENUE (RAAD PROPERTY)
UNION AVENUE SOUTHEAST
CHERRY STREET SOUTHEAST
SIDEWALK
SIDEWALK/ENTRY
SIDEWALK/ENTRY RAMP
ASPHALT
GRASS
DRIVEWAY
ROOF LINE
FORMER ROOF DRAIN PIPE
BOILER ROOM
DRY CLEANER MACHINE
3" Ø STEEL DRAIN FILLED WITH CONCRETE
ARTESIAN SUPPLY WELL
CONCRETE BERM
SEEP
CATCH BASIN
MANHOLE
CHERRY SW
STORM DRAIN
UTILITY POLE
BOREHOLE A
BOREHOLE B
HB-1
HB-1A
HB-1B
HB-2
BH-1
BH-2
BH-3
BH-4
BH-5
SS-1
B-01
B-02
B-03
B-04
B-05
B-06
B-07
B-08
B-09
B-10
B-11
B-12
B-18
B-19
B-20
S-1 (12/7/02)
S-1 (4/9/01)
S-1 (7/18/01)
S-2 (7/18/01)
S-3 (12/7/02)
S-3 (4/9/01)
S-3 (7/18/01)
S-4
S-5 (12/7/02)
S-8
S-9
S-11
S-12
S-15
20'
21'
22'
23'
24'
25'
26'
27'
28'

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SOUND ENVIRONMENTAL STRATEGIES
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DATE: 01/27/2009
DRAWN BY: NAC
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CAD FILE: 0566-001_2009_GD_ISO

PROJECT NAME: FORMER OLYMPIA DRY CLEANERS
SES PROJECT NUMBER: 0566-001-03
STREET ADDRESS: 606 UNION AVE SOUTH EAST
CITY, STATE: OLYMPIA, WASHINGTON

REGION:

0 15 30 60
APPROXIMATE SCALE IN FEET

FIGURE 14
PCE ISOCONCENTRATIONS IN GROUNDWATER

SOUNDENVIRONMENTAL.COM

01/19/2009

LEGEND

- MW-04 — MONITORING WELL LOCATION (STEMEN, 2001-2002 & SES 2008)
- MW-02 — FORMER MONITORING WELL LOCATION (ABANDONED SEPTEMBER 2006)
- B-08 — SOIL BORING LOCATION (SES, 2008)
- BH-6 — SOIL BORING LOCATION (CONREX, 1995)
- S-12 — BORING (STEMEN, 2001-2002)
- SEEP LOCATION
- CATCH BASIN
- APPROXIMATE LATERAL EXTENT OF INTERIM REMEDIAL ACTION EXCAVATION (SEPTEMBER 2006)
- PROPERTY BOUNDARY
- APPROXIMATE DIRECTION OF GROUNDWATER FLOW (GROUNDWATER FLOW IS PERPENDICULAR TO GROUNDWATER CONTOUR LINES) (JANUARY 2009)
- GROUNDWATER CONTOUR LINE, DASHED WHEN INFERRED
- GAS — UNDERGROUND NATURAL GAS LINE
- W — UNDERGROUND WATER LINE
- SW — UNDERGROUND STORMWATER LINE
- SS — UNDERGROUND SANITARY SEWER LINE
- E — UNDERGROUND ELECTRIC LINE
- T — OVERHEAD TELEPHONE LINE
- OE — OVERHEAD ELECTRIC LINE
- SHRUBS/TREES
- (19.29') — GROUNDWATER ELEVATION IN FEET ABOVE SEA LEVEL (JANUARY 14, 2009)
- VINYL CHLORIDE > 200 µg/L
- VINYL CHLORIDE 2 - 200 µg/L
- VINYL CHLORIDE 0.2 - 2 µg/L

N

20' 21' 22' 23' 24' 25' 26' 27' 28'

MW-06 (19.29')
MW-04 (24.37')
MW-07 (28,82')
MW-08/B-13 (27.73')
MW-09/B-14 (26.73')
MW-10/B-15 (26.19')
MW-11/B-16 (24.57')
MW-12/B-17 (32.01')
MW-03 (27.20')
MW13/B-21 (26.08')
MW-01 (25.86')

S-1 (12/7/02)
S-2 (12/7/02)
S-3 (12/7/02)
S-1 (4/9/01)
S-2 (4/9/01)
S-3 (4/9/01)
S-1 (7/18/01)
S-2 (7/18/01)
S-3 (7/18/01)
S-4
S-5
S-8
S-11
S-12

BH-1
BH-2
BH-3
BH-4
BH-5
SS-1
HB-1
HB-1B
HB-2
B-01
B-02
B-03
B-04
B-05
B-06
B-07
B-08
B-09
B-10
B-11
B-12
B-18
B-19
B-20
B-22

BOREHOLE A
BOREHOLE B
SEEP
CATCH BASIN
MANHOLE
UTILITY POLE
STORM DRAIN
ARTESIAN SUPPLY WELL
3" Ø STEEL DRAIN FILLED WITH CONCRETE
FORMER ROOF DRAIN PIPE
CONCRETE PAD
NORTH ALLEY
ROOF LINE

FORMER OLYMPIA DRY CLEANERS BUILDING
BOILER ROOM
DRY CLEANER MACHINE

CHERRY STREET Q-TIP TRUST BUILDING
520 SOUTHEAST UNION AVENUE (RAAD PROPERTY)

ASPHALT
GRASS
SIDEWALK
SIDEWALK/ENTRY
SIDEWALK/ENTRY RAMP
DRIVEWAY
CHERRY SW
CHERRY STREET SOUTHEAST
UNION AVENUE SOUTHEAST

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DRAWN BY: NAC
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CAD FILE: 0566-001_2009_GD_ISOVC

PROJECT NAME: FORMER OLYMPIA DRY CLEANERS
SES PROJECT NUMBER: 0566-001-03
STREET ADDRESS: 606 UNION AVE SOUTH EAST
CITY, STATE: OLYMPIA, WASHINGTON

REGION:

0 15 30 60
APPROXIMATE SCALE IN FEET

FIGURE 15
VINYL CHLORIDE ISOCONCENTRATIONS IN GROUNDWATER

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01/19/2009

LEGEND

- MW-04 — MONITORING WELL LOCATION (STEMEN, 2001-2002 & SES 2008)
- MW-02 — FORMER MONITORING WELL LOCATION (ABANDONED SEPTEMBER 2006)
- B-08 — SOIL BORING LOCATION (SES, 2008)
- BH-6 — SOIL BORING LOCATION (CONREX, 1995)
- S-12 — BORING (STEMEN, 2001-2002)
- SEEP LOCATION
- CATCH BASIN
- APPROXIMATE LATERAL EXTENT OF INTERIM REMEDIAL ACTION EXCAVATION (SEPTEMBER 2006)
- PROPERTY BOUNDARY
- GAS — UNDERGROUND NATURAL GAS LINE
- W — UNDERGROUND WATER LINE
- SW — UNDERGROUND STORMWATER LINE
- SS — UNDERGROUND SANITARY SEWER LINE
- E — UNDERGROUND ELECTRIC LINE
- T — OVERHEAD TELEPHONE LINE
- OE — OVERHEAD ELECTRIC LINE
- SHRUBS/TREES
- OIL RANGE PETROLEUM HYDROCARBONS >2,000 MG/KG

N

MW-06

CHERRY STREET Q-TIP TRUST BUILDING

ASPHALT

MW-04

S-4

MW-07

S-9

GRASS

CATCH BASIN

ASPHALT

SIDEWALK

UNION AVENUE SOUTHEAST

S-8

BH-4

BH-3

MW-08/B-13

BH-2

SS-1

BH-5

S-10

BH-1

BOREHOLE B

HB-2

BOREHOLE A

MW-09/B-14

NORTH ALLEY

CONCRETE PAD

B-13

B-12

FORMER ROOF DRAIN PIPE

BOILER ROOM

B-01

FORMER OLYMPIA DRY CLEANERS BUILDING

DRY CLEANER MACHINE

S-14

B-02

S-15

MW-03

B-03

3" Ø STEEL DRAIN FILLED WITH CONCRETE

ARTESIAN SUPPLY WELL

ROOF LINE

B-10

S-1 (12/7/02)

B-11

S-3 (4/9/01)

S-2 (4/9/01)

MW-10/B-15

MW-12/B-17

B-04

ASPHALT

B-12

S-1 (4/9/01)

MW-01

B-09

SIDEWALK/ENTRY

SIDEWALK/ENTRY RAMP

S-11

MW14/ B-22

HB-1B

HB-1A

S-2 (12/7/02)

S-3 (12/7/02)

SIDEWALK

MW-11/B-16

SEEP

SIDEWALK

B-05

B-08

B-06

B-07

B-20

MANHOLE

B-19

B-18

MANHOLE

MANHOLE

MANHOLE

UTILITY POLE

STORM DRAIN

CHERRY STREET SOUTHEAST

SIDEWALK

MW13/B-21

DRIVEWAY

ASPHALT

520 SOUTHEAST UNION AVENUE
(RAAD PROPERTY)

Draft – Issued for Ecology Review

SOUND ENVIRONMENTAL STRATEGIES
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DATE: 01/27/2009
DRAWN BY: NAC
CHECKED BY: TSB
CAD FILE: 0566-001_2009_SD_ISO_ORPH

PROJECT NAME: FORMER OLYMPIA DRY CLEANERS
SES PROJECT NUMBER: 0566-001-03
STREET ADDRESS: 606 UNION AVE SOUTH EAST
CITY, STATE: OLYMPIA, WASHINGTON

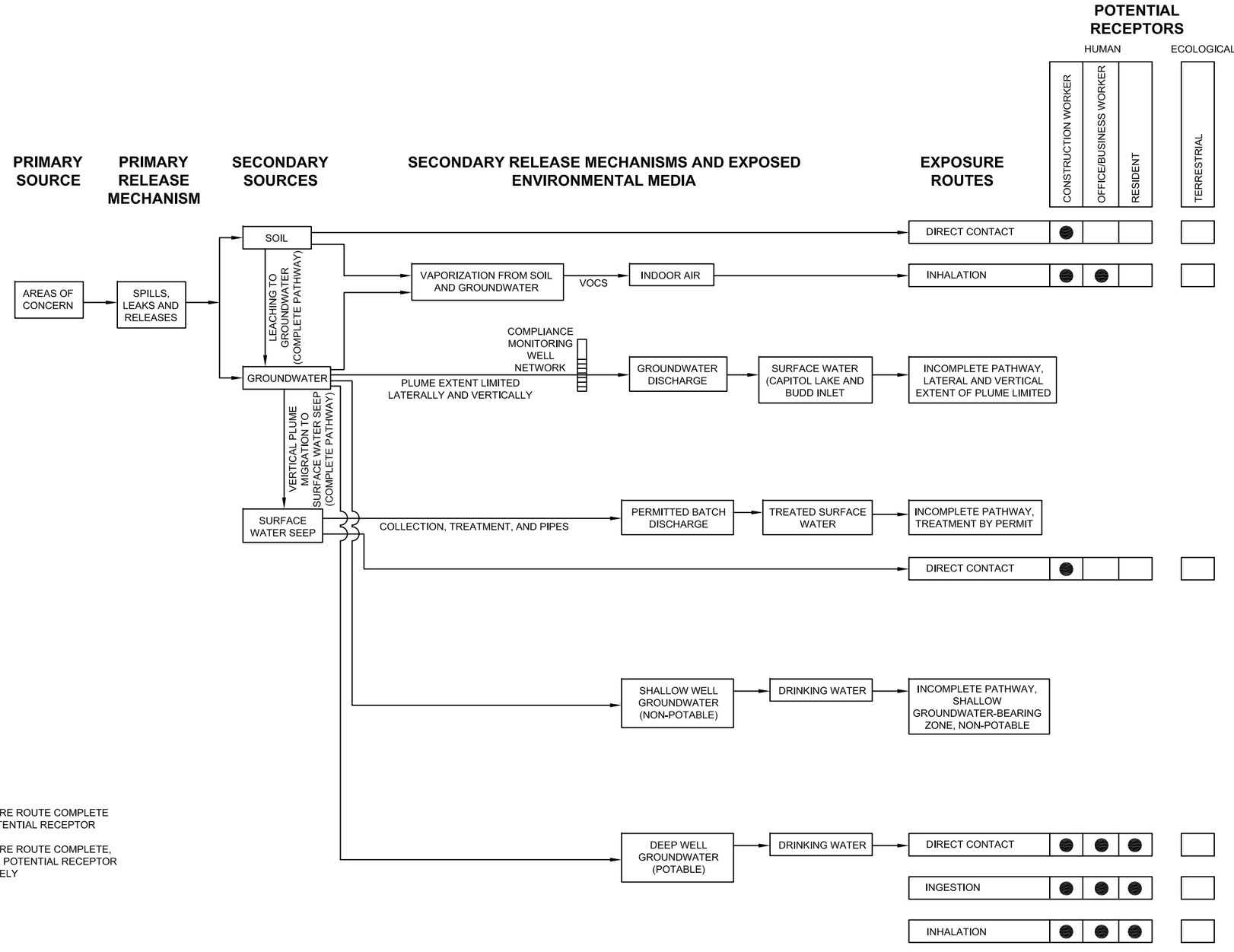
REGION:

0 15 30 60
APPROXIMATE SCALE IN FEET

FIGURE 16
ORPH CONCENTRATIONS IN SOIL

P:\0566 Former Olympia Dry Cleaners\Technical\CAD\Revised 2009_R\0566-001_2009_SD_ISO_ORPH_DFER.dwg

SOUNDENVIRONMENTAL.COM



LEGEND

- ● EXPOSURE ROUTE COMPLETE FOR POTENTIAL RECEPTOR
- ☐ EXPOSURE ROUTE COMPLETE, BUT THE POTENTIAL RECEPTOR IS UNLIKELY

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SOUND ENVIRONMENTAL STRATEGIES
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DATE: 09/22/2009
DRAWN BY: NAC
CHECKED BY: TSB
CAD FILE: 0566-001_2009_CSM

PROJECT NAME: FORMER OLYMPIA DRY CLEANERS
SES PROJECT NUMBER: 0566-001-03
STREET ADDRESS: 606 UNION AVENUE SOUTH EAST
CITY, STATE: OLYMPIA, WASHINGTON

REGION:

NOT TO SCALE

FIGURE 17
PRELIMINARY EXPOSURE ASSESSMENT
CONCEPTUAL SITE MODEL

TABLES

SOUND ENVIRONMENTAL STRATEGIES
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Table 1
Soil Analytical Results for Selected HVOCs
Former Olympia Dry Cleaners
606 Union Avenue Southeast
Olympia, Washington

Boring/Sample Location	Sampled By	Sample Identification	Sample Date	Sample Depth (feet bgs)	Analytical Results (milligrams per kilogram)					
					PCE	TCE	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,1-Dichloroethene	Vinyl Chloride
Borehole A	CONREX	Soil #1	5/19/1995	1	<0.05[a]	**0.08**[a]	0.24[a]		<0.05[a]	--
BH-1	CONREX	BH-1 @ 3'	5/26/1995	3	**0.07**[a]	<0.05[a]	<0.05[a]		<0.05[a]	--
BH-2	CONREX	BH-2 @ 5'	5/26/1995	5	**0.12**[a]	<0.05[a]	<0.05[a]		<0.05[a]	--
BH-3	CONREX	BH-3 @ 3'	5/26/1995	3	<0.05[a]	<0.05[a]	<0.05[a]		<0.05[a]	--
BH-4	CONREX	BH-4 @ 5'	5/26/1995	5	<0.05[a]	<0.05[a]	<0.05[a]		<0.05[a]	--
BH-5	CONREX	BH-5 @ 6'	5/26/1995	6	<0.05[a]	<0.05[a]	<0.05[a]		<0.05[a]	--
S-1(4/9/01)	Stemen	S-1-10	4/9/2001	10	<0.05[b]	<0.05[b]	<0.05[b]	<0.05[b]	<0.05[b]	<0.25[b]
		S-1-14		14	<0.05[b]	<0.05[b]	<0.05	<0.05[b]	<0.05[b]	<0.25[b]
S-2(4/9/01)	Stemen	S-2-0/3	4/9/2001	0 - 3	<0.05[b]	<0.05[b]	3.84	0.06[b]	<0.05[b]	**2.44**[b]
		S2-6		6	**6.75**[b]	**3.16**[b]	5.55	0.07[b]	<0.05[b]	<0.25[b]
		S2-8		8	<0.05[b]	<0.05[b]	<0.05	<0.05[b]	<0.05[b]	<0.25[b]
S-3(4/9/01)	Stemen	S-3-4/8	4/9/2001	4 - 8	**4.58**[b]	**2.10**[b]	2.31	0.10[b]	<0.05[b]	**3.31**[b]
S-4	Stemen	S-4-4	4/8/2001	4	<0.05[b]	<0.05[b]	<0.05	<0.05[b]	<0.05[b]	<0.25[b]
		S-4-4/8		4 - 8	<0.05[b]	<0.05[b]	<0.05	<0.05[b]	<0.05[b]	<0.25[b]
		S-4-8/13		8 - 13	**0.33**[b]	<0.05[b]	<0.05	<0.05[b]	<0.05[b]	<0.25[b]
		S-4-15		15	<0.05[b]	<0.05[b]	<0.05	<0.05[b]	<0.05[b]	<0.25[b]
S-8	Stemen	S-8-4/8	4/9/2001	4 - 8	<0.05[b]	<0.05[b]	<0.05	<0.05[b]	<0.05[b]	<0.25[b]
		S-8-8/12		8 - 12	<0.05[b]	<0.05[b]	<0.05	<0.05[b]	<0.05[b]	<0.25[b]
S-9	Stemen	S-9-0/4	4/9/2001	0 - 4	<0.05[b]	<0.05[b]	0.16	<0.05[b]	<0.05[b]	<0.25[b]
		S-9-8/12		8 - 12	<0.05[b]	<0.05[b]	<0.05	<0.05[b]	<0.05[b]	<0.25[b]
S-10	Stemen	S-10-36	4/9/2001	3	<0.05[b]	<0.05[b]	0.09	<0.05[b]	<0.05[b]	<0.25[b]
		S-10-0/6		0 - 0.5	**0.12**[b]	<0.05[b]	0.28	<0.05[b]	<0.05[b]	<0.25[b]
S-11	Stemen	S-11-0/4	4/9/2001	0 - 4	<0.05[b]	<0.05[b]	<0.05	<0.05[b]	<0.05[b]	<0.25[b]
		S-11-4/8		4 - 8	<0.05[b]	<0.05[b]	<0.05	<0.05[b]	<0.05[b]	<0.25[b]
S-12	Stemen	S-12	5/1/2001	6 - 9	<0.05[b]	<0.05[b]	<0.05	<0.05[b]	<0.05[b]	<0.25[b]
S-13	Stemen	S-13	5/1/2001	6	<0.05[b]	<0.05[b]	<0.05	<0.05[b]	<0.05[b]	<0.25[b]
S-14	Stemen	S-14	5/1/2001	6 - 9	<0.05[b]	<0.05[b]	<0.05	<0.05[b]	<0.05[b]	<0.25[b]
S-15	Stemen	S-15	5/1/2001	3	<0.05[b]	<0.05[b]	<0.05	<0.05[b]	<0.05[b]	<0.25[b]
SS-1	Stemen	SS-1	4/9/2001	0-0.5	<0.05[b]	<0.05[b]	<0.05	<0.05[b]	<0.05[b]	<0.25[b]
S-1(12/7/02)	Stemen	S-1	12/7/2002	2	<0.02[b]	<0.02[b]	<0.25	<0.25[b]	<0.25[b]	<0.25[b]
S-2(12/7/02)	Stemen	S-2	12/7/2002	2	**0.099**[b]	<0.02[b]	0.16	<0.25[b]	<0.25[b]	<0.25[b]
S-3(12/7/02)	Stemen	S-3	12/7/2002	2	**0.16**[b]	<0.02[b]	<0.25[b]	<0.25[b]	<0.25[b]	<0.25[b]
MTCA Cleanup Levels for Soil					**0.05**[c]	**0.03**[c]	**800**[d]	**1,600**[d]	**4,000**[d]	**0.67**[f]

SOUND ENVIRONMENTAL STRATEGIES
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Table 1
Soil Analytical Results for Selected HVOCs
Former Olympia Dry Cleaners
606 Union Avenue Southeast
Olympia, Washington

Boring/Sample Location	Sampled By	Sample Identification	Sample Date	Sample Depth (feet bgs)	Analytical Results (milligrams per kilogram) PCE	TCE	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,1-Dichloroethene	Vinyl Chloride
B01	SES	B01-04	5/15/2008	4	<0.025[e]	<0.03[e]	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
		B01-07		7	<0.025[e]	<0.03[e]	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
		B01-20		20	<0.025[e]	<0.03[e]	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
B02	SES	B02-04	5/15/2008	4	<0.025[e]	<0.03[e]	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
		B02-12		12	<0.025[e]	<0.03[e]	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
		B02-20		20	<0.025[e]	<0.03[e]	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
B03	SES	B03-03	5/15/2008	3	<0.025[e]	<0.03[e]	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
		B03-11		11	<0.025[e]	<0.03[e]	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
		B03-20		20	<0.025[e]	<0.03[e]	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
B04	SES	B04-03	7/9/2008	3	<0.025[e]	<0.03[e]	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
		B04-07		7	<0.025[e]	<0.03[e]	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
		B04-20		20	<0.025[e]	<0.03[e]	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
B05	SES	B05-03	7/9/2008	3	<0.025[e]	<0.03[e]	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
		B05-07		7	**2.9**[e]	**0.98**[e]	1.1[e]	<0.05[e]	<0.05[e]	0.093[e]
		B05-11		11	<0.025[e]	<0.03[e]	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
		B05-14.5		14.5	<0.025[e]	<0.03[e]	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
B06	SES	B06-03	7/9/2008	3	<0.025[e]	**0.07**[e]	0.51	<0.05[e]	<0.05[e]	<0.05[e]
		B06-07		7	<0.025[e]	<0.03[e]	<0.05	<0.05[e]	<0.05[e]	<0.05[e]
		B06-16		16	<0.025[e]	<0.03[e]	<0.05	<0.05[e]	<0.05[e]	<0.05[e]
B07	SES	B07-03	7/9/2008	3	<0.025[e]	<0.03[e]	<0.05	<0.05[e]	<0.05[e]	<0.05[e]
		B07-07		7	**0.10**[e]	**0.10**[e]	0.12	<0.05[e]	<0.05[e]	<0.05[e]
		B07-11		11	<0.025[e]	<0.03[e]	0.075	<0.05[e]	<0.05[e]	<0.05[e]
B08	SES	B08-03	7/9/2008	3	<0.025[e]	<0.03	<0.05	<0.05[e]	<0.05[e]	<0.05[e]
		B08-07		7	<0.025[e]	<0.03[e]	<0.05	<0.05[e]	<0.05[e]	<0.05[e]
		B08-10.5		10.5	<0.025[e]	<0.03[e]	<0.05	<0.05[e]	<0.05[e]	<0.05[e]
B09	SES	B09-03	7/9/2008	3	<0.025[e]	<0.03[e]	<0.05	<0.05[e]	<0.05[e]	<0.05[e]
		B09-07		7	<0.025[e]	<0.03[e]	<0.05	<0.05[e]	<0.05[e]	<0.05[e]
B10	SES	B10-02	7/10/2008	2	<0.025[e]	<0.03[e]	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
		B10-05		5	**0.062**[e]	<0.03[e]	<0.05	<0.05[e]	<0.05[e]	<0.05[e]
		B10-08		8	**2.2**[e]	**0.49**[e]	0.12	<0.05[e]	<0.05[e]	<0.05[e]
		B10-14.5		14.5	<0.025[e]	<0.03[e]	<0.05	<0.05[e]	<0.05[e]	<0.05[e]
B11	SES	B11-02	7/10/2008	2	<0.025[e]	<0.03[e]	<0.05	<0.05[e]	<0.05[e]	<0.05[e]
		B11-06		6	**6.0**[e]	**2.0**[e]	2.3	<0.05[e]	<0.05[e]	<0.05[e]
		B11-10		10	<0.025[e]	<0.03[e]	<0.05	<0.05[e]	<0.05[e]	<0.05[e]
		B11-16		16	<0.025[e]	<0.03[e]	<0.05	<0.05[e]	<0.05[e]	<0.05[e]
MTCA Cleanup Levels for Soil					**0.05**[c]	**0.03**[c]	**800**[d]	**1,600**[d]	**4,000**[d]	**0.67**[f]

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Table 1
Soil Analytical Results for Selected HVOCs
Former Olympia Dry Cleaners
606 Union Avenue Southeast
Olympia, Washington

Boring/Sample Location	Sampled By	Sample Identification	Sample Date	Sample Depth (feet bgs)	Analytical Results (milligrams per kilogram) PCE	TCE	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,1-Dichloroethene	Vinyl Chloride
B12	SES	B12-03	7/10/2008	3	<0.025[e]	<0.03[e]	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
		B12-07		7	<0.025[e]	<0.03[e]	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
		B12-15.5		15.5	<0.025[e]	<0.03[e]	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
B13	SES	B13-08	8/5/2008	8	<0.025[e]	<0.03[e]	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
B14	SES	B14-05.5	8/5/2008	5.5	<0.025[e]	<0.03[e]	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
B15	SES	B15-08	8/5/2008	8	**0.085**	<0.03[e]	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
B16	SES	B16-05.5	8/5/2008	5.5	<0.025[e]	<0.03[e]	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
B17	SES	B17-51	8/6/2008	51	<0.025[e]	<0.03[e]	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
B18	SES	B18-07	11/5/2008	7	<0.02[e]	<0.03[e]	<0.02[e]	<0.02[e]	<0.05[e]	<0.02[e]
B19	SES	B19-03	11/5/2008	3	<0.02[e]	<0.03[e]	<0.02[e]	<0.02[e]	<0.05[e]	<0.02[e]
B20	SES	B20-08	11/5/2008	8	<0.02[e]	<0.03[e]	<0.02[e]	<0.02[e]	<0.05[e]	<0.02[e]
B21	SES	B21-07.5	11/6/2008	7.5	<0.02[e]	<0.03[e]	<0.02[e]	<0.02[e]	<0.05[e]	<0.02[e]
B22	SES	B22-11	11/7/2008	6	<0.02[e]	<0.03[e]	<0.02[e]	<0.02[e]	<0.05[e]	<0.02[e]
HB2	SES	HB2-00.75	7/10/2008	0.75	**2.8**[e]	**0.088**[e]	0.73[e]	<0.05[e]	<0.05[e]	0.19[e]
MTCA Cleanup Levels for Soil					**0.05**[c]	**0.03**[c]	**800**[d]	**1,600**[d]	**4,000**[d]	**0.67**[f]

NOTES:

Red denotes concentration exceeds MTCA cleanup level.

[a]Analyzed by EPA Modified Method 8010/8020.

[b]Analyzed by EPA Method 8021B.

[c]MTCA Cleanup Regulation, Method A Cleanup Levels for Soil, Chapter 173-340 of the Washington Administrative Code (amended November 2007).

[d]CLARC, Soil, Method B, Non-Carcinogen, Standard Formula Value, Direct Contact (ingestion only), CLARC website <https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx>.

[e]Analyzed by EPA Method 8260B.

[f]CLARC, Soil, Method B, Carcinogen, Standard Formula Value, Direct Contact (ingestion only), CLARC website <https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx>.

< = concentration not detected above the laboratory practical quantitation limit
-- = not analyzed
bgs = below ground surface
CLARC = Cleanup Levels and Risk Calculations
CONREX = CONREX Inc.
EPA = United States Environmental Protection Agency
CONREX = CONREX Inc.
EPA = United States Environmental Protection Agency
HVOCs = halogenated volatile organic compounds
MTCA = Washington State Model Toxics Control Act
PCE = tetrachloroethene
SES = Sound Environmental Strategies Corporation
Stemen = Stemen Environmental, Inc.
TCE = trichloroethene

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Table 2
Soil Analytical Results for Total Petroleum Hydrocarbons
Former Olympia Dry Cleaners
606 Union Avenue Southeast
Olympia, Washington

Boring/Sample Location	Sampled By	Sample Identification	Sample Date	Sample Depth (feet bgs)	Analytical Results (milligrams per kilogram)						
					DRPH	ORPH	GRPH	Benzene	Toluene	Ethylbenzene	Total Xylenes
Borehole A	CONREX	Soil #1	5/19/1995	1	<10[a]	20,000[a]	<20[b]	--	--	--	--
BH-1	CONREX	BH-1 @ 3'	5/26/1995	3	<20[a]	<20[a]	<10[b]	<0.05[c]	<0.05[c]	<0.05[c]	<0.05[c]
BH-2	CONREX	BH-2 @ 5'	5/26/1995	5	<20[a]	<20[a]	29[b]	<0.05[c]	<0.05[c]	<0.05[c]	<0.05[c]
BH-3	CONREX	BH-3 @ 3'	5/26/1995	3	<20[a]	<20[a]	<10[b]	<0.05[c]	<0.05[c]	<0.05[c]	<0.05[c]
BH-4	CONREX	BH-4 @ 5'	5/26/1995	5	<20[a]	<20[a]	<10[b]	<0.05[c]	<0.05[c]	<0.05[c]	<0.05[c]
BH-5	CONREX	BH-5 @ 6'	5/26/1995	6	<20[a]	<20[a]	<10[b]	<0.05[c]	<0.05[c]	<0.05[c]	<0.05[c]
BH-6	CONREX	BH-6 @ 2'	5/26/1995	2	<20[a]	<20[a]	<10[b]	--	--	--	--
S-1(4/9/01)	Stemen	S-1-10	4/9/2001	10	<20[a]	<40[a]	<10[d]	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
		S-1-14		14	<20[a]	<40[a]	<10[d]	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
S-2(4/9/01)	Stemen	S-2-0/3	4/9/2001	0 - 3	<20[a]	<40[a]	<10[d]	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
		S-2-6		6	<20[a]	<40[a]	<10[d]	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
		S2-8		8	--	--	--	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
S-3(4/9/01)	Stemen	S-3-4/8	4/9/2001	4 - 8	<20[a]	<40[a]	<10[d]	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
S-4	Stemen	S-4-4	4/9/2001	4	--	--	--	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
		S4-4/8		4 - 8	--	--	--	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
		S-4-8/13		8 - 13	--	--	--	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
		S4-15		15	--	--	--	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
S-8	Stemen	S-8-4/8	4/9/2001	4 - 8	<20[a]	<40[a]	<10[d]	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
		S-8-8/12		8 - 12	<20[a]	<40[a]	<10[d]	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
S-9	Stemen	S-9-0-4	4/9/2001	0 - 4	<20[a]	<40[a]	<10[d]	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
		S-9-8/12		8 - 12	<20[a]	<40[a]	<10[d]	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
S-10	Stemen	S-10-0/6"	4/9/2001	0 - 0.5	<20[a]	<40[a]	<10[d]	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
		S-10-36		3	<20[a]	<40[a]	<10[d]	<0.05[e]	<0.05[e]	<0.05[e]	<0.05[e]
S-11	Stemen	S11-0/4	4/9/2001	0 - 4	--	--	--	<0.05[c]	<0.05[c]	<0.05[c]	<0.05[c]
		S11-4/8		4 - 8	<20[a]	<40[a]	--	<0.05[c]	<0.05[c]	<0.05[c]	<0.05[c]
S-12	Stemen	S-12	5/1/2001	6 - 9	--	--	--	<0.05[c]	<0.05[c]	<0.05[c]	<0.05[c]
S-13	Stemen	S-13	5/1/2001	6	--	--	--	<0.05[c]	<0.05[c]	<0.05[c]	<0.05[c]
S-14	Stemen	S-14	5/1/2001	6 - 9	--	--	--	<0.05[c]	<0.05[c]	<0.05[c]	<0.05[c]
S-15	Stemen	S-15	5/1/2001	3	--	--	--	<0.05[c]	<0.05[c]	<0.05[c]	<0.05[c]
SS-1	Stemen	SS-1	4/9/2001	0 - 0.5	<20[a]	<40[a]	<10[d]	<0.05[c]	<0.05[c]	<0.05[c]	<0.05[c]
S-1(12/7/02)	Stemen	S-1	12/7/2002	2	--	--	--	<0.02[c]	<0.05[c]	<0.05[c]	<0.05[c]
S-2(12/7/02)	Stemen	S-2	12/7/2002	2	--	--	--	<0.02[c]	0.055[c]	<0.05[c]	<0.05[c]
MTCA Cleanup Levels for Soil[1]					**2,000**	**2,000**	**100**	**0.03**	**7**	**6**	**9**

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Table 2
Soil Analytical Results for Total Petroleum Hydrocarbons
Former Olympia Dry Cleaners
606 Union Avenue Southeast
Olympia, Washington

Boring/Sample Location	Sampled By	Sample Identification	Sample Date	Sample Depth (feet bgs)	Analytical Results (milligrams per kilogram)						
					DRPH	ORPH	GRPH	Benzene	Toluene	Ethylbenzene	Total Xylenes
S-3(12/7/02)	Stemen	S-3	12/7/2002	2	--	--	--	<0.02[c]	0.053[c]	<0.05[c]	<0.05[c]
B01	SES	B01-04	5/15/2008	4	<50[f]	<250[f]	<20[f]	--	--	--	--
		B01-07		7	<50[f]	<250[f]	<20[f]	--	--	--	--
B03	SES	B03-03	5/15/2008	3	<50[f]	<250[f]	<20[f]	--	--	--	--
		B03-11		11	<50[f]	<250[f]	<20[f]	--	--	--	--
B05	SES	B05-03	7/9/2008	3	<50[f]	<250[f]	<20[f]	--	--	--	--
B10	SES	B10-02	7/10/2008	2	<50[f]	<250[f]	<20[f]	--	--	--	--
HB2	SES	HB2-00.75	7/10/2008	0.75	<50[f]	<250[f]	<20[f]	--	--	--	--
MTCA Cleanup Levels for Soil[1]					**2,000**	**2,000**	**100**	**0.03**	**7**	**6**	**9**

NOTES:

Red denotes concentration exceeds MTCA cleanup level.
[a]Analyzed by NWTPH Method NWTPH-Dx.
[b]Analyzed by NWTPH Method NWTPH-G.
[c]Analyzed by United States Environmental Protection Agency Modified Method 8010/8020.
[d]Analyzed by NWTPH Method NWTPH-Gx.
[e]Analyzed by United States Environmental Protection Agency Method 8021B.
[f]Analyzed by NWTPH Method NWTPH-HCID.
[1]MTCA Cleanup Regulation, Method A Cleanup Levels for Soil, Chapter 173-340 of the Washington Administrative Code (amended November 2007).

< = concentration not detected above the laboratory practical quantitation limit
-- = not analyzed
bgs = below ground surface
CONREX = CONREX Inc.
DRPH = diesel-range petroleum hydrocarbons
GRPH = gasoline-range petroleum hydrocarbons
NWTPH = Northwest Total Petroleum Hydrocarbon
MTCA = Washington State Model Toxics Control Act
ORPH = oil-range petroleum hydrocarbons
SES = Sound Environmental Strategies Corporation
Stemen = Stemen Environmental, Inc.

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Table 3
Reconnaissance Groundwater Analytical Results for Selected HVOCs
Former Olympia Dry Cleaners
606 Union Avenue Southeast
Olympia, Washington

Boring/Sample Location	Sampled By	Sample Identification	Sample Date	Sample Depth (feet bgs)	Analytical Results (micrograms per liter)					
					PCE	TCE	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,1-Dichloroethene	Vinyl Chloride
Borehole B	CONREX	Water #1	5/19/1995	1	<5[a]	1,810[a]	2,680[a]		<1[a]	NA
BH-1	CONREX	BH-1 @ 3'	5/26/1995	3	4[a]	3[a]	6[a]		<1[a]	NA
BH-3	CONREX	BH-3 @ 5'	5/26/1995	5	68[a]	8[a]	7[a]		<1[a]	NA
BH-5	CONREX	BH-5 @ 6'	5/26/1995	6	<1[a]	<1[a]	<1[a]	<1[a]	<1[a]	NA
BH -6	CONREX	BH-6 @ 6'	5/26/1995	6	41,300[a]	3,680[a]	4,340[a]		<1[a]	NA
S-2(4/9/01)	Stemen	S-2-W	4/9/2001	NR	10,000E[b]	1,150[b]	4,550[b]	104[b]	<1[b]	830[b]
S-9	Stemen	S-9-W	4/9/2001	4[b]	<1[b]	2.7[b]	1,420[b]	2.0[b]	<1[b]	640[b]
S-11	Stemen	S-11-W	4/9/2001	4[b]	2.1[b]	<1[b]	2.6[b]	<1[b]	<1[b]	<1[b]
S-12	Stemen	S-12-W	5/1/2001	9[b]	105[b]	79[b]	157[b]	1.7[b]	5.9[b]	1,700[b]
S-13	Stemen	S-13-W	5/1/2001	4[b]	72[b]	45[b]	188[b]	1.7[b]	3.1[b]	870[b]
S-14	Stemen	S-14-W	5/1/2001	NR	16[b]	1.1[b]	1.4[b]	<1[b]	<1[b]	113[b]
S1(7/18/01)	Stemen	S1-15	7/18/2001	15[b]	<1[b]	<1[b]	<5[b]	<5[b]	<5[b]	<5[b]
S2(7/18/01)	Stemen	S2-15	7/18/2001	15[b]	<1[b]	<1[b]	<5[b]	<5[b]	<5[b]	<5[b]
S3(7/18/01)	Stemen	S3-15	7/18/2001	15[b]	<1[b]	<1[b]	<5[b]	<5[b]	<5[b]	<5[b]
B01	SES	B01-GW-11/16	5/15/2008	13.5	<1[c]	<1[c]	<1[c]	<1[c]	<1[c]	<0.2[c]
B02	SES	B02-GW-15/20	5/15/2008	17.5	<1[c]	<1[c]	<1[c]	<1[c]	<1[c]	<0.2[c]
B03	SES	B03-GW-15/20	5/15/2008	17.5	<1[c]	<1[c]	<1[c]	<1[c]	<1[c]	<0.2[c]
B05	SES	B05-20080709-8-11	7/9/2008	9.5	1,800[c]	64[c]	31[c]	<20[c]	<1[c]	14[c]
B06	SES	B06-20080709-5-8	7/9/2008	6.5	1.1[c]	2.9[c]	87[c]	<1[c]	<1[c]	35[c]
B07	SES	B07-20080709-5-8	7/9/2008	6.5	39[c]	140[c]	490[c]	3.3[c]	<1[c]	47[c]
B08	SES	B08-20080709-5-8	7/9/2008	6.5	<1[c]	<1[c]	<1[c]	<1[c]	<1[c]	1.0[c]
B09	SES	B09-20080709-6-9	7/9/2008	7.5	<1[c]	<1[c]	<1[c]	<1[c]	<1[c]	<0.2[c]
B10	SES	10-20080710-1.5/4.5	7/10/2008	3	9,400[c]	2,000[c]	4,500[c]	12[c]	8[c]	880[c]
B12	SES	12-20080710-5.5/8.5	7/10/2008	7	12[c]	<1[c]	<1[c]	<1[c]	<1[c]	<0.2[c]
B17/MW12	SES	B17-20080806-18	8/6/2008	18	7.2[c]	1.2[c]	11[c]	<1[c]	<1[c]	2.1[c]
		B17-20080806-28		28	14[c]	2.3[c]	23[c]	<1[c]	<1[c]	5.7[c]
		B17-20080806-38		38	6.8[c]	1.2[c]	13[c]	<1[c]	<1[c]	2.6[c]
B18	SES	B18-20081105-5.5-8.5	11/5/2008	7	<1[c]	1.4[c]	12.7[c]	<1[c]	<1[c]	2.5[c]
B19	SES	B19-20081105-4-7	11/5/2008	3.5	<1[c]	<1[c]	<1[c]	<1[c]	<1[c]	0.42[c]
MTCA Cleanup Levels for Groundwater					**5[d]**	**5[d]**	**80[e]**	**160[e]**	**400[e]**	**0.2[d]**

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Table 3
Reconnaissance Groundwater Analytical Results for Selected HVOCs
Former Olympia Dry Cleaners
606 Union Avenue Southeast
Olympia, Washington

Boring/Sample Location	Sampled By	Sample Identification	Sample Date	Sample Depth (feet bgs)	Analytical Results (micrograms per liter) PCE	TCE	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,1-Dichloroethene	Vinyl Chloride
B20	SES	B20-20081105-7-10	11/5/2008	8.5	<1[c]	<1[c]	<1[c]	<1[c]	<1[c]	<0.2[c]
B21/MW13	SES	B21-20081106-16-19	11/6/2008	18	<1[g]	<1[g]	<1[g]	<1[g]	<1[g]	<0.2[g]
		B21-20081106-26.5-29.5		28	<1[g]	<1[g]	<1[g]	<1[g]	<1[g]	<0.2[g]
		B21-20081106-36.5-39.5		38	<1[g]	<1[g]	<1[g]	<1[g]	<1[g]	<0.2[g]
B22/MW14	SES	B22-20081107-3-4.5	11/7/2008	3.75	<1[g]	1.5[g]	18[g]	<1[g]	<1[g]	**2.7**[g]
MTCA Cleanup Levels for Groundwater					**5[d]**	**5[d]**	**80[e]**	**160[e]**	**400[e]**	**0.2[d]**

NOTES:

Red denotes concentration exceeds MTCA cleanup level.

[a]Analyzed by EPA Modified Method 8010/8020.

[b]Analyzed by EPA Method 8021B.

[c]Analyzed by EPA Method 8260B.

[d]MTCA Cleanup Regulation, Method A Cleanup Levels for Groundwater, Chapter 173-340 of the Washington Administrative Code (amended November 2007).

[e]CLARC, Groundwater, Method B, Non-Carcinogen, Standard Formula Value, CLARC website <https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx>.

< = concentration not detected above the laboratory practical quantitation limit
bgs = below ground surface
CLARC = Cleanup Levels and Risk Calculations
CONREX = CONREX Inc.
EPA = United States Environmental Protection Agency
EPA = United States Environmental Protection Agency
HVOCs = halogenated volatile organic compounds
MTCA = Washington State Model Toxics Control Act
NR = not reported
PCE = tetrachloroethene
SES = Sound Environmental Strategies Corporation
Stemen = Stemen Environmental, Inc.
TCE = trichloroethene

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Table 4
Reconnaissance Groundwater Analytical Results for Total Petroleum Hydrocarbons
Former Olympia Dry Cleaners
606 Union Avenue Southeast
Olympia, Washington

Boring/Sample Location	Sampled By	Sample Identification	Sample Date	Sample Depth (feet bgs)	Analytical Results (micrograms per liter)						
					DRPH	ORPH	GRPH	Benzene	Toluene	Ethylbenzene	Total Xylenes
Borehole B	CONREX	Water #1	5/19/1995	1	<100[a]	**2,700,000**[a]	<100[b]	<1[c]	2.4[c]	<1[c]	2.3[c]
BH #1	CONREX	BH-1 @ 3'	5/26/1995	3	<20[a]	<20[a]	<10[b]	<1[c]	<1[c]	<1[c]	<1[c]
BH #3	CONREX	BH-3 @ 5'	5/26/1995	5	<20[a]	**24,700**[a]	<10[b]	<1[c]	<1[c]	<1[c]	<1[c]
BH #5	CONREX	BH-5 @ 6'	5/26/1995	6	<20[a]	<20[a]	<10[b]	<1[c]	<1[c]	<1[c]	<1[c]
BH #6	CONREX	BH-6 @ 6'	5/26/1995	6	<20[a]	**11,100**[a]	**29,000**[b]	<1[c]	<1[c]	<1[c]	<1[c]
S-2(4/9/01)	Stemen	S-2-W	4/9/2001	NR	**5,000**[a]	<400[a]	--	<1[c]	<1[c]	<1[c]	<1[c]
S-9	Stemen	S-9-W	4/9/2001	4	--	--	--	<1[d]	<1[d]	<1[d]	<1[d]
S-11	Stemen	S-11-W	4/9/2001	4	--	--	--	<1[d]	<1[d]	<1[d]	<1[d]
S1(7/18/01)	Stemen	S1-15	7/18/2001	15	<200[a]	<500[a]	--	<1[d]	<1[d]	<1[d]	<1[d]
S2(7/18/01)	Stemen	S2-15	7/18/2001	15	<200[a]	<500[a]	--	<1[d]	<1[d]	<1[d]	<1[d]
S3(7/18/01)	Stemen	S3-15	7/18/2001	15	<200[a]	<500[a]	--	<1[d]	<1[d]	<1[d]	<1[d]
B01	SES	B01-GW-11/16	5/15/2008	13.5	<500[e]	<500[e]	<200[e]	--	--	--	--
B03	SES	B03-GW-15/20	5/15/2008	17.5	<500[e]	<500[e]	<200[e]	--	--	--	--
B05	SES	B05-20087009-8-11	7/9/2008	9.5	<500[e]	<500[e]	<200[e]	--	--	--	--
B10	SES	10-20087010-1.5/4.5	7/10/2008	3	<500[e]	<500[e]	<200[e]	--	--	--	--
MTCA Cleanup Levels for Groundwater[1]					**500**	**500**	**800**	**5**	**1,000**	**700**	**1,000**

NOTES:

Red denotes concentration exceeds MTCA cleanup level.

[a]Analyzed by NWTPH Method NWTPH-Dx.

[b]Analyzed by NWTPH Method NWTPH-G.

[c]Analyzed by United States Environmental Protection Agency Modified Method 8010/8020.

[d]Analyzed by United States Environmental Protection Agency Method 8021B.

[e]Analyzed by NWTPH Method NWTPH-HCID.

[1]MTCA Cleanup Regulation, Method A Cleanup Levels for Groundwater, Chapter 173-340 of the Washington Administrative Code (amended November 2007).

< = concentration not detected above the laboratory practical quantitation limit

-- = not analyzed

bgs = below ground surface

CONREX = CONREX Inc.

DRPH = diesel-range petroleum hydrocarbons

GRPH = gasoline-range petroleum hydrocarbons

MTCA = Washington State Model Toxics Control Act

NR = not reported

NWTPH = Northwest Total Petroleum Hydrocarbon

ORPH = oil-range petroleum hydrocarbons

SES = Sound Environmental Strategies Corporation

Stemen = Stemen Environmental, Inc.

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Table 5
Groundwater Analytical Results for Selected HVOCs
Former Olympia Dry Cleaners
606 Union Avenue Southeast
Olympia, Washington

Well Location	Sampled By	Sample Identification	Sample Date	Sample Depth (feet below well casing)	Analytical Results (micrograms per liter) PCE	TCE	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,1-Dichloroethene	Vinyl Chloride
MW01	Stemen	MW-1	4/9/2001	NR	<1[a]	<1[a]	<1[a]	<1[a]	<1[a]	<5[a]
			10/1/2002		**5.7[a]**	<0.4[a]	<5[a]	<5[a]	<5[a]	<5[a]
			1/3/2003		<1[a]	<1[a]	<5[a]	<5[a]	<5[a]	<5[a]
			5/2/2003		<1[b]	<1[b]	<1[b]	<1[b]	<1[b]	<0.2[b]
			3/23/2004		<1[a]	<1[a]	<1[a]	<1[a]	<1[a]	<5[a]
			10/6/2005		ND	ND	ND	NA	NA	ND
	SES	MW01-20080813	8/13/2008	13	<1[b]	<1[b]	<1[b]	<1[b]	<1[b]	<0.2[b]
MW02 (Decommissioned due to Interim Remedial Action)	Stemen	MW-2	4/9/2001	NR	**52,000[a,c]**	**6,000[a]**	**9,700[a]**	**196[a]**	<1[a]	**1,100[a]**
			10/1/2002		**50,000[a]**	**4,500[a]**	**3,900[a]**	100[a]	<5[a]	**1,300[a]**
			1/3/2003		**65[a]**	**34[a]**	**810[a]**	<5[a]	<5[a]	**170[a]**
			5/2/2003		**15,000[b]**	**2,200[b]**	**2,800[b]**	<1[b]	<1[b]	**790[b]**
			3/23/2004		<1[a]	<1[a]	<1[a]	<1[a]	<1[a]	<5[a]
			10/6/2005		**4,400[a]**	**1,600[a]**	**4,300[a]**	NA	NA	**2,900[a]**
MW03	Stemen	MW-3-W	4/27/2001	NR	<1[a]	<1[a]	<1[a]	<1[a]	<1[a]	<5[a]
		MW-3	5/1/2001		4.4[a]	<1[a]	<1[a]	<1[a]	<1[a]	<5[a]
			10/1/2002		**31[a]**	3.6[a]	<5[a]	<5[a]	<5[a]	<5[a]
			1/3/2003		**12[a]**	<1[a]	<5[a]	<5[a]	<5[a]	<5[a]
			5/2/2003		<1[b]	<1[b]	<1[b]	<1[b]	<1[b]	<0.2[b]
			3/23/2004		<1[a]	<1[a]	<1[a]	<1[a]	<1[a]	<5[a]
			10/6/2005		ND	ND	ND	NA	NA	ND
	SES	MW03-20080813	8/13/2008	5	<1[b]	<1[b]	<1[b]	<1[b]	<1[b]	<0.2[b]
MW04	Stemen	MW4	10/1/2002	NR	4.8[a]	**26[a]**	<5[a]	<5[a]	<5[a]	<5[a]
			1/3/2003		<1[a]	<1[a]	<5[a]	<5[a]	<5[a]	<5[a]
			5/2/2003		<1[b]	<1[b]	<1[b]	<1[b]	<1[b]	<0.2[b]
			3/23/2004		<1[a]	<1[a]	<1[a]	<1[a]	<1[a]	<5[a]
			10/6/2005		0.66	ND	ND	NA	NA	ND
	SES	MW04-20080813	8/13/2008	10	<1[b]	<1[b]	<1[b]	<1[b]	<1[b]	<0.2[b]
MW05 (Decommissioned due to Interim Remedial Action)	Stemen	MW5	10/1/2002	NR	2.9[a]	<0.4[a]	<5[a]	<5[a]	<5[a]	<5[a]
			1/3/2003		<1[a]	<1[a]	<5[a]	<5[a]	<5[a]	<5[a]
			5/2/2003		<1[b]	<1[b]	<1[b]	<1[b]	<1[b]	<0.2[b]
			3/23/2004		**120[a]**	**12[a]**	**990[a]**	13[a]	<1[a]	**380[a]**
			10/6/2005		0.77	ND	ND	NA	NA	ND
MTCA Cleanup Levels for Groundwater					**5[e]**	**5[e]**	**80[f]**	**160[f]**	**400[f]**	**0.2[e]**

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Table 5
Groundwater Analytical Results for Selected HVOCs
Former Olympia Dry Cleaners
606 Union Avenue Southeast
Olympia, Washington

Well Location	Sampled By	Sample Identification	Sample Date	Sample Depth (feet below well casing)	Analytical Results (micrograms per liter) PCE	TCE	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,1-Dichloroethene	Vinyl Chloride
MW06	Stemen	MW6	10/1/2002	NR	<0.4[a]	<0.4[a]	<5[a]	<5[a]	<5[a]	<5[a]
			1/3/2003		<1[a]	<1[a]	<5[a]	<5[a]	<5[a]	<5[a]
			5/2/2003		<1[b]	<1[b]	<1[b]	<1[b]	<1[b]	<0.2[b]
			3/23/2004		<1[a]	<1[a]	<1[a]	<1[a]	<1[a]	<5[a]
			10/6/2005		ND	ND	ND	NA	NA	ND
	SES	MW06-20080813	8/13/2008	14	<1[b]	<1[b]	<1[b]	<1[b]	<1[b]	<0.2[b]
MW07	Stemen	MW7	10/1/2002	NR	<0.4a	<0.4a	<5[a]	<5[a]	<5[a]	<5[a]
		MW-7	1/3/2003		<1[a]	<1[a]	<5[a]	<5[a]	<5[a]	<5[a]
			5/2/2003		<1[b]	<1[b]	<1[b]	<1[b]	<1[b]	<0.2[b]
			3/23/2004		**4,700[a]**	<1[a]	<1[a]	<1[a]	<1[a]	<5[a]
			10/6/2005		ND	ND	ND	NA	NA	ND
	SES	MW07-20070319	3/19/2007		<1[b]	<1[b]	<1[b]	<1[b]	<1[b]	<0.2[b]
		MW07-20080813	8/13/2008	15	<1[b]	<1[b]	<1[b]	<1[b]	<1[b]	<0.2[b]
MW08	SES	MW08-20080813	8/13/2008	7	<1[b]	<1[b]	<1[b]	<1[b]	<1[b]	<0.2[b]
MW09	SES	MW09-20080813	8/13/2008	4	<1[b]	1.8[b]	14[b]	<1[b]	<1[b]	**2.0[b]**
MW10	SES	MW10-20080813	8/13/2008	7	**360[b]**	**120[b]**	**250[b]**	1[b]	1.9[b]	**190[b]**
MW11	SES	MW11-20080813	8/13/2008	8	<1[b]	<1[b]	<1[b]	<1[b]	<1[b]	<0.2[b]
MW12	SES	MW12-20080813	8/13/2008	47	<1[b]	<1[b]	<1[b]	<1[b]	<1[b]	<0.2[b]
MW13	SES	MW13-20081112	11/12/2008	7	<1[b]	<1[b]	<1[b]	<1[b]	<1[b]	<0.2[b]
MW14	SES	MW14-20081112	11/12/2008	11	**10[b]**	4.1[b]	7.7[b]	<1[b]	<1[b]	**0.73[b]**
Artesian Supply Well	CONREX	Artesian	5/26/1995	NR	<1[d]	<1[d]	<1[d]	<1[d]	<1[d]	NA
	SES	Supply Well-20070315	3/15/2007		<1[b]	<1[b]	<1[b]	<1[b]	<1[b]	<0.2[b]
		SW-20070328	3/28/2007		<1[b]	<1[b]	<1[b]	<1[b]	<1[b]	<0.2[b]
		Supply Well-20081021	10/21/2008		<1[b]	<1[b]	<1[b]	<1[b]	<1[b]	<0.2[b]
MTCA Cleanup Levels for Groundwater					**5[e]**	**5[e]**	**80[f]**	**160[f]**	**400[f]**	**0.2[e]**

NOTES:

Red denotes concentration exceeds MTCA cleanup level.

[a]Analyzed by EPA Method 8021B

[b]Analyzed by EPA Method 8260B.

[c]Indicates estimated concentration above linear range.

[a]Analyzed by EPA Modified Method 8010/8020.

[e]MTCA Cleanup Regulation, Method A Cleanup Levels for Groundwater, Chapter 173-340 of the Washington Administrative Code (amended November 2007).

[e]CLARC, Groundwater, Method B, Non-Carcinogen, Standard Formula Value, CLARC website <https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx>.

< = concentration not detected above the laboratory PQL

-- = not sampled

CLARC = Cleanup Levels and Risk Calculations

EPA =United States Environmental Protection Agency

HVOCs = halogenated volatile organic compounds

MTCA = Washington State Department of Ecology Model Toxics Control Act

NA = not available

ND = not detected above the laboratory PQL; PQL not available

NR = not reported

PCE = tetrachloroethene

SES = Sound Environmental Strategies Corporation

Stemen = Stemen Environmental, Inc.

TCE = trichloroethene

PQL = practical quantitation limit

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Table 6
Groundwater Analytical Results for Total Petroleum Hydrocarbons
Former Olympia Dry Cleaners
606 Union Avenue Southeast
Olympia, Washington

Well Location	Sampled By	Sample Identification	Sample Date	Sample Depth (feet below well casing)	Analytical Results (micrograms per liter) DRPH	ORPH	Benzene	Toluene	Ethyl-Benzene	Total Xylenes
MW01	Stemen	MW-1	4/09/2001	NR	--	--	<1[a]	<1[a]	<1[a]	<1[a]
		MW1	10/01/2002		--	--	<0.4[a]	<1[a]	<1[a]	<1[a]
		MW-1	1/3/2003		--	--	<1[a]	<1[a]	<1[a]	<1[a]
			5/2/2003		--	--	<1[b]	<1[b]	<1[b]	<1[b]
			3/23/2004		--	--	<1[a]	<1[a]	<1[a]	<1[a]
MW02 (Decommissioned due to Interim Remedial Action)	Stemen	MW-2	4/09/2001	NR	<200[c]	<400[c]	<1[a]	10.7[a]	<1[a]	<1[a]
		MW2	10/01/2002		--	--	<0.4[a]	<1[a]	<1[a]	<1[a]
		MW-2	1/3/2003		--	--	<1[a]	<1[a]	<1[a]	<1[a]
			5/2/2003		--	--	<1[b]	<1[b]	<1[b]	<1[b]
			3/23/2004		--	--	<1[a]	<1[a]	<1[a]	<1[a]
MW03	Stemen	MW-3-W	4/27/07	NR	--	--	<1[a]	<1[a]	<1[a]	<1[a]
		MW-3	5/2/2001		--	--	<1[a]	<1[a]	<1[a]	<1[a]
		MW3	10/01/2002		--	--	<0.4[a]	<1[a]	<1[a]	<1[a]
		MW-3	1/3/2003		--	--	<1[a]	<1[a]	<1[a]	<1[a]
			5/2/2003		--	--	<1[b]	<1[b]	<1[b]	<1[b]
			3/23/2004		--	--	<1[a]	<1[a]	<1[a]	<1[a]
MW04	Stemen	MW4	10/01/2002	NR	--	--	<0.4[a]	<1[a]	<1[a]	<1[a]
		MW-4	1/3/2003		--	--	<1[a]	<1[a]	<1[a]	<1[a]
			5/2/2003		--	--	<1[b]	<1[b]	<1[b]	<1[b]
			3/23/2004		--	--	<1[a]	<1[a]	<1[a]	<1[a]
MW05 (Decommissioned due to Interim Remedial Action)	Stemen	MW5	10/01/2002	NR	--	--	<0.4[a]	<1[a]	<1[a]	<1[a]
		MW-5	1/3/2003		--	--	<1[a]	<1[a]	<1[a]	<1[a]
			5/2/2003		--	--	<1[b]	<1[b]	<1[b]	<1[b]
			3/23/2004		--	--	<1[a]	<1[a]	<1[a]	<1[a]
MTCA Cleanup Levels for Groundwater[1]					**500**	**500**	**5**	**1,000**	**700**	**1,000**

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Table 6
Groundwater Analytical Results for Total Petroleum Hydrocarbons
Former Olympia Dry Cleaners
606 Union Avenue Southeast
Olympia, Washington

Well Location	Sampled By	Sample Identification	Sample Date	Sample Depth (feet below well casing)	Analytical Results (micrograms per liter) DRPH	ORPH	Benzene	Toluene	Ethyl-Benzene	Total Xylenes
MW06	Stemen	MW6	10/01/2002	NR	--	--	<0.4[a]	<1[a]	<1[a]	<1[a]
		MW-6	1/3/2003		--	--	<1[a]	<1[a]	<1[a]	<1[a]
			5/2/2003		--	--	<1[b]	<1[b]	<1[b]	<1[b]
			3/23/2004		--	--	<1[a]	<1[a]	<1[a]	<1[a]
MW07	Stemen	MW7	10/01/2002	NR	--	--	<0.4[a]	<1[a]	<1[a]	<1[a]
		MW-7	1/3/2003		--	--	<1[a]	<1[a]	<1[a]	<1[a]
			5/2/2003		--	--	<1[b]	<1[b]	<1[b]	<1[b]
			3/23/2004		--	--	<1[a]	2.0[a]	<1[a]	<1[a]
Artesian Supply Well	CONREX	Artesian	5/26/1995	NR	<400[c]	<400[c]	<1[d]	<1[d]	<1[d]	<1[d]
MTCA Cleanup Levels for Groundwater[1]					**500**	**500**	**5**	**1,000**	**700**	**1,000**

NOTES:

[a]Analyzed by EPA Method 8021B.

[b]Analyzed by EPA Method 8260B.

[c]Analyzed by Northwest Method NWTPH-Dx.

[d]Analyzed by United States Environmental Protection Agency Modified Method 8010/8020.

[1]MTCA Cleanup Regulation, Method A Cleanup Levels for Groundwater, Chapter 173-340 of the Washington Administrative Code (amended November 2007).

practical quantitation limit

-- = not analyzed

DRPH = diesel-range petroleum hydrocarbons

EPA =United States Environmental Protection Agency

MTCA = Washington State Model Toxics Control Act

NR = not reported

ORPH = oil-range petroleum hydrocarbons

Stemen = Stemen Environmental, Inc.

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Table 7
Reconnaissance Surface Water Analytical Results for Selected HVOCs
Former Olympia Dry Cleaners
606 Union Avenue Southeast
Olympia, Washington

Boring/Sample Location	Sampled By	Sample Identification	Sample Date	Sample Depth (feet bgs)	Analytical Results (micrograms per liter)					
					PCE	TCE	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	1,1-Dichloroethene	Vinyl Chloride
DW-1	Stemen	DW-1	4/9/2001	0	**15.3**[a]	<1[a]	<1[a]	<1[a]	<1[a]	<5[a]
DW-2	Stemen	DW-2	4/9/2001	0	<1[a]	<1[a]	<1[a]	<1[a]	<1[a]	<5[a]
DW-3	Stemen	DW-3	4/9/2001	0	**3.9**[a]	1.0[a]	30.0[a]	<1[a]	<1[a]	<5[a]
S-10	Stemen	S-10-W	4/9/2001	0	**990**[a]	**280**[a]	2,890[a]	7.7[a]	4.4[a]	**374**[a]
ODC Building	Stemen	IFD	5/1/2001	0	**280,000**[a]	**640**[a]	61[a]	79[a]	230[a]	<5[a]
Street	Stemen	Cherry S.W.	5/1/2001	0	**2.7**[a]	1.1[a]	6.6[a]	<1[a]	<1[a]	<5[a]
Cooling Water Effluent	Stemen	CW	5/2/2003	0	<1[b]	<1[b]	<1[b]	<1[b]	<1[b]	<0.2[b]
Seep	SES	Seep-20070130	1/30/2007	0	**900**[b]	**980**[b]	3,100[b]	<200[b]	<200[b]	**170**[b]
		Seep-20070224	2/24/2007		**280**[b]	**270**[b]	770[b]	<100[b]	<100[b]	**38**[b]
		Seep-20070312	3/12/2007		**300**[b]	**280**[b]	790[b]	3.7[b]	<1[b]	<0.2[b]
		Seep-20080710	7/10/2008		**390**[b]	**580**[b]	2,500[b]	12[b]	2.6[b]	**190**[b]
Catch Basin (Excavation Area)	SES	CB-ODC	2/24/2007	0	<100[b]	<100[b]	<100[b]	<100[b]	<100[b]	<20[b]
Street - 1	Ecology	8424015	10/15/2008	0	<2.0	<1.0	<1.0	<1.0	<1.0	<1.0
Street - 2	Ecology	8424016	10/15/2008	0	<2.0	<1.0	<1.0	<1.0	<1.0	<1.0
MTCA Cleanup Levels for Surface Water[c]					**0.39**	**6.7**	**NE**	**33,000[d]**	**23,000[d]**	**3.7**

NOTES:

Red denotes concentration exceeds MTCA cleanup level.

[a]Analyzed by EPA Method 8021B.

[b]Analyzed by EPA Method 8260B.

[c]CLARC, Surface Water, Method B, Carcinogen, Standard Formula Value, CLARC website <https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx>.

[d]CLARC, Surface Water, Method B, Non-Carcinogen, Standard Formula Value, CLARC website <https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx>.

< = concentration not detected above the laboratory practical quantitation limit
bgs = below ground surface
CLARC = Cleanup Levels and Risk Calculations
Ecology = Washington State Department of Ecology
EPA =United States Environmental Protection Agency
HVOCs = halogenated volatile organic compounds
NE = cleanup level not established
ODC = Olympia Dry Cleaners
PCE = tetrachloroethene
SES = Sound Environmental Strategies Corporation
Stemen = Stemen Environmental, Inc.
TCE = trichloroethene

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Table 8
Reconnaissance Surface Water Analytical Results for Total Petroleum Hydrocarbons
Former Olympia Dry Cleaners
606 Union Avenue Southeast
Olympia, Washington

Boring/Sample Location	Sampled By	Sample Identification	Sample Date	Sample Depth (feet bgs)	Analytical Results (micrograms per liter)					
					DRPH	ORPH	Benzene	Toluene	Ethylbenzene	Total Xylenes
DW-1	Stemen	DW-1	4/9/2001	0	--	--	<1[a]	1.6[a]	<1[a]	<1[a]
DW-2	Stemen	DW-2	4/9/2001	0	--	--	<1[a]	<1[a]	<1[a]	<1[a]
DW-3	Stemen	DW-3	4/9/2001	0	--	--	<1[a]	<1[a]	<1[a]	<1[a]
S-10	Stemen	S-10-W	4/9/2001	0	<200[b]	19,000[b]	<1[a]	<1[a]	<1[a]	<1[a]
Cooling System Effluent	Stemen	CW	5/2/2003	0	--	--	<1[c]	<1[c]	<1[c]	<1[c]
Street - 1	Ecology	80424015	10/15/08	0	--	--	<1.0	<1.0	<1.0	<3.0
Street - 2	Ecology	80424016	10/15/08	0	--	--	<1.0	<1.0	<1.0	<3.0
MTCA Cleanup Levels for Surface Water					**NE**	**NE**	**23[d]**	**19,000[e]**	**6,900[e]**	**NE**

NOTES:

[a]Analyzed by United States Environmental Protection Agency Method 80:

[b]Analyzed by NWTPH Method NWTPH-Dx.

[c]Analyzed by United States Environmental Protection Agency Method 8260B.

[d]MTCA Cleanup Regulation, CLARC, Surface Water, Method B, Carcinogen, Standard Formula Value, CLARC website <https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx>.

[e]MTCA Cleanup Regulation, CLARC, Surface Water, Method B, Non-Carcinogen, Standard Formula Vale, CLARC website <https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx>.

< = concentration not detected above the laboratory practical quantitation limit
-- = not analyzed or not applicable
bgs = below ground surface
CLARC = Cleanup Levels and Risk Calculations
DRPH = diesel-range petroleum hydrocarbons
Ecology = Washington State Department of Ecology
GRPH = gasoline-range petroleum hydrocarbons
MTCA = Washington State Model Toxics Control Act
NE = cleanup level not established
NWTPH = Northwest Total Petroleum Hydrocarbon
ORPH = oil-range petroleum hydrocarbons
SES = Sound Environmental Strategies Corporation
Stemen = Stemen Environmental, Inc.

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Table 9
Summary of Potentiometric Surface Data
Former Olympia Dry Cleaners
606 Union Avenue Southeast
Olympia, Washington

Well Location	Date Measured	Well Casing Diameter (inches)	Screen Interval (approx. feet bgs)	Top of Well Casing Elevation[1] (feet)	Temporary Well Casing Riser Length (feet)	Top of Temporary Well Casing Riser Elevation[2] (feet)	Depth to Groundwater[3] (feet below well casing)	Potentiometric Surface[4] (feet)
MW01	08/13/08	0.75	8 to 18	31.44	--	--	6.14	25.30
	01/14/09	0.75	8 to 18	31.44	--	--	5.58	25.86
MW03	08/13/08	0.75	3 to 8	30.10	--	--	2.70	27.40
	01/14/09	0.75	3 to 8	30.10	--	--	2.84	27.26
MW04	08/13/08	0.75	5 to 15	26.03	--	--	1.33	24.70
	01/14/09	0.75	5 to 15	26.03	--	--	1.66	24.37
MW06	08/13/08	0.75	10 to 20	20.12	--	--	0.70	19.42
	01/14/09	0.75	10 to 20	20.12	--	--	0.83	19.29
MW07	08/13/08	0.75	12 to 22	29.82	--	--	0.64	29.18
	01/14/09	0.75	12 to 22	29.82	--	--	1.00	28.82
MW08	08/13/08	2.00	5 to 10	31.53	--	--	3.70	27.83
	01/14/09	2.00	5 to 10	31.53	--	--	3.80	27.73
MW09	08/13/08	2.00	3 to 6	30.56	--	--	3.78	26.78
	01/14/09	2.00	3 to 6	30.56	--	--	3.83	26.73
MW10	08/13/08	2.00	5 to 10	30.80	--	--	4.83	25.97
	01/14/09	2.00	5 to 10	30.80	--	--	4.61	26.19
MW11	08/13/08	2.00	5 to 10	24.66	5.13	29.79	5.30	24.49
	01/14/09	2.00	5 to 10	24.66	5.22	29.88	5.31	24.57
MW12	08/13/08	2.00	45 to 50	31.15	5.38	36.53	4.15	32.38
	01/14/09	2.00	45 to 50	31.15	5.38	36.53	4.51	32.02
MW13	11/12/08	2.00	4.5 to 9.5	26.38	--	--	0.20	26.18
	01/14/09	2.00	4.5 to 9.5	26.38	--	--	0.30	26.08
MW14[a]	11/12/08	2.00	9.3 to 14.3	26.00	5.35	31.35	3.47	22.86
	01/14/08	2.00	9.3 to 14.3	26.00	5.35	31.35	4.25	22.22

NOTES:

-- = not applicable

bgs = below ground surface

[1]Well top-of-casing elevations surveyed to mean sea level by ESM Consulting Engineers in August and November 2008.

[2]Top of temporary well casing riser elevation = top of well casing elevation + temporary well casing riser length.

[3]Depth to groundwater below the top of well casing or top of temporary well casing riser.

[4]Top of well casing elevation or top of temporary well casing riser elevation - depth to groundwater.

[a]Monitoring well installed at a 55 degree angle from ground surface. Potentiometric surface is approximated by multiplying the top of temporary well casing riser elevation - depth to groundwater by sin 55°.

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Table 10
Estimated Volume and Mass Calculations for PCE in Soil and Groundwater
Former Olympia Dry Cleaners
606 Union Avenue Southeast
Olympia, Washington

SOIL																		
PCE Concentrations in Soil Range	PCE Concentration (mg/kg)[1]	Area (square feet)[2]	Thickness (feet)[3]	Porosity[4]	Soil Volume Subtotal (cubic feet)	% of Total Volume Soil >0.05 mg/kg PCE	Total Volume Soil >0.05 mg/kg PCE (cubic feet)	Total Volume Soil >0.05 mg/kg PCE (bank cubic yards[5])	Total Volume Soil >0.05 mg/kg PCE (loose cubic yards)	Total Mass Soil >0.05 mg/kg PCE (tons)	Total Mass Soil >0.05 mg/kg PCE (pounds)	Soil Mass Total >0.05 mg/kg PCE (kilograms)	Soil Mass Subtotal >0.05 mg/kg PCE (kilograms)	PCE Mass Subtotal (milligrams)	PCE Mass Subtotal (kilograms)	PCE Mass Subtotal (pounds)	Total PCE Mass (pounds)	Notes
0.05 - 0.5 mg/kg	0.275	1,575	4.5	0.35	4,607	0.643	--	--	--	--	--	--	302,109	83,080	83	183	--	thickness averages 2' A-A' and 7' B-B'
0.5 - 5 mg/kg	2.75	910	4	0.35	2,366	0.330	--	--	--	--	--	--	155,157	426,682	427	940	--	thickness averages 2' A-A' and 6' B-B'
5 - 50 mg/kg	27.5	212	1.25	0.35	172	0.024	--	--	--	--	--	--	11,296	310,634	311	684	--	thickness averages 2.5' A-A' and 0' B-B'
>50 (to 100) mg/kg	75	29	1.25	0.35	24	0.003	--	--	--	--	--	--	1,545	115,888	116	255	--	96 mg/kg PCE highest detected concentration; thickness estimate not based on x-sections
Totals							7,169	266	345	518	1,035,477	470,107	--	--	--	--	2,062	

[1]Mean value within specified range of PCE concentrations
[2]Based on Figure 11 of draft RI Report; each value is sum of aerial calculation performed in AutoCAD and total area of any interior zone(s)
[3]Based on Figures 8 and 9 of draft RI Report; presents mean value of estimated averages for each cross-section (when available)
[4]Estimated average based on conventional default (0.35) adjusted upward for silt/clay content
[5]Bank cubic yards is the volumetric value of the soil in the ground that was naturally compacted. It is usually 20%-40% less than fluffed yard, or excavated cubic yards.

% = percent
> = greater than
µg/l = micrograms per liter
mg/kg = milligrams per kilogram
PCE = tetrachloroethene

GROUNDWATER															
PCE Concentrations in Groundwater Range	PCE Concentration (µg/L)[1]	Area (square feet)[2]	Thickness (feet)[3]	Porosity[4]	Groundwater Volume Subtotal (cubic feet)	% of Total Volume Groundwater >5 µg/L PCE	Total Volume Groundwater >5 µg/L PCE (cubic feet)	Total Volume Groundwater >5 µg/L PCE (gallons)	Total Volume Groundwater >5 µg/L PCE (liters)	Groundwater Volume Subtotal (liters)	PCE Mass Subtotal (micrograms)	PCE Mass Subtotal (grams)	PCE Mass Subtotal (pounds)	Total PCE Mass (pounds)	Notes
5 - 50 µg/L	27.5	3,053	7.5	0.35	8,014	0.672	--	--	--	226,894	6,239,593	6.2	0.01	--	thickness averages 7' A-A' and 8' B-B'
50 - 500 µg/L	275	1,696	3.5	0.35	2,078	0.174	--	--	--	58,821	16,175,664	16.2	0.03	--	thickness averages 3.5' A-A' and 3.5' B-B'
500 - 5,000 µg/L	2,750	618	6.5	0.35	1,406	0.118	--	--	--	39,805	109,463,682	109.5	0.22	--	thickness averages 6' A-A' and 7' B-B'
5,000 - 10,000 µg/L	7,500	240	5	0.35	420	0.035	--	--	--	11,891	89,182,170	89.2	0.18	--	9,400 µg/L PCE highest detected concentration (reconnaissance sample); thickness averages 2.5 A-A' and 7.5 B-B'
Totals							11,918	89,144	337,411	--	--	--	--	0.45	

[1]Mean value within specified range of PCE concentrations
[2]Based on Figure 13 of draft RI Report; calculations performed in AutoCAD
[3]Based on Figures 8 and 9 of draft RI Report; presents mean value of estimated averages for each cross-section; does not incorporate thickness of any interior zone(s)
[4]Estimated average based on conventional default (0.35) adjusted upward for silt/clay content

% = percent
> = greater than
µg/l = micrograms per liter
PCE = tetrachloroethene

Total mass of PCE in contaminated media at Site: $M_T = V(Ø_w)C + V(\rho_b)X + V(Ø_a)G$ +NAPL. Source: Kuo, J. 1999. Practical Design Calculations for Soil and Groundwater Remediation. Lewis Publishers, New York, New York. pp.48-50.

APPENDIX A
Investigation Reports by Others (Compact Disc)

Previous Investigation Reports

No.	Title	Prepared by	Date
1	*Phase II Environmental Site Assessment for the site located at: Olympia Dry Cleaners, 606 E. Union Ave., Olympia, Washington*	CONREX, Inc.	June 13, 1995
2	*Draft Remedial Investigations and Associated Interim Remedial/Corrective Actions Report*, *Former Olympia Dry Cleaners, 606 East Union Avenue, Olympia, Washington*	Stemen Environmental, Inc.	January 10, 2005
3	*Health Consultation, Evaluation of Follow-Up Indoor Air Sampling Results, (January-March 2007) at the Washington Traffic Safety Commission Offices, TMC CLEANERS (a/l/a Howard's Cleaners And Olympia Cleaners), Olympia, Thurston County, Washington, EPA Facility 10: WAH000017277*	United States Department of Health and Human Services	August 31, 2007
4	*Indoor Air Sampling Results, 1000 Cherry Street Southeast, Olympia, Washington*	Farallon Consulting, LLC	March 16, 2007

To be included in final document

APPENDIX B
Laboratory Analytical Reports

To be included in final document

APPENDIX C
Boring and Monitoring Well Logs

To be included in final document

APPENDIX D
Terrestrial Ecological Evaluation Form

To be included in final document