Remedial Investigation / Feasibility Study Report

Conducted on:
Lacey Urban Center
7131-7269 Martin Way East
Olympia, Washington 98516

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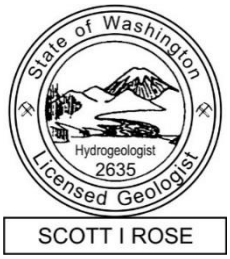

AEG Project #: 17-126
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1.0 INTRODUCTION

This report presents the findings of a Remedial Investigation and Feasibility Study (RI/FS) conducted by Associated Environmental Group, LLC (AEG) for the Lacey Urban Center property located at 7131-7269 Martin Way East, Olympia, Washington (Site). The purpose of this report is to document the completion of the RI and provide support for remedial actions proposed in the FS. The scope of work for this investigation was developed based on our professional judgment and experience in accordance with requirements in the Washington State Department of Ecology (Ecology) Model Toxics Control Act (MTCA) Cleanup Regulations (Chapter 173-340 WAC). The investigation was performed in general accordance with the American Society for Testing and Materials (ASTM) Standard E 1903-11, Standard Guide Environmental Site Assessments: Phase II Environmental Site Assessment Process.

1.1 *General Site Information*

Site Name: Lacey Urban Center
Site Address: 7131-7269 Martin Way East, Olympia, Washington 98516
Thurston County Parcel No.: 78801200000
Property Owner: Ms. Keum Woo

The *Lacey Urban Center* shopping center consists of four buildings, occupying one footprint with a total square footage of approximately 89,000 square feet, and the shopping center occupies a 4-acre area and multiple tax parcels. The building that housed the former dry cleaner from 1965 to 1997 is a slab-on-grade, single-story masonry building located in the western portion of the shopping center. Occupancy of the multi-tenant shopping center has primarily been for retail, office, and service tenants, and have included a bank, barber shop, post office, donut shop, drapery shop, hair salon, drug store, restaurants, shoe repair, floral and gift shops, nail shops, bakery, dentist, and chiropractic center.

The Site is located within a mixed commercial and residential area of Thurston County. The Site is bound to the north by Martin Way East with commercial properties beyond; to the east by Ranger Drive Southeast with commercial properties beyond; to the west by Tanglewilde Lumber; and to the south by residential single-family homes. Figure 1, *Vicinity Map*, presents the general layout of the Site vicinity. The Site's current layout can be seen in Figure 2, *Site Map*.

1.2 *Site History*

Based a Phase I Environmental Site Assessment (ESA) performed by Partner Engineering and Science, Inc. (Partner) in 2018, the Site was occupied by a dry-cleaning business from circa 1965 through approximately 1997. The dry-cleaning business occupied the southwestern corner of the

multi-tenant building. The Site was formerly served by an on-Site septic system, with the septic tank serving the dry-cleaning building. The tank was located adjacent to the south of the building and the leachfield was located adjacent to the west of the building.

1.3 *Site Use*

The Site is used as a multi-tenant shopping center, including retail, office, and service tenants. The former dry cleaner tenant space is currently used as a coin-operated laundromat.

2.0 FIELD INVESTIGATIONS

2.1 *Site Characterization History*

2.1.1 Phase I Environmental Site Assessment – Partner Engineering, July 2018

On July 3, 2018, a Phase I Environmental Site Assessment (ESA) was conducted on the Site and according to the study, Partner recommended the following:

- *Based on the duration of onsite dry cleaning operations (at least 15 years), the use of septic systems at the subject property prior to 1994, the lack of previous subsurface investigations, and the nature of dry cleaning chemicals, the former presence of the dry cleaning business is considered a recognized environmental condition. The study recommended a limited subsurface investigation.*

2.1.2 Phase II ESA – Envitechnology, Inc., July and August 2018

In July 2018, Envitechnology, Inc. (Envitech) conducted Site investigation activities on the Site to determine whether a release had occurred from the former dry-cleaning operation. These included advancing 18 soil borings (B-1 through B-18) both inside and outside the Site building. Soil samples were collected from all borings, soil gas samples were collected from 10 of the borings (B-1 through B-8, B-10, and B-11), and groundwater was encountered and sampled from one boring (B-14) at about 26 feet below ground surface (bgs). Analytical results indicated the presence of tetrachloroethylene (PCE) in select soil and soil gas samples above MTCA cleanup levels or screening levels.

Boring locations are illustrated on Figure 2, *Site Map*. Analytical results of the soil, groundwater, and soil gas samples are presented in Table 1, *Summary of Soil Analytical Results*, Table 2, *Summary of Groundwater Analytical Results*, and Table 4, *Summary of Soil Gas Analytical Results*, respectively.

2.1.3 Remedial Investigation – AEG, July and October 2020

In July 2020, AEG mobilized to the Site to collect additional data to fill in remaining data gaps from the work done by Envitech. AEG's scope of work included the following:

- Two borings (B-19 and B-20) were advanced inside the laundromat adjacent to Envitech borings B-3 and B-1, respectively, to define the vertical extent of tetrachloroethylene (PCE) in soil.
- Borings B-21, B-22, and B-23, and well boring MW-1, were advanced on the south and southwest sides of the building to laterally define the extent of PCE in soil.

- Three soil gas borings (SG-1, SG-2, and SG-3) were advanced west of the former leachfield to laterally define soil gas impacts in this area, and soil gas samples SG-4, SG-5, and SG-6 were collected from borings B-23, B-22, and B-21, respectively, on the south side of the building to laterally define soil gas impacts in this area.
- Three monitoring wells (MW-1, MW-2, and MW-3) were installed to determine potential impacts to shallow groundwater. Groundwater was encountered at about 31 feet bgs, and the wells were screened from 25 to 35 feet bgs.

All samples were submitted for analysis for PCE and daughter products. Analytical results for all constituents analyzed in soil, groundwater, and soil gas samples were either non-detect or were detected below their respective MTCA Method A cleanup levels or Method B sub-slab screening levels.

Boring/well locations are illustrated on Figure 2, *Site Map*. Analytical results of the soil, groundwater, and soil gas samples are presented in Table 1, *Summary of Soil Analytical Results*, Table 2, *Summary of Groundwater Analytical Results*, and Table 4, *Summary of Soil Gas Analytical Results*, respectively. Copies of the boring/well logs and laboratory datasheets are provided in Appendix B, Supporting Documents.

In October 2020, AEG returned to the Site to install two deep wells (MW-4 and MW-5) to account for the potential presence of dense non-aqueous phase liquid (DNAPL) that may not be detectable in shallow groundwater. Groundwater flow in the shallow groundwater was determined to be to the southwest, so the wells were installed on the south (MW-4) and west (MW-5) sides of the building. The well borings were advanced until a confining layer was encountered as PCE and its daughter products are heavier than water and tend to sink in the formation until reaching a confining layer that prevents further downward migration. A confining layer was encountered at about 75 to 80 feet bgs, and the wells were installed with 5 feet of screen. Soil samples collected and analyzed from the well borings were non-detect for all constituents.

During this time, AEG also completed a Tier II Vapor Assessment, which included sampling indoor air from two locations (Indoor-1 and Indoor-2), ambient air from one location outside and upwind (Ambient), and sub-slab vapor from two locations (SS-1 and SS-2). The assessment was done to determine if the PCE detected in the soil beneath the building is present and/or has to potential to migrate into the indoor air inside the Lacey Urban Center facility.

Analytical results indicated PCE and associated daughter products were non-detect in the indoor and ambient air samples submitted for analysis. However, PCE was detected above the MTCA Method B sub-slab screening level at both sampling locations (SS-1 and SS-2). All other daughter products were below the laboratory detection limits for each compound.

Well/sample locations are illustrated on Figure 2, *Site Map*. Analytical results of the soil, and air/sub-slab vapor samples are presented in Table 1, *Summary of Soil Analytical Results*, and Table 5, *Summary of Sub-Slab and Indoor Air Analytical Results*. Copies of the well logs and laboratory datasheets are provided in Appendix B, Supporting Documents.

2.1.4 Quarterly Groundwater Monitoring – AEG, July 2020 to January 2021

Beginning in July 2020 with the installation of MW-1 through MW-3, AEG has performed three rounds of groundwater monitoring at the Site. Deep monitoring wells MW-4 and MW-5 were included in the January 2021 event following installation in late October. PCE and daughter products have been either non-detect or below MTCA cleanup levels in all events to date. The analytical results are presented in Table 2, *Summary of Groundwater Analytical Results*.

2.2 *Field Methodology*

2.2.1 Soil Sampling Procedures

Soil sampling methods for this work followed the protocols established by Ecology and the U.S. Environmental Protection Agency (EPA). To minimize VOC losses, soil sampling for VOCs and field preservation methods followed methods set forth by EPA's Method 5035A and Ecology's guidance, "Collecting and Preparing Soil Samples for VOC Analysis". Soil samples were collected from the boreholes via continuous soil cores in an acetate sleeve inside the drilling rod's core barrel for direct-push borings, or via a split-spoon sampler advanced inside the augers for hollow-stem auger borings. Soils were observed to document soil lithology, color, moisture content, and sensory evidence of contamination.

Soil samples from each boring were transferred to laboratory provided pre-weighed 40-milliliter (ml) volatile organic analysis (VOA) glass vials. The soil samples were submitted for laboratory analysis to Libby Environmental (Libby), a Washington State-certified laboratory, following industry standard chain-of-custody procedures.

2.2.2 Soil Gas Sampling Procedures

Soil gas samples were collected from selected borings as follows: After reaching the desired depth, a Summa canister was attached to a retractable drilling rod end via post-run tubing, and vacated of one volume of interstitial air in the tubing for quality control. The tubing was connected to a 1-liter, 10-minute Summa canister. A water bath over hydrated bentonite seal was used to assure a tight seal and no leaking.

2.2.3 Indoor Air and Sub-Slab Vapor Sampling Procedures

Indoor air and ambient background air samples were collected in accordance with Ecology's *Guidance for Evaluating Soil Vapor Intrusion in Washington State*. Samples were collected using 6-liter (L) Summa canisters with 8-hour inlet flow regulators, and placed within the breathing zone at about 4 to 6 feet above the ground surface. After placing the canisters at each sampling location, AEG opened the inlet valves, and returned at the end of the 8-hour event to close the canisters. Ambient background samples were placed upwind of on-Site source areas.

For sub-slab vapor samples, the concrete slab was drilled out to subgrade level to allow for sampling just below the slab (typically about 1 to 2 feet bgs). A tube was placed in the hole and sealed using a bentonite seal to the concrete. A water bath was used to check for leaks in the bentonite seal. Once no leaks were found, a 1-L Summa canister with a 10-minute regulator was opened after the tube was purged for one volume of air.

2.2.4 Well Construction

The five monitoring wells at the Site were constructed pursuant to Ecology's *Minimum Standards for Construction and Maintenance of Wells*, Chapter 173-160 WAC. Three groundwater monitoring wells at the Site (MW-1, MW-2, and MW-3) were constructed to a depth of 35 feet bgs, with 10 feet of 2-inch diameter 0.020-inch slotted PVC screen. Two groundwater monitoring wells at the Site (MW-4 and MW-5) were constructed to a depth of either 75 or 80 feet bgs, with 5 feet of 2-inch diameter 0.020-inch slotted PVC screen. The annular space around the well screen was filled with 10/20 Colorado sand to approximately 1.5 feet above the top of the well screen. To seal each well, bentonite chips were placed above the sand and a traffic-rated surface monument was placed over the well casing to protect it. The monitoring wells were properly developed after installation using high-flow pumping until turbidity decreased and stabilized.

2.2.5 Boring Groundwater and Monitoring Well Groundwater Sampling Procedures

AEG sampled the groundwater from each of the borings where groundwater was encountered. A temporary PVC well screen was installed in each boring to collect a groundwater sample immediately after reaching the total boring depth. The temporary well screen was placed at the interval below the vadose zone where groundwater was encountered during drilling activities. Dedicated polyethylene tubing was inserted into the retractable screen, and groundwater was then purged using a peristaltic pump until the discharge was relatively free of sediment, for sample collection via the EPA approved low-flow purge technique.

Groundwater monitoring wells were sampled via the low flow-purging technique, and purged until the field parameters, including pH, temperature, specific conductivity, dissolved oxygen, and/or total dissolved solids were stabilized, and the water was relatively free of sediment.

Groundwater samples were collected in laboratory provided 40-ml vials. Upon collection, the samples were placed in a chilled cooler for transport to Libby, in Olympia, Washington under strict chain of custody.

2.2.6 Quality Controls

To ensure that quality information was obtained at the Site:

- All samples were collected in general accordance with industry protocols for the collection, documentation, and handling of samples.
- Nitrile gloves were used in handling all sampling containers and sampling devices.
- Upon sampling, all soil vapor samples were placed into a cooler.
- The samples were transported under a chain-of-custody to the laboratory for analysis.

The laboratory provided standard quality assurance/quality control (QA/QC), which included:

- Surrogate recoveries for each sample.
- Method blank results.
- Duplicate analyses, matrix or blank spiked analyses.
- Duplicate spiked analyses.

2.2.7 Investigation-Derived Waste

Investigation-derived waste for this project consisted of soil cuttings and purge water from the subsurface exploration activities, and decontamination water from decontamination of the drilling core barrel and associated equipment. These wastes were separated and placed in Washington State Department of Transportation (DOT) approved 55-gallon drums. The drums were appropriately labelled and stored on Site for subsequent characterization and disposal.

2.3 *Analytical Results*

Soil, groundwater, soil gas, indoor air, and sub-slab vapor samples collected to date have been analyzed for the following analyses:

- Chlorinated VOCs using EPA Method 8260.
- PCE and its daughter products using EPA Method TO-15 SIM.

All analytical results were compared to MTCA Method A or B cleanup levels for soil, groundwater, and indoor air, and Method B sub-slab screening levels for soil gas and sub-slab vapor. Copies of the laboratory datasheets are provided in Appendix B, Supporting Documents, *Laboratory Datasheets*.

2.3.1 Soil Results

PCE was detected above the MTCA Method A cleanup level of 0.05 milligrams per kilogram (mg/kg) in selected soil samples collected by Envitech. Exceedances were present in borings B-1, B-3, B-5, B-9, and B-12 at concentrations ranging from 0.06 to 0.25 mg/kg. No other chlorinated VOCs were detected in any of the other soil samples. Table 1, *Summary of Soil Analytical Results*, presents analytical results as compared to MTCA cleanup levels for soil. The distribution of soil concentrations in excess of MTCA Method A cleanup levels is illustrated in plan view on Figure 3, *PCE Concentrations in Soil Map*, and in cross section on Figure 6, *Geologic Cross Section A-A'*, Figure 7, *Geologic Cross Section B-B'*, and Figure 8, *Geologic Cross Section C-C'*.

2.3.2 Groundwater Results

PCE was not detected above MTCA cleanup levels in any groundwater samples submitted for analysis to date from shallow borings/wells or deep wells. No other chlorinated VOCs were detected in any of the other groundwater samples. Table 3, *Summary of Groundwater Analytical Results*, presents the analytical results as compared to MTCA cleanup levels for groundwater.

2.3.3 Soil Gas Results

Analytical results of soil gas samples collected by Envitech indicated the presence of PCE at concentrations above the MTCA Method B sub-slab screening level of 321 micrograms per cubic meter (µg/m^3) in selected samples ranging from 350 to 1,800 µg/m^3. Analytical results of remaining soil gas samples collected by Envitech and AEG were either non-detect or detected at concentrations below their respective MTCA Method B sub-slab screening levels for the constituents analyzed. Table 4, *Summary of Soil Gas Analytical Results*, presents the analytical results as compared to MTCA Method B sub-slab screening levels for soil gas. The distribution of soil gas concentrations in excess of MTCA Method B sub-slab screening levels is illustrated on Figure 4, *PCE In Soil Vapor Plume Map*.

2.3.4 Sub-Slab Vapor and Indoor Air Results

Analytical results of the sub-slab vapor samples indicated the presence of PCE above the MTCA Method B sub-slab screening level of 321 µg/m^3 in vapor samples SS-1 and SS-2. Concentrations included 1,600 µg/m^3 (SS-1) and 410 µg/m^3 (SS-2). Both samples were from beneath the southern portion of the former dry-cleaning space. These results were included in the distribution of soil

gas concentrations in excess of MTCA Method B sub-slab screening levels illustrated on Figure 4, *PCE In Soil Vapor Plume Map*.

Analytical results of indoor and outdoor ambient air samples were all non-detect for the constituents analyzed.

Analytical results of all sub-slab vapor and indoor air samples collected from the Site to date are summarized in Table 5, *Summary of Sub-Slab Vapor & Indoor Air Analytical Results.* Copies of the laboratory datasheets are provided in Appendix B, Supporting Documents, *Laboratory Datasheets*.

3.0 CONCEPTUAL SITE MODEL (CSM)

This section provides a conceptual understanding of the Site, derived from the results of the subsurface investigations performed at the Site. The CSM is dynamic and may be refined as additional information becomes available.

3.1 *Constituents of Concern and Affected Media*

PCE and its anaerobic sequential degradation chain constituents, including trichloroethene (TCE), cis-1,2-dichloroethene (DCE), trans-1,2-DCE, and vinyl chloride, are the contaminants of concern (COCs) for the Site. Shallow soil and sub-slab soil vapor are the media affected. Groundwater was encountered at various depths from 30 to 33 feet bgs and did not contain VOCs above MTCA cleanup levels. Soil impacts at the Site are likely the result of use and storage of PCE formerly used in the former dry cleaner machine and dry-cleaning process.

PCE was the only COC detected in soil above MTCA cleanup levels. PCE was detected above the MTCA Method A cleanup level of 0.05 mg/kg in selected soil samples collected by Envitech. Exceedances were present in borings B-1, B-3, B-5, B-9, and B-12 at concentrations ranging from 0.06 to 0.25 mg/kg. No other chlorinated VOCs were detected in any of the other soil samples. The distribution of soil concentrations in excess of MTCA Method A cleanup levels is illustrated in plan view on Figure 3, *PCE Concentrations in Soil Map*, and in cross section on Figure 6, *Geologic Cross Section A-A'*, Figure 7, *Geologic Cross Section B-B'*, and Figure 8, *Geologic Cross Section C-C'*.

PCE was the only COC detected in soil gas and sub-slab vapor above MTCA screening levels. The distribution of soil gas and sub-slab vapor concentrations in excess of MTCA Method B sub-slab screening levels is illustrated on Figure 4, *PCE In Soil Vapor Plume Map*.

There was also a former septic sewer system identified and was likely used by the dry cleaner tenant space to suggest this as a preferential pathway, which would explain the limited impacts to the south and west of the building. The location of the septic sewer system layout is illustrated on Figure 2, *Site Map*.

AEG believes the Site has been sufficiently characterized to be able to establish cleanup standards and select a cleanup action for the Site. Remedial alternatives presented in the accompanying FS contemplate contamination in both accessible and inaccessible areas of the Site.

3.2 *Site Geology and Hydrogeology*

The Site is situated at the southern end of the Puget Sound Lowlands physiographic province of the State of Washington. During the Quaternary, the Puget Lowland was covered a number of times by continental ice sheets. The most recent glaciation (Fraser) reached its peak about 14,000 years ago. The uppermost geologic formation underlying the soils at the subject property parcel is Pleistocene continental glacial drift, mostly Vashon Shade recessional outwash. The unit consists mostly of recessional and proglacial stratified, moderately to well-rounded, poorly to moderately sorted outwash sand and gravel of northern or mixed northern and Cascade source.

According to the information obtained from the USDA Natural Resources Conservation Service Web Soil Survey online database, the Site is mapped as Spanaway gravelly sandy loam. The Spanaway series consists of deep and moderately deep, moderately well and well drained soils with moderately coarse textures that formed on outwash plains and terraces from volcanic ash over gravelly outwash of Pleistocene age. Slopes range from 0 to 3 percent.

Soils encountered at the Site during subsurface investigations generally consisted of silt with gravel to approximately 35 feet bgs, underlain by dense, sandy gravel with fine- to coarse-sized gravels, and cobbles to about 85 feet bgs. Groundwater at the time of drilling was encountered at various depths from 30 to 33 feet bgs. Depth to water measured in Site wells ranges from about 17 to 25 feet bgs. Groundwater flow direction is generally to the west-southwest and varies seasonally to the north. Lake Lois is located about 5,000 feet southwest of the Site.

Depth to water measurements for the shallow Site wells on July 30, 2020 ranged from 30 to 31 feet bgs, on October 16, 2020 ranged from 21.8 to 24.2 feet bgs, and on January 7, 2021 ranged from 17.44 to 20.89 feet bgs (Table 3, *Summary of Groundwater Elevations*). The groundwater flow direction for the July 2020 sampling event is primarily towards the southwest with an approximate gradient of 0.01 feet per foot (ft/ft) (Figure 9, *Groundwater Elevation Contour Map 07/30/2020*). The groundwater flow direction for the October 2020 sampling event is primarily towards the southwest with an approximate gradient of 0.02 ft/ft (Figure 10, *Groundwater Elevation Contour Map 10/16/2020*). The groundwater flow direction for the January 2021 sampling event is primarily towards the southwest with an approximate gradient of 0.03 ft/ft (Figure 11, *Groundwater Elevation Contour Map 01/07/2021*).

Depth to water measurements for the deep Site wells on January 7, 2021 ranged from 23.90 to 24.82 feet bgs (Table 3, *Summary of Groundwater Elevations*).

3.3 *Environmental Fate of Chlorinated Solvents in the Subsurface*

The density of PCE and its breakdown products is greater than water. Upon release into the environment, chlorinated VOCs can sink through the vadose zone, through the water table, and possibly penetrate leaking aquitards. These chemicals can also exist as a residual non-mobile phase either sorbed to the soil or trapped in the pore spaces between the soil particles. At this Site, residual dissolved-phase PCE, TCE, DCE, and vinyl chloride have not been detected in groundwater; however, sorbed-phase PCE has been detected in soil, and PCE is present in soil gas.

AEG advanced two deep wells on Site (MW-4 and MW-5) to the first-encountered confining layer (about 75-80 feet bgs) to investigate the potential presence of dense non-aqueous phase liquid (DNAPL). No DNAPL was detected.

Chlorinated VOCs and their associated compounds can be volatilized under the appropriate conditions. In the subsurface, volatilization releases COCs from soil and/or groundwater into soil vapor where, if conditions are right, can migrate beneath or into structures.

The most common anaerobic dechlorination pathway of PCE is the degradation to ethenes. In the sequential transformation of the chlorinated ethenes, chlorine is replaced using hydrogen as an electron donor. The occurrence of the lesser chlorinated ethenes (such as vinyl chloride and DCE) in groundwater is primarily a consequence of incomplete anaerobic reductive dechlorination of the more highly chlorinated ethenes (PCE and TCE). Vinyl chloride and DCE are toxic, and vinyl chloride is a known human carcinogen.

3.4 *Potential Exposure Pathways*

As defined in WAC 173-340-200, an exposure pathway describes the mechanism by which a hazardous substance takes or could take a pathway from a source or contaminated medium to an exposed receptor.

3.4.1 Potential Soil Exposure Pathways

Potentially complete soil exposure pathways at the Site include:

- Contact (dermal contact, incidental ingestion) with hazardous substances in soil by visitors, residents, and workers (including excavation workers). Direct ingestion of, or dermal contact with, soil containing PCE is considered a potential exposure pathway. However, impacted areas are currently covered by the building or asphalt cover, and unless disturbed, are not available for potential direct contact or ingestion. Soil impacts have been documented at and below 2 feet bgs.

3.4.2 Potential Groundwater Exposure Pathways

Potentially complete groundwater exposure pathways at the Site include:

- Contact (dermal, incidental ingestion) with hazardous substances dissolved in groundwater by visitors, residents, and workers (including excavation workers). Groundwater in Site borings and completed monitoring wells was measured at depths ranging from about 25 to 33 feet bgs. This is below the direct contact point of compliance of 15 feet. Therefore, direct contact with potentially impacted groundwater is not considered a potentially complete pathway.
- Consumption of hazardous substances in groundwater. Currently, drinking water is provided by the city. In addition, no Site COCs have been detected in groundwater above MTCA cleanup levels. As such, consumption of hazardous substances in groundwater is not considered a completed pathway.

3.4.3 Potential Air Exposure Pathways

Potentially complete air exposure pathways include:

- Inhalation of hazardous substances in soil vapor by visitors, residents, and workers (including excavation workers). Analytical results of the soil gas and sub-slab vapor samples indicated the presence of PCE above the MTCA Method B screening level for sub-slab vapor. However, PCE and daughter products were below the MTCA Method B Indoor Air screening level in the two indoor air sampling events. An exceedance of the MTCA Method B sub-slab screening levels indicates that particular constituent is present at a concentration that has the potential to migrate into indoor air. For the purpose of this CSM and establishing cleanup standards, this pathway is considered potentially complete.

3.4.4 Terrestrial Ecological Evaluation

This Site qualifies for an exclusion from further terrestrial ecological evaluation based on the following:

- Barriers to Exposure: WAC 173-340-7491(1)(b): All contaminated soil, is or will be, covered by physical barriers (such as buildings or paved roads) that prevent exposure to plants and wildlife, and institutional controls are used to manage remaining contamination.
- Undeveloped Land: WAC 173-340-7491(1)(c): There is less than 1.5 acres of contiguous undeveloped land on or within 500 feet of any area of the Site.

A Terrestrial Ecological Evaluation Form is included in Appendix B.

4.0 CLEANUP STANDARDS

The following sections identify applicable or relevant and appropriate requirements (ARARs), remedial action objectives (RAOs), and preliminary cleanup standards for the Site, which were developed to address Ecology's requirements for cleanup. These requirements address conditions relative to potential identified impacts. Together, ARARs, RAOs, and cleanup standards provide the framework for evaluating remedial alternatives.

4.1 *Potentially Applicable Laws*

All cleanup actions conducted under MTCA shall comply with applicable state and federal laws [WAC 173-340-710(1)]. MTCA defines applicable state and federal laws to include legally applicable requirements and those requirements that are relevant and appropriate. Collectively, these requirements are referred to as ARARs. The primary ARAR is the MTCA regulation (WAC 173-340), especially with regard to the development of cleanup levels and procedures for development and implementation of a cleanup under MTCA. ARARs for the Site cleanup also include the following:

- Federal Safe Drinking Water Act Maximum Contaminant Levels (MCLs; 40 CFR Part 141).
- Washington Clean Air Act (Chapter 70.94 RCW).
- Olympic Region Clean Air Agency (ORCAA), Regulation I.
- Washington Solid and Hazardous Waste Management (RCW 70.105); Chapter 173-303 WAC; 40 CFR 241, 257; Chapter 173-350 and 173-351 WAC) and Land Disposal Restrictions (40 CFR 268; WAC 173-303-340).
- Washington Industrial Safety and Health Act (RCW 49.17) and other Federal Occupational Safety and Health Act (29 CFR 1910, 1926).

4.2 *Remedial Action Objectives*

RAOs have been established for the Site to establish remedial alternatives protective of human health and the environment under the MTCA cleanup process (WAC 173-340-350). The primary RAO for this cleanup action focuses on substantially eliminating, reducing, and controlling unacceptable risks to human health and the environment posed by the COCs, to the greatest extent practicable.

RAOs are important for the evaluation of the general response actions, technologies, process options, and cleanup action alternatives. Based on the assessment of Site-specific conditions and the potentially applicable cleanup levels presented below, the RAOs for the Site have been established as follows:

- *In a reasonable restoration time frame, reduce concentrations of COCs in Site soils and soil vapors to levels protective of human health and the environment and which are protective of groundwater quality.*

4.3 *Cleanup Standards*

Cleanup standards include cleanup levels and points of compliance (POCs) as described in WAC 173-340-700 through WAC 173-340-760. Cleanup standards must also incorporate other state and federal regulatory requirements applicable.

4.3.1 Proposed Cleanup Levels

MTCA Method A cleanup levels for the soil exposure pathways are appropriate for this Site. MTCA Method B cleanup levels are appropriate for the air exposure pathway, and for constituents where MTCA Method A cleanup levels are not promulgated. These cleanup levels are based on the most stringent values for each exposure pathway and are considered appropriate for the Site COCs. Proposed MTCA cleanup levels for the Site COCs that have been measured in soil at the Site include:

Constituent	Soil	Groundwater	Indoor Air
• PCE	0.05 mg/kg	5 µg/L	9.62 µg/m^3*
• TCE	0.03 mg/kg	5 µg/L	0.37 µg/m^3*
• cis-1,2-DCE	160 mg/kg*	16 µg/L*	NL
• trans-1,2-DCE	1,600 mg/kg*	160 µg/L*	NL
• Vinyl Chloride	0.67 mg/kg*	0.2 µg/L	0.28 µg/m^3*

mg/kg = milligrams per kilogram
µg/m^3 = micrograms per cubic meter
NL = Not Listed; no cleanup/screening levels have been promulgated for these constituents
* Method B cleanup level (Method A cleanup level not established)

4.3.2 Points of Compliance

For this Site, it is assumed that standard points of compliance will be used.

- Soil – Direct Contact: For soil cleanup levels based on human exposure via direct contact, the point of compliance is throughout the Site from the ground surface to 15 feet bgs.
- Soil – Leaching: For soil cleanup levels based on protection of groundwater, the point of compliance is throughout the Site.

- Groundwater: For groundwater, the point of compliance is throughout the Site from the uppermost level of the saturated zone extending vertically to the lowest most depth that could potentially be affected by the Site.
- Indoor Air/Soil Gas: The point of compliance is ambient and indoor air throughout the Site.

5.0 IDENTIFICATION AND SCREENING OF REMEDIATION TECHNOLOGIES

This section identifies general response actions and screens remediation technologies for use in assembling remediation alternatives.

5.1 *General Response Actions*

General response actions are broad categories of remedial actions that can be combined to meet the RAOs for a site. The following are typical general response actions that are applicable to most impacted sites:

- No action
- Institutional controls
- Monitored natural attenuation
- Containment
- Removal
- Ex-situ treatment
- In-situ treatment

Potentially applicable technologies associated with these general response actions have been identified and screened based on the Site COCs and affected media and take into consideration the current and future use of the property. An overview of those technologies is provided in the following section.

5.2 *Identification and Screening of Applicable Technologies*

Applicable technologies associated with general response actions have been identified and screened for potential inclusion in the remediation alternatives for the Site. Each identified technology was screened based on applicability to Site conditions, overall effectiveness, implementability, and relative cost. Potentially applicable technologies considered for the Site are presented in Table 6, *Identification and Screening of Response Actions and Remediation Technologies*, which provides a summary of the screening results. Seven remedial technologies were retained for further consideration. Details of each technology are summarized below. The technologies determined to be most appropriate for the Site were then incorporated into three potentially applicable remediation alternatives.

5.2.1 Institutional Controls

Institutional controls considered for this RI/FS include legal restrictions on land and on groundwater use to limit potential exposure to contamination, often through an environmental covenant filed at the time of Site closure. Environmental covenants are often appropriate as a component of a remedial alternative for Sites where residual contamination is constrained within

the property at the completion of active remediation, and where a POC can be determined and monitored over time. Such controls prohibit or limit activities on a property that may interfere with the integrity of engineered controls or result in exposure to hazardous substances. Except under certain specified circumstances, such controls must be executed through an environmental covenant on the affected property. Environmental covenants are typically not appropriate for sites where residual contamination above cleanup standards extends off property at the time of closure unless agreed upon by adjacent property owners. Institutional controls alone do not fully mitigate the potential vapor migration pathway, and additional technologies may be required to address that exposure pathway as part of the overall cleanup.

5.2.2 Monitored Natural Attenuation

The term "natural attenuation" as used in this RI/FS refers to a variety of physical, chemical, or biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of hazardous substances in the environment (Ecology, 2005). These in-situ processes include: natural biodegradation, dispersion, dilution by recharge, sorption, volatilization, chemical or biological stabilization, transformation or destruction of hazardous substances (WAC 173-340-200).

When applied as part of a cleanup action, natural attenuation is often referred to by EPA as "monitored natural attenuation" to distinguish the action from "no action". "Monitored natural attenuation", as the term is used in EPA OSWER Directive 9200.4-17P (1999a), means the reliance on natural attenuation processes (within the context of a carefully controlled and monitored site cleanup approach) to achieve site-specific remedial objectives within a timeframe that is reasonable compared to that offered by more active cleanup methods.

The natural attenuation processes can be classified as either physical (dispersion, dilution by recharge, and volatilization), chemical (sorption and chemical degradation), or biological (biodegradation).

Natural attenuation processes that result in the reduction of concentration or mobility of a contaminant, but not the total mass, are referred to as "non-destructive" mechanisms. Those processes include the physical dispersion and dilution processes and the chemical sorption process (ASTM, 1998). Natural attenuation processes that result in the reduction of the total contaminant mass in the system are referred to as "destructive" mechanisms. Those processes include the chemical and biological degradation processes. For petroleum hydrocarbons in the subsurface, biological degradation is often the most important destructive mechanism because hydrocarbons can be destroyed (ASTM, 1998).

Although some natural attenuation typically occurs at most contaminated sites, the effectiveness of these processes varies depending on the types and concentrations of contaminants present at the site and the physical, chemical, and biological characteristics of the site. Natural attenuation should be evaluated as one potential remedial approach along with other cleanup action alternatives involving more active remedial technologies. Natural attenuation processes alone do not fully mitigate the potential vapor migration pathway, and additional technologies would be required to address that exposure pathway as part of the overall cleanup.

5.2.3 Containment (Capping)

This retained containment technology option for this Site would include retaining capped portions of the Site with an impervious surface, such as use of the existing building and asphalt. Capping would prevent exposure to contamination in soil or soil gas if contamination remains above cleanup levels at the end of any active remediation. Capping would be memorialized with institutional controls at the Site. Containment technologies do not fully mitigate the potential vapor migration pathway, and additional technologies may be required to address that exposure pathway as part of the overall cleanup.

5.2.4 In-Situ Treatment (Soil Vapor Extraction [SVE])

SVE technology may be implemented alone or coupled with other technologies such as groundwater extraction or air sparging. This technology would require installation of SVE wells screened within the vadose zone where impacts are present in soil. SVE technology may also utilize appropriately constructed monitoring wells for either vapor and vacuum monitoring or for active extraction. Using vacuum blower equipment, a vacuum is applied to the SVE wells to extract volatile contaminants from the subsurface. Volatile compounds are present in soil gas either through volatilization or as the result of extraction.

Extracted vapors require treatment prior to atmospheric discharge. Vapor effluent treatment technologies include granulated activated carbon (GAC), thermal oxidation (therm-ox), or catalytic oxidation (cat-ox). Any thermal treatment of chlorinated VOCs may require preliminary treatment of the air stream before entering the destruction chamber of the unit. GAC is typically applicable to lower air effluent discharges while therm-ox and cat-ox are more applicable to higher mass loadings. If vapor concentrations are expected to be significantly elevated during the initial phase of remediation, a therm-ox or cat-ox is often more suitable and more cost-effective than using GAC adsorption equipment for vapor treatment. However, GAC could be more practical for vapor treatment once concentrations are significantly reduced. Remedial pilot testing should be conducted for this technology to evaluate the effective radius of influence for extraction and determine the appropriate well spacing.

5.2.5 In-Situ Treatment (Enhanced Bioremediation)

Enhanced bioremediation is a process in which indigenous or inoculated micro-organisms (e.g., fungi, bacteria, and other microbes) degrade (metabolize) organic contaminants found in soil and/or groundwater, converting them to innocuous end products. Nutrients, oxygen, or other amendments may be used to enhance bioremediation and contaminant desorption from subsurface materials. For this Site, in-situ treatment may consist of using the "Trap and Treat" process in which granulated carbon is injected in a grid-like pattern in areas of concern, which traps the contaminants and provides plume control. The plume is then treated with a matrix, which incorporates both aerobic and anaerobic biological processes, providing longer term remedial degradation.

5.2.6 In-Situ Treatment (Chemical Oxidation)

Application of chemical oxidation technology mineralizes contaminants within subsurface soil and groundwater through chemical reactions. A mixture of oxidant and buffering compounds are typically injected into impacted soil and groundwater and, upon contact with contaminants, the oxidizer(s) break down the dissolved contaminants into carbon dioxide, water, and salts.

Delivery of oxidants to the subsurface can be conducted using direct-push probes or injection wells installed across the Site. Typical chemical oxidants used for chemical oxidation of chlorinated VOCs include Fenton's reagent and ozone, both of which have been proven to effectively destroy petroleum hydrocarbons and chlorinated solvents. Fenton's reagent consists of hydrogen peroxide combined with an iron catalyst. The injection mixture also typically includes the addition of acid, as Fenton's reagent is more effective at acidic pH. Regardless of the oxidant that is used, the destruction efficiency of contaminants can be greatly affected by the organic content of the soil and other subsurface characteristics that can be readily oxidized. Therefore, testing should be conducted at the Site to analyze the overall soil and water oxygen demand and determine the appropriate oxidant dose to be applied.

Permanganates are chemical oxidants that exist as salts and are traditionally available in a sodium or potassium form. Permanganates are commonly used for many industrial purposes including water and wastewater treatment operations. The use of permanganates in groundwater treatment applications is a proven, well documented technology. In-situ permanganate oxidation technology relies on the enhanced delivery of a permanganate oxidant compound within the subsurface providing recalcitrant contaminant (e.g., PCE, TCE, DCE isomers, and vinyl chloride) remediation; with final benign reaction products of carbon dioxide, water, and inorganic salts (e.g. chlorides) via direct electron exchange processes.

When ozone is used for chemical oxidation, it is applied through sparging technology, discussed above. For ozone sparging, ozone is generated on site from air and then injected as a gas into the subsurface.

5.2.7 In-Situ Treatment (Thermal Desorption)

Electrical Resistance Heating (ERH) is an in-situ, thermal technology that uses commonly available electricity and applies it into the ground through electrodes. These electrodes can be installed either vertically to any depth or horizontally underneath buildings, operating facilities, and in the presence of buried utilities. The technology is equally effective in both soil and groundwater.

Electric current is passed through a targeted soil volume between subsurface electrode elements. The resistance to electrical flow that exists in the soil causes the formation of heat; resulting in an increase in temperature until the boiling point of water at depth is reached. After reaching this temperature, further energy input causes a phase change, forming steam and removing volatile contaminants. ERH is typically more cost effective when used for treating contaminant source areas.

In-Situ Thermal Conduction Heating (TCH) is a soil remediation process in which heat and vacuum are applied simultaneously to subsurface soils, either with surface heater blankets or with an array of vertical heater/vacuum wells. Radiation heat transport dominates near the heaters, which are operated at 800 to 900° C; however, thermal conduction accounts for most of the heating at greater distances into the soil. As soil is heated, contaminants in the soil are vaporized or destroyed by a number of mechanisms, including (1) evaporation into the air stream, (2) steam distillation into the water vapor stream, (3) boiling, (4) oxidation, and (5) pyrolysis. The vaporized water, contaminants, and natural organic compounds are drawn by the vacuum in a direction countercurrent to the heat flow into the vacuum source using trenches or wells.

ERH and TCH are typically most effective on chlorinated VOCs. Less volatile contaminants like xylene or diesel can also be remediated with ERH, but energy requirements increase as the volatility decreases.

6.0 DESCRIPTION AND SELECTION OF REMEDIAL ALTERNATIVES

Based on the requirements of WAC 173-340-360, *Selection of Cleanup Actions*, three potential remedial alternatives were developed from the general response actions and technologies screened in Table 7, *Identification and Screening of Response Actions and Remediation Technologies*, and described above.

All three alternatives directly address soil contamination at the Site, and are also intended to indirectly address ambient air quality at the Site. By reducing remaining contamination in the soil to below cleanup levels, the source of contamination for ambient air is removed, and ambient air is expected to meet appropriate cleanup standards.

Based on preliminary screening of the general response actions identified in Section 5.2, *Identification and Screening of Remediation Technologies*, individual general response actions are not expected to individually meet MTCA threshold requirements, and therefore are not considered as stand-alone remedial alternatives.

6.1 *MTCA Threshold Requirements*

Potential remedial alternatives must meet the threshold requirements described in WAC 173-340-360(2)(a), which specifies that cleanup actions shall:

- Protect human health and the environment;
- Comply with cleanup standards;
- Comply with applicable state and federal laws; and
- Provide for compliance monitoring.

MTCA [WAC 173-340-360(2)(b)] also indicates other requirements that must be met by any cleanup alternative:

- Use permanent solutions to the maximum extent practicable;
- Provide for a reasonable restoration time frame; and
- Consider public concerns.

Local Requirements

All required local permits to implement the chosen Remedial Action will be obtained according to Thurston County requirements. These could include, but are not limited to, construction, air quality, right-of-way (ROW), and building permits.

6.2 *Description of Remedial Alternatives*

Based upon the screening evaluation, MTCA threshold and other requirements, AEG proposes four remedial alternatives for the Site. The alternatives were developed and are evaluated with the goal of achieving remedial objectives within a reasonable timeframe, with the most permanent cleanup and minimal disruption to the Site.

6.2.1 Alternative 1 – No Action

While no exposure pathways are currently complete at the Site, the no action alternative does not alone meet the RAOs identified for the Site and is not applicable because contaminant concentrations in soil would not be reduced or isolated and potential exposure pathways would not be mitigated. However, this option is retained to provide a baseline of comparison for other more permanent remedial alternatives.

Estimated time to closure: 15 to 20 years.

6.2.2 Alternative 2 – In-Situ Treatment via Soil Vapor Extraction

Alternative 2 includes:

- Installation of four SVE extraction wells on the south and west sides of the existing building.
- Complete underground conveyance piping to the four extraction wells, and place vacuum equipment on the south and west sides of the building.
- Provide electrical power to the remediation equipment from the existing building power source.
- Treatment of extracted soil vapors with carbon filtration.
- Obtain air permits from the State and Local authorities.
- Eight quarters of performance monitoring using vapor samples pre & post GAC filtration units to establish trends in contaminant reduction and for permit requirements.
- Confirmatory sampling and SVE well abandonment.

Alternative 2 would cause the most impacts on vehicular and pedestrian traffic in the parking lot during installation of the extraction wells and conveyance piping. If a permanent cleanup is unable to be performed due to accessibility, institutional controls via an environmental covenant on the property would be needed to achieve cleanup standards.

Estimated time to closure: 2 to 3 years.

6.2.3 Alternative 3 – Closure with Vapor Mitigation System Installation and Environmental Covenant

Alternative 3 includes the following:

- Installation of sub-slab depressurization (SSD) system with extraction points in the areas shown to have the highest vapor concentrations.
- Complete conveyance piping to the extraction points, and place vacuum equipment in accessible areas of the southside of the building.
- Provide electrical power to the vacuum equipment from the existing building power source.
- Baseline vapor sampling from the SSD system to establish trends in contaminant concentrations and to confirm impacted vapors are successfully being redirected to outdoor air.

Institutional controls by legal restrictions on land use to limit potential exposure to contamination through an environmental covenant restricting removal of the asphalt cover and overburden soils (acting as a cap and preventing stormwater infiltration) in areas that exceed safe concentrations. An environmental covenant is a deed restriction filed for the property that would limit access to contaminated areas of the Site without prior approval of Ecology.

Estimated time to closure: 1 to 2 years.

6.3 *Evaluation of Remedial Alternatives*

This section presents an evaluation and comparison of the three proposed remedial alternatives. In accordance with MTCA, the alternatives are evaluated relative to the criteria specified in WAC 173-340-360(3)(f) and WAC 173-340-360(4), which include the following:

1. Protectiveness;
2. Permanence;
3. Effectiveness over the long term;
4. Management of short-term risks;
5. Technical and administrative implementability;
6. Consideration of public concerns;
7. Restoration time frame; and
8. Cost.

Each of these criteria is evaluated below, except for cost, which is evaluated separately. A summary of the evaluation is provided in Table 7, *Remedial Alternatives Evaluation /*

Disproportionate Cost Analysis. The overall evaluation is then used to determine the relative benefit of each alternative.

Each criterion was first assigned a score ranging from 5 (best) to 1 (worst), based upon AEG's experience, best professional judgement, and the application of scientific principles. Each score is based on the perceived benefit associated with the criterion, and is included in Table 7, *Remedial Alternatives Evaluation / Disproportionate Cost Analysis*. Alternatives deemed equally beneficial are given the same score. Several criteria are comprised of subcriteria. In such cases, each subcriterion is scored and the average of those scores is used as the criterion score.

6.3.1 Protectiveness

Protectiveness is defined in WAC 173-340-360(3)(f)(i) as:

> "*Overall protectiveness of human health and the environment, including the degree to which existing risks are reduced, time required to reduce risk at the facility and attain cleanup standards, on-site and off-site risks resulting from implementing and alternative, and improvement of the overall environmental quality.*"

Each of the three remedial alternatives reduce risk at the Site, and each is protective of human health and the environment. Alternative 1 is the least certain to reduce risks and attain cleanup standards at the Site due to a lack of shallow groundwater and access within the tenant space, and received the lowest score. Alternatives 2 and 3 ranked similarly for protectiveness.

6.3.2 Permanence

Permanence is defined in WAC 173-340-360(3)(f)(ii) as:

> "*The degree to which the alternative permanently reduces the toxicity, mobility or volume of hazardous substances, including the adequacy of the alternative in destroying the hazardous substances, the reduction or elimination of hazardous substance releases and sources of releases, the degree of irreversibility of waste treatment process, and the characteristics and improvement of the overall environmental quality.*"

At the completion of remedial activities, each of the alternatives would result in a solution that is permanent. Permanence includes the subcriteria of reduction in toxicity, degree of irreversibility, and the type and character of the waste streams generated during treatment. While each of the technologies, if successfully implemented would be permanent, the degree of certainty in the success of the technology varies due to the nature of the technologies. Alternative 1 received the

lowest score due to the timeframe associated with reducing toxicity, mobility, and volume, as well as its reversibility. Alternatives 2 and 3 ranked similarly for permanence.

6.3.3 Effectiveness over the Long Term

Effectiveness over the long term is defined in WAC 173-340-360(3)(f)(iv):

> "*Long-term effectiveness includes the degree of certainty that the alternative will be successful, the reliability of the alternative during the period of time hazardous substances are expected to remain on-site at concentrations that exceed cleanup levels, the magnitude of residual risk with the alternative in place, and the effectiveness of controls required to manage treatment residues or remaining wastes. The following types of cleanup action components may be used as a guide, in descending order, when assessing the relative degree of long-term effectiveness: Reuse or recycling; destruction or detoxification; immobilization or solidification; on-site or off-site disposal in an engineered, lined and monitored facility; on-site isolation or containment with attendant engineering controls; and institutional controls and monitoring.*"

Long-term effectiveness includes the subcriteria of certainty, reliability, residual risk, and utilization of preferred remedies. Each of the alternatives have the intent of meeting cleanup standards and protecting human health and the environment after completion of the remedial action. However, there are varying levels of uncertainty and reliability associated with each technology throughout the process. Alternative 1 is the least certain to reduce risks and attain cleanup standards at the Site due to a lack of shallow groundwater and access within the tenant space, and received the lowest score. Alternatives 2 and 3 ranked similarly as they intend to destroy the contaminants in-situ, and not leave any residuals behind.

6.3.4 Management of Short-Term Risks

Management of short-term risks is defined in WAC 173-340-360(3)(f)(v):

> "*The risk to human health and the environment associated with the alternative during construction and implementation, and the effectiveness of measures that will be taken to manage such risks.*"

All of the alternatives have manageable short-term risks and effective measures for mitigating those risks. Alternatives 2 and 3 ranked similarly as they all include intrusive activities.

6.3.5 Technical and Administrative Implementability

Technical and administrative implementability is defined in WAC 173-340-360(3)(f)(vi):

> "*Ability to be implemented including consideration of whether the alternative is technically possible, availability of necessary off-site facilities, services and materials, administrative and regulatory requirements, scheduling, size, complexity, monitoring requirements, access for construction operations and monitoring, and integration with existing facility operations and other current or potential remedial actions.*"

This criterion includes the concepts of technical possibility, access, necessary resources, monitoring requirements and integration into existing facility features. The primary determining subcriterion is technical possibility. Alternative 2 and Alternative 3 received a similar score based on their similar advantages and disadvantages.

6.3.6 Consideration of Public Concerns

Consideration of public concerns is defined in WAC 173-340-360(3)(f)(vii):

> "*Whether the community has concerns regarding the alternative and, if so, the extent to which the alternative addresses those concerns. This process includes concerns from individuals, community groups, local governments, tribes, federal and state agencies, or any other organization that may have an interest in or knowledge of the site.*"

Alternatives with significant construction components, or alternatives that leave contamination in place at the end of active remedial activities are assumed to have the most concern to the public. All three alternatives ranked similarly for this category.

6.3.7 Restoration Time Frame

Restoration Time Frame (RTF) is evaluated using the following factors described in WAC 173-340-360(4)(b)(i through ix):

1. Potential risks posed by the site to human health and the environment.

2. Practicability of achieving a shorter restoration timeframe.

3. Current use of the site.

4. Potential future use of the site.

5. Availability of alternative water supplies.

6. Likely effectiveness and reliability of institutional controls.

7. Ability to monitor and control migration of hazardous substances from the site.

8. Toxicity of hazardous substances at the site.

9. Natural processes that reduce concentrations of hazardous substances at the site.

Estimates of restoration time frame are necessarily subjective. Each of the alternatives is assumed to provide a reasonable restoration time frame. Actual estimates of effectiveness are premature without performance monitoring data regarding actual effectiveness. Reasonable restoration time frame was ranked based upon the general aggressiveness of each of the technologies and perceived certainty associated with the technology. Alternative 2 received a slightly lower score than Alternative 3.

6.4 *Benefit Value Determination*

Average criterion scores determined in Section 6.3 are multiplied by weighting. Weighting factors adapted from those established by Ecology are used to determine the total weighted scores:

Criteria	Weighting Factor
Protectiveness	30%
Permanence	25%
Long Term Effectiveness	20%
Short-Term Risk Management	5%
Implementability	5%
Public Concerns	10%
Restoration Time Frame	5%
Total	**100%**

Each criteria is multiplied by the weighting factor and the products summed to determine each Alternative's Benefit Value. The scoring of these values is summarized in Table 7, *Remedial Alternatives Evaluation / Disproportionate Cost Analysis*.

The results show that Alternatives 2 and 3 are the preferred alternatives for the non-cost criteria, as they result in the same and highest overall benefit value. Alternative Benefit Values are compared to Estimated Alternative Costs, discussed below.

6.4.1 Estimated Alternative Costs

Cost is defined in WAC 173-340-360(f)(iii) as:

> "*The cost to implement the alternative, including the cost of construction, the net present value of any long-term costs, and agency oversight costs that are cost recoverable. Long-term costs include operation and maintenance costs, monitoring costs, equipment replacement costs, and the cost of maintaining institutional controls. Cost estimates for treatment technologies shall describe pretreatment, analytical, labor, and waste management costs. The design life of the cleanup action shall be estimated, and the cost of replacement or repair of major elements shall be included in the cost estimate.*"

Estimated Alternative costs have been estimated for each of the remedial alternatives based on the descriptions and associated assumptions presented above. The expected accuracy range of the cost estimates is -30% to +50%. Costs are based on typical costs for Washington State, and the current knowledge of the Site. All costs are assumed to be for newly purchased equipment. Cost estimates are not based upon refurbished or used equipment. Estimated capital costs are based on current dollar values. Estimated recurring costs and periodic costs associated with system operation and maintenance, performance and compliance monitoring, and Site closure activities are adjusted to reflect the net present value. The following table summarizes estimated costs for each alternative. These costs are for comparison purposes only and actual implementation costs will vary from those provided. Estimated costs incorporate a variety of necessary assumptions and the validity of those assumptions cannot be fully known at this time.

Remedial Alternatives Cost Summary		
Alternative Number	**Remedial Alternative**	**Estimated Alternative Costs**
1	No Action	$ 10,477
2	In-Situ Treatment via Soil Vapor Extraction	$294,570
3	In-Situ Treatment via Thermal Heating and Vapor Extraction	$ 82,838

6.5 *Disproportionate Cost Analysis*

The disproportionate cost analysis is made by comparing Alternative Benefit Values from Section 6.3, to each remedial alternative's estimated cost from Section 6.4. Based upon WAC 173-340-360(3)(e), a cleanup action shall not be considered practicable *"if the incremental cost of the alternative over that of a lower cost alternative exceeds the incremental degree of benefits achieved by the alternative over that of the other lower cost alternative."*

This comparison is provided below:

Disproportionate Cost Analysis			
Alternative Number	**Cost**	**Benefit Value**	**Cost per Benefit Value**
1	$ 10,477	2.13	$ 4,911
2	$294,570	3.99	$73,920
3	$ 82,838	3.99	$20,779

The results of the disproportionate cost analysis show that the cost per benefit value of Alternative 1 is least. The results also show that Alternatives 3 and 2 are each incrementally more costly per Benefit Value than Alternative 1. Based solely upon analysis of disproportionate cost, Alternative 1 is the preferred alternative.

Alternatives 2 and 3 have a similar restoration time frame. However, Alternative 2 has a higher cost per benefit value than Alternative 3. Therefore, the results of the disproportionate cost analysis for practicable alternatives with similar reasonable restoration timeframes show that Alternative 3 is the preferred alternative. The analysis of disproportionate cost is included in the attachments graphically as *Chart 1, Disproportionate Cost Analysis*.

6.6 *Selection of Preferred Alternative*

Selection of the preferred alternative for the Site takes into account the following considerations:

- RAOs for the Site.
- Restoration Timeframe.
- Regulatory Requirements.
- Disproportionate Cost Analysis.
- The Site's continued retail operation.

Based solely on the Disproportionate Cost Analysis, Alternative 1 would be the preferred alternative, as Alternatives 3 and 2 are incrementally more costly per benefit value.

Alternatives 2 and 3 are assumed to meet RAOs, and have a restoration timeframe of between 1 and 3 years.

Meeting regulatory requirements is also not as certain for Alternative 1 as the other two alternatives. The net benefit value of Alternative 1 is close to one half of Alternatives 2 and 3,

reflecting uncertainties regarding outcome. For these reasons, AEG does not currently recommend Alternative 1 as the preferred alternative.

Alternative 2 is the most expensive, and provides the same benefit value as Alternative 3. Of the two alternatives with similar net benefit values, Alternative 3 is the least expensive, and is therefore AEG's preferred alternative for this Site.

7.0 LIMITATIONS

This report summarizes the findings of the services authorized under our agreement with Ms. Keum Woo. It has been prepared using generally accepted professional practices, related to the nature of the work accomplished. This report was prepared for the exclusive use of Ms. Woo and her designated representatives for the specific application to the project purpose.

Recommendations, opinions, site history, and proposed actions contained in this report apply to conditions and information available at the time this report was completed. Since conditions and regulations beyond our control can change at any time after completion of this report, or our proposed work, we are not responsible for any impacts of any changes in conditions, standards, practices, and/or regulations subsequent to our performance of services. We cannot warrant or validate the accuracy of information supplied by others, in whole or part.

8.0 REFERENCES

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FIGURES

2633 Parkmont Lane SW, Suite A • Olympia, WA • 98502
Phone: 360-352-9835 • Fax: 360-352-8164 • Email: admin@aegwa.com

FILENAME	DRAWN BY		CHECKED BY		APPROVED BY		PROJECT NUMBER
18-236_1804.DWG	ICD	12/26/2018	BD	12/26/2018	BD	12/26/2018	18-236

N
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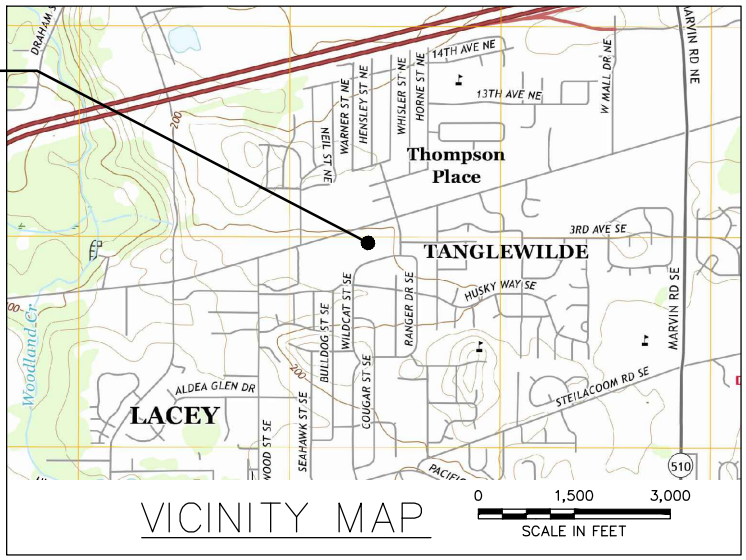
PROJECT LOCATION



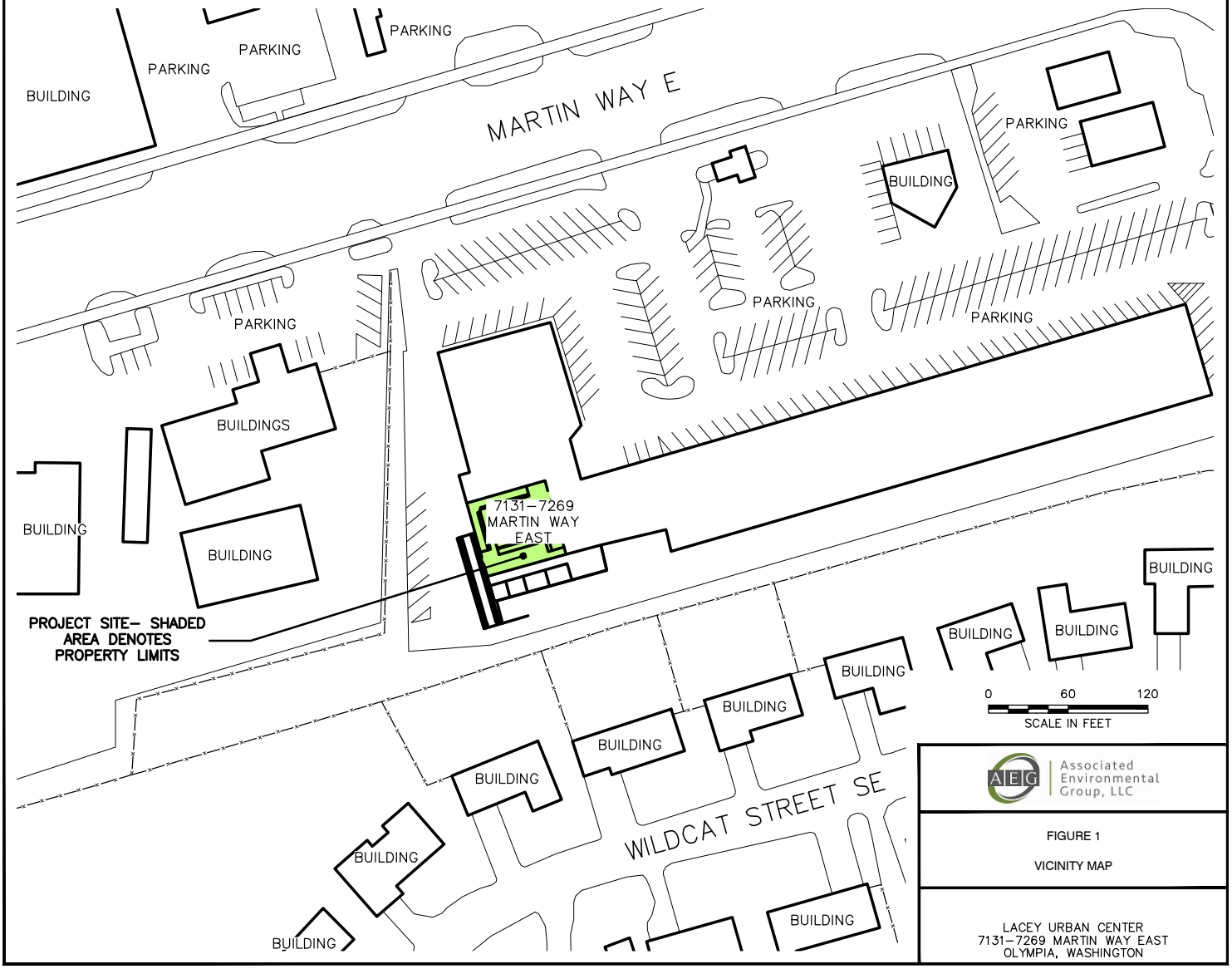
VICINITY MAP

NOTES

1. THE LOCATIONS OF ALL FEATURES SHOWN ARE APPROXIMATE
2. THIS DRAWING IS FOR INFORMATION PURPOSES. IT IS INTENDED TO ASSIST IN SHOWING FEATURES DISCUSSED IN AN ATTACHED DOCUMENT.

REFERENCE

DRAWING CREATED FROM AERIAL PHOTOGRAPH AND NOTES PROVIDED BY AEG, LLC.
VICINITY IMAGE SOURCE: U.S. GEOLOGICAL SURVEY–2017, 7.5 MINUTE QUADRANGLE MAP
OLYMPIA, WASHINGTON



Associated Environmental Group, LLC

FIGURE 1

VICINITY MAP

LACEY URBAN CENTER
7131–7269 MARTIN WAY EAST
OLYMPIA, WASHINGTON

FILENAME	DRAWN BY	CHECKED BY	APPROVED BY	PROJECT NUMBER
18-236_2101_1.DWG	ICD 3/23/2021	CS 3/23/2021	CS 3/23/2021	18-236

N
W E
S

LEGEND

MW-1	SHALLOW MONITORING WELL LOCATION
MW-4	DEEP MONITORING WELL LOCATION
SG-1	SOIL GAS SAMPLE LOCATION
B-1	SOIL BORING LOCATION
SS-1	SUB-SLAB VAPOR SAMPLE LOCATION
AMBIENT	AIR SAMPLE LOCATION
—x—x—	FENCE

NOTES

1. THE LOCATIONS OF ALL FEATURES SHOWN ARE APPROXIMATE
2. THIS DRAWING IS FOR INFORMATION PURPOSES. IT IS INTENDED TO ASSIST IN SHOWING FEATURES DISCUSSED IN AN ATTACHED DOCUMENT.

REFERENCE

DRAWING CREATED FROM AERIAL PHOTOGRAPH AND NOTES PROVIDED BY AEG, LLC.

0 10 20
SCALE IN FEET

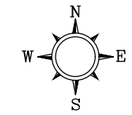
Associated Environmental Group, LLC

FIGURE 2

SITE MAP

LACEY URBAN CENTER
7131-7269 MARTIN WAY EAST
OLYMPIA, WASHINGTON

PROJECT NUMBER	18-236
APPROVED BY	BD 3/23/2021
CHECKED BY	BD 3/23/2021
DRAWN BY	ICD 3/23/2021
FILENAME	18-236_2101_1.DWG



LEGEND

MW-1	SHALLOW MONITORING WELL LOCATION
MW-4	DEEP MONITORING WELL LOCATION
SG-1	SOIL GAS SAMPLE LOCATION
B-1	SOIL BORING LOCATION
SS-1	SUB-SLAB VAPOR SAMPLE LOCATION
AMBIENT	AIR SAMPLE LOCATION
—x—x—	FENCE
--------	0.05 mg/kg ISOCONCENTRATION LINE
--------	0.20 mg/kg ISOCONCENTRATION LINE
0.07	PCE CONCENTRATION IN SOIL (mg/kg)
PCE	TETRACHLOROETHYLENE
mg/kg	MILLIGRAMS PER KILOGRAM

NOTES

1. THE LOCATIONS OF ALL FEATURES SHOWN ARE APPROXIMATE
2. THIS DRAWING IS FOR INFORMATION PURPOSES. IT IS INTENDED TO ASSIST IN SHOWING FEATURES DISCUSSED IN AN ATTACHED DOCUMENT.

REFERENCE

DRAWING CREATED FROM AERIAL PHOTOGRAPH AND NOTES PROVIDED BY AEG, LLC.

0 10 20
SCALE IN FEET

AEG Associated Environmental Group, LLC

FIGURE 3

PCE IN SOIL PLUME MAP

LACEY URBAN CENTER
7131-7269 MARTIN WAY EAST
OLYMPIA, WASHINGTON

PROJECT NUMBER	18-236
APPROVED BY	BD 3/23/2021
CHECKED BY	BD 3/23/2021
DRAWN BY	ICD 3/23/2021
FILENAME	18-236_2101_1.DWG

N
W E
S

LEGEND

MW-1	SHALLOW MONITORING WELL LOCATION
MW-4	DEEP MONITORING WELL LOCATION
SG-1	SOIL GAS SAMPLE LOCATION
B-1	SOIL BORING LOCATION
SS-1	SUB-SLAB VAPOR SAMPLE LOCATION
AMBIENT	AIR SAMPLE LOCATION
—x—x—	FENCE
-------	400 µg/m³ ISOCONCENTRATION LINE
-------	1,000 µg/m³ ISOCONCENTRATION LINE
450	PCE CONCENTRATION IN SOIL VAPOR (µg/m³)
µg/m³	MICROGRAMS PER CUBIC METER
PCE	TETRACHLOROETHYLENE
<	NOT DETECTED ABOVE LIMIT NOTED

RED BOLD INDICATES THE DETECTED CONCENTRATION EXCEEDS ECOLOGY MTCA METHOD B SCREENING LEVELS

BOLD INDICATES THE DETECTED CONCENTRATION IS BELOW ECOLOGY MTCA METHOD B SCREENING LEVELS

NOTES

1. THE LOCATIONS OF ALL FEATURES SHOWN ARE APPROXIMATE
2. THIS DRAWING IS FOR INFORMATION PURPOSES. IT IS INTENDED TO ASSIST IN SHOWING FEATURES DISCUSSED IN AN ATTACHED DOCUMENT.

REFERENCE

DRAWING CREATED FROM AERIAL PHOTOGRAPH AND NOTES PROVIDED BY AEG, LLC.

0 10 20
SCALE IN FEET

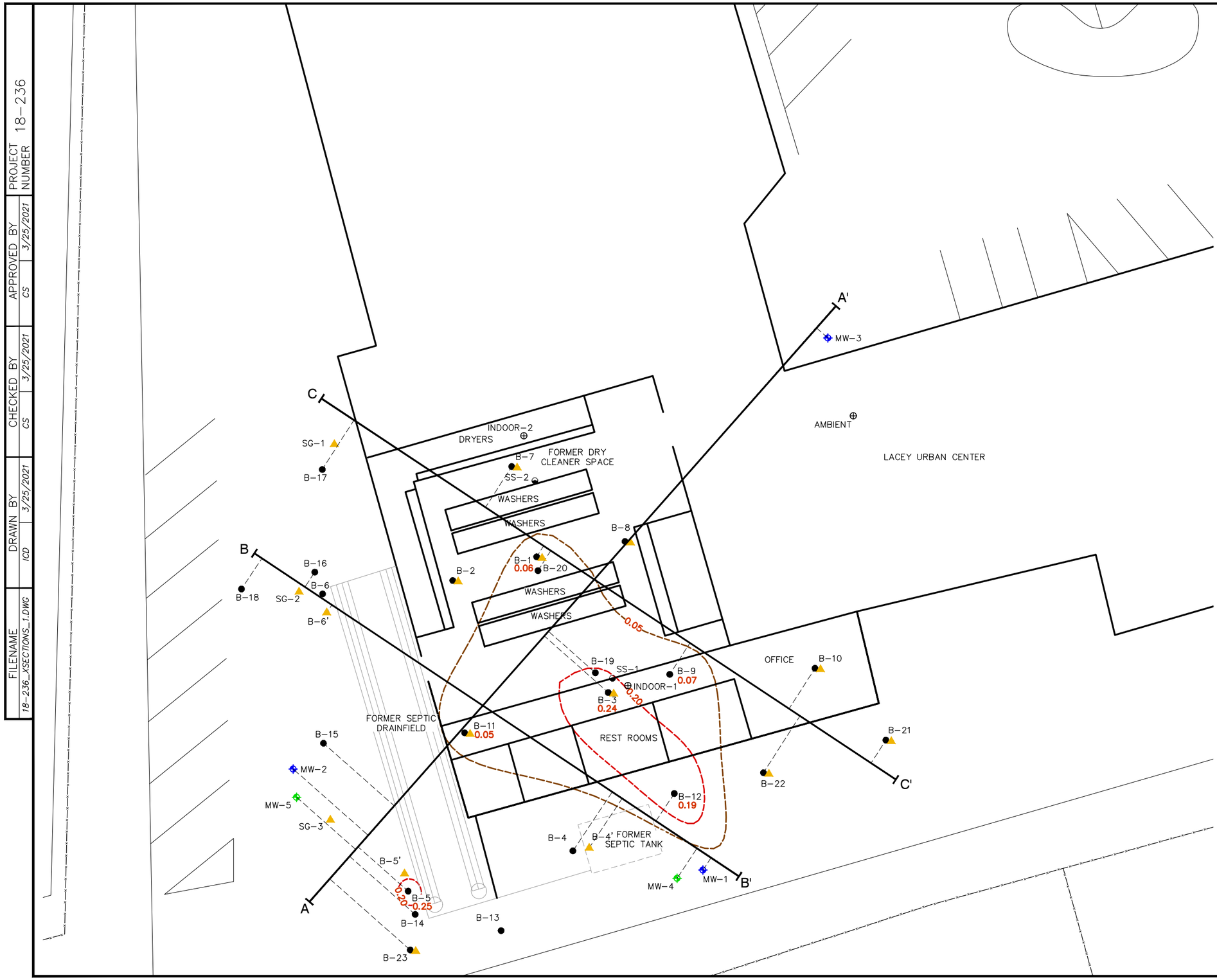
AEG Associated Environmental Group, LLC

FIGURE 4

PCE IN SOIL VAPOR PLUME MAP

LACEY URBAN CENTER
7131-7269 MARTIN WAY EAST
OLYMPIA, WASHINGTON

FILENAME	DRAWN BY	CHECKED BY	APPROVED BY	PROJECT NUMBER
18-236_XSECTIONS_1.DWG	ICD 3/25/2021	CS 3/25/2021	CS 3/25/2021	18-236



N
W E
S

LEGEND

MW-1	SHALLOW MONITORING WELL LOCATION
MW-1	DEEP MONITORING WELL LOCATION
SG-1	SOIL GAS SAMPLE LOCATION
B-1	SOIL BORING LOCATION
SS-1	SUB-SLAB VAPOR SAMPLE LOCATION
AMBIENT	AIR SAMPLE LOCATION
—x—x—	FENCE
- - - -	0.05 mg/kg ISOCONCENTRATION LINE
- - - -	0.20 mg/kg ISOCONCENTRATION LINE
0.07 PCE	PCE CONCENTRATION IN SOIL (mg/kg)
	TETRACHLOROETHENE
mg/kg	MILLIGRAMS PER KILOGRAM
A A'	LINE OF LITHOLOGIC CROSS SECTION AND PROJECTION LINE OR BORING/WELL

NOTES

1. THE LOCATIONS OF ALL FEATURES SHOWN ARE APPROXIMATE
2. THIS DRAWING IS FOR INFORMATION PURPOSES. IT IS INTENDED TO ASSIST IN SHOWING FEATURES DISCUSSED IN AN ATTACHED DOCUMENT.

REFERENCE

DRAWING CREATED FROM AERIAL PHOTOGRAPH AND NOTES PROVIDED BY AEG, LLC.

0 10 20
SCALE IN FEET

Associated Environmental Group, LLC

FIGURE 5

PCE PLUME MAP WITH GEOLOGIC CROSS SECTIONS A-A', B-B' AND C-C'

LACEY URBAN CENTER
7131-7269 MARTIN WAY EAST
OLYMPIA, WASHINGTON

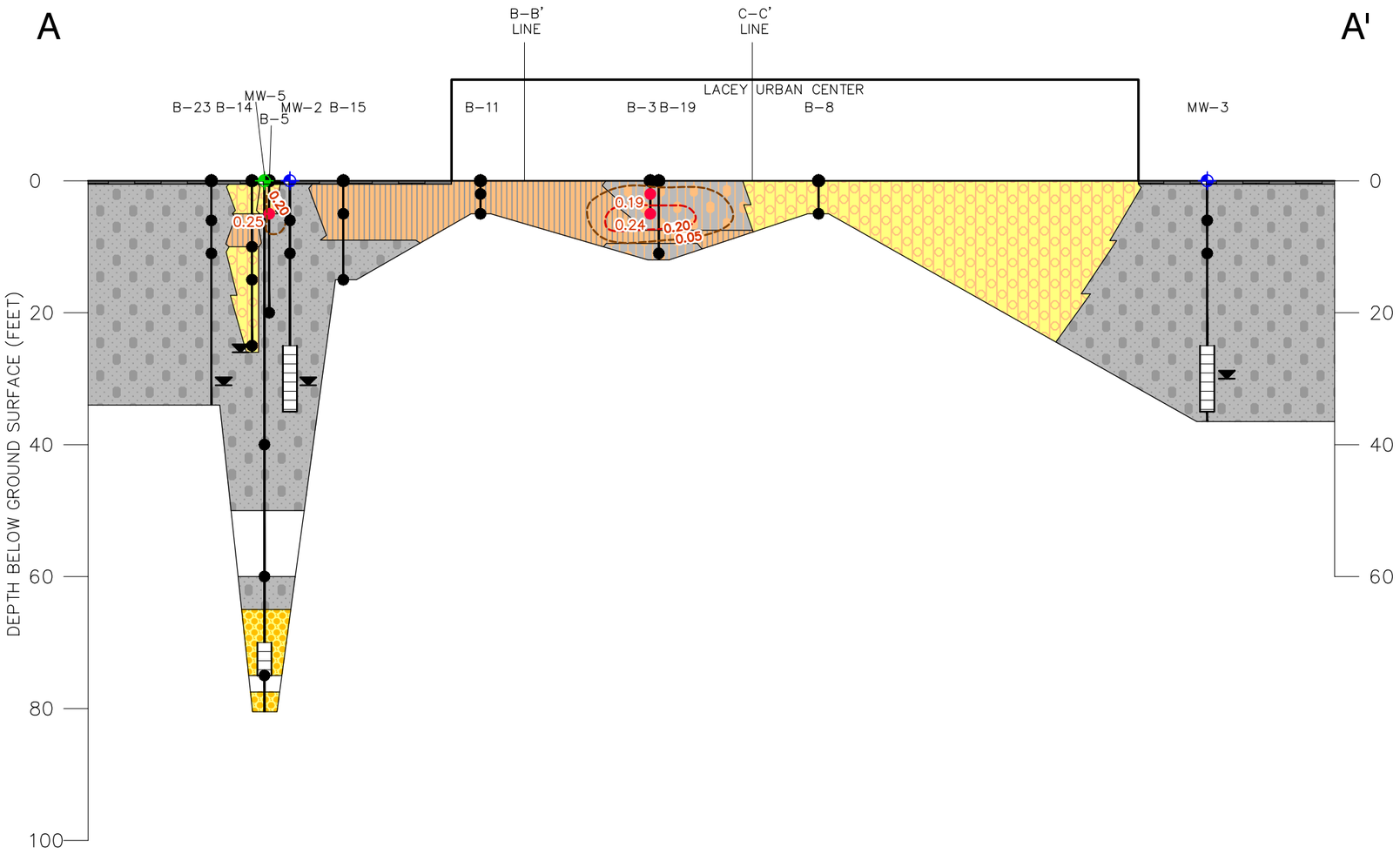
FILENAME	DRAWN BY	CHECKED BY	APPROVED BY	PROJECT NUMBER
18-236_XSECTIONS_1.DWG	ICD 3/25/2021	CS 3/25/2021	CS 3/25/2021	18-236

SOUTHWEST

A

NORTHEAST

A'



LEGEND

B-11 MW-5 MW-2

- WELL, SOIL BORING
- SOIL SAMPLE INTERVAL TOP
- SOIL SAMPLE INTERVAL WHERE PCE IS NON-DETECTED OR BELOW MTCA METHOD A CLEANUP LEVELS
- GROUNDWATER LEVEL AT TIME OF DRILLING
- SCREENED INTERVAL
- MAXIMUM DEPTH EXPLORED
- SOIL CONTACT

- NO RECOVERY
- ASPHALT
- SP= POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
- SM= SILTY-SANDS, SAND-SILT MIXTURES
- SP/SM= POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES/SILTY-SANDS, SAND-SILT MIXTURES
- ML= INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS, WITH SLIGHT PLASTICITY
- GP= POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
- GM= SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES

---------- 0.05 mg/kg ISOCONCENTRATION LINE

---------- 0.20 mg/kg ISOCONCENTRATION LINE

0.06 PCE CONCENTRATION IN SOIL (mg/kg)

mg/kg MILLIGRAMS PER KILOGRAM

RED BOLD VALUE INDICATES THE DETECTED CONCENTRATION EXCEEDS ECOLOGY MTCA METHOD A CLEANUP LEVELS

0 10 20
HORIZONTAL SCALE

0 10 20
VERTICAL SCALE

AEG Associated Environmental Group, LLC

FIGURE 6

GEOLOGIC CROSS SECTION A-A'

LACEY URBAN CENTER
7131-7269 MARTIN WAY EAST
OLYMPIA, WASHINGTON

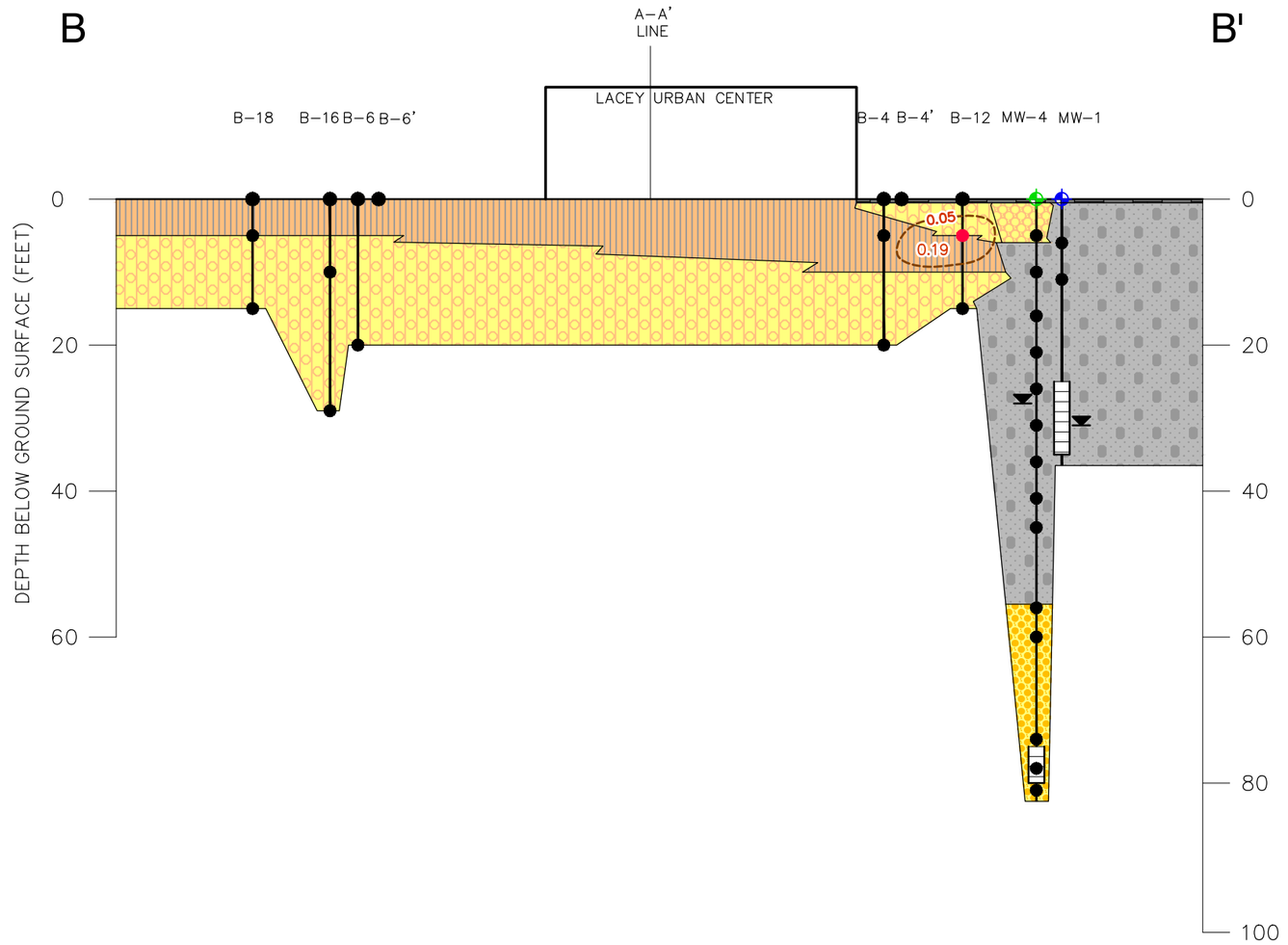
FILENAME	DRAWN BY	CHECKED BY	APPROVED BY	PROJECT NUMBER
18-236_XSECTIONS_1.DWG	ICD 3/25/2021	CS 3/25/2021	CS 3/25/2021	18-236

NORTHWEST

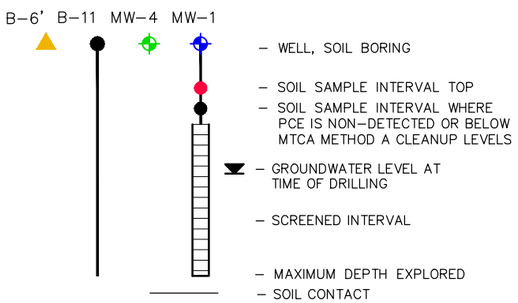
B

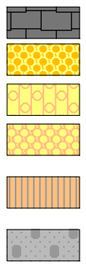
SOUTHEAST

B'



LEGEND





ASPHALT

SP= POORLY–GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES

SM= SILTY–SANDS, SAND–SILT MIXTURES

SP/SM= POORLY–GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES/SILTY–SANDS, SAND–SILT MIXTURES

ML= INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS, WITH SLIGHT PLASTICITY

GP= POORLY–GRADED GRAVELS, GRAVEL–SAND MIXTURES, LITTLE OR NO FINES

---------- 0.05 mg/kg ISOCONCENTRATION LINE

0.19 PCE CONCENTRATION IN SOIL (mg/kg)

PCE TETRACHLOROETHENE

mg/kg MILLIGRAMS PER KILOGRAM

RED BOLD VALUE INDICATES THE DETECTED CONCENTRATION EXCEEDS ECOLOGY MTCA METHOD A CLEANUP LEVELS

0 10 20
HORIZONTAL SCALE

0 10 20
VERTICAL SCALE

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FIGURE 7

GEOLOGIC CROSS SECTION B-B'

LACEY URBAN CENTER
7131–7269 MARTIN WAY EAST
OLYMPIA, WASHINGTON

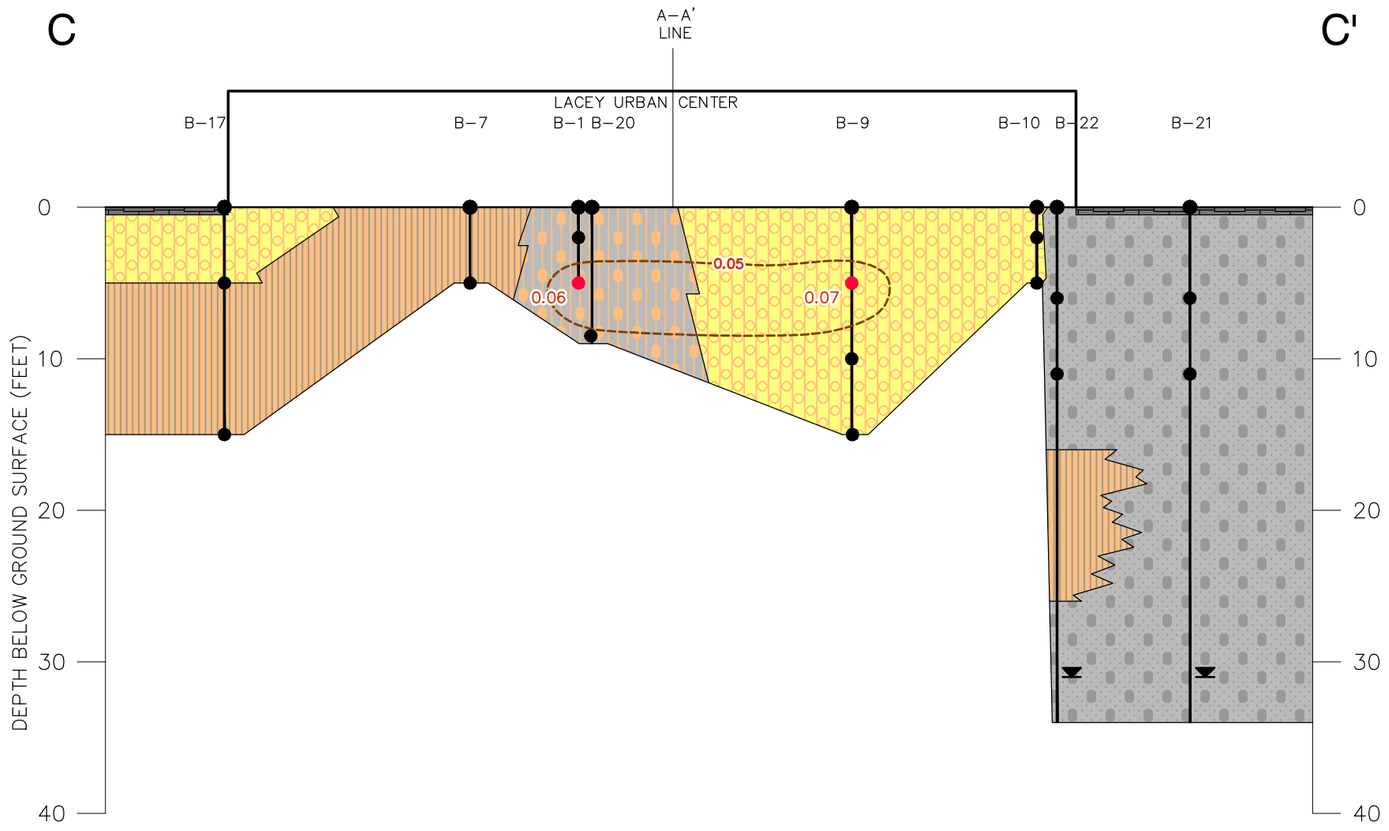
FILENAME	DRAWN BY	CHECKED BY	APPROVED BY	PROJECT NUMBER
18-236_XSECTIONS_1.DWG	ICD 3/25/2021	CS 3/25/2021	CS 3/25/2021	18-236

NORTHWEST

C

SOUTHEAST

C'



LEGEND

B–7 – WELL, SOIL BORING

– SOIL SAMPLE INTERVAL TOP

– SOIL SAMPLE INTERVAL WHERE PCE IS NON–DETECTED OR BELOW MTCA METHOD A CLEANUP LEVELS

– GROUNDWATER LEVEL AT TIME OF DRILLING

– MAXIMUM DEPTH EXPLORED

– SOIL CONTACT

NO RECOVERY

ASPHALT

SP= POORLY–GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES

SM= SILTY–SANDS, SAND–SILT MIXTURES

SP/SM= POORLY–GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES/SILTY–SANDS, SAND–SILT MIXTURES

ML= INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS, WITH SLIGHT PLASTICITY

GP= POORLY–GRADED GRAVELS, GRAVEL–SAND MIXTURES, LITTLE OR NO FINES

GM= SILTY GRAVELS, GRAVEL–SAND–SILT MIXTURES

0.05 mg/kg ISOCONCENTRATION LINE

0.06 PCE mg/kg — PCE CONCENTRATION IN SOIL (mg/kg); TETRACHLOROETHENE; MILLIGRAMS PER KILOGRAM

RED BOLD VALUE INDICATES THE DETECTED CONCENTRATION EXCEEDS ECOLOGY MTCA METHOD A CLEANUP LEVELS

0 10 20
HORIZONTAL SCALE

0 5 10
VERTICAL SCALE

AEG Associated Environmental Group, LLC

FIGURE 8

GEOLOGIC CROSS SECTION C-C'

LACEY URBAN CENTER
7131–7269 MARTIN WAY EAST
OLYMPIA, WASHINGTON

FILENAME	DRAWN BY	CHECKED BY	APPROVED BY	PROJECT NUMBER
18-236_2003_2.DWG	ICD 3/25/2021	CS 3/25/2021	CS 3/25/2021	18-236

N

W E

S

LEGEND

MW-1	MONITORING WELL LOTACION
—x—x—	FENCE
168.65	GROUNDWATER ELEVATION (FEET)
168.00	INFERRED GROUNDWATER ELEVATION CONTOUR LINE (FEET) CONTOUR INTERVAL=0.50 FEET
0.01 ft/ft	APPROXIMATE GROUNDWATER GRADIENT DIRECTION (ft/ft)

NOTES

1. THE LOCATIONS OF ALL FEATURES SHOWN ARE APPROXIMATE
2. THIS DRAWING IS FOR INFORMATION PURPOSES. IT IS INTENDED TO ASSIST IN SHOWING FEATURES DISCUSSED IN AN ATTACHED DOCUMENT.

REFERENCE

DRAWING CREATED FROM AERIAL PHOTOGRAPH AND NOTES PROVIDED BY AEG, LLC.

0 10 20
SCALE IN FEET

AEG Associated Environmental Group, LLC

FIGURE 9

GROUNDWATER ELEVATION CONTOUR MAP
07/30/2020

LACEY URBAN CENTER
7131-7269 MARTIN WAY EAST
OLYMPIA, WASHINGTON

FILENAME	DRAWN BY	CHECKED BY	APPROVED BY	PROJECT NUMBER
18-236_2004_3.DWG	ICD 3/23/2021	CS 3/23/2021	CS 3/23/2021	18-236

N
W E
S

LEGEND

MW-1 / MW-4	SHALLOW / DEEP MONITORING WELL LOCATION
—x—x—	FENCE
176.85	GROUNDWATER ELEVATION (FEET)
176.00	INFERRED GROUNDWATER ELEVATION CONTOUR LINE (FEET) CONTOUR INTERVAL=0.50 FEET
0.02 ft/ft	APPROXIMATE GROUNDWATER GRADIENT DIRECTION (ft/ft)
NRE	NO REFERENCE ELEVATION

NOTES

1. THE LOCATIONS OF ALL FEATURES SHOWN ARE APPROXIMATE
2. THIS DRAWING IS FOR INFORMATION PURPOSES. IT IS INTENDED TO ASSIST IN SHOWING FEATURES DISCUSSED IN AN ATTACHED DOCUMENT.

REFERENCE

DRAWING CREATED FROM AERIAL PHOTOGRAPH AND NOTES PROVIDED BY AEG, LLC.

0 10 20
SCALE IN FEET

AEG Associated Environmental Group, LLC

FIGURE 10

GROUNDWATER ELEVATION CONTOUR MAP
10/16/2020

LACEY URBAN CENTER
7131-7269 MARTIN WAY EAST
OLYMPIA, WASHINGTON

FILENAME	DRAWN BY	CHECKED BY	APPROVED BY	PROJECT NUMBER
18-236_2101_1.DWG	ICD 3/25/2021	CS 3/25/2021	CS 3/25/2021	18-236

N
W E
S

LEGEND

MW-1	SHALLOW MONITORING WELL LOCATION
MW-4	DEEP MONITORING WELL LOCATION
—x—x—	FENCE
181.21	GROUNDWATER ELEVATION (FEET)
180.00	INFERRED GROUNDWATER ELEVATION CONTOUR LINE (FEET) CONTOUR INTERVAL=1.00 FEET
0.03 ft/ft	APPROXIMATE GROUNDWATER GRADIENT DIRECTION (ft/ft)
NRE	NO REFERENCE ELEVATION

NOTES

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REFERENCE

DRAWING CREATED FROM AERIAL PHOTOGRAPH AND NOTES PROVIDED BY AEG, LLC.

0 10 20
SCALE IN FEET

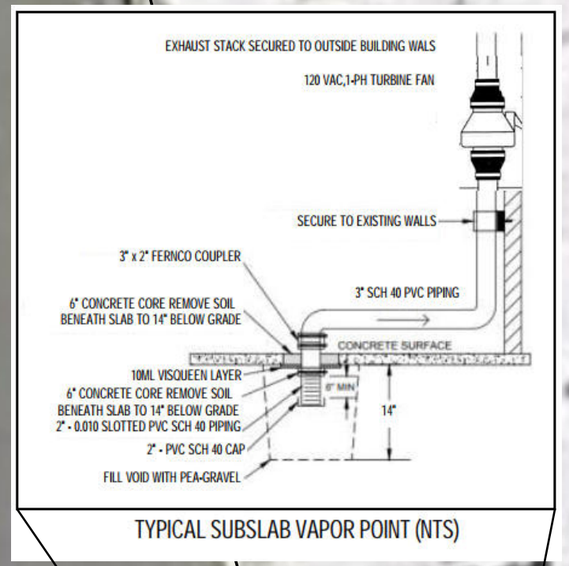
AEG Associated Environmental Group, LLC

FIGURE 11

GROUNDWATER ELEVATION CONTOUR MAP
01/07/2021

LACEY URBAN CENTER
7131-7269 MARTIN WAY EAST
OLYMPIA, WASHINGTON

PROJECT NUMBER	18-236
APPROVED BY	CS 3/25/2021
CHECKED BY	CS 3/25/2021
DRAWN BY	ICD 3/25/2021
FILENAME	18-236_2101_1.DWG



TYPICAL SUBSLAB VAPOR POINT (NTS)

N
W E
S

LEGEND

MW-1	SHALLOW MONITORING WELL LOCATION
MW-4	DEEP MONITORING WELL LOCATION
SG-1	SOIL GAS SAMPLE LOCATION
B-1	SOIL BORING LOCATION
SS-1	SUB-SLAB VAPOR SAMPLE LOCATION
AMBIENT	AIR SAMPLE LOCATION
—x—x—	FENCE
SSD-1	SUB-SLAB VAPOR POINT
450	PCE CONCENTRATION IN SOIL VAPOR ($\mu g/m^3$)
$\mu g/m^3$	MICROGRAMS PER CUBIC METER
PCE	TETRACHLOROETHYLENE
<	NOT DETECTED ABOVE LIMIT NOTED

RED BOLD INDICATES THE DETECTED CONCENTRATION EXCEEDS ECOLOGY MTCA METHOD B SCREENING LEVELS

BOLD INDICATES THE DETECTED CONCENTRATION IS BELOW ECOLOGY MTCA METHOD B SCREENING LEVELS

NOTES

1. THE LOCATIONS OF ALL FEATURES SHOWN ARE APPROXIMATE
2. THIS DRAWING IS FOR INFORMATION PURPOSES. IT IS INTENDED TO ASSIST IN SHOWING FEATURES DISCUSSED IN AN ATTACHED DOCUMENT.

REFERENCE

DRAWING CREATED FROM AERIAL PHOTOGRAPH AND NOTES PROVIDED BY AEG, LLC.

0 10 20
SCALE IN FEET

AEG Associated Environmental Group, LLC

FIGURE 12

VAPOR MITIGATION SYSTEM

LACEY URBAN CENTER
7131-7269 MARTIN WAY EAST
OLYMPIA, WASHINGTON

TABLES

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Phone: 360-352-9835 • Fax: 360-352-8164 • Email: admin@aegwa.com

Table 1 - Summary of Soil Analytical Results
Lacey Urban Center (18-236)
Olympia, Washington

Sample Number	Depth (feet)	Date Collected	Chlorinated Volatile Organic Compounds				
			PCE	TCE	cis-1,2 DCE	trans-1,2-DCE	Vinyl Chloride
Envitechnology, 2018							
B1-2	2	7/20/2018	**0.04**	<0.03	<0.15	<0.15	<0.15
B1-5	5	7/20/2018	**0.06**	<0.03	<0.15	<0.15	<0.15
B2-2	2	7/20/2018	**0.02**	<0.03	<0.15	<0.15	<0.15
B2-5	5	7/20/2018	**0.02**	<0.03	<0.15	<0.15	<0.15
B3-2	2	7/20/2018	**0.19**	<0.03	<0.15	<0.15	<0.15
B3-5	5	7/20/2018	**0.24**	<0.03	<0.15	<0.15	<0.15
B4-5	5	7/20/2018	**0.04**	<0.03	<0.15	<0.15	<0.15
B4-20	20	7/20/2018	<0.05	<0.03	<0.15	<0.15	<0.15
B5-5	5	7/20/2018	**0.25**	<0.03	<0.15	<0.15	<0.15
B5-20	20	7/20/2018	<0.05	<0.03	<0.15	<0.15	<0.15
B6-20	20	7/20/2018	<0.05	<0.03	<0.15	<0.15	<0.15
B7-5	5	8/20/2018	<0.05	<0.03	<0.15	<0.15	<0.15
B8-5	5	8/20/2018	**0.03**	<0.03	<0.15	<0.15	<0.15
B9-5	5	8/20/2018	**0.07**	<0.03	<0.15	<0.15	<0.15
B9-10	10	8/20/2018	<0.05	<0.03	<0.15	<0.15	<0.15
B9-15	15	8/20/2018	<0.05	<0.03	<0.15	<0.15	<0.15
B10-2	2	8/20/2018	<0.05	<0.03	<0.15	<0.15	<0.15
B10-5	5	8/20/2018	<0.05	<0.03	<0.15	<0.15	<0.15
B11-2	2	8/20/2018	**0.05**	<0.03	<0.15	<0.15	<0.15
B11-5	5	8/20/2018	**0.04**	<0.03	<0.15	<0.15	<0.15
B12-5	5	8/20/2018	**0.19**	<0.03	<0.15	<0.15	<0.15
B12-15	15	8/20/2018	<0.05	<0.03	<0.15	<0.15	<0.15
B13-5	5	8/20/2018	**0.02**	<0.03	<0.15	<0.15	<0.15
B13-15	15	8/20/2018	<0.05	<0.03	<0.15	<0.15	<0.15
B14-10	10	8/20/2018	<0.05	<0.03	<0.15	<0.15	<0.15
B14-15	15	8/20/2018	<0.05	<0.03	<0.15	<0.15	<0.15
B14-25	25	8/20/2018	<0.05	<0.03	<0.15	<0.15	<0.15
B15-5	5	8/20/2018	<0.05	<0.03	<0.15	<0.15	<0.15
B15-15	15	8/20/2018	<0.05	<0.03	<0.15	<0.15	<0.15
B16-10	10	8/20/2018	<0.05	<0.03	<0.15	<0.15	<0.15
B16-29	29	8/20/2018	<0.05	<0.03	<0.15	<0.15	<0.15
B17-5	5	8/20/2018	<0.05	<0.03	<0.15	<0.15	<0.15
B17-15	15	8/20/2018	<0.05	<0.03	<0.15	<0.15	<0.15
B18-5	5	8/20/2018	<0.05	<0.03	<0.15	<0.15	<0.15
B18-15	15	8/20/2018	<0.05	<0.03	<0.15	<0.15	<0.15
AEG, 2020							
B19-9	9	7/22/2020	<0.05	<0.03	<0.15	<0.15	<0.15
B20-9	9	7/22/2020	<0.05	<0.03	<0.15	<0.15	<0.15
B21-6	6	7/28/2020	<0.05	<0.03	<0.15	<0.15	<0.15
B21-11	11	7/28/2020	<0.05	<0.03	<0.15	<0.15	<0.15

Table 1 - Summary of Soil Analytical Results
Lacey Urban Center (18-236)
Olympia, Washington

Sample Number	Depth (feet)	Date Collected	Chlorinated Volatile Organic Compounds				
			PCE	TCE	cis-1,2 DCE	trans-1,2-DCE	Vinyl Chloride
B22-6	6	7/28/2020	<0.05	<0.03	<0.15	<0.15	<0.15
B22-11	11	7/28/2020	<0.05	<0.03	<0.15	<0.15	<0.15
B23-6	6	7/29/2020	<0.05	<0.03	<0.15	<0.15	<0.15
B23-11	11	7/29/2020	<0.05	<0.03	<0.15	<0.15	<0.15
MW1-6	6	7/29/2020	<0.05	<0.03	<0.15	<0.15	<0.15
MW1-11	11	7/29/2020	<0.05	<0.03	<0.15	<0.15	<0.15
MW2-6	6	7/29/2020	<0.05	<0.03	<0.15	<0.15	<0.15
MW2-11	11	7/29/2020	<0.05	<0.03	<0.15	<0.15	<0.15
MW3-6	6	7/30/2020	<0.05	<0.03	<0.15	<0.15	<0.15
MW3-11	11	7/30/2020	<0.05	<0.03	<0.15	<0.15	<0.15
B24-5/MW4-5	5	10/30/2020	<0.03	<0.02	<0.03	<0.03	<0.02
B24-10/MW4-10	10	10/30/2020	<0.03	<0.02	<0.03	<0.03	<0.02
B24-16/MW4-16	16	10/30/2020	<0.03	<0.02	<0.03	<0.03	<0.02
B24-21/MW4-21	21	10/30/2020	<0.03	<0.02	<0.03	<0.03	<0.02
B24-26/MW4-26	26	10/30/2020	<0.03	<0.02	<0.03	<0.03	<0.02
B24-31/MW4-31	31	10/30/2020	<0.03	<0.02	<0.03	<0.03	<0.02
B24-36/MW4-36	36	10/30/2020	<0.03	<0.02	<0.03	<0.03	<0.02
B24-41/MW4-41	41	10/30/2020	<0.03	<0.02	<0.03	<0.03	<0.02
B24-45/MW4-45	45	10/30/2020	<0.03	<0.02	<0.03	<0.03	<0.02
B24-56/MW4-56	56	10/30/2020	<0.03	<0.02	<0.03	<0.03	<0.02
B24-60/MW4-60	60	10/30/2020	<0.03	<0.02	<0.03	<0.03	<0.02
B24-74/MW4-74	74	10/30/2020	<0.03	<0.02	<0.03	<0.03	<0.02
B24-78/MW4-78	78	10/30/2020	<0.03	<0.02	<0.03	<0.03	<0.02
B24-81/MW4-81	81	10/30/2020	<0.03	<0.02	<0.03	<0.03	<0.02
MW5-40	40	10/30/2020	<0.03	<0.02	<0.03	<0.03	<0.02
MW5-60	60	10/30/2020	<0.03	<0.02	<0.03	<0.03	<0.02
MW5-75	75	10/30/2020	<0.03	<0.02	<0.03	<0.03	<0.02
Laboratory PQL			0.03/0.05	0.02/0.03	0.03/0.15	0.03/0.15	0.02/0.15
MTCA Method A Cleanup Levels			0.05	0.03	*160	*1,600	*0.67

Notes:
All values are presented in milligrams per kilogram (mg/kg)
< = Not detected at the listed laboratory detection limits
PQL = Practical Quantification Limit (laboratory detection limit)
Red Bold indicates the detected concentration exceeds MTCA cleanup level
Bold indicates the detected concentration is below MTCA cleanup level
PCE = Tetrachloroethylene
TCE = Trichloroethylene
DCE = Dichloroethylene
* MTCA Method B cleanup level; Method A cleanup level not established

Table 2 - Summary of Groundwater Analytical Results

Lacey Urban Center (18-236)

Olympia, Washington

Sample/Well Number	Date Collected	Halogenated Volatile Organic Compounds				
		PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Vinyl Chloride
Boring Groundwater Results (Envitechnology)						
W14	8/20/2018	<1.0	<0.4	<1.0	<1.0	<0.2
Boring Groundwater Results (AEG)						
B21-W	7/28/2020	**0.6**	<0.4	<1.0	<1.0	<0.2
B22-W	7/29/2020	**1.6**	<0.4	<1.0	<1.0	<0.2
B23-W	7/30/2020	**1.3**	<0.4	<1.0	<1.0	<0.2
Monitoring Well Results (AEG)						
MW-1	7/30/2020	**0.82**	<0.4	<1.0	<1.0	<0.2
	10/16/2020	**0.7 J**	<0.4	<1.0	<1.0	<0.2
	1/7/2021	<1.0	<0.4	<1.0	<1.0	<0.2
MW-2	7/30/2020	**0.66**	<0.4	<1.0	<1.0	<0.2
	10/16/2020	**0.6J**	<0.4	<1.0	<1.0	<0.2
	1/7/2021	<1.0	<0.4	<1.0	<1.0	<0.2
MW-3	7/30/2020	<1.0	<0.4	<1.0	<1.0	<0.2
	10/16/2020	<1.0	<0.4	<1.0	<1.0	<0.2
	1/7/2021	<1.0	<0.4	<1.0	<1.0	<0.2
MW-4	1/7/2021	<1.0	<0.4	<1.0	<1.0	<0.2
MW-5	1/7/2021	<1.0	<0.4	<1.0	<1.0	<0.2
PQL		1.0	0.4/1.0	1.0	1.0	0.2
MTCA Method A Cleanup Levels		5	5	16*	160*	0.2

Notes:

All values reported in micrograms per liter (µg/L)

-- = Not analyzed for constituent

< = Not detected at the listed laboratory detection limits

PQL = Practical Quantification Limit (laboratory detection limit)

Red Bold indicates the detected concentration exceeds MTCA cleanup levels

Bold indicates the detected concentration is below MTCA cleanup levels

* MTCA Method B cleanup level; Method A cleanup level not established

PCE = Tetrachloroethylene

TCE = Trichloroethylene

DCE = Dichloroethylene

Table 3 - Summary of Groundwater Elevations
Lacey Urban Center (18-236)
Olympia, Washington

Well No./ TOC Elevation	Well Screen Interval	Date	Depth to Water	Depth to Free Product	Free Product Thickness	Apparent Groundwater Elevation	Actual Groundwater Elevation	Change in Elevation
MW-1	25-35	7/30/2020	31.00	--	--	--	168.15	--
199.15		10/16/2020	24.20	--	--	--	174.95	6.80
		1/7/2021	20.89	--	--	--	178.26	3.31
MW-2	25-35	7/30/2020	31.00	--	--	--	167.33	--
198.33		10/16/2020	24.18	--	--	--	174.15	6.82
		1/7/2021	20.60	--	--	--	177.73	3.58
MW-3	25-35	7/30/2020	30.00	--	--	--	168.65	--
198.65		10/16/2020	21.80	--	--	--	176.85	8.20
		1/7/2021	17.44	--	--	--	181.21	4.36
MW-4	75-80	1/7/2021	24.82	--	--	--	--	--
--								
MW-5	70-75	1/7/2021	23.90	--	--	--	--	--
--								

Notes:

All values reported in feet

TOC = Top of casing elevation relative to assigned benchmark.

-- = Not measured, not available, or not applicable

Table 4 - Summary of Soil Gas Analytical Results
Lacey Urban Center (18-236)
Olympia, Washington

Sample Number	Date Collected	Chlorinated Volatile Organic Compounds				
		PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	Vinyl Chloride
Envitechnology, 2018						
SG1-5 (B-1)	7/20/2018	**180**	**6.6**	<4.0	<4.0	<2.6
SG2-5 (B-2)	7/20/2018	**140**	**3.8**	<4.0	<4.0	<2.6
SG3-5 (B-3)	7/20/2018	**1,800**	<2.7	<4.0	<4.0	<2.6
SG4-5 (B-4')	7/20/2018	**430**	<2.7	<4.0	<4.0	<2.6
SG5-5 (B-5')	7/20/2018	**610**	<2.7	<4.0	<4.0	<2.6
SG6-5 (B-6')	7/20/2018	**350**	<2.7	<4.0	<4.0	<2.6
SG7-5 (B-7)	8/21/2018	**450**	**1.7**	<4.0	<4.0	<2.6
SG8-5 (B-8)	8/21/2018	**450**	**3.3**	<4.0	<4.0	<2.6
SG10-5 (B-10)	8/21/2018	**120**	**7.3**	<4.0	<4.0	<2.6
SG11-5 (B-11)	8/21/2018	**780**	**3.5**	<4.0	<4.0	**6.2**
AEG, 2020						
SG-1	7/29/2020	**60**	<1.8	<2.7	<2.7	<1.7
SG-2	7/29/2020	**180**	<1.8	<2.7	<2.7	<1.7
SG-3	7/29/2020	**90**	<1.8	<2.7	<2.7	<1.7
SG-4	7/29/2020	**72**	**2.4**	<2.7	<2.7	<1.7
SG-5	7/29/2020	**270**	<3.5	<5.2	<5.2	<3.3
SG-6	7/29/2020	**76**	<1.9	<2.8	<2.8	<1.8
MTCA Method B Sub-Slab Screening Levels		321*	12.3*	NL	NL	9.33*

Notes:

All values presented in micrograms per cubic meter ($\mu g/m^3$)

< = Not detected above the laboratory practical quantitation limit (PQL)

* Cancer cleanup/screening level (all other constituents listed have non-cancer values)

Red Bold indicates the detected concentration exceeds MTCA Method B screening levels

Bold indicates the detected concentration is below MTCA Method B screening levels

NL = Not Listed; no screening level has been promulgated for these constituents

PCE = Tetrachloroethylene

TCE = Trichloroethylene

DCE = Dichloroethene

Table 5 - Summary of Sub-Slab Vapor and Indoor Air Analytical Results

Lacey Urban Center (18-236)

Olympia, Washington

Sample ID		Indoor-1	Indoor-2	Ambient	Method B Indoor Air Cleanup Level	SS-1	SS-2	Method B Sub-Slab Screening Level
Date Collected		10/29/2020	10/29/2020	10/29/2020		10/29/2020	10/29/2020	
TO-15 - Volatile Organic Compounds	Vinyl Chloride	<0.26	<0.26	<0.26	0.28*	<8.9	<1.8	9.33*
	trans-1,2-DCE	<0.4	<0.4	<0.4	NL	<14	<2.8	NL
	cis-1,2-DCE	<0.4	<0.4	<0.4	NL	<14	<2.8	NL
	TCE	<0.11	<0.11	<0.11	0.37*	<3.8	<0.75	12.3*
	PCE	<6.8	<6.8	<6.8	9.62*	**1,600**	**410**	321*

Notes:

All values presented in micrograms per cubic meter ($\mu g/m^3$)

-- = Not analyzed for constituent

< = Not detected above laboratory limits

* Cancer cleanup/screening level (all other constituents listed have non-cancer values)

Red Bold indicates the detected concentration exceeds MTCA Method B cleanup or screening levels

Bold indicates the detected concentration is below MTCA Method B cleanup or screening levels

NL = Not Listed; no cleanup/screening levels have been promulgated for these constituents

PCE = Tetrachloroethylene

TCE = Trichloroethylene

DCE = Dichloroethylene

Table 6 - Identification and Screening of Response Actions and Remediation Technologies, Lacey Urban Center, 7131-7269 Martin Way East, Olympia, Washington 98516

General Response Action	Technology/Options	Process Description	Applicability to Site Conditions	Effectiveness	Implementability	Relative Cost	Retain for Further Consideration	Reasons for Screening Decision
No Action	None	--	Not applicable. Contamination exceeds MTCA Method A cleanup levels	Unable to achieve RAOs. Not effective.	Not implementable	Low	Not retained	RAOs not achievable.
Institutional Controls	Site access and use restrictions	Legal Restrictions/environmental covenant limiting exposure to contamination. Deed restrictions to control soil excavation or access to groundwater.	Possibly applicable for closure after site demonstrates no off-property impacts	Effective at limiting exposure pathways to remaining contamination above CULs on-property, where disproportionate cost analysis demonstrates additional remediation not cost-effective.	Implementable	Low, with possible future monitoring requirements.	**Retained**	Environmental Covenant may be appropriate as part of a remedial option.
Monitored Natural Attenuation	Long term monitoring of affected media at Site	Actively and regularly monitor ongoing natural processes acting to reduce contaminant concentrations in affected media. Enhancement of natural attenuation processes possible through injection of chemicals or microbes to increase the rate of attenuation.	May be applicable	Effective on petroleum hydrocarbons where natural conditions determined to be conducive to attenuation.	Implementable	Low, with possible future monitoring requirements.	**Retained**	Could be appropriate remedial solution for residual contamination.
Containment	Vertical Barriers	Impermeable subsurface slurry wall or dike constructed to prevent migration of contamination.	Not applicable	Can be effective for preventing lateral migration of contaminants. Not effective in reducing LNAPL or dissolved phase contamination.	Not implementable	High	Not retained	No LNAPL present with a number of utilities present make it impractical.
	Hydraulic Containment	Groundwater pumping.	Not applicable	Not effective in Site-specific conditions.	Not implementable	High	Not retained	Low permeability soils make hydraulic containment ineffective at this site.
	Capping	Impervious concrete or asphalt surfaces over contamination, limiting exposure pathways at Site.	May be applicable	Effective at limiting exposure pathways to remaining contamination above CULs.	Implementable	Moderate	**Retained**	Site is currently capped in some areas with impermeable surfaces.
Removal	Soil Excavation	Excavation and removal of contaminated soil.	Not applicable	Effective at removing PCS where accessible.	Not implementable	High	Not retained	Contaminated soil excavation is not appropriate with the building and sidewalk placement.
	LNAPL Recovery	Extraction of LNAPL from groundwater table by pumping or skimming.	Not applicable	Effective at reducing LNAPL sources.	Not implementable	Moderate	Not retained	LNAPL not present at Site
	Groundwater Extraction	Pumping groundwater from extraction wells to ex-situ treatment system	Not applicable	Effective at removing dissolved phase contamination from groundwater.	Not implementable	High	Not retained	Groundwater not an issue at the Site.
Ex-Situ Treatment-Soil	Excavated soil treatment	Treatment and on-site reuse of contaminated soil.	Not applicable	Effective at reducing soil contamination levels.	Not implementable.	High, depending on methods of access and treatment.	Not retained	Not likely implementable at this Site. Possible permitting issues. Would require areas on the property to properly contain and treat contaminated soil.
Ex-Situ Treatment-Groundwater	Activated Carbon Adsorption	Contaminated groundwater is passed through granular activated carbon (GAC) filters to absorb contaminants. Treated water may be discharged or reinjected.	Not applicale	Effective for reducing dissolved phase contamination in groundwater.	Not implementable	Moderate	Not retained	Groundwater not an issue at the Site.
	Air Stripping	Extract groundwater to volatilize through air stripper.	Not applicable	Effective for reducing dissolved phase contamination in groundwater.	Not implementable	Moderate	Not retained	Groundwater not an issue at the Site.
	Chemical Oxidation	Injection of chemical oxidants such as ozone or hydrogen peroxide into extracted groundwater.	Not applicable	Effective for reducing dissolved phase contamination in groundwater.	Not Implementable	High	Not retained	Groundwater not an issue at the Site.

Table 6 - Identification and Screening of Response Actions and Remediation Technologies, Lacey Urban Center, 7131-7269 Martin Way East, Olympia, Washington 98516

General Response Action	Technology/Options	Process Description	Applicability to Site Conditions	Effectiveness	Implementability	Relative Cost	Retain for Further Consideration	Reasons for Screening Decision
In-Situ Treatment, Soil and Groundwater	Air/Ozone Sparging	Air or ozone injection into the subsurface to volatilize contamination and provide oxygen for enhanced aerobic biodegradation.	Applicable	Effective for reducing dissolved phase contamination in groundwater.	Not implementable	Moderate	Not retained	Groundwater not an issue at the Site.
	Soil Vapor Extraction	Extract volatile contaminants by applying a vacuum to subsurface. Collected gasses would require additional treatment in vapor phase-GAC filter or through thermal treatment prior to discharge.	Applicable	Effective for reducing dissolved phase contamination.	Implementable	Moderate	**Retained**	Appropriate for soils at the Site.
	High Vacuum Dual-Phase Extraction	Extract volatile and dissolved phase contaminants by applying a vacuum to subsurface. Collected water and soil gasses would require additional treatment in liquid and vapor phase-GAC filters .	Not applicable	Effective for reducing dissolved phase contamination.	Implementable	Moderate	Not retained	Groundwater not an issue at the Site.
	In-Situ Chemical Injection	Injection of chemicals and substances promoting degradation of contamination into the subsurface.	Applicable	Effective for reducing dissolved phase contamination.	Implementable	Moderate	**Retained**	Appropriate for soils at the Site.
	Enhanced Bioremediation	Injection of chlorinated hydrocarbon-degrading microbes along with other substances to provide additional biodegradation in the subsurface	Applicable	Can be effective.	Implementable	Moderate	**Retained**	Appropriate for groundwater and soils at the Site and deeper groundwater table.
	Electrical Resistance Heating	Heat subsurface by heated water, steam or electrical resistance to volatilize contamination.	Applicable	Effective for reducing dissolved phase contamination in groundwater.	Implementable	High	**Retained**	Appropriate for soils at the Site and groundwater table but the limitations of ERH needs large area of equipment makes this option very costly and will impede site activities.

TABLE 7 - Remedial Alternatives Evaluation / Disproportionate Cost Analysis, Lacey Urban Center, 7131-7269 Martin Way East, Olympia, Washington 98516

	Alternative 1		Alternative 2		Alternative 3	
Description of Alternative	Alternative 1, No Action Alternative1 includes EIM submittals and existing monitoring well abandonment.		Alternative 2, Soil Vapor Extraction (SVE) Alternative 2 includes the installation and operation of an SVE system, compliance air sampling, confirmatory soil sampling, and system decommissioning. If a permanent cleanup is unable to be performed due to accessibility, institutional controls via an environmental covenant on the property would be needed to achieve cleanup standards.		Alternative 3, Vapor Mitigation System and Environmental Covenant. Results showed PCE vapors were not impacting indoor air above MTCA cleanup levels as the building slab is likely acting as a cap and preventing vapor from migrating into indoor air. However, sub-slab vapor concentrations of PCE were deemed high enough that they had the potential to affect indoor air at some point in the future. To provde protection for current and future building tenants, a sub-slab depressurization (SSD) system is proposed. These systems reduce the pressure beneath a building floor slab, creating a pressure barrier to the interior air space. SSDs are often deployed in existing structures by installing collection sumps equipped with extraction fans. The volatile vapor enters the piping and sumps, and is then discharged by the fan to the outside atmosphere. Following installation of the SSD system, institutional controls in the fomr of an environmental covenant would be needed to achieve MTCA cleanup standards.	
		SCORE		***SCORE***		***SCORE***
Protectiveness						
Overall protectiveness	*Not as protective when complete*	*1*	*More protective when complete*	*4*	*More protective when complete*	4
Reduces existing risks	*Reduces risks when implemented*	*1*	*Reduces risks when implemented*	*4*	*Reduces risks when implemented*	4
Time required to reduce risk	*Longer duration required with less certainty*	*1*	*Medium duration to reduce risks*	*4*	*Medium duration to reduce risks*	4
On-Site risks	*Reduces risk with lower level of certainty*	*1*	*Reduces risks with a moderate level of certainty*	*4*	*Reduces risks with a moderate level of certainty*	4
Off-Site risks	*Reduces risk with lower level of certainty*	*1*	*Reduces risks with a moderate level of certainty*	*4*	*Reduces risks with a moderate level of certainty*	4
Improvement in environmental quality	*Low level of improvement*	*1*	*Moderate to high level of improvement*	*4*	*Moderate to high level of improvement*	4
Criterion Score x weighting factor (average 0.30)*		***0.30***		***1.20***		***1.20***
Permanence						
Reduces toxicity, mobility, and volume	*Longer term reduction*	*1*	*Reduces toxicity, mobility, and volume rapidly. May leave some toxicity in place under building or in vadose zone soils.*	*4*	*Longer term reduction. May leave some toxicity in place under building or in vadose zone soils.*	3
Degree of irreversibility	*Can be reversed*	*1*	*Irreversible. Waste treated in-situ.*	*4*	*Irreversible. Waste treated in-situ.*	4
Waste characteristics	*No waste generated from action. Some waste from monitoring.*	*5*	*Solid waste from monitoring and air treatment operations.*	*4*	*Some waste generated from action. No waste from monitoring.*	4
Criterion Score x weighting factor (average 0.25)*		***0.58***		***1.00***		***0.92***
Long-Term Effectiveness						
Degree of Certainty	*Low certainity.*	*1*	*Moderately certain. May leave some waste in place under the building vadose zone soils.*	*4*	*Moderately certain. May leave some waste in place under the building vadose zone soils.*	4
Reliability	*Low reliable*	*1*	*Reliable and proven*	*5*	*Reliable and proven*	5
Residual Risk	*Low*	*1*	*Moderate to High level based on potential to leave residuals in soil.*	*4*	*Moderate to High level based on potential to leave residuals in soil.*	4
Technology hierarchy	*Low rank - treats in-situ*	*1*	*Mid rank - treats in-situ*	*4*	*Mid rank - treats in-situ*	4
Criterion Score x weighting factor (average 0.20)*		***0.20***		***0.85***		***0.85***
Short-Term Risk Management						
During construction	*Low risk*	*5*	*Moderate risks associated with system installation, utilities, and traffic*	*3*	*Low risk disruption to indoor tenants.*	4
Effectiveness of risk management	*Effective*	*5*	*Moderately effective*	*4*	*Moderately effective*	4
Criterion Score x weighting factor (average 0.05)*		***0.25***		***0.18***		***0.20***
Implementability						
Technically possible	*Possible*	*5*	*Possible, demonstrated at similar sites. Possible issues with residuals in Site soils.*	*4*	*Possible, demonstrated at similar sites. Possible issues with residuals in Site soils.*	3
Access	*Not Difficult*	*5*	*Moderately accessible*	*3*	*Moderately to Easily accessible*	4
Availability of necessary resources	*Readily available*	*5*	*Readily available*	*5*	*Readily available*	5
Monitoring requirements	*Low to None*	*5*	*Moderate*	*1*	*Low monitoring required*	4
Integration with existing features	*Possible*	*5*	*Moderate*	*3*	*No Changes required*	1
Criterion Score x weighting factor (average 0.05)*		***0.25***		***0.16***		***0.17***
Public Concerns						
Public Concerns	*Leaves contamination in place and possible concerns with off site migration*	*5*	*Treats contamination in place. May leave residuals under the building and/or in vadose zone soils.*	*4*	*Treats contamination in place. May leave residuals under building and/or in vadose zone soils.*	*4*
Criterion Score x weighting factor (average 0.10)*		***0.50***		***0.40***		***0.40***
Restoration Time Frame						
Restoration Time Frame	*Long time frame (15-20 years)*	*1*	*Short to moderate time frame (2-3 years)*	*4*	*Short time frame (1-3 years)*	*5*
Criterion Score x weighting factor (average 0.05)*		***0.05***		***0.20***		***0.25***
Alternative Benefit Value	*2.13*		*3.99*		*3.99*	
Estimated Alternative Cost to Closure	$10,477		$294,570		$82,838	
Cost per Benefit Value	$4,911		$73,920		$20,779	

* Alternative Benefit Values are determined by multiplying criterion scores by weighting factors described in Section 10.4

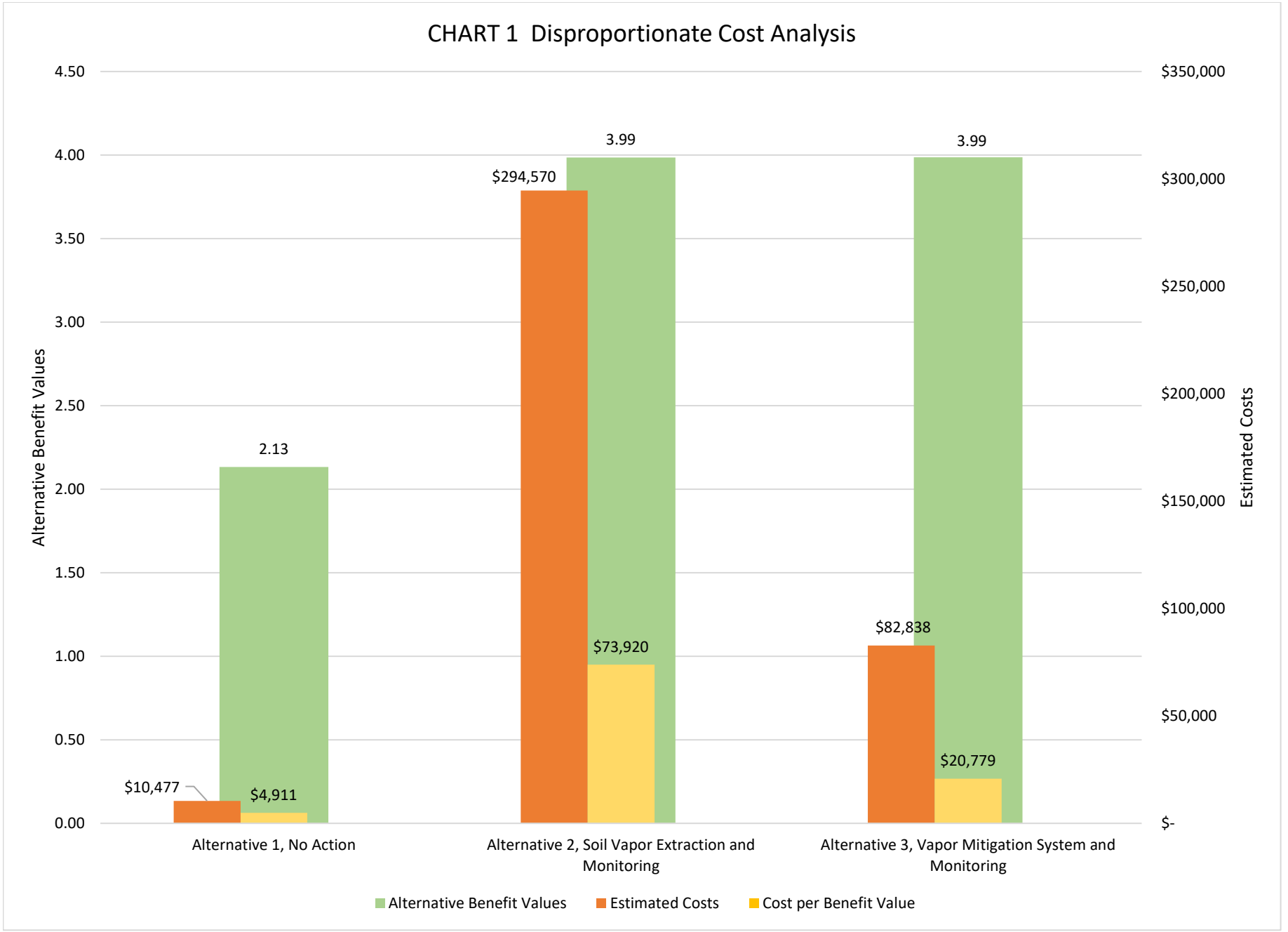
CHART 1 Disproportionate Cost Analysis
Alternative Benefit Values
Estimated Costs
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
$350,000
$300,000
$250,000
$200,000
$150,000
$100,000
$50,000
$-
2.13
3.99
3.99
$10,477
$4,911
$294,570
$73,920
$82,838
$20,779
Alternative 1, No Action
Alternative 2, Soil Vapor Extraction and Monitoring
Alternative 3, Vapor Mitigation System and Monitoring
Alternative Benefit Values
Estimated Costs
Cost per Benefit Value

APPENDIX A

Site Photographs

2633 Parkmont Lane SW, Suite A • Olympia, WA • 98502
Phone: 360-352-9835 • Fax: 360-352-8164 • Email: admin@aegwa.com

Associated Environmental Group, LLC

SITE PHOTOGRAPHIC RECORD

Lacey Urban Center
AEG Project #18-236

Photo #1:	*Installation of monitoring well MW-5 facing northeast.*

Photo #2:	*Installation of monitoring well MW-4 facing north.*

Photo #3:	*Typical soil profile from location B-19 sand/silts.*

Photo #4:	*Deep soil profile from location MW-4 silts/sands with gravels.*

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Photo #5:	*Looking northwest location of boring B-22.*

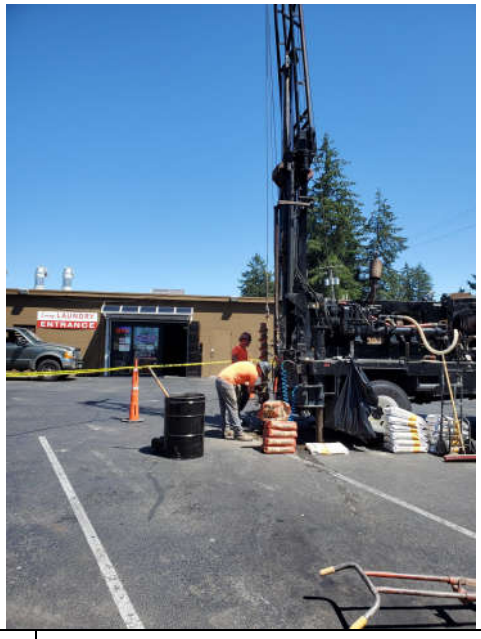

Photo #6:	*Looking east location of boring B-23.*

APPENDIX B

Supporting Documents:

Boring Logs

Laboratory Datasheets

TEE Form

$

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Associated Environmental Group, LLC

BORING AND WELL LOG LEGEND

LITHOLOGY	WATER LEVEL	WELL/BORING COMPLETION	Sample Type	DESCRIPTION
				ASPHALT
				CONCRETE
				BEDROCK
				IGNEOUS Rock
				METAMORPHIC Rock
				SEDIMENTARY Rock
				Well-graded GRAVEL (GW)
				Poorly graded GRAVEL (GP)
				Silty GRAVEL (GM)
				Clayey GRAVEL (GC)
				Well-graded GRAVEL with silt (GW-GM)
				Poorly graded GRAVEL with silt (GP-GM)
				Well-graded GRAVEL with clay (GW-GC)
				Poorly graded GRAVEL with clay (GP-GC)
				Well-graded SAND (SW)
				Poorly graded SAND (SP)
				Silty SAND (SM)
				Clayey SAND (SC)
				Well-graded SAND with silt (SW-SM)
				Poorly graded SAND with silt (SP-SM)
				Well-graded SAND with clay (SW-SC)
				Poorly graded SAND with clay (SP-SC)
				SILT (ML)
				Lean CLAY (CL)
				Organic SOIL (OL)
				Elastic SILT (MH)
				Fat CLAY (CH)
				Organic SOIL (OH)
				Organic SOIL (OL/OH)
				PEAT (PT)
				Volume Descriptors:
				Trace = <5%
				Few = 5-10%
				Little = 15-25%
				Some = 30-45%
				Mostly = >=50%
	▽			Water Level During Drilling
	▼			Water Level at End of Drilling/in Completed Well
				Cap
				Riser
				Screen
				End Plug
				Annular Seal (Bentonite-Cement Grout, Bentonite Slurry/Chips/Pellets/Powder, Other)
				Sanitary Seal (Bentonite Slurry/Chips/Pellets/Powder, Other)
				Filter Pack (Sand, Gravel, Other)
				Backfill
			GR	Grab
			EN	Encore
			SS	Split Spoon
			SH	Shelby Tube
			CO	Core Barrel
			DP	Direct Push
			ID	Lab Sample and ID

NOTES:

Associated Environmental Group, LLC	Client: AEG-CLIENTS	BORING LOG
	Project: 18-236	Boring No. B-19
	Address: 7131-7269 Martin Way East, Olympia, WA	Page: 1 of 1

Drilling Start Date:	**07/22/2020 12:25**	Boring Depth (ft):	**12.0**
Drilling End Date:	**07/22/2020 13:07**	Boring Diameter (in):	**2.00**
Drilling Company:	**Cascade**	Sampling Method(s):	**Direct Push**
Drilling Method:	**Direct Push**	DTW During Drilling (ft):	**N/A**
Drilling Equipment:	**Limited Acces Geoprobe**	DTW After Drilling (ft):	**N/A**
Driller:	**Scott**	Ground Surface Elev. (ft):	
Logged By:	**B. Dilba**	Location (Lat, Long):	

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
0				DP	12:31		2.50	(0') Concrete			0
								(0.5') Silty GRAVEL with sand (GM); mostly fine-coarse grained gravel, some fine-coarse sand, poorly graded, dense, dry, light reddish-brown		B19-3	
				DP	12:39		3.00				
5										B19-6	5
				DP	12:50		2.50				
								(7.5') SILT with gravel (ML); few fine gravel, mostly silt, nonplastic, medium stiff, moist, light reddish-brown			
				DP	13:07		0.00			B19-9	
10								(9.5') Silty GRAVEL with sand (GM); mostly fine-coarse grained gravel, some fine-coarse sand, dense, dry, light reddish-brown			10
								(12') Boring terminated			
15											15
20											20

NOTES:

Associated Environmental Group, LLC

Client:	**AEG-CLIENTS**
Project:	**18-236**
Address:	**7131-7269 Martin Way East, Olympia, WA**

BORING LOG

Boring No. **B-20**

Page: **1 of 1**

Drilling Start Date:	**07/22/2020 11:40**	Boring Depth (ft):	**9.0**
Drilling End Date:	**07/22/2020 12:20**	Boring Diameter (in):	**2.00**
Drilling Company:	**Cascade**	Sampling Method(s):	**Direct Push**
Drilling Method:	**Direct Push**	DTW During Drilling (ft):	**N/A**
Drilling Equipment:	**Limited Acces Geoprobe**	DTW After Drilling (ft):	**N/A**
Driller:	**Scott**	Ground Surface Elev. (ft):	
Logged By:	**B. Dilba**	Location (Lat, Long):	

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
0				DP	11:48		2.00	(0') Concrete (0.5') Silty GRAVEL with sand (GM); mostly fine-coarse grained gravel, some fine-coarse sand, poorly graded, dense, dry, light reddish-brown	0.0	B20-3	0
				DP	11:54		3.00				
5				DP	12:07		3.00		0.0	B20-6	5
									0.0	B20-9	
10								(9') Boring terminated			10
15											15
20											20

NOTES:

Associated Environmental Group, LLC

Client:	**AEG-CLIENTS**
Project:	**18-236**
Address:	**7131-7269 Martin Way East, Olympia, WA**

BORING LOG

Boring No. **B-21**

Page: **1 of 2**

Drilling Start Date:	**07/28/2020 08:55**	Boring Depth (ft):	**34.0**
Drilling End Date:	**07/28/2020 09:34**	Boring Diameter (in):	**0**
Drilling Company:	**Cascade**	Sampling Method(s):	**Split Spoon**
Drilling Method:	**Hollow Stem Auger**	DTW During Drilling (ft):	**31.0**
Drilling Equipment:	**Truck Mounted Auger**	DTW After Drilling (ft):	**N/A**
Driller:	**James**	Ground Surface Elev. (ft):	
Logged By:	**B. Dilba**	Location (Lat, Long):	

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
0				SS	09:01	5 6 6	1.50	(0') Asphalt (0.5') Poorly graded GRAVEL (GP); mostly fine-coarse grained gravel, trace medium-coarse sand, dense, dry, light reddish-brown			0
5				SS	09:05	10 13 15	1.50			B21-6	5
10				SS	09:09	37 31 25	1.50			B21-11	10
15				SS	09:16		1.50			B21-16	15
20											20

NOTES:

Associated Environmental Group, LLC

Client:	**AEG-CLIENTS**
Project:	**18-236**
Address:	**7131-7269 Martin Way East, Olympia, WA**

BORING LOG

Boring No. **B-21**

Page: **2 of 2**

Drilling Start Date:	**07/28/2020 08:55**	Boring Depth (ft):	**34.0**
Drilling End Date:	**07/28/2020 09:34**	Boring Diameter (in):	**0**
Drilling Company:	**Cascade**	Sampling Method(s):	**Split Spoon**
Drilling Method:	**Hollow Stem Auger**	DTW During Drilling (ft):	**31.0**
Drilling Equipment:	**Truck Mounted Auger**	DTW After Drilling (ft):	**N/A**
Driller:	**James**	Ground Surface Elev. (ft):	
Logged By:	**B. Dilba**	Location (Lat, Long):	

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
0.00								(0.5') Poorly graded GRAVEL (GP); mostly fine-coarse grained gravel, trace medium-coarse sand, dense, dry, light reddish-brown		B21-21	
1.00				SS	09:26	47 6 0					
1.50				SS	09:31	23 34 30				B21-26	
		▽						(31') Wet		B21-31	
								(34') Boring terminated			

NOTES: Water sample B21-W collected at 30-34 ft bgs.

Associated Environmental Group, LLC	Client: AEG-CLIENTS	BORING LOG
	Project: 18-236	Boring No. B-22
	Address: 7131-7269 Martin Way East, Olympia, WA	Page: 1 of 2

Drilling Start Date:	**07/28/2020 10:46**	Boring Depth (ft):	**0**
Drilling End Date:	**07/28/2020 11:33**	Boring Diameter (in):	**0**
Drilling Company:	**Cascade**	Sampling Method(s):	**Split Spoon**
Drilling Method:	**Hollow Stem Auger**	DTW During Drilling (ft):	**31.0**
Drilling Equipment:	**Truck Mounted Auger**	DTW After Drilling (ft):	**N/A**
Driller:	**James**	Ground Surface Elev. (ft):	
Logged By:	**B. Dilba**	Location (Lat, Long):	

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
0				SS	10:57	11 12 12	1.50	(0') Asphalt (0.5') Poorly graded GRAVEL (GP); mostly fine-coarse grained gravel, trace medium-coarse sand, dense, dry, light reddish-brown			0
5				SS	11:10	7 14 14	1.50			B22-6	5
10				SS	11:15	12 12 13	1.50			B22-11	10
15				SS	11:23	13 15 20	1.50	(16') SILT with gravel (ML); few fine gravel, mostly silt, nonplastic, stiff, moist, light reddish-brown		B22-16	15
20											20

NOTES:

Associated Environmental Group, LLC	Client: AEG-CLIENTS	BORING LOG
	Project: 18-236	Boring No. B-22
	Address: 7131-7269 Martin Way East, Olympia, WA	Page: 2 of 2

Drilling Start Date:	**07/28/2020 10:46**	Boring Depth (ft):	**0**
Drilling End Date:	**07/28/2020 11:33**	Boring Diameter (in):	**0**
Drilling Company:	**Cascade**	Sampling Method(s):	**Split Spoon**
Drilling Method:	**Hollow Stem Auger**	DTW During Drilling (ft):	**31.0**
Drilling Equipment:	**Truck Mounted Auger**	DTW After Drilling (ft):	**N/A**
Driller:	**James**	Ground Surface Elev. (ft):	
Logged By:	**B. Dilba**	Location (Lat, Long):	

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
20						15 20	0.00	(16') SILT with gravel (ML); few fine gravel, mostly silt, nonplastic, stiff, moist, light reddish-brown		B22-21	20
				SS	11:25	20 50 0	1.50				
25										B22-26	25
				SS	11:32	19 33 33	1.50	(26') Poorly graded GRAVEL (GP); mostly fine-coarse grained gravel, trace medium-coarse sand, dense, dry, light reddish-brown			
30		▽						(30') Wet		B22-31	30
35								(34') Boring terminated			35
40											40

NOTES:

Associated Environmental Group, LLC

Client:	**AEG-CLIENTS**
Project:	**18-236**
Address:	**7131-7269 Martin Way East, Olympia, WA**

BORING LOG

Boring No. **B-23**

Page: **1 of 2**

Drilling Start Date:	**07/29/2020 10:17**	Boring Depth (ft):	**0**
Drilling End Date:	**07/29/2020 11:15**	Boring Diameter (in):	**0**
Drilling Company:	**Cascade**	Sampling Method(s):	**Split Spoon**
Drilling Method:	**Hollow Stem Auger**	DTW During Drilling (ft):	**31.0**
Drilling Equipment:	**Truck Mounted Auger**	DTW After Drilling (ft):	**N/A**
Driller:	**James**	Ground Surface Elev. (ft):	
Logged By:	**B. Dilba**	Location (Lat, Long):	

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
0								(0') Asphalt			0
				SS	10:39	4 5 7	1.50	(0.5') Poorly graded GRAVEL (GP); mostly fine-coarse grained gravel, trace medium-coarse sand, dense, dry, light reddish-brown			
5										B23-6	5
				SS	10:45	12 13 13	1.50				
10										B23-11	10
				SS	10:48	50 0 0	0.50				
15										B23-16	15
				SS	10:58	21 23 26	1.50				
20											20

NOTES:

Associated Environmental Group, LLC

Client:	**AEG-CLIENTS**
Project:	**18-236**
Address:	**7131-7269 Martin Way East, Olympia, WA**

BORING LOG

Boring No. **B-23**

Page: **2 of 2**

Drilling Start Date:	**07/29/2020 10:17**	Boring Depth (ft):	**0**
Drilling End Date:	**07/29/2020 11:15**	Boring Diameter (in):	**0**
Drilling Company:	**Cascade**	Sampling Method(s):	**Split Spoon**
Drilling Method:	**Hollow Stem Auger**	DTW During Drilling (ft):	**31.0**
Drilling Equipment:	**Truck Mounted Auger**	DTW After Drilling (ft):	**N/A**
Driller:	**James**	Ground Surface Elev. (ft):	
Logged By:	**B. Dilba**	Location (Lat, Long):	

DEPTH (ft)	LITHOLOGY	WATER LEVEL	BORING COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
20						23 26	0.00	(0.5') Poorly graded GRAVEL (GP); mostly fine-coarse grained gravel, trace medium-coarse sand, dense, dry, light reddish-brown		B23-21	20
				SS	11:06	26 50 0	1.00				
25										B23-26	25
				SS	11:15	29 33 33	1.50	(26') Poorly graded GRAVEL (GP); mostly fine-coarse grained gravel, trace medium-coarse sand, dense, dry, light reddish-brown			
30		▽								B23-31	30
35								(34') Boring terminated			35
40											40

NOTES:

Associated Environmental Group, LLC

Client:	**AEG-CLIENTS**
Project:	**18-236**
Address:	**7131-7269 Martin Way East, Olympia, WA**

WELL LOG

Well No.	**MW-1**
Page:	**1 of 2**

Drilling Start Date:	**07/29/2020 07:34**	Boring Depth (ft):	**36.5**	Well Depth (ft):	**35.0**
Drilling End Date:	**07/29/2020 08:31**	Boring Diameter (in):	**0**	Well Diameter (in):	**2.0**
Drilling Company:	**Cascade**	Sampling Method(s):	**Split Spoon**	Screen Slot (in):	**0.010**
Drilling Method:	**Hollow Stem Auger**	DTW During Drilling (ft):	**31.0**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Truck Mounted Auger**	DTW After Drilling (ft):	**N/A**	Screen Material:	**Sch 40 PVC Slotted**
Driller:	**James**	Top of Casing Elev. (ft):		Seal Material(s):	**Bent. Chips**
Logged By:	**B. Dilba**	Location (Lat, Long):		Filter Type:	**Sand**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
0				SS	07:40	4 4 5	0.50	(0') Asphalt (0.5') Poorly graded GRAVEL (GP); mostly fine-coarse grained gravel, trace medium-coarse sand, dense, dry, light reddish-brown			0
5				SS	07:46	16 15 16	1.50			MW1-6	5
10				SS	07:52	50 0 0	0.50			MW1-11	10
15				SS	08:02	16 21 29	1.50			MW1-16	15
20											20

NOTES: Ecology ID#: BLK 961

Associated Environmental Group, LLC

Client:	**AEG-CLIENTS**
Project:	**18-236**
Address:	**7131-7269 Martin Way East, Olympia, WA**

WELL LOG

Well No.	**MW-1**
Page:	**2 of 2**

Drilling Start Date:	**07/29/2020 07:34**	Boring Depth (ft):	**36.5**	Well Depth (ft):	**35.0**
Drilling End Date:	**07/29/2020 08:31**	Boring Diameter (in):	**0**	Well Diameter (in):	**2.0**
Drilling Company:	**Cascade**	Sampling Method(s):	**Split Spoon**	Screen Slot (in):	**0.010**
Drilling Method:	**Hollow Stem Auger**	DTW During Drilling (ft):	**31.0**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Truck Mounted Auger**	DTW After Drilling (ft):	**N/A**	Screen Material:	**Sch 40 PVC Slotted**
Driller:	**James**	Top of Casing Elev. (ft):		Seal Material(s):	**Bent. Chips**
Logged By:	**B. Dilba**	Location (Lat, Long):		Filter Type:	**Sand**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
20						21 29	0.00	(0.5') Poorly graded GRAVEL (GP); mostly fine-coarse grained gravel, trace medium-coarse sand, dense, dry, light reddish-brown		MW1-21	20
				SS	08:07	50 0 0	0.50				
25										MW1-26	25
				SS	08:27	50 0 0	0.00				
30											30
				SS	08:39	50 0 0	0.50				
35								(36.5') Boring terminated		MW1-36	35
40											40

NOTES: Ecology ID#: BLK 961 Water sample MW1-W collected at 30-35.0 ft bgs.

Associated Environmental Group, LLC

Client:	**AEG-CLIENTS**
Project:	**18-236**
Address:	**7131-7269 Martin Way East, Olympia, WA**

WELL LOG

Well No.	**MW-2**
Page:	**1 of 2**

Drilling Start Date:	**07/29/2020 13:14**	Boring Depth (ft):	**35.0**	Well Depth (ft):	**35.0**
Drilling End Date:	**07/29/2020 14:21**	Boring Diameter (in):	**0**	Well Diameter (in):	**2.0**
Drilling Company:	**Cascade**	Sampling Method(s):	**Split Spoon**	Screen Slot (in):	**0.010**
Drilling Method:	**Hollow Stem Auger**	DTW During Drilling (ft):	**31.0**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Truck Mounted Auger**	DTW After Drilling (ft):	**N/A**	Screen Material:	**Sch 40 PVC Slotted**
Driller:	**James**	Top of Casing Elev. (ft):		Seal Material(s):	**Bent. Chips**
Logged By:	**B. Dilba**	Location (Lat, Long):		Filter Type:	**Sand**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
0				SS	13:22	4 5 7	1.50	(0') Asphalt (0.5') Poorly graded GRAVEL (GP); mostly fine-coarse grained gravel, trace medium-coarse sand, dense, dry, light reddish-brown			0
5				SS	13:24	15 20 11	1.50			MW2-6	5
10				SS	13:31	23 50 0	1.00			MW2-11	10
15				SS	13:35	37 50	0.00			MW2-16	15
20											20

NOTES: Ecology ID#: BLK 962

Associated Environmental Group, LLC

Client:	**AEG-CLIENTS**
Project:	**18-236**
Address:	**7131-7269 Martin Way East, Olympia, WA**

WELL LOG

Well No.	**MW-2**
Page:	**2 of 2**

Drilling Start Date:	**07/29/2020 13:14**	Boring Depth (ft):	**35.0**	Well Depth (ft):	**35.0**
Drilling End Date:	**07/29/2020 14:21**	Boring Diameter (in):	**0**	Well Diameter (in):	**2.0**
Drilling Company:	**Cascade**	Sampling Method(s):	**Split Spoon**	Screen Slot (in):	**0.010**
Drilling Method:	**Hollow Stem Auger**	DTW During Drilling (ft):	**31.0**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Truck Mounted Auger**	DTW After Drilling (ft):	**N/A**	Screen Material:	**Sch 40 PVC Slotted**
Driller:	**James**	Top of Casing Elev. (ft):		Seal Material(s):	**Bent. Chips**
Logged By:	**B. Dilba**	Location (Lat, Long):		Filter Type:	**Sand**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
0								(0.5') Poorly graded GRAVEL (GP); mostly fine-coarse grained gravel, trace medium-coarse sand, dense, dry, light reddish-brown			0
				SS	13:54	50 25 28 35	0.00 1.50				
25				SS	14:00	29 50 0	1.00			MW2-26	25
30										MW2-31	30
35								(35') Boring terminated			35
40											40

NOTES: Ecology ID#: BLK 962

Associated Environmental Group, LLC

Client:	**AEG-CLIENTS**	**WELL LOG**	
Project:	**18-236**	**Well No.**	**MW-3**
Address:	**7131-7269 Martin Way East, Olympia, WA**	**Page:**	**1 of 2**

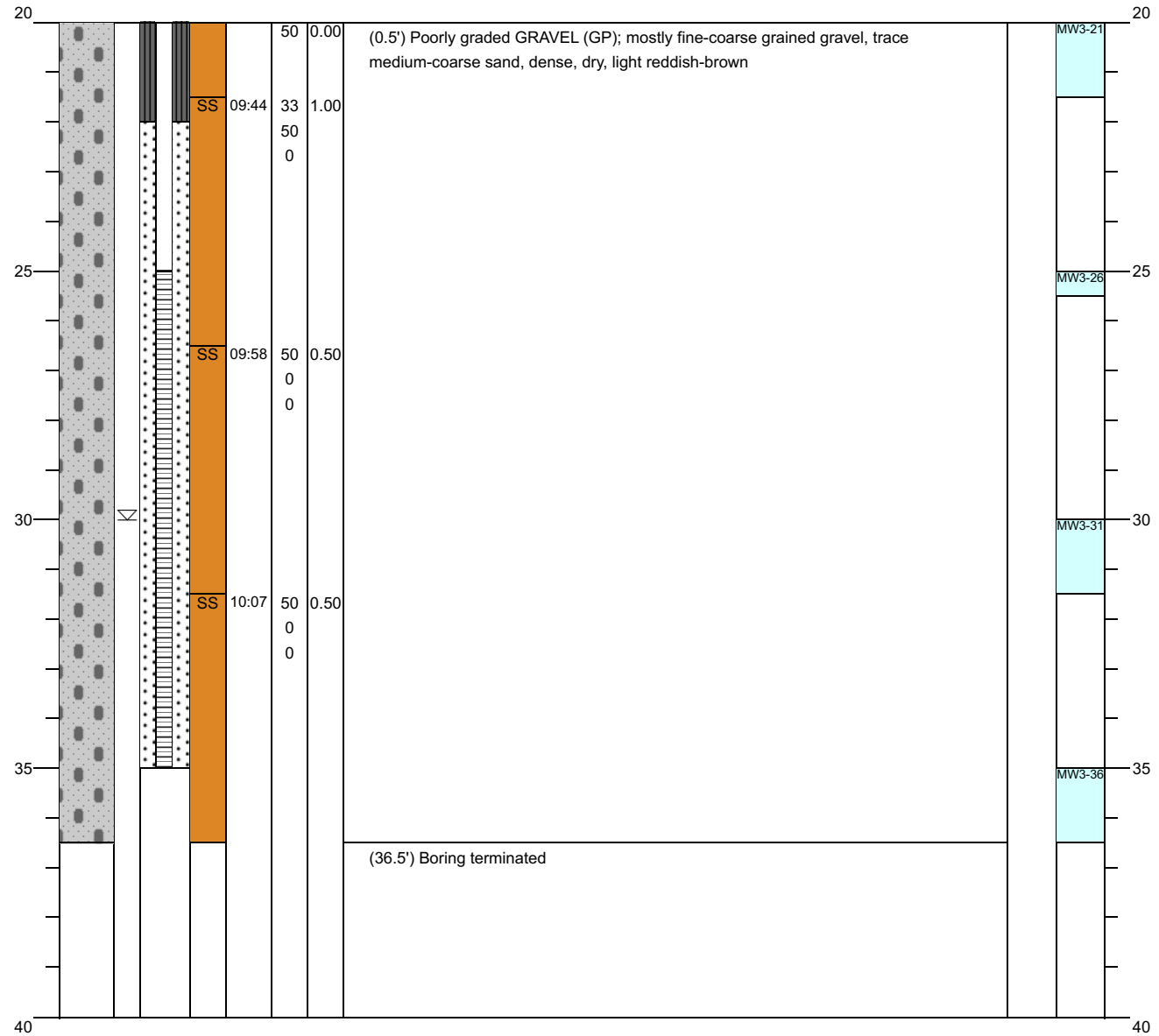
Drilling Start Date:	**07/30/2020 08:58**	Boring Depth (ft):	**36.5**	Well Depth (ft):	**35.0**
Drilling End Date:	**07/30/2020 10:10**	Boring Diameter (in):	**0**	Well Diameter (in):	**2.0**
Drilling Company:	**Cascade**	Sampling Method(s):	**Split Spoon**	Screen Slot (in):	**0.010**
Drilling Method:	**Hollow Stem Auger**	DTW During Drilling (ft):	**30.0**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Truck Mounted Auger**	DTW After Drilling (ft):	**N/A**	Screen Material:	**Sch 40 PVC Slotted**
Driller:	**James**	Top of Casing Elev. (ft):		Seal Material(s):	**Bent. Chips**
Logged By:	**B. Dilba**	Location (Lat, Long):		Filter Type:	**Sand**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
0				SS	09:08	3 3 4	1.50	(0') Asphalt (0.5') Poorly graded GRAVEL (GP); mostly fine-coarse grained gravel, trace medium-coarse sand, dense, dry, light reddish-brown			0
5				SS	09:12	27 50 0	1.00			MW3-6	5
10				SS	09:20	14 10 14	1.50			MW3-11	10
15				SS	09:29	25 50	1.00			MW3-16	15
20											20

NOTES: Ecology ID#: BLK 963

Associated Environmental Group, LLC	Client: AEG-CLIENTS	WELL LOG
	Project: 18-236	Well No. MW-3
	Address: 7131-7269 Martin Way East, Olympia, WA	Page: 2 of 2

Drilling Start Date:	07/30/2020 08:58	Boring Depth (ft):	36.5	Well Depth (ft):	35.0
Drilling End Date:	07/30/2020 10:10	Boring Diameter (in):	0	Well Diameter (in):	2.0
Drilling Company:	Cascade	Sampling Method(s):	Split Spoon	Screen Slot (in):	0.010
Drilling Method:	Hollow Stem Auger	DTW During Drilling (ft):	30.0	Riser Material:	Sch 40 PVC
Drilling Equipment:	Truck Mounted Auger	DTW After Drilling (ft):	N/A	Screen Material:	Sch 40 PVC Slotted
Driller:	James	Top of Casing Elev. (ft):		Seal Material(s):	Bent. Chips
Logged By:	B. Dilba	Location (Lat, Long):		Filter Type:	Sand



NOTES: Ecology ID#: BLK 963

Associated Environmental Group, LLC

Client:	**AEG-CLIENTS**
Project:	**18-236**
Address:	**7131-7269 Martin Way East, Olympia, WA**

WELL LOG

Well No.	**MW-4**
Page:	**1 of 5**

Drilling Start Date:	**10/29/2020 09:52**	Boring Depth (ft):	**82.5**	Well Depth (ft):	**80.0**
Drilling End Date:	**10/30/2020 08:56**	Boring Diameter (in):	**8.00**	Well Diameter (in):	**2.0**
Drilling Company:	**Cascade**	Sampling Method(s):	**Split Spoon**	Screen Slot (in):	**0.010**
Drilling Method:	**Hollow Stem Auger**	DTW During Drilling (ft):	**28.0**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Truck Mounted Auger Rig**	DTW After Drilling (ft):	**N/A**	Screen Material:	**Sch 40 PVC Slotted**
Driller:	**James**	Ground Surface Elev. (ft):		Seal Material(s):	**Bent. Chips**
Logged By:	**B. Dilba**	Location (Lat, Long):		Filter Type:	**Sand**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
0								(0') Asphalt			0
								(0.5') Poorly graded SAND with silt (SP-SM); mostly coarse grained sand, trace fine gravel, some silt, medium dense, dry, dark reddish-brown			
5				SS	10:00	4 3 3	1.50			B24-5	5
								(6') Poorly graded GRAVEL with sand (GP); mostly fine-coarse grained gravel, some fine-coarse sand, dense, moist, light bluish-gray			
10				SS	10:11	13 15 16	1.50			B24-10	10
15				SS	10:28	22 23 20	1.00			B24-16	15
20											20

NOTES: Ecology Well ID#:

Associated Environmental Group, LLC	Client: AEG-CLIENTS	WELL LOG
	Project: 18-236	Well No. MW-4
	Address: 7131-7269 Martin Way East, Olympia, WA	Page: 2 of 5

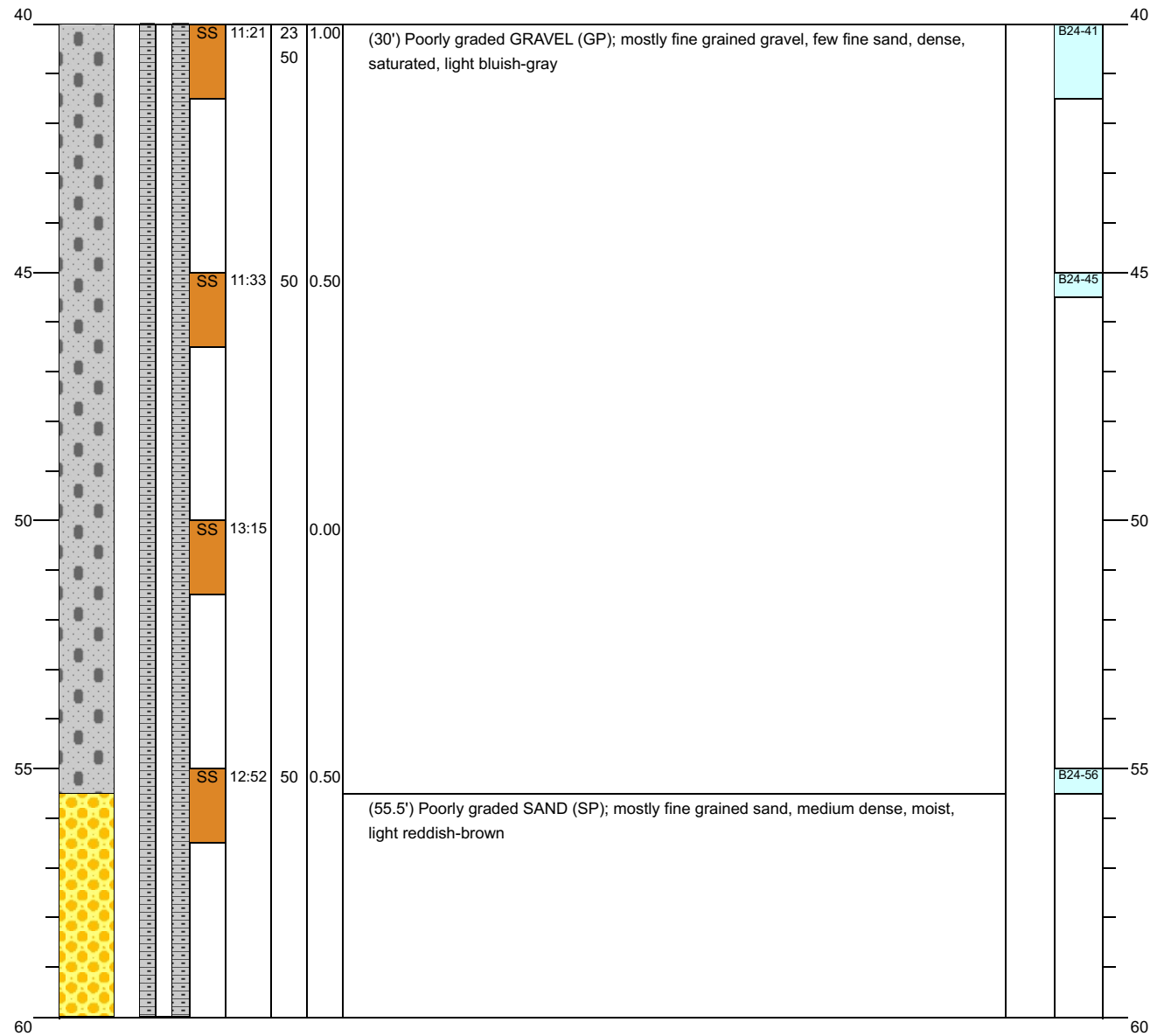
Drilling Start Date:	**10/29/2020 09:52**	Boring Depth (ft):	**82.5**	Well Depth (ft):	**80.0**
Drilling End Date:	**10/30/2020 08:56**	Boring Diameter (in):	**8.00**	Well Diameter (in):	**2.0**
Drilling Company:	**Cascade**	Sampling Method(s):	**Split Spoon**	Screen Slot (in):	**0.010**
Drilling Method:	**Hollow Stem Auger**	DTW During Drilling (ft):	**28.0**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Truck Mounted Auger Rig**	DTW After Drilling (ft):	**N/A**	Screen Material:	**Sch 40 PVC Slotted**
Driller:	**James**	Ground Surface Elev. (ft):		Seal Material(s):	**Bent. Chips**
Logged By:	**B. Dilba**	Location (Lat, Long):		Filter Type:	**Sand**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
20				SS	10:34	12 8 9	1.50	(6') Poorly graded GRAVEL with sand (GP); mostly fine-coarse grained gravel, some fine-coarse sand, dense, moist, light bluish-gray		B24-21	20
25				SS	10:41	50	0.50			B24-26	25
30				SS	10:57	24 36 37	1.50	(30') Poorly graded GRAVEL (GP); mostly fine grained gravel, few fine sand, dense, saturated, light bluish-gray		B24-31	30
35				SS	11:11	34 50	1.00			B24-36	35
40											40

NOTES: Ecology Well ID#:

Associated Environmental Group, LLC	Client: AEG-CLIENTS	WELL LOG
	Project: 18-236	Well No. MW-4
	Address: 7131-7269 Martin Way East, Olympia, WA	Page: 3 of 5

Drilling Start Date:	**10/29/2020 09:52**	Boring Depth (ft):	**82.5**	Well Depth (ft):	**80.0**
Drilling End Date:	**10/30/2020 08:56**	Boring Diameter (in):	**8.00**	Well Diameter (in):	**2.0**
Drilling Company:	**Cascade**	Sampling Method(s):	**Split Spoon**	Screen Slot (in):	**0.010**
Drilling Method:	**Hollow Stem Auger**	DTW During Drilling (ft):	**28.0**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Truck Mounted Auger Rig**	DTW After Drilling (ft):	**N/A**	Screen Material:	**Sch 40 PVC Slotted**
Driller:	**James**	Ground Surface Elev. (ft):		Seal Material(s):	**Bent. Chips**
Logged By:	**B. Dilba**	Location (Lat, Long):		Filter Type:	**Sand**



NOTES: Ecology Well ID#:

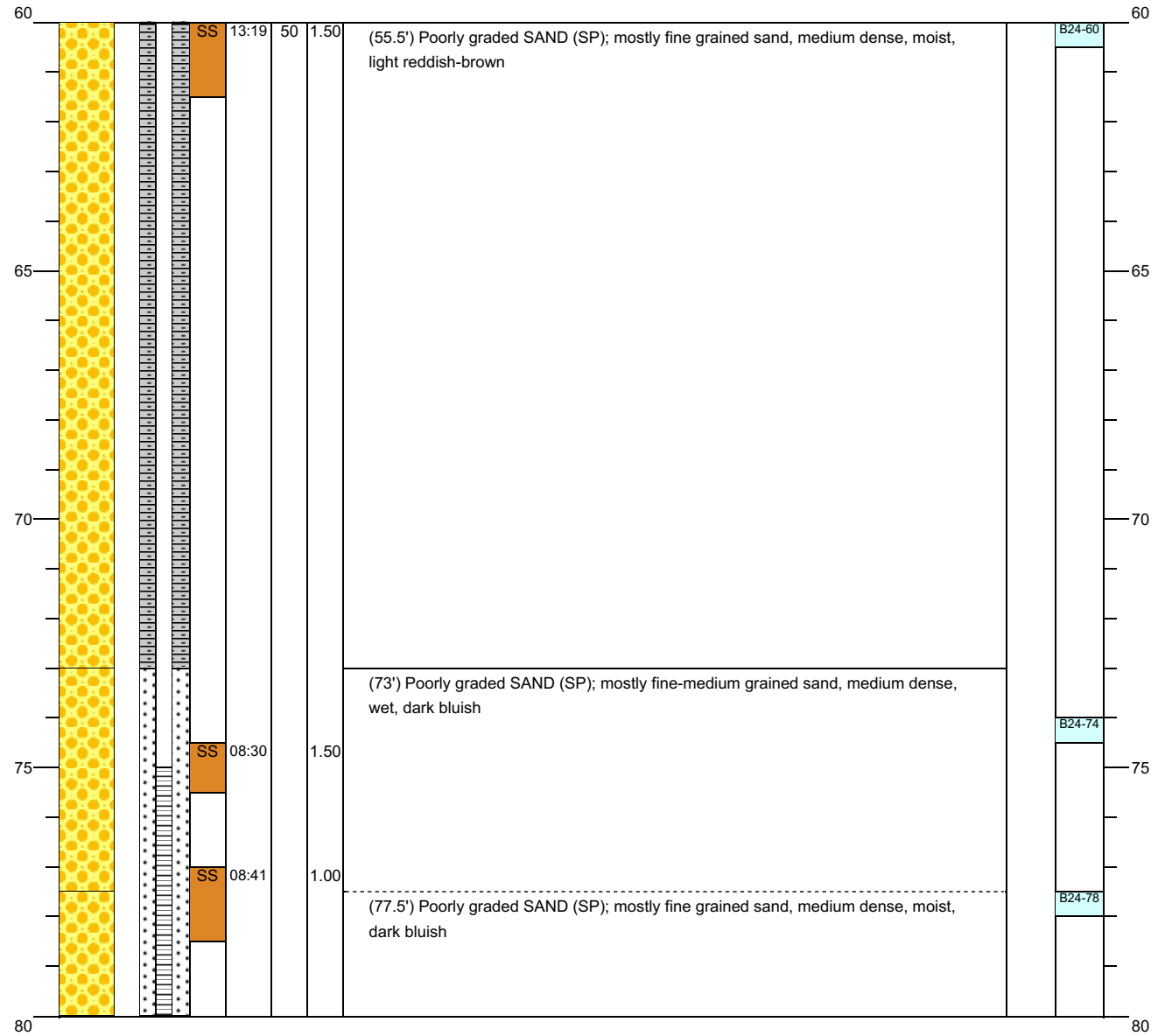
Associated Environmental Group, LLC

Client:	**AEG-CLIENTS**
Project:	**18-236**
Address:	**7131-7269 Martin Way East, Olympia, WA**

WELL LOG

Well No.	**MW-4**
Page:	**4 of 5**

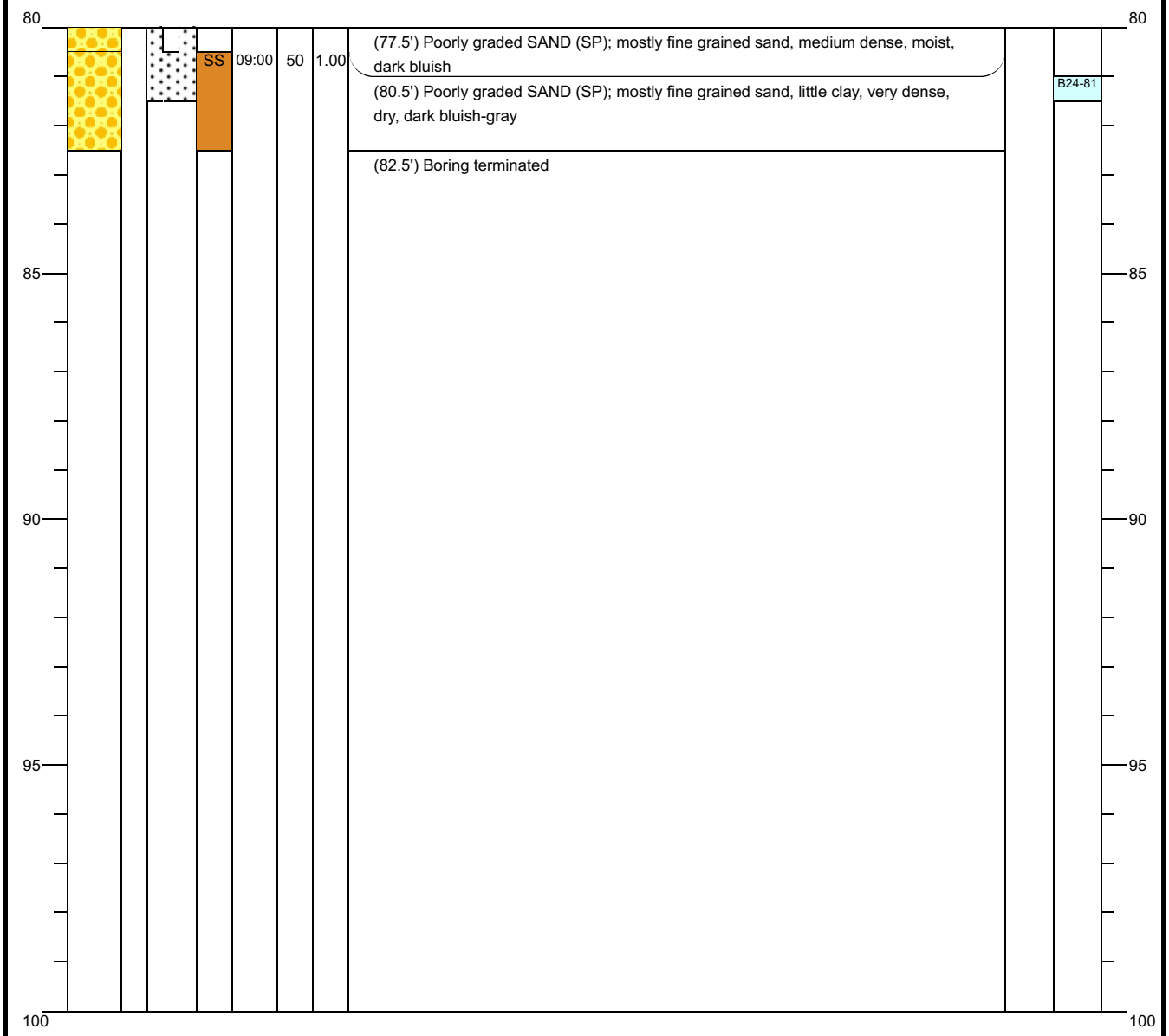
Drilling Start Date:	**10/29/2020 09:52**	Boring Depth (ft):	**82.5**	Well Depth (ft):	**80.0**
Drilling End Date:	**10/30/2020 08:56**	Boring Diameter (in):	**8.00**	Well Diameter (in):	**2.0**
Drilling Company:	**Cascade**	Sampling Method(s):	**Split Spoon**	Screen Slot (in):	**0.010**
Drilling Method:	**Hollow Stem Auger**	DTW During Drilling (ft):	**28.0**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Truck Mounted Auger Rig**	DTW After Drilling (ft):	**N/A**	Screen Material:	**Sch 40 PVC Slotted**
Driller:	**James**	Ground Surface Elev. (ft):		Seal Material(s):	**Bent. Chips**
Logged By:	**B. Dilba**	Location (Lat, Long):		Filter Type:	**Sand**



NOTES: Ecology Well ID#:

Associated Environmental Group, LLC	Client: AEG-CLIENTS	WELL LOG
	Project: 18-236	Well No. MW-4
	Address: 7131-7269 Martin Way East, Olympia, WA	Page: 5 of 5

Drilling Start Date:	**10/29/2020 09:52**	Boring Depth (ft):	**82.5**	Well Depth (ft):	**80.0**
Drilling End Date:	**10/30/2020 08:56**	Boring Diameter (in):	**8.00**	Well Diameter (in):	**2.0**
Drilling Company:	**Cascade**	Sampling Method(s):	**Split Spoon**	Screen Slot (in):	**0.010**
Drilling Method:	**Hollow Stem Auger**	DTW During Drilling (ft):	**28.0**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Truck Mounted Auger Rig**	DTW After Drilling (ft):	**N/A**	Screen Material:	**Sch 40 PVC Slotted**
Driller:	**James**	Ground Surface Elev. (ft):		Seal Material(s):	**Bent. Chips**
Logged By:	**B. Dilba**	Location (Lat, Long):		Filter Type:	**Sand**



NOTES: Ecology Well ID#:

Associated Environmental Group, LLC	Client: AEG-CLIENTS	WELL LOG
	Project: 18-236	Well No. MW-5
	Address: 7131-7269 Martin Way East, Olympia, WA	Page: 1 of 5

Drilling Start Date:	10/30/2020 12:25	Boring Depth (ft):	75.0	Well Depth (ft):	75.0
Drilling End Date:	10/30/2020 14:41	Boring Diameter (in):	8.00	Well Diameter (in):	2.0
Drilling Company:	Cascade	Sampling Method(s):	Split Spoon	Screen Slot (in):	0.010
Drilling Method:	Hollow Stem Auger	DTW During Drilling (ft):	N/A	Riser Material:	Sch 40 PVC
Drilling Equipment:	Truck Mounted Auger Rig	DTW After Drilling (ft):	N/A	Screen Material:	Sch 40 PVC Slotted
Driller:	James	Ground Surface Elev. (ft):		Seal Material(s):	Bent. Chips
Logged By:	B. Dilba	Location (Lat, Long):		Filter Type:	Sand

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
0								(0') Asphalt			0
								(0.5') Poorly graded SAND with silt (SP-SM); mostly coarse grained sand, trace fine gravel, some silt, medium dense, dry, dark reddish-brown			
5											5
								(6') Poorly graded GRAVEL with sand (GP); mostly fine-coarse grained gravel, some fine-coarse sand, dense, moist, light bluish-gray			
10											10
15											15
20											20

NOTES: Samples not collected from 5' t0 35' due to the proximity to MW-2, where samples at those depths were already collected.
Ecology Well ID#:

Associated Environmental Group, LLC

Client:	**AEG-CLIENTS**
Project:	**18-236**
Address:	**7131-7269 Martin Way East, Olympia, WA**

WELL LOG

Well No.	**MW-5**
Page:	**2 of 5**

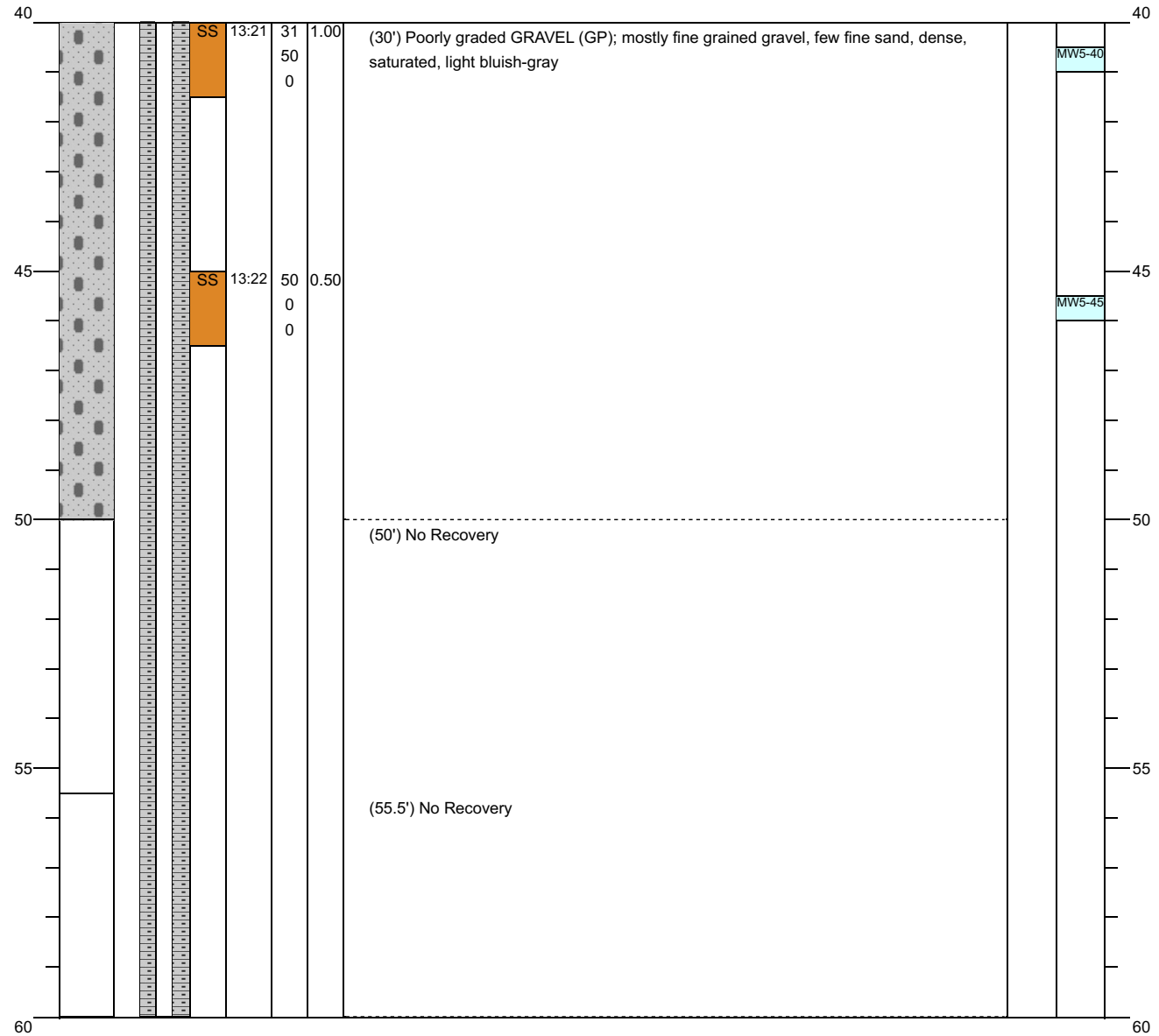
Drilling Start Date:	**10/30/2020 12:25**	Boring Depth (ft):	**75.0**	Well Depth (ft):	**75.0**
Drilling End Date:	**10/30/2020 14:41**	Boring Diameter (in):	**8.00**	Well Diameter (in):	**2.0**
Drilling Company:	**Cascade**	Sampling Method(s):	**Split Spoon**	Screen Slot (in):	**0.010**
Drilling Method:	**Hollow Stem Auger**	DTW During Drilling (ft):	**N/A**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Truck Mounted Auger Rig**	DTW After Drilling (ft):	**N/A**	Screen Material:	**Sch 40 PVC Slotted**
Driller:	**James**	Ground Surface Elev. (ft):		Seal Material(s):	**Bent. Chips**
Logged By:	**B. Dilba**	Location (Lat, Long):		Filter Type:	**Sand**

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
20								(6') Poorly graded GRAVEL with sand (GP); mostly fine-coarse grained gravel, some fine-coarse sand, dense, moist, light bluish-gray			20
25											25
30								(30') Poorly graded GRAVEL (GP); mostly fine grained gravel, few fine sand, dense, saturated, light bluish-gray			30
35											35
40											40

NOTES: Samples not collected from 5' t0 35' due to the proximity to MW-2, where samples at those depths were already collected.
Ecology Well ID#:

Associated Environmental Group, LLC	Client: AEG-CLIENTS	WELL LOG
	Project: 18-236	Well No. MW-5
	Address: 7131-7269 Martin Way East, Olympia, WA	Page: 3 of 5

Drilling Start Date:	**10/30/2020 12:25**	Boring Depth (ft):	**75.0**	Well Depth (ft):	**75.0**
Drilling End Date:	**10/30/2020 14:41**	Boring Diameter (in):	**8.00**	Well Diameter (in):	**2.0**
Drilling Company:	**Cascade**	Sampling Method(s):	**Split Spoon**	Screen Slot (in):	**0.010**
Drilling Method:	**Hollow Stem Auger**	DTW During Drilling (ft):	**N/A**	Riser Material:	**Sch 40 PVC**
Drilling Equipment:	**Truck Mounted Auger Rig**	DTW After Drilling (ft):	**N/A**	Screen Material:	**Sch 40 PVC Slotted**
Driller:	**James**	Ground Surface Elev. (ft):		Seal Material(s):	**Bent. Chips**
Logged By:	**B. Dilba**	Location (Lat, Long):		Filter Type:	**Sand**



NOTES: Samples not collected from 5' t0 35' due to the proximity to MW-2, where samples at those depths were already collected.
Ecology Well ID#:

Associated Environmental Group, LLC	Client: AEG-CLIENTS	WELL LOG
	Project: 18-236	Well No. MW-5
	Address: 7131-7269 Martin Way East, Olympia, WA	Page: 4 of 5

Drilling Start Date:	10/30/2020 12:25	Boring Depth (ft):	75.0	Well Depth (ft):	75.0
Drilling End Date:	10/30/2020 14:41	Boring Diameter (in):	8.00	Well Diameter (in):	2.0
Drilling Company:	Cascade	Sampling Method(s):	Split Spoon	Screen Slot (in):	0.010
Drilling Method:	Hollow Stem Auger	DTW During Drilling (ft):	N/A	Riser Material:	Sch 40 PVC
Drilling Equipment:	Truck Mounted Auger Rlg	DTW After Drilling (ft):	N/A	Screen Material:	Sch 40 PVC Slotted
Driller:	James	Ground Surface Elev. (ft):		Seal Material(s):	Bent. Chips
Logged By:	B. Dilba	Location (Lat, Long):		Filter Type:	Sand

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
60				SS	14:05	100 0 0	0.50	(60') Poorly graded GRAVEL with sand (GP); mostly fine grained gravel, some fine sand, very dense, wet, dark bluish-gray		MW5-60	60
65				SS	14:21	50 0 0	1.50	(65') Poorly graded SAND (SP); mostly fine-coarse grained sand, trace fine gravel, dense, wet, dark bluish-gray		MW5-65	65
70				SS	14:22	50 0 0	0.50	(73') Poorly graded SAND (SP); mostly fine-medium grained sand, medium dense, wet, dark bluish		MW5-70	70
75				SS	14:38	100 0 0	0.50	(75') Boring terminated		MW5-75	75
80								(77.5') Poorly graded SAND (SP); mostly fine grained sand, medium dense, moist, dark bluish			80

NOTES: Samples not collected from 5' t0 35' due to the proximity to MW-2, where samples at those depths were already collected.
Ecology Well ID#:

Associated Environmental Group, LLC	Client: AEG-CLIENTS	WELL LOG
	Project: 18-236	Well No. MW-5
	Address: 7131-7269 Martin Way East, Olympia, WA	Page: 5 of 5

Drilling Start Date:	10/30/2020 12:25	Boring Depth (ft):	75.0	Well Depth (ft):	75.0
Drilling End Date:	10/30/2020 14:41	Boring Diameter (in):	8.00	Well Diameter (in):	2.0
Drilling Company:	Cascade	Sampling Method(s):	Split Spoon	Screen Slot (in):	0.010
Drilling Method:	Hollow Stem Auger	DTW During Drilling (ft):	N/A	Riser Material:	Sch 40 PVC
Drilling Equipment:	Truck Mounted Auger Rig	DTW After Drilling (ft):	N/A	Screen Material:	Sch 40 PVC Slotted
Driller:	James	Ground Surface Elev. (ft):		Seal Material(s):	Bent. Chips
Logged By:	B. Dilba	Location (Lat, Long):		Filter Type:	Sand

DEPTH (ft)	LITHOLOGY	WATER LEVEL	WELL COMPLETION	COLLECT: Sample Type	COLLECT: Time	COLLECT: Blow Counts	COLLECT: Recovery (ft)	SOIL/ROCK VISUAL DESCRIPTION	MEASURE: PID (ppm)	MEASURE: Lab Sample	DEPTH (ft)
80								(77.5') Poorly graded SAND (SP); mostly fine grained sand, medium dense, moist, dark bluish			80
								(80.5') Poorly graded SAND (SP); mostly fine grained sand, little clay, very dense, dry, dark bluish-gray			
85											85
90											90
95											95
100											100

NOTES: Samples not collected from 5' t0 35' due to the proximity to MW-2, where samples at those depths were already collected.
Ecology Well ID#:

Unified Soil Classification System Chart

Major Divisions			Graph	USCS	Typical Description
Coarse Grained Soils More Than 50% Retained On No. 200 Sieve	Gravel More Than 50% of Coarse Fraction Retained On No. 4 Sieve	Clean Gravels		GW	Well-graded Gravels, Gravel-Sand Mixtures
				GP	Poorly-Graded Gravels, Gravel-Sand Mixtures
		Gravels With Fines		GM	Silty Gravels, Gravel-Sand-Silt Mixtures
				GC	Clayey Gravels, Gravel-Sand-Clay Mixtures
	Sand More Than 50% of Coarse Fraction Passing No. 4 Sieve	Clean Sands		SW	Well-graded Sands, Gravelly Sands
				SP	Poorly-Graded Sands, Gravelly Sands
		Sands With Fines		SM	Silty Sands, Sand-Silt Mixtures
				SC	Clayey Sands, Clay Mixtures
Fine Grained Soils More Than 50% Passing The No. 200 Sieve	Silts & Clays	Liquid Limit Less Than 50		ML	Inorganic Silts, rock Flour, Clayey Silts With Low Plasticity
				CL	Inorganic Clays of Low To Medium Plasticity
				OL	Organic Silts and Organic Silty Clays of Low Plasticity
	Silts & Clays	Liquid Limit Greater Than 50		MH	Inorganic Silts of Moderate Plasticity
				CH	Inorganic Clays of High Plasticity
				OH	Organic Clays And Silts of Medium to High Plasticity
Highly Organic Soils				PT	Peat, Humus, Soils with Predominantly Organic Content

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The Unified Soil Classification System (USCS)

07/20/2018 | **Figure A1**

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Log of Borehole – B7

Project : Lacey Urban Center — Approximate Elevation: 197 ft. above sea level

Loc: 7131 Martin Way E, Olympia, WA 98516 — Drilling Method: Hand probe

Driller: ESN Northwest — Logged by: Jake Lee

Depth (ft)	Well	Water Table	Symbol	USCS	Soil Sample	Water sample	PID Reading	Soil Description
	NO WELL CONSTRUCTED							Top concrete
								Dark brown
				SM			<1.0	Gravelly silty SAND (SM)
								Light brown, silty SAND (SM)
5					B7-5		<1.0	Soil sample (B7-5), Soil-gas sample (SG7-5)
								Boring termination at 5 feet bgs
10								
15								
20								

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Lacey Urban Center

8/20/2018 | **Figure A2**

Log of Borehole – B8

Project : Lacey Urban Center	Approximate Elevation: 197 ft. above sea level
Loc: 7131 Martin Way E, Olympia, WA 98516	Drilling Method: Hand probe
Driller: ESN Northwest	Logged by: Jake Lee

Depth (ft)	Well	Water Table	Symbol	USCS	Soil Sample	Water sample	PID Reading	Soil Description
	NO WELL CONSTRUCTED			SM				Top concrete
								Light brown, gravelly silty SAND (SM)
							<1.0	No recovery between 2-4ft.
								Light brown, silty SAND (SM)
5					B8-5		<1.0	Soil sample (B8-5), Soil-gas sample (SG8-5)
								Boring termination at 5 feet bgs
10								
15								
20								

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Lacey Urban Center

8/20/2018 | **Figure A3**

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16541 Redmond Way #358c Redmond, WA 98052

Log of Borehole – B9

Project : Lacey Urban Center — Approximate Elevation: 197 ft. above sea level

Loc: 7131 Martin Way E, Olympia, WA 98516 — Drilling Method: Limited access

Driller: ESN Northwest — Logged by: Jake Lee

Depth (ft)	Well	Water Table	Symbol	USCS	Soil Sample	Water sample	PID Reading	Soil Description
	NO WELL CONSTRUCTED							Top concrete
								Dark brown, gravelly silty SAND (SM)
5				SM	B9-5		<1.0	Dark brown, gravelly silty SAND (SM) Soil sample (B9-5)
10					B9-10		<1.0	Soil sample (B9-10)
15					B9-15		<1.0	Soil sample (B9-15) Boring termination at 15 feet bgs
20								

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Lacey Urban Center

8/21/2018 | **Figure A4**

Log of Borehole – B10

Project : Lacey Urban Center	Approximate Elevation: 197 ft. above sea level
Loc: 7131 Martin Way E, Olympia, WA 98516	Drilling Method: Hand probe
Driller: ESN Northwest	Logged by: Jake Lee

Depth (ft)	Well	Water Table	Symbol	USCS	Soil Sample	Water sample	PID Reading	Soil Description
	NO WELL CONSTRUCTED							Top concrete
					B10-2			Light brown gravelly silty SAND, Soil sample (B10-2)
				SM			<1.0	No recovery between 2-4ft.
								Light brown, silty SAND (SM)
5					B10-5		<1.0	Soil sample (B10-5), Soil-gas sample (SG10-5)
								Boring termination at 5 feet bgs
10								
15								
20								

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support@envitechnology.com
Tel 425.890.3517 Fax 425.310.6600
16541 Redmond Way #358c Redmond, WA 98052

Log of Borehole – B11

Project : Lacey Urban Center — Approximate Elevation: 197 ft. above sea level

Loc: 7131 Martin Way E, Olympia, WA 98516 — Drilling Method: Limited access

Driller: ESN Northwest — Logged by: Jake Lee

Depth (ft)	Well	Water Table	Symbol	USCS	Soil Sample	Water sample	PID Reading	Soil Description
	NO WELL CONSTRUCTED							Top concrete
					B11-2			Dark brown, gravelly sandy SILT (ML)
				ML			<1.0	Soil sample (B11-2)
								Dark brown, gravelly sandy SILT (ML)
5					B11-5		<1.0	Soil sample (B11-5), Soil gas sample (SG11-5)
								Boring termination at 5 feet bgs
10								
15								
20								

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Lacey Urban Center

8/21/2018 | **Figure A6**

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Log of Borehole – B12

Project : Lacey Urban Center	Approximate Elevation: 197 ft. above sea level
Loc: 7131 Martin Way E, Olympia, WA 98516	Drilling Method: Geoprobe
Driller: ESN Northwest	Logged by: Jake Lee

Depth (ft)	Well	Water Table	Symbol	USCS	Soil Sample	Water sample	PID Reading	Soil Description
	NO WELL CONSTRUCTED			SM				Top asphalt Dark brown, gravelly silty SAND (SM)
5					B12-5		<1.0	Soil sample (B12-5)
				ML				Light Brown, coarse-grained, Medium dense, gravelly sandy SILT (MT)
10							<1.0	
				SM				Grayish Gravelly silty SAND (SM)
15					B12-15		<1.0	Soil sample (B12-15)
								Boring termination at 15 feet bgs
20								

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Lacey Urban Center

8/20/2018 | **Figure A7**

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16541 Redmond Way #358c Redmond, WA 98052

Log of Borehole – B13

Project : Lacey Urban Center	Approximate Elevation: 197 ft. above sea level
Loc: 7131 Martin Way E, Olympia, WA 98516	Drilling Method: Geoprobe
Driller: ESN Northwest	Logged by: Jake Lee

Depth (ft)	Well	Water Table	Symbol	USCS	Soil Sample	Water sample	PID Reading	Soil Description
	NO WELL CONSTRUCTED			SM				Top asphalt Dark brown, gravelly silty SAND (SM)
5					B13-5		<1.0	Soil sample (B13-5)
				ML				Light Brown, coarse-grained, Medium dense, gravelly sandy SILT (MT)
10							<1.0	
				SM				Grayish, gravelly silty SAND (SM)
15					B13-15		<1.0	Soil sample (B13-15)
								Boring termination at 15 feet bgs
20								

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Lacey Urban Center

8/20/2018 | **Figure A8**

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16541 Redmond Way #358c Redmond, WA 98052

Log of Borehole – B14

Project : Lacey Urban Center	Approximate Elevation: 197 ft. above sea level
Loc: 7131 Martin Way E, Olympia, WA 98516	Drilling Method: Geoprobe
Driller: ESN Northwest	Logged by: Jake Lee

Depth (ft)	Well	Water Table	Symbol	USCS	Soil Sample	Water sample	PID Reading	Soil Description
	NO WELL CONSTRUCTED			SM				Top asphalt Dark brown, gravelly silty SAND (SM)
5							<1.0	
				ML				Light Brown, coarse-grained Medium dense, gravelly sandy SILT (MT)
10					B14-10		<1.0	Soil sample (B14-10)
								Grayish, gravelly silty SAND (SM)
15					B14-15		<1.0	Soil sample (B14-15)
				SM				
20							<1.0	
		▽			B14-25	W14	<1.0	Soil sample (B14-20), Water sample (W14) at 26 ft. Boring termination at 26 ft

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16541 Redmond Way #358C Redmond WA 98052

Lacey Urban Center

8/20/2018 | **Figure A9**

Log of Borehole – B15

Project : Lacey Urban Center	Approximate Elevation: 197 ft. above sea level
Loc: 7131 Martin Way E, Olympia, WA 98516	Drilling Method: Geoprobe
Driller: ESN Northwest	Logged by: Jake Lee

Depth (ft)	Well	Water Table	Symbol	USCS	Soil Sample	Water sample	PID Reading	Soil Description
	NO WELL CONSTRUCTED							Top asphalt
								Dark brown, coarse-grained
								Medium dense, gravelly sandy SILT (MT)
5				ML	B15-5		<1.0	Soil sample (B15-5)
								Light Brown, coarse-grained
								Medium dense, gravelly sandy SILT (MT)
10							<1.0	
				SM				Grayish, gravelly silty SAND (SM)
15					B15-15		<1.0	Soil sample (B15-15)
								Boring termination at 15 feet bgs
20								

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Lacey Urban Center

8/20/2018 | **Figure A10**

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16541 Redmond Way #358c Redmond, WA 98052

Log of Borehole – B16

Project : Lacey Urban Center — Approximate Elevation: 197 ft. above sea level

Loc: 7131 Martin Way E, Olympia, WA 98516 — Drilling Method: Geoprobe

Driller: ESN Northwest — Logged by: Jake Lee

Depth (ft)	Well	Water Table	Symbol	USCS	Soil Sample	Water sample	PID Reading	Soil Description
	NO WELL CONSTRUCTED							Top asphalt
								Dark brown, coarse-grained
				ML				Medium dense, gravelly sandy SILT (ML)
5							<1.0	
10					B16-10		<1.0	Soil sample (B16-10)
								Grayish, Medium dense
								Gravelly silty SAND (SM)
15				SM			<1.0	
20							<1.0	
~								
29					B16-29		<1.0	Soil sample (B16-29), No water, boring stop at 29'

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16541 Redmond Way #358C Redmond WA 98052

Lacey Urban Center

8/20/2018 | **Figure A11**

Log of Borehole – B17

Project : Lacey Urban Center	Approximate Elevation: 197 ft. above sea level
Loc: 7131 Martin Way E, Olympia, WA 98516	Drilling Method: Geoprobe
Driller: ESN Northwest	Logged by: Jake Lee

Depth (ft)	Well	Water Table	Symbol	USCS	Soil Sample	Water sample	PID Reading	Soil Description
	NO WELL CONSTRUCTED							Top asphalt
								Dark brown, coarse-grained
				ML				Medium dense, gravelly sandy SILT (ML)
5					B17-5		<1.0	Soil sample (B17-5)
								Grayish, Medium dense
								Gravelly silty SAND (SM)
10				SM			<1.0	
15					B17-15		<1.0	Soil sample (B17-15)
								Boring termination at 15 ft.
20								
~								
29								

Log of Borehole – B18

Project : Lacey Urban Center	Approximate Elevation: 197 ft. above sea level
Loc: 7131 Martin Way E, Olympia, WA 98516	Drilling Method: Geoprobe
Driller: ESN Northwest	Logged by: Jake Lee

Depth (ft)	Well	Water Table	Symbol	USCS	Soil Sample	Water sample	PID Reading	Soil Description
	NO WELL CONSTRUCTED							Top asphalt
								Dark brown, coarse-grained
				ML				Medium dense, gravelly sandy SILT (ML)
5					B18-5		<1.0	Soil sample (B18-5)
								Grayish, Medium dense
								Gravelly silty SAND (SM)
10				SM			<1.0	
15					B18-15		<1.0	Soil sample (B18-15)
								Boring termination at 15 ft.
20								
25								

ENVITECHNOLOGY
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16541 Redmond Way #358C Redmond WA 98052

Lacey Urban Center

8/20/2018 | **Figure A13**

Libby Environmental, Inc.
3322 South Bay Road NE • Olympia, WA 98506-2957

July 27, 2020

Becky Dilba
Associated Environmental Group, LLC
2633 Parkmont Lane SW, Suite A
Olympia, WA 98502

Dear Ms. Dilba:

Please find enclosed the analytical data report for the Lacey Urban Center Project located in Lacey, Washington.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. The sample(s) will be disposed of in 30 days unless we are contacted to arrange long term storage.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Sherry L. Chilcutt
Senior Chemist
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@gmail.com

Libby Environmental, Inc.

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LACEY URBAN CENTER PROJECT
AEG, LLC
Lacey, Washington
Libby Project # L200722-9
Client Project # 18-236

Volatile Organic Compounds by EPA Method 8260D in Soil

Sample Description		Method Blank	B20-9	B19-19
Date Sampled		N/A	7/22/2020	7/22/2020
Date Analyzed	PQL	7/23/2020	7/23/2020	7/23/2020
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Vinyl Chloride (VC)	0.02	nd	nd	nd
1,1-Dichloroethene	0.05	nd	nd	nd
trans-1,2-Dichloroethene	0.03	nd	nd	nd
cis -1,2-Dichloroethene	0.03	nd	nd	nd
Trichloroethene (TCE)	0.02	nd	nd	nd
Tetrachloroethene (PCE)	0.03	nd	nd	nd
Surrogate Recovery				
Dibromofluoromethane		99	105	95
1,2-Dichloroethane-d4		107	105	104
Toluene-d8		100	104	106
4-Bromofluorobenzene		93	96	94

"nd" Indicates not detected at listed detection limit.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE : 65% TO 135%

ANALYSES PERFORMED BY: Paul Burke

Libby Environmental, Inc.

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LACEY URBAN CENTER PROJECT
AEG, LLC
Lacey, Washington
Libby Project # L200722-9
Client Project # 18-236

QA/QC for Volatile Organic Compounds by EPA Method 8260D in Soil

Matrix Spike Sample Identification: L200723-1

	Spiked Conc. (mg/kg)	MS Response (mg/kg)	MSD Response (mg/kg)	MS Recovery (%)	MSD Recovery (%)	RPD (%)	Limits Recovery (%)	Data Flag
Vinyl Chloride (VC)	0.25	0.29	0.29	116	116	0.0	65-135	
1,1-Dichloroethene	0.25	0.27	0.27	108	108	0.0	65-135	
trans-1,2-Dichloroethene	0.25	0.27	0.27	108	108	0.0	65-135	
cis -1,2-Dichloroethene	0.25	0.29	0.29	116	116	0.0	65-135	
Trichloroethene (TCE)	0.25	0.29	0.29	116	116	0.0	65-135	
Tetrachloroethene (PCE)	0.25	0.33	0.32	132	128	3.1	65-135	

Surrogate Recovery (%)	MS	MSD	
Dibromofluoromethane	94	93	65-135
1,2-Dichloroethane-d4	104	105	65-135
Toluene-d8	109	110	65-135
4-Bromofluorobenzene	105	106	65-135

ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Paul Burke

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LACEY URBAN CENTER PROJECT
AEG, LLC
Lacey, Washington
Libby Project # L200722-9
Client Project # 18-236

Laboratory Control Sample

	Spiked Conc. (mg/kg)	LCS Response (mg/kg)	LCS Recovery (%)	LCS Recovery Limits (%)	Data Flag
Vinyl Chloride (VC)	0.25	0.21	84	80-120	
1,1-Dichloroethene	0.25	0.23	92	80-120	
trans-1,2-Dichloroethene	0.25	0.22	86	80-120	
cis -1,2-Dichloroethene	0.25	0.27	107	80-120	
Trichloroethene (TCE)	0.25	0.27	108	80-120	
Tetrachloroethene (PCE)	0.25	0.23	92	80-120	
Surrogate Recovery					
Dibromofluoromethane			123	65-135	
1,2-Dichloroethane-d4			129	65-135	
Toluene-d8			122	65-135	
4-Bromofluorobenzene			102	65-135	

ANALYSES PERFORMED BY: Paul Burke

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LACEY URBAN CENTER PROJECT
AEG, LLC
Lacey, Washington
Libby Project # L200722-9
Client Project # 18-236

Volatile Organic Compounds by EPA Method 8260D in Water

Sample Description		Method Blank	Trip Blank	Trip Blank Dup
Date Sampled		N/A	7/22/2020	7/22/2020
Date Analyzed	PQL (µg/L)	7/23/2020 (µg/L)	7/23/2020 (µg/L)	7/23/2020 (µg/L)
Vinyl Chloride (VC)	0.2	nd	nd	nd
1,1-Dichloroethene	0.5	nd	nd	nd
trans-1,2-Dichloroethene	1.0	nd	nd	nd
cis -1,2-Dichloroethene	1.0	nd	nd	nd
Trichloroethene (TCE)	0.4	nd	nd	nd
Tetrachloroethene (PCE)	1.0	nd	nd	nd
Surrogate Recovery				
Dibromofluoromethane		99	102	83
1,2-Dichloroethane-d4		107	105	86
Toluene-d8		100	100	76
4-Bromofluorobenzene		93	91	91

"nd" Indicates not detected at listed detection limit.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE : 65% TO 135%

ANALYSES PERFORMED BY: Paul Burke

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LACEY URBAN CENTER PROJECT
AEG, LLC
Lacey, Washington
Libby Project # L200722-9
Client Project # 18-236

QA/QC for Volatile Organic Compounds by EPA Method 8260D in Water

Matrix Spike Sample Identification: Trip Blank

	Spiked Conc. (µg/L)	MS Response (µg/L)	MSD Response (µg/L)	MS Recovery (%)	MSD Recovery (%)	RPD (%)	Limits Recovery (%)	Data Flag
Vinyl Chloride (VC)	5.0	4.4	4.2	88	84	4.7	65-135	
1,1-Dichloroethene	5.0	4.3	4.6	86	92	6.7	65-135	
trans-1,2-Dichloroethene	5.0	4.4	4.0	88	80	9.5	65-135	
cis -1,2-Dichloroethene	5.0	4.5	4.4	90	88	1.8	65-135	
Trichloroethene (TCE)	5.0	6.4	5.9	128	118	8.1	65-135	
Tetrachloroethene (PCE)	5.0	6.1	5.8	121	117	3.7	65-135	

Surrogate Recovery (%)	MS	MSD	
Dibromofluoromethane	86	83	65-135
1,2-Dichloroethane-d4	88	85	65-135
Toluene-d8	81	79	65-135
4-Bromofluorobenzene	107	107	65-135

ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Paul Burke

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LACEY URBAN CENTER PROJECT
AEG, LLC
Lacey, Washington
Libby Project # L200722-9
Client Project # 18-236

Laboratory Control Sample

	Spiked Conc. (µg/L)	LCS Response (µg/L)	LCS Recovery (%)	LCS Recovery Limits (%)	Data Flag
Vinyl Chloride (VC)	5.0	4.5	90	80-120	
1,1-Dichloroethene	5.0	4.6	92	80-120	
trans-1,2-Dichloroethene	5.0	4.3	86	80-120	
cis -1,2-Dichloroethene	5.0	5.3	106	80-120	
Trichloroethene (TCE)	5.0	5.6	112	80-120	
Tetrachloroethene (PCE)	5.0	4.6	92	80-120	
Surrogate Recovery					
Dibromofluoromethane			123	65-135	
1,2-Dichloroethane-d4			129	65-135	
Toluene-d8			122	65-135	
4-Bromofluorobenzene			102	65-135	

ANALYSES PERFORMED BY: Paul Burke

Libby Environmental, Inc.

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Email: libbyenv@gmail.com

LACEY URBAN CENTER PROJECT
AEG, LLC
Libby Project # L200722-9
Date Received 7/22/2020
Time Received 1:36 PM

Received By MH

Sample Receipt Checklist

Chain of Custody

1. Is the Chain of Custody complete?	☑ Yes	☐ No	
2. How was the sample delivered?	☑ Hand Delivered	☐ Picked Up	☐ Shipped

Log In

3. Cooler or Shipping Container is present.	☑ Yes	☐ No	☐ N/A
4. Cooler or Shipping Container is in good condition.	☑ Yes	☐ No	☐ N/A
5. Cooler or Shipping Container has Custody Seals present.	☐ Yes	☑ No	☐ N/A
6. Was an attempt made to cool the samples?	☑ Yes	☐ No	☐ N/A
7. Temperature of cooler (0°C to 8°C recommended)	8.8 °C		
8. Temperature of sample(s) (0°C to 8°C recommended)	0.0 °C		
9. Did all containers arrive in good condition (unbroken)?	☑ Yes	☐ No	
10. Is it clear what analyses were requested?	☑ Yes	☐ No	
11. Did container labels match Chain of Custody?	☑ Yes	☐ No	
12. Are matrices correctly identified on Chain of Custody?	☑ Yes	☐ No	
13. Are correct containers used for the analysis indicated?	☑ Yes	☐ No	
14. Is there sufficient sample volume for indicated analysis?	☑ Yes	☐ No	
15. Were all containers properly preserved per each analysis?	☑ Yes	☐ No	
16. Were VOA vials collected correctly (no headspace)?	☑ Yes	☐ No	☐ N/A
17. Were all holding times able to be met?	☑ Yes	☐ No	

Discrepancies/ Notes

18. Was client notified of all discrepancies? ☐ Yes ☐ No ☑ N/A

Person Notified: _____ Date: _____

By Whom: _____ Via: _____

Regarding: _____

19. Comments. _____

Libby Environmental, Inc.

Chain of Custody Record

www.LibbyEnvironmental.com

3322 South Bay Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Date: 7/22/2020 Page: 1 of 1

Client: AEG

Project Manager: B. Dilba

Address:

Project Name: Lacey Urban Center

City: State: Zip:

Location: City, State: Lacey, WA

Phone: 360-352-9835 Fax:

Collector: B. D. Date of Collection: 7/22/2020

Client Project # 18-236

Email: bdilba@aegwa.com

	Sample Number	Depth	Time	Sample Type	Container Type	VOC 8260	NWTPH-Gx	BTEX 8021	NWTPH-HCID	NWTPH-Dx	NWTPH-Dx/Dx	cPAH 8270	PAH 8270	Semi Vol 8270	PCB 8082	MTCA 5 Metals	RCRA 8 Metals	PCE + daughters			Field Notes
1	B20 - 3	3	1148	S																	
2	B20-6	6	1156	S																	
3	B20-9	9	1210	S													X				
4	B19-3	3	1231	S																	
5	B19-6	6	1239	S																	
6	~~PCE~~ B19-9	9	1253	S													X				
7	~~Field Blank Trip Blank~~	—		H2O													X				
8																					
9																					
10																					
11																					
12																					
13																					
14																					
15																					
16																					
17																					

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	7/24/2020 1336	[signature]	7/22/2020 1336
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt

Good Condition?	Y	N
Cooler Temp.		°C
Sample Temp.		°C
Total Number of Containers		

Remarks:

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: *In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a cout of law.*

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.
3322 South Bay Road NE • Olympia, WA 98506-2957

August 4, 2020

Becky Dilba
Associated Environmental Group, LLC
2633 Parkmont Lane SW, Suite A
Olympia, WA 98502

Dear Ms. Dilba:

Please find enclosed the analytical data report for the Lacey Urban Center Project located in Lacey, Washington.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. The sample(s) will be disposed of in 30 days unless we are contacted to arrange long term storage.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Sherry L. Chilcutt
Senior Chemist
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@gmail.com

Libby Environmental, Inc.

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LACEY URBAN CENTER PROJECT
AEG, LLC
Lacey, Washington
Libby Project # L200728-3
Client Project # 18-236

Volatile Organic Compounds by EPA Method 8260D in Soil

Sample Description		Method Blank	B21-6	B21-6 Dup	B21-11	B22-6	B22-11
Date Sampled		N/A	7/28/2020	7/28/2020	7/28/2020	7/28/2020	7/28/2020
Date Analyzed	PQL (mg/kg)	7/29/2020 (mg/kg)	7/29/2020 (mg/kg)	7/29/2020 (mg/kg)	7/29/2020 (mg/kg)	7/29/2020 (mg/kg)	7/29/2020 (mg/kg)
Vinyl Chloride (VC)	0.02	nd	nd	nd	nd	nd	nd
1,1-Dichloroethene	0.05	nd	nd	nd	nd	nd	nd
trans-1,2-Dichloroethene	0.03	nd	nd	nd	nd	nd	nd
cis -1,2-Dichloroethene	0.03	nd	nd	nd	nd	nd	nd
Trichloroethene (TCE)	0.02	nd	nd	nd	nd	nd	nd
Tetrachloroethene (PCE)	0.03	nd	nd	nd	nd	nd	nd
Surrogate Recovery							
Dibromofluoromethane		132	133	131	131	134	126
1,2-Dichloroethane-d4		113	113	110	116	119	117
Toluene-d8		93	93	90	91	92	88
4-Bromofluorobenzene		100	99	94	95	94	102

"nd" Indicates not detected at listed detection limit.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE : 65% TO 135%

ANALYSES PERFORMED BY: Sherry Chilcutt

Libby Environmental, Inc.

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LACEY URBAN CENTER PROJECT
AEG, LLC
Lacey, Washington
Libby Project # L200728-3
Client Project # 18-236

QA/QC for Volatile Organic Compounds by EPA Method 8260D in Soil

Matrix Spike Sample Identification: L200729-3

	Spiked Conc. (mg/kg)	MS Response (mg/kg)	MSD Response (mg/kg)	MS Recovery (%)	MSD Recovery (%)	RPD (%)	Limits Recovery (%)	Data Flag
Vinyl Chloride (VC)	0.25	0.18	0.19	72	78	7.5	65-135	
1,1-Dichloroethene	0.25	0.21	0.24	82	95	14.4	65-135	
trans-1,2-Dichloroethene	0.25	0.24	0.27	96	109	12.1	65-135	
cis -1,2-Dichloroethene	0.25	0.24	0.27	94	108	13.8	65-135	
Trichloroethene (TCE)	0.25	0.24	0.25	96	101	5.3	65-135	
Tetrachloroethene (PCE)	0.25	0.34	0.32	134	129	4.0	65-135	

Surrogate Recovery (%)	MS	MSD	
Dibromofluoromethane	124	133	65-135
1,2-Dichloroethane-d4	120	107	65-135
Toluene-d8	94	94	65-135
4-Bromofluorobenzene	112	104	65-135

ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Sherry Chilcutt

Libby Environmental, Inc.

3322 South Bay Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@gmail.com

LACEY URBAN CENTER PROJECT
AEG, LLC
Lacey, Washington
Libby Project # L200728-3
Client Project # 18-236

Laboratory Control Sample

	Spiked Conc. (mg/kg)	LCS Response (mg/kg)	LCS Recovery (%)	LCS Recovery Limits (%)	Data Flag
Vinyl Chloride (VC)	0.25	0.24	96	80-120	
1,1-Dichloroethene	0.25	0.22	88	80-120	
trans-1,2-Dichloroethene	0.25	0.22	90	80-120	
cis -1,2-Dichloroethene	0.25	0.27	106	80-120	
Trichloroethene (TCE)	0.25	0.21	83	80-120	
Tetrachloroethene (PCE)	0.25	0.22	90	80-120	
Surrogate Recovery					
Dibromofluoromethane			123	65-135	
1,2-Dichloroethane-d4			114	65-135	
Toluene-d8			96	65-135	
4-Bromofluorobenzene			111	65-135	

ANALYSES PERFORMED BY: Sherry Chilcutt

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LACEY URBAN CENTER PROJECT
AEG, LLC
Lacey, Washington
Libby Project # L200728-3
Client Project # 18-236

Volatile Organic Compounds by EPA Method 8260D in Water

Sample Description		Method Blank	B21-W
Date Sampled		N/A	7/28/2020
Date Analyzed	PQL (µg/L)	7/31/2020 (µg/L)	7/31/2020 (µg/L)
Vinyl Chloride (VC)	0.2	nd	nd
1,1-Dichloroethene	0.5	nd	nd
trans-1,2-Dichloroethene	1.0	nd	nd
cis-1,2-Dichloroethene	1.0	nd	nd
Trichloroethene (TCE)	0.4	nd	nd
Tetrachloroethene (PCE)	1.0	nd	0.6 J
Surrogate Recovery			
Dibromofluoromethane		90	85
1,2-Dichloroethane-d4		101	86
Toluene-d8		106	69
4-Bromofluorobenzene		91	89

"nd" Indicates not detected at listed detection limit.
“J” Result is less than the PQL but greater than the MDL. Reported value is approximate.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE : 65% TO 135%

ANALYSES PERFORMED BY: Sherry Chilcutt

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AEG, LLC
Lacey, Washington
Libby Project # L200728-3
Client Project # 18-236

QA/QC for Volatile Organic Compounds by EPA Method 8260D in Water

Matrix Spike Sample Identification: B21-W

	Spiked Conc. (µg/L)	MS Response (µg/L)	MSD Response (µg/L)	MS Recovery (%)	MSD Recovery (%)	RPD (%)	Limits Recovery (%)	Data Flag
Vinyl Chloride (VC)	5.0	4.3	3.5	85	70	19.5	65-135	
1,1-Dichloroethene	5.0	5.3	4.4	105	88	18.4	65-135	
trans-1,2-Dichloroethene	5.0	5.2	4.3	105	86	20.0	65-135	
cis -1,2-Dichloroethene	5.0	5.4	5.2	108	103	5.1	65-135	
Trichloroethene (TCE)	5.0	5.2	4.3	104	85	20.5	65-135	
Tetrachloroethene (PCE)	5.0	5.6	5.2	112	104	7.4	65-135	

Surrogate Recovery (%)	MS	MSD	
Dibromofluoromethane	115	117	65-135
1,2-Dichloroethane-d4	115	114	65-135
Toluene-d8	101	94	65-135
4-Bromofluorobenzene	104	106	65-135

ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Sherry Chilcutt

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LACEY URBAN CENTER PROJECT
AEG, LLC
Lacey, Washington
Libby Project # L200728-3
Client Project # 18-236

Laboratory Control Sample

	Spiked Conc. (µg/L)	LCS Response (µg/L)	LCS Recovery (%)	LCS Recovery Limits (%)	Data Flag
Vinyl Chloride (VC)	5.0	5.5	110	80-120	
1,1-Dichloroethene	5.0	5.8	117	80-120	
trans-1,2-Dichloroethene	5.0	5.7	113	80-120	
cis -1,2-Dichloroethene	5.0	5.0	100	80-120	
Trichloroethene (TCE)	5.0	5.6	113	80-120	
Tetrachloroethene (PCE)	5.0	4.2	84	80-120	
Surrogate Recovery					
Dibromofluoromethane			75	65-135	
1,2-Dichloroethane-d4			75	65-135	
Toluene-d8			103	65-135	
4-Bromofluorobenzene			103	65-135	

ANALYSES PERFORMED BY: Sherry Chilcutt

Libby Environmental, Inc.

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LACEY URBAN CENTER PROJECT
AEG, LLC
Libby Project # L200728-3
Date Received 7/28/2020
Time Received 1:24 PM

Received By KD

Sample Receipt Checklist

Chain of Custody

1. Is the Chain of Custody complete?	☑ Yes	☐ No	
2. How was the sample delivered?	☑ Hand Delivered	☐ Picked Up	☐ Shipped

Log In

3. Cooler or Shipping Container is present.	☑ Yes	☐ No	☐ N/A
4. Cooler or Shipping Container is in good condition.	☑ Yes	☐ No	☐ N/A
5. Cooler or Shipping Container has Custody Seals present.	☐ Yes	☑ No	☐ N/A
6. Was an attempt made to cool the samples?	☑ Yes	☐ No	☐ N/A
7. Temperature of cooler (0°C to 8°C recommended)	4.9 °C		
8. Temperature of sample(s) (0°C to 8°C recommended)	15.7 °C		
9. Did all containers arrive in good condition (unbroken)?	☑ Yes	☐ No	
10. Is it clear what analyses were requested?	☑ Yes	☐ No	
11. Did container labels match Chain of Custody?	☑ Yes	☐ No	
12. Are matrices correctly identified on Chain of Custody?	☑ Yes	☐ No	
13. Are correct containers used for the analysis indicated?	☑ Yes	☐ No	
14. Is there sufficient sample volume for indicated analysis?	☑ Yes	☐ No	
15. Were all containers properly preserved per each analysis?	☑ Yes	☐ No	
16. Were VOA vials collected correctly (no headspace)?	☑ Yes	☐ No	☐ N/A
17. Were all holding times able to be met?	☑ Yes	☐ No	

Discrepancies/ Notes

18. Was client notified of all discrepancies? ☐ Yes ☐ No ☑ N/A

Person Notified: _____ Date: _____

By Whom: _____ Via: _____

Regarding: _____

19. Comments. _____

Libby Environmental, Inc.

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Fax: 360-352-4154

Chain of Custody Record

www.LibbyEnvironmental.com

Date: 7/28/2020 Page: 1 of 1

Client: AEG
Project Manager: BECKY DILBA
Address:
Project Name: ~~SH MARKET~~ LACEY URBAN CENTER
City: State: Zip:
Location: City, State: ~~FEDERAL WAY~~ LACEY, WA
Phone: 360-352-9835 Fax:
Collector: BJP Date of Collection: 7/28/2020
Client Project # ~~KJ 190~~ 18-236
Email: dilba@aeg-wa.com

	Sample Number	Depth	Time	Sample Type	Container Type	VOC 8260	PCE & Daughter Prod.	NWTPH-Gx	BTEX (8260) / (8021)	NWTPH-HCID	NWTPH-Dx / Dx	PCB 8082	MTCA 5 Metals	RCRA 8 Metals	c PAH 8270	PAH 8270	Semi Vol 8270			Field Notes
1	B21-6	6	902	S			X													
2	B21-11	11	905				X													
3	B21-16	16	910																	
4	B21-21	21	919																	
5	B21-26	26	926																	
6	B21-31	31	931																	
7	B22-6	6	1058				X													
8	B22-11	11	1110				X													
9	B22-16	16	1118																	
10	B22-21	21	1123																	
11	B22-26	26	1126																	
12	B22-31	31	1133																	
13	B21-W	—	1014	H2O			X													
14																				
15																				
16																				
17																				

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	7/28/2020 1324	[signature]	7/29/20
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt

Good Condition?	Y	N
Cooler Temp.	4.9	°C
Sample Temp.	15.7	°C
Total Number of Containers		

Remarks: PROJECT NAME CHANGED 8-3-2020 PER BECKY VIA EMAIL.

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: *In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.*

Distribution: White - Lab, Yellow - Originator

Libby Environmental, Inc.
3322 South Bay Road NE • Olympia, WA 98506-2957

August 5, 2020

Becky Dilba
Associated Environmental Group, LLC
2633 Parkmont Lane SW, Suite A
Olympia, WA 98502

Dear Ms. Dilba:

Please find enclosed the analytical data report for the Lacey Urban Center Project located in Lacey, Washington.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. The sample(s) will be disposed of in 30 days unless we are contacted to arrange long term storage.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Sherry L. Chilcutt
Senior Chemist
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@gmail.com

Libby Environmental, Inc.

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LACEY URBAN CENTER PROJECT
AEG, LLC
Lacey, Washington
Libby Project # L200729-2
Client Project # 18-236

Volatile Organic Compounds by EPA Method 8260D in Soil

Sample Description		Method Blank	MW1-6	MW1-11	B23-6	B23-11	MW2-6
Date Sampled		N/A	7/29/2020	7/29/2020	7/29/2020	7/29/2020	7/29/2020
Date Analyzed	PQL (mg/kg)	7/29/2020 (mg/kg)	7/29/2020 (mg/kg)	7/29/2020 (mg/kg)	7/29/2020 (mg/kg)	7/30/2020 (mg/kg)	7/30/2020 (mg/kg)
Vinyl Chloride (VC)	0.02	nd	nd	nd	nd	nd	nd
1,1-Dichloroethene	0.05	nd	nd	nd	nd	nd	nd
trans-1,2-Dichloroethene	0.03	nd	nd	nd	nd	nd	nd
cis -1,2-Dichloroethene	0.03	nd	nd	nd	nd	nd	nd
Trichloroethene (TCE)	0.02	nd	nd	nd	nd	nd	nd
Tetrachloroethene (PCE)	0.03	nd	nd	nd	nd	nd	nd
Surrogate Recovery							
Dibromofluoromethane		132	131	133	133	133	125
1,2-Dichloroethane-d4		113	98	92	92	91	83
Toluene-d8		93	91	92	91	94	92
4-Bromofluorobenzene		100	101	94	99	94	93

"nd" Indicates not detected at listed detection limit.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE : 65% TO 135%

ANALYSES PERFORMED BY: Sherry Chilcutt

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LACEY URBAN CENTER PROJECT
AEG, LLC
Lacey, Washington
Libby Project # L200729-2
Client Project # 18-236

Volatile Organic Compounds by EPA Method 8260D in Soil

Sample Description		MW2-11
Date Sampled		7/29/2020
Date Analyzed	PQL (mg/kg)	7/30/2020 (mg/kg)
Vinyl Chloride (VC)	0.02	nd
1,1-Dichloroethene	0.05	nd
trans-1,2-Dichloroethene	0.03	nd
cis -1,2-Dichloroethene	0.03	nd
Trichloroethene (TCE)	0.02	nd
Tetrachloroethene (PCE)	0.03	nd
Surrogate Recovery		
Dibromofluoromethane		129
1,2-Dichloroethane-d4		96
Toluene-d8		93
4-Bromofluorobenzene		98

"nd" Indicates not detected at listed detection limit.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE : 65% TO 135%

ANALYSES PERFORMED BY: Sherry Chilcutt

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LACEY URBAN CENTER PROJECT
AEG, LLC
Lacey, Washington
Libby Project # L200729-2
Client Project # 18-236

QA/QC for Volatile Organic Compounds by EPA Method 8260D in Soil

Matrix Spike Sample Identification: L200729-3

	Spiked Conc. (mg/kg)	MS Response (mg/kg)	MSD Response (mg/kg)	MS Recovery (%)	MSD Recovery (%)	RPD (%)	Limits Recovery (%)	Data Flag
Vinyl Chloride (VC)	0.25	0.18	0.19	72	78	7.5	65-135	
1,1-Dichloroethene	0.25	0.21	0.24	82	95	14.4	65-135	
trans-1,2-Dichloroethene	0.25	0.24	0.27	96	109	12.1	65-135	
cis -1,2-Dichloroethene	0.25	0.24	0.27	94	108	13.8	65-135	
Trichloroethene (TCE)	0.25	0.24	0.25	96	101	5.3	65-135	
Tetrachloroethene (PCE)	0.25	0.34	0.32	134	129	4.0	65-135	

Surrogate Recovery (%)	MS	MSD	
Dibromofluoromethane	124	133	65-135
1,2-Dichloroethane-d4	120	107	65-135
Toluene-d8	94	94	65-135
4-Bromofluorobenzene	112	104	65-135

ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Sherry Chilcutt

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LACEY URBAN CENTER PROJECT
AEG, LLC
Lacey, Washington
Libby Project # L200729-2
Client Project # 18-236

Laboratory Control Sample

	Spiked Conc. (mg/kg)	LCS Response (mg/kg)	LCS Recovery (%)	LCS Recovery Limits (%)	Data Flag
Vinyl Chloride (VC)	0.25	0.24	96	80-120	
1,1-Dichloroethene	0.25	0.22	88	80-120	
trans-1,2-Dichloroethene	0.25	0.22	90	80-120	
cis -1,2-Dichloroethene	0.25	0.27	106	80-120	
Trichloroethene (TCE)	0.25	0.21	83	80-120	
Tetrachloroethene (PCE)	0.25	0.22	90	80-120	
Surrogate Recovery					
Dibromofluoromethane			123	65-135	
1,2-Dichloroethane-d4			114	65-135	
Toluene-d8			96	65-135	
4-Bromofluorobenzene			111	65-135	

ANALYSES PERFORMED BY: Sherry Chilcutt

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LACEY URBAN CENTER PROJECT
AEG, LLC
Lacey, Washington
Libby Project # L200729-2
Client Project # 18-236

Volatile Organic Compounds by EPA Method 8260D in Water

Sample Description		Method Blank	B22-W	B22-W Dup	Trip Blank
Date Sampled		N/A	7/29/2020	7/29/2020	7/29/2020
Date Analyzed	PQL (µg/L)	7/31/2020 (µg/L)	7/31/2020 (µg/L)	7/31/2020 (µg/L)	7/31/2020 (µg/L)
Vinyl Chloride (VC)	0.2	nd	nd	nd	nd
1,1-Dichloroethene	0.5	nd	nd	nd	nd
trans-1,2-Dichloroethene	1.0	nd	nd	nd	nd
cis -1,2-Dichloroethene	1.0	nd	nd	nd	nd
Trichloroethene (TCE)	0.4	nd	nd	nd	nd
Tetrachloroethene (PCE)	1.0	nd	1.6	1.4	nd
Surrogate Recovery					
Dibromofluoromethane		90	84	84	116
1,2-Dichloroethane-d4		101	84	85	109
Toluene-d8		106	67	65	85
4-Bromofluorobenzene		91	90	89	86

"nd" Indicates not detected at listed detection limit.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE : 65% TO 135%

ANALYSES PERFORMED BY: Sherry Chilcutt

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AEG, LLC
Lacey, Washington
Libby Project # L200729-2
Client Project # 18-236

QA/QC for Volatile Organic Compounds by EPA Method 8260D in Water

Matrix Spike Sample Identification: L200728-3

	Spiked Conc. (µg/L)	MS Response (µg/L)	MSD Response (µg/L)	MS Recovery (%)	MSD Recovery (%)	RPD (%)	Limits Recovery (%)	Data Flag
Vinyl Chloride (VC)	5.0	4.3	3.5	85	70	19.5	65-135	
1,1-Dichloroethene	5.0	5.3	4.4	105	88	18.4	65-135	
trans-1,2-Dichloroethene	5.0	5.2	4.3	105	86	20.0	65-135	
cis -1,2-Dichloroethene	5.0	5.4	5.2	108	103	5.1	65-135	
Trichloroethene (TCE)	5.0	5.2	4.3	104	85	20.5	65-135	
Tetrachloroethene (PCE)	5.0	5.0	4.6	100	92	8.3	65-135	

Surrogate Recovery (%)	MS	MSD	
Dibromofluoromethane	115	117	65-135
1,2-Dichloroethane-d4	115	114	65-135
Toluene-d8	101	94	65-135
4-Bromofluorobenzene	104	106	65-135

ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Sherry Chilcutt

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LACEY URBAN CENTER PROJECT
AEG, LLC
Lacey, Washington
Libby Project # L200729-2
Client Project # 18-236

Laboratory Control Sample

	Spiked Conc. (µg/L)	LCS Response (µg/L)	LCS Recovery (%)	LCS Recovery Limits (%)	Data Flag
Vinyl Chloride (VC)	5.0	5.5	110	80-120	
1,1-Dichloroethene	5.0	5.8	117	80-120	
trans-1,2-Dichloroethene	5.0	5.7	113	80-120	
cis -1,2-Dichloroethene	5.0	5.0	100	80-120	
Trichloroethene (TCE)	5.0	5.6	113	80-120	
Tetrachloroethene (PCE)	5.0	4.2	84	80-120	
Surrogate Recovery					
Dibromofluoromethane			75	65-135	
1,2-Dichloroethane-d4			75	65-135	
Toluene-d8			103	65-135	
4-Bromofluorobenzene			103	65-135	

ANALYSES PERFORMED BY: Sherry Chilcutt

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FAX: (360) 352-4154
Email: libbyenv@gmail.com

LACEY URBAN CENTER PROJECT
AEG, LLC
Libby Project # L200729-2
Date Received 7/29/2020
Time Received 3:24 PM

Received By SC

Sample Receipt Checklist

Chain of Custody

1. Is the Chain of Custody complete?	☑ Yes	☐ No	
2. How was the sample delivered?	☑ Hand Delivered	☐ Picked Up	☐ Shipped

Log In

3. Cooler or Shipping Container is present.	☑ Yes	☐ No	☐ N/A
4. Cooler or Shipping Container is in good condition.	☑ Yes	☐ No	☐ N/A
5. Cooler or Shipping Container has Custody Seals present.	☐ Yes	☑ No	☐ N/A
6. Was an attempt made to cool the samples?	☑ Yes	☐ No	☐ N/A
7. Temperature of cooler (0°C to 8°C recommended)	0.1 °C		
8. Temperature of sample(s) (0°C to 8°C recommended)	28.6 °C		
9. Did all containers arrive in good condition (unbroken)?	☑ Yes	☐ No	
10. Is it clear what analyses were requested?	☑ Yes	☐ No	
11. Did container labels match Chain of Custody?	☑ Yes	☐ No	
12. Are matrices correctly identified on Chain of Custody?	☑ Yes	☐ No	
13. Are correct containers used for the analysis indicated?	☑ Yes	☐ No	
14. Is there sufficient sample volume for indicated analysis?	☑ Yes	☐ No	
15. Were all containers properly preserved per each analysis?	☑ Yes	☐ No	
16. Were VOA vials collected correctly (no headspace)?	☑ Yes	☐ No	☐ N/A
17. Were all holding times able to be met?	☑ Yes	☐ No	

Discrepancies/ Notes

18. Was client notified of all discrepancies?	☐ Yes	☐ No	☑ N/A

Person Notified: _____ Date: _____

By Whom: _____ Via: _____

Regarding: _____

19. Comments. _____

Libby Environmental, Inc.

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Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Chain of Custody Record

www.LibbyEnvironmental.com

Date: 7/29/2020 Page: 1 of 2

Client: AEG
Address:
City: State: Zip:
Phone: 360-352-9835 Fax:
Client Project # 18-236

Project Manager: B.D.
Project Name: Lacey urban center
Location: City, State: Lacey, WA
Collector: B.D. Date of Collection: 7/29/2020
Email: bdilba@aegwa.com

	Sample Number	Depth	Time	Sample Type	Container Type	VOC 8260	PCE & Daughter Prod.	NWTPH-Gx	BTEX (8260) / (8021)	NWTPH-HCID	NWTPH-Dx / Dx	PCB 8082	MTCA 5 Metals	RCRA 8 Metals	c PAH 8270	PAH 8270	Semi Vol 8270			Field Notes
1	MW-6		743	Soil	40z VOA	X														
2	MW-11		746			X														
3	MW-16		752																	
4	MW-21		803																	
5	MW-26		808																	
6	MW-36		840																	
7	~~MW-W~~ SC		954	W	40z VOA	X														ΔID to B22-W SC
8	323-6		1040		40z VOA	X														
9	B23-11		1045			X														
10	B23-16		1048																	
11	B23-21		1054																	
12	B23-26		1107																	
13	B23-31		1116																	
14	MW2-6		1324			X														
15	MW2-11		1327			X														
16	~~MW2-16~~		1332																	Duplicate
17	Trip Blank		730	W	VOA	X														

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	7/29/2020 1523	[signature]	7-29-20 1524
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt

Good Condition?	Y	N
Cooler Temp.		°C
Sample Temp.		°C
Total Number of Containers		

Remarks:

TAT: 24HR 48HR ~~5-DAY~~

LEGAL ACTION CLAUSE: *In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.*

Distribution: White - Lab, Yellow - Originator

Libby Environmental, Inc.

3322 South Bay Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Chain of Custody Record

www.LibbyEnvironmental.com

Date: 7/29/2020 Page: 2 of 2

Client: Aqua
Address:
City: State: Zip:
Phone: 360-352-9835 Fax:
Client Project # 18-234

Project Manager: B.D
Project Name: Lacey Union Center
Location: City, State: Lacey, WA
Collector: B.D. Date of Collection: 7/29/2020
Email: BDirba@aqua.com

Sample Number	Depth	Time	Sample Type	Container Type	VOC 8260	PCE & Daughter Prod.	NWTPH-Gx	BTEX (8260) / (8021)	NWTPH-HCID	NWTPH-Dx / Dx	PCB 8082	MTCA 5 Metals	RCRA 8 Metals	c PAH 8270	PAH 8270	Semi Vol 8270			Field Notes
1 MW2-16		1332	S	40z VOA															
2 ~~MW2-27~~		~~1355~~	↓	↓															
3 MW2-26		1355																	
4 MW2-31		1401																	
5																			
6																			
7																			
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			
16																			
17																			

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	7/29/2020 1523	[signature] UNA	7-29-20 1524
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt

Good Condition?	Y	N
Cooler Temp.		°C
Sample Temp.		°C
Total Number of Containers		

Remarks:

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: *In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.*

Distribution: White - Lab, Yellow - Originator

Libby Environmental, Inc.
3322 South Bay Road NE • Olympia, WA 98506-2957

August 6, 2020

Becky Dilba
Associated Environmental Group, LLC
2633 Parkmont Lane SW, Suite A
Olympia, WA 98502

Dear Ms. Dilba:

Please find enclosed the analytical data report for the Lacey Urban Center Project located in Lacey, Washington.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. The sample(s) will be disposed of in 30 days unless we are contacted to arrange long term storage.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Sherry L. Chilcutt
Senior Chemist
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@gmail.com

Libby Environmental, Inc.

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LACEY URBAN CENTER PROJECT
AEG, LLC
Lacey, Washington
Libby Project # L200730-2
Client Project # 18-236

Volatile Organic Compounds by EPA Method 8260D in Soil

Sample Description		Method Blank	Method Blank	MW3-6	MW3-11
Date Sampled		N/A	N/A	7/30/2020	7/30/2020
Date Analyzed	PQL (mg/kg)	8/3/2020 (mg/kg)	8/3/2020 (mg/kg)	8/3/2020 (mg/kg)	8/3/2020 (mg/kg)
Vinyl Chloride (VC)	0.02	nd	nd	nd	nd
1,1-Dichloroethene	0.05	nd	nd	nd	nd
trans-1,2-Dichloroethene	0.03	nd	nd	nd	nd
cis-1,2-Dichloroethene	0.03	nd	nd	nd	nd
Trichloroethene (TCE)	0.02	nd	nd	nd	nd
Tetrachloroethene (PCE)	0.03	nd	nd	nd	nd
Surrogate Recovery					
Dibromofluoromethane		133	133	135	131
1,2-Dichloroethane-d4		114	111	108	119
Toluene-d8		96	93	92	93
4-Bromofluorobenzene		100	98	97	117

"nd" Indicates not detected at listed detection limit.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE : 65% TO 135%

ANALYSES PERFORMED BY: Melissa Harrington

Libby Environmental, Inc.

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LACEY URBAN CENTER PROJECT
AEG, LLC
Lacey, Washington
Libby Project # L200730-2
Client Project # 18-236

QA/QC for Volatile Organic Compounds by EPA Method 8260D in Soil

Matrix Spike Sample Identification: L200729-2

	Spiked Conc. (mg/kg)	MS Response (mg/kg)	MSD Response (mg/kg)	MS Recovery (%)	MSD Recovery (%)	RPD (%)	Limits Recovery (%)	Data Flag
Vinyl Chloride (VC)	0.25	0.18	0.21	72	84	15.4	65-135	
1,1-Dichloroethene	0.25	0.22	0.26	88	104	16.7	65-135	
trans-1,2-Dichloroethene	0.25	0.25	0.27	100	108	7.7	65-135	
cis -1,2-Dichloroethene	0.25	0.30	0.34	120	136	12.5	65-135	S
Trichloroethene (TCE)	0.25	0.21	0.23	84	92	9.1	65-135	
Tetrachloroethene (PCE)	0.25	0.31	0.37	124	148	17.6	65-135	S

Surrogate Recovery (%)	MS	MSD	
Dibromofluoromethane	128	130	65-135
1,2-Dichloroethane-d4	117	117	65-135
Toluene-d8	96	94	65-135
4-Bromofluorobenzene	114	113	65-135

ACCEPTABLE RPD IS 35%
S" Spike compound recovery is outside acceptance limits.

ANALYSES PERFORMED BY: Melissa Harrington

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LACEY URBAN CENTER PROJECT
AEG, LLC
Lacey, Washington
Libby Project # L200730-2
Client Project # 18-236

Laboratory Control Sample

	Spiked Conc. (mg/kg)	LCS Response (mg/kg)	LCS Recovery (%)	LCS Recovery Limits (%)	Data Flag
Vinyl Chloride (VC)	0.25	0.21	84	80-120	
1,1-Dichloroethene	0.25	0.27	108	80-120	
trans-1,2-Dichloroethene	0.25	0.26	104	80-120	
cis -1,2-Dichloroethene	0.25	0.27	108	80-120	
Trichloroethene (TCE)	0.25	0.27	108	80-120	
Tetrachloroethene (PCE)	0.25	0.30	120	80-120	
Surrogate Recovery					
Dibromofluoromethane			117	65-135	
1,2-Dichloroethane-d4			94	65-135	
Toluene-d8			89	65-135	
4-Bromofluorobenzene			92	65-135	

ANALYSES PERFORMED BY: Melissa Harrington

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LACEY URBAN CENTER PROJECT
AEG, LLC
Lacey, Washington
Libby Project # L200730-2
Client Project # 18-236

QA/QC for Volatile Organic Compounds by EPA Method 8260D in Soil

Matrix Spike Sample Identification: L200803-6

	Spiked Conc. (mg/kg)	MS Response (mg/kg)	MSD Response (mg/kg)	MS Recovery (%)	MSD Recovery (%)	RPD (%)	Limits Recovery (%)	Data Flag
Vinyl Chloride (VC)	0.25	0.17	0.19	68	76	11.1	65-135	
1,1-Dichloroethene	0.25	0.23	0.23	92	92	0.0	65-135	
trans-1,2-Dichloroethene	0.25	0.24	0.23	96	92	4.3	65-135	
cis -1,2-Dichloroethene	0.25	0.17	0.23	68	92	30.0	65-135	
Trichloroethene (TCE)	0.25	0.23	0.22	92	88	4.4	65-135	
Tetrachloroethene (PCE)	0.25	0.33	0.33	132	132	0.0	65-135	

Surrogate Recovery (%)	MS	MSD	
Dibromofluoromethane	113	135	65-135
1,2-Dichloroethane-d4	110	106	65-135
Toluene-d8	100	102	65-135
4-Bromofluorobenzene	130	109	65-135

ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Melissa Harrington

Libby Environmental, Inc.

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LACEY URBAN CENTER PROJECT
AEG, LLC
Lacey, Washington
Libby Project # L200730-2
Client Project # 18-236

Laboratory Control Sample

	Spiked Conc. (mg/kg)	LCS Response (mg/kg)	LCS Recovery (%)	LCS Recovery Limits (%)	Data Flag
Vinyl Chloride (VC)	0.25	0.20	80	80-120	
1,1-Dichloroethene	0.25	0.26	104	80-120	
trans-1,2-Dichloroethene	0.25	0.30	120	80-120	
cis -1,2-Dichloroethene	0.25	0.25	100	80-120	
Trichloroethene (TCE)	0.25	0.24	96	80-120	
Tetrachloroethene (PCE)	0.25	0.29	116	80-120	
Surrogate Recovery					
Dibromofluoromethane			135	65-135	
1,2-Dichloroethane-d4			115	65-135	
Toluene-d8			102	65-135	
4-Bromofluorobenzene			96	65-135	

ANALYSES PERFORMED BY: Melissa Harrington

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LACEY URBAN CENTER PROJECT
AEG, LLC
Lacey, Washington
Libby Project # L200730-2
Client Project # 18-236

Volatile Organic Compounds by EPA Method 8260D in Water

Sample Description		Method Blank	B23-W	MW3-W	MW2-W	MW2-W Dup	MW1-W
Date Sampled		N/A	7/30/2020	7/30/2020	7/30/2020	7/30/2020	7/30/2020
Date Analyzed	PQL (µg/L)	7/31/2020 (µg/L)	7/31/2020 (µg/L)	7/31/2020 (µg/L)	7/31/2020 (µg/L)	7/31/2020 (µg/L)	7/31/2020 (µg/L)
Vinyl Chloride (VC)	0.2	nd	nd	nd	nd	nd	nd
1,1-Dichloroethene	0.5	nd	nd	nd	nd	nd	nd
trans-1,2-Dichloroethene	1.0	nd	nd	nd	nd	nd	nd
cis -1,2-Dichloroethene	1.0	nd	nd	nd	nd	nd	nd
Trichloroethene (TCE)	0.4	nd	nd	nd	nd	nd	nd
Tetrachloroethene (PCE)	1.0	nd	1.3	nd	0.66 J	0.61 J	0.82 J
Surrogate Recovery							
Dibromofluoromethane		90	94	85	86	84	84
1,2-Dichloroethane-d4		101	103	89	88	86	99
Toluene-d8		106	104	71	70	70	104
4-Bromofluorobenzene		91	93	94	89	90	94

"nd" Indicates not detected at listed detection limit.
int Indicates that interference prevents determination.
“J” Result is less than the PQL but greater than the MDL. Reported value is approximate.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE : 65% TO 135%

ANALYSES PERFORMED BY: Sherry Chilcutt

Libby Environmental, Inc.

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LACEY URBAN CENTER PROJECT
AEG, LLC
Lacey, Washington
Libby Project # L200730-2
Client Project # 18-236

QA/QC for Volatile Organic Compounds by EPA Method 8260D in Water

Matrix Spike Sample Identification: L200728-3

	Spiked Conc. (µg/L)	MS Response (µg/L)	MSD Response (µg/L)	MS Recovery (%)	MSD Recovery (%)	RPD (%)	Limits Recovery (%)	Data Flag
Vinyl Chloride (VC)	5.0	4.3	3.5	85	70	19.5	65-135	
1,1-Dichloroethene	5.0	5.3	4.4	105	88	18.4	65-135	
trans-1,2-Dichloroethene	5.0	5.2	4.3	105	86	20.0	65-135	
cis -1,2-Dichloroethene	5.0	5.4	5.2	108	103	5.1	65-135	
Trichloroethene (TCE)	5.0	5.2	4.3	104	85	20.5	65-135	
Tetrachloroethene (PCE)	5.0	5.6	5.2	112	104	7.4	65-135	

Surrogate Recovery (%)	MS	MSD	
Dibromofluoromethane	115	117	65-135
1,2-Dichloroethane-d4	115	114	65-135
Toluene-d8	101	94	65-135
4-Bromofluorobenzene	104	106	65-135

ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Sherry Chilcutt

Libby Environmental, Inc.

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LACEY URBAN CENTER PROJECT
AEG, LLC
Lacey, Washington
Libby Project # L200730-2
Client Project # 18-236

Laboratory Control Sample

	Spiked Conc. (µg/L)	LCS Response (µg/L)	LCS Recovery (%)	LCS Recovery Limits (%)	Data Flag
Vinyl Chloride (VC)	5.0	5.5	110	80-120	
1,1-Dichloroethene	5.0	5.8	117	80-120	
trans-1,2-Dichloroethene	5.0	5.7	113	80-120	
cis -1,2-Dichloroethene	5.0	5.0	100	80-120	
Trichloroethene (TCE)	5.0	5.6	113	80-120	
Tetrachloroethene (PCE)	5.0	4.2	84	80-120	
Surrogate Recovery					
Dibromofluoromethane			75	65-135	
1,2-Dichloroethane-d4			75	65-135	
Toluene-d8			103	65-135	
4-Bromofluorobenzene			103	65-135	

ANALYSES PERFORMED BY: Sherry Chilcutt

Libby Environmental, Inc.

3322 South Bay Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@gmail.com

LACEY URBAN CENTER PROJECT
AEG, LLC
Libby Project # L200730-2
Date Received 7/30/2020
Time Received 12:25 PM

Received By KD

Sample Receipt Checklist

Chain of Custody

1. Is the Chain of Custody complete?	☑ Yes	☐ No	
2. How was the sample delivered?	☑ Hand Delivered	☐ Picked Up	☐ Shipped

Log In

3. Cooler or Shipping Container is present.	☑ Yes	☐ No	☐ N/A
4. Cooler or Shipping Container is in good condition.	☑ Yes	☐ No	☐ N/A
5. Cooler or Shipping Container has Custody Seals present.	☐ Yes	☑ No	☐ N/A
6. Was an attempt made to cool the samples?	☑ Yes	☐ No	☐ N/A
7. Temperature of cooler (0°C to 8°C recommended)	2.0 °C		
8. Temperature of sample(s) (0°C to 8°C recommended)	14.8 °C		
9. Did all containers arrive in good condition (unbroken)?	☑ Yes	☐ No	
10. Is it clear what analyses were requested?	☑ Yes	☐ No	
11. Did container labels match Chain of Custody?	☑ Yes	☐ No	
12. Are matrices correctly identified on Chain of Custody?	☑ Yes	☐ No	
13. Are correct containers used for the analysis indicated?	☑ Yes	☐ No	
14. Is there sufficient sample volume for indicated analysis?	☑ Yes	☐ No	
15. Were all containers properly preserved per each analysis?	☑ Yes	☐ No	
16. Were VOA vials collected correctly (no headspace)?	☑ Yes	☐ No	☐ N/A
17. Were all holding times able to be met?	☑ Yes	☐ No	

Discrepancies/ Notes

18. Was client notified of all discrepancies?	☐ Yes	☐ No	☑ N/A

Person Notified: _____ Date: _____

By Whom: _____ Via: _____

Regarding: _____

19. Comments. _____

Libby Environmental, Inc.

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Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Chain of Custody Record

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Date: 7/30/2020 Page: 1 of 1

Client: [illegible]
Project Manager: B.D
Address:
Project Name: Lacey Urban Center
City: State: Zip:
Location: City, State: LACEY, WA
Phone: 360-352-9835 Fax:
Collector: B.D Date of Collection: 7/30/2020
Client Project # 18-236
Email: kdilka@riegner

	Sample Number	Depth	Time	Sample Type	Container Type	VOC 8260	PCE & Daughter Prod.	NWTPH-Gx	BTEX (8260) / (8021)	NWTPH-HCID	NWTPH-Dx / Dx	PCB 8082	MTCA 5 Metals	RCRA 8 Metals	c PAH 8270	PAH 8270	Semi Vol 8270			Field Notes
1	B23-W		725	S	VOA/jar		X													
2	MW3-6		912				X													
3	MW3-11		913				X													
4	MW3-16		921																	
5	MW3-21		930																	
6	MW3-26		945																	
7	MW3-31		954																	
8	MW3-36		1002																	
9	MW3-W		1125				X													
10	MW2-W		1133				X													
11	MW1-W		1140				X													
12																				
13																				
14																				
15																				
16																				
17																				

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	7/30/2020 1225	[signature]	7/30/2020 1225
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt

Good Condition?	Y	N
Cooler Temp.		°C
Sample Temp.		°C
Total Number of Containers		

Remarks:

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: *In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.*

Distribution: White - Lab, Yellow - Originator

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

August 17, 2020

Becky Dilba, Project Manager
AEG
605 11th Ave SE
Suite 201
Olympia, WA 98501

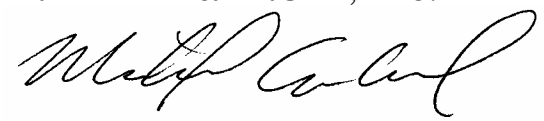
Dear Ms Dilba:

Included are the results from the testing of material submitted on July 31, 2020 from the Lacey Urban Center 7269 Martin Way East, Olympia PO 18-236, F&BI 007546 project. There are 10 pages included in this report.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
AEG0817R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on July 31, 2020 by Friedman & Bruya, Inc. from the AEG Lacey Urban Center 7269 Martin Way East, Olympia PO 18-236, F&BI 007546 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	AEG
007546 -01	SG-1
007546 -02	SG-2
007546 -03	SG-3
007546 -04	SG-4
007546 -05	SG-5
007546 -06	SG-6

All quality control requirements were acceptable.

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SG-1	Client:	AEG
Date Received:	07/31/20	Project:	Lacey Urban Center
Date Collected:	07/29/20	Lab ID:	007546-01 1/6.8
Date Analyzed:	08/13/20	Data File:	081234.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	95	70	130

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<1.7	<0.68
Chloroethane	<18	<6.8
1,1-Dichloroethene	<2.7	<0.68
trans-1,2-Dichloroethene	<2.7	<0.68
1,1-Dichloroethane	<2.8	<0.68
cis-1,2-Dichloroethene	<2.7	<0.68
1,2-Dichloroethane (EDC)	<0.28	<0.068
1,1,1-Trichloroethane	<3.7	<0.68
Trichloroethene	<1.8	<0.34
1,1,2-Trichloroethane	<0.74	<0.14
Tetrachloroethene	60	8.9

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SG-2	Client:	AEG
Date Received:	07/31/20	Project:	Lacey Urban Center
Date Collected:	07/29/20	Lab ID:	007546-02 1/6.8
Date Analyzed:	08/13/20	Data File:	081233.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	106	70	130

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<1.7	<0.68
Chloroethane	<18	<6.8
1,1-Dichloroethene	<2.7	<0.68
trans-1,2-Dichloroethene	<2.7	<0.68
1,1-Dichloroethane	<2.8	<0.68
cis-1,2-Dichloroethene	<2.7	<0.68
1,2-Dichloroethane (EDC)	<0.28	<0.068
1,1,1-Trichloroethane	<3.7	<0.68
Trichloroethene	<1.8	<0.34
1,1,2-Trichloroethane	<0.74	<0.14
Tetrachloroethene	180	27

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SG-3	Client:	AEG
Date Received:	07/31/20	Project:	Lacey Urban Center
Date Collected:	07/29/20	Lab ID:	007546-03 1/6.7
Date Analyzed:	08/13/20	Data File:	081232.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	108	70	130

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<1.7	<0.67
Chloroethane	<18	<6.7
1,1-Dichloroethene	<2.7	<0.67
trans-1,2-Dichloroethene	<2.7	<0.67
1,1-Dichloroethane	<2.7	<0.67
cis-1,2-Dichloroethene	<2.7	<0.67
1,2-Dichloroethane (EDC)	<0.27	<0.067
1,1,1-Trichloroethane	<3.7	<0.67
Trichloroethene	<1.8	<0.33
1,1,2-Trichloroethane	<0.73	<0.13
Tetrachloroethene	90	13

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SG-4	Client:	AEG
Date Received:	07/31/20	Project:	Lacey Urban Center
Date Collected:	07/29/20	Lab ID:	007546-04 1/6.6
Date Analyzed:	08/13/20	Data File:	081235.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	107	70	130

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<1.7	<0.66
Chloroethane	<17	<6.6
1,1-Dichloroethene	<2.6	<0.66
trans-1,2-Dichloroethene	<2.6	<0.66
1,1-Dichloroethane	<2.7	<0.66
cis-1,2-Dichloroethene	<2.6	<0.66
1,2-Dichloroethane (EDC)	<0.27	<0.066
1,1,1-Trichloroethane	<3.6	<0.66
Trichloroethene	2.4	0.45
1,1,2-Trichloroethane	<0.72	<0.13
Tetrachloroethene	72	11

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SG-5	Client:	AEG
Date Received:	07/31/20	Project:	Lacey Urban Center
Date Collected:	07/29/20	Lab ID:	007546-05 1/13
Date Analyzed:	08/11/20	Data File:	081032.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	100	70	130

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<3.3	<1.3
Chloroethane	<34	<13
1,1-Dichloroethene	<5.2	<1.3
trans-1,2-Dichloroethene	<5.2	<1.3
1,1-Dichloroethane	<5.3	<1.3
cis-1,2-Dichloroethene	<5.2	<1.3
1,2-Dichloroethane (EDC)	<0.53	<0.13
1,1,1-Trichloroethane	<7.1	<1.3
Trichloroethene	<3.5	<0.65
1,1,2-Trichloroethane	<1.4	<0.26
Tetrachloroethene	270	39

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SG-6	Client:	AEG
Date Received:	07/31/20	Project:	Lacey Urban Center
Date Collected:	07/29/20	Lab ID:	007546-06 1/7.0
Date Analyzed:	08/11/20	Data File:	081031.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	105	70	130

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<1.8	<0.7
Chloroethane	<18	<7
1,1-Dichloroethene	<2.8	<0.7
trans-1,2-Dichloroethene	<2.8	<0.7
1,1-Dichloroethane	<2.8	<0.7
cis-1,2-Dichloroethene	<2.8	<0.7
1,2-Dichloroethane (EDC)	<0.28	<0.07
1,1,1-Trichloroethane	<3.8	<0.7
Trichloroethene	<1.9	<0.35
1,1,2-Trichloroethane	<0.76	<0.14
Tetrachloroethene	76	11

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	AEG
Date Received:	Not Applicable	Project:	Lacey Urban Center
Date Collected:	Not Applicable	Lab ID:	00-1730 mb
Date Analyzed:	08/10/20	Data File:	081016.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	91	70	130

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<0.26	<0.1
Chloroethane	<2.6	<1
1,1-Dichloroethene	<0.4	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1
1,1-Dichloroethane	<0.4	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1
1,2-Dichloroethane (EDC)	<0.04	<0.01
1,1,1-Trichloroethane	<0.55	<0.1
Trichloroethene	<0.27	<0.05
1,1,2-Trichloroethane	<0.11	<0.02
Tetrachloroethene	<6.8	<1

Date of Report: 08/17/20
Date Received: 07/31/20
Project: Lacey Urban Center 7269 Martin Way East, Olympia PO 18-236, F&BI 007546

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD TO-15

Laboratory Code: 008120-01 1/8.3 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Vinyl chloride	ug/m3	12	8.4	35 vo
Chloroethane	ug/m3	<22	<22	nm
1,1-Dichloroethene	ug/m3	<3.3	<3.3	nm
trans-1,2-Dichloroethene	ug/m3	<3.3	<3.3	nm
1,1-Dichloroethane	ug/m3	<3.4	<3.4	nm
cis-1,2-Dichloroethene	ug/m3	<3.3	<3.3	nm
1,2-Dichloroethane (EDC)	ug/m3	<0.34	<0.34	nm
1,1,1-Trichloroethane	ug/m3	<4.5	<4.5	nm
Trichloroethene	ug/m3	<2.2	<2.2	nm
1,1,2-Trichloroethane	ug/m3	<0.91	<0.91	nm
Tetrachloroethene	ug/m3	<56	<56	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Vinyl chloride	ug/m3	35	79	70-130
Chloroethane	ug/m3	36	80	70-130
1,1-Dichloroethene	ug/m3	54	94	70-130
trans-1,2-Dichloroethene	ug/m3	54	86	70-130
1,1-Dichloroethane	ug/m3	55	81	70-130
cis-1,2-Dichloroethene	ug/m3	54	94	70-130
1,2-Dichloroethane (EDC)	ug/m3	55	83	70-130
1,1,1-Trichloroethane	ug/m3	74	84	70-130
Trichloroethene	ug/m3	73	77	70-130
1,1,2-Trichloroethane	ug/m3	74	92	70-130
Tetrachloroethene	ug/m3	92	97	70-130

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

SAMPLE CHAIN OF CUSTODY

007546 — ME 07-31-20

Report To B. Dilba

Company AECOM

Address

City, State, ZIP

Phone Email bdilba@aecom.com

SAMPLERS (*signature*)

PROJECT NAME & ADDRESS: Lacey Veteran Center, 7209 Martin Way East, Olympia — PO # B-236

NOTES:

INVOICE TO: AECOM

Page # ____ of ____

TURNAROUND TIME
- ☒ Standard
- ☐ RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- ☐ Default: Clean after 3 days
- ☐ Archive (Fee may apply)

SAMPLE INFORMATION										ANALYSIS REQUESTED						
Sample Name	Lab ID	Canister ID	Flow Cont. ID	Reporting Level: IA=Indoor Air SG=Soil Gas (Circle One)	Date Sampled	Initial Vac. ("Hg)	Field Initial Time	Final Vac. ("Hg)	Field Final Time	TO15 Full Scan	TO15 BTEXN	TO15 cVOCs	APH	Helium	PCE : Daughters	Notes
SG-1	01	3868	117	IA / (SG)	7/29/2020	-30	7:58	-0	8:09						X	
SG-2	02	4183	07	IA / (SG)		-30	8:08	-0	820						X	
SG-3	03	3254	106	IA / (SG)		-29	8:18	-0	826						X	
SG-4	04	2299	109	IA / (SG)		-30	8:42	0	856						X	
SG-5	05	4181	105	IA / (SG)		-30	859	-1.5	923						X	
SG-6	06	3312	029	IA / (SG)		-30	938	-2	1007						X	
				IA / SG												
				IA / SG												Samples received at 27 °C

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Beeny Dilba	AECOM	7/31/2020	953
Received by:	Liz Webber-Bruya	FBI	7/31/20	1520
Relinquished by:				
Received by:				

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

Libby Environmental, Inc.
3322 South Bay Road NE • Olympia, WA 98506-2957

November 2, 2020

Becky Dilba
Associated Environmental Group, LLC
2633 Parkmont Lane SW, Suite A
Olympia, WA 98502

Dear Ms. Dilba:

Please find enclosed the analytical data report for the Lacey Urban Center Project located in Olympia, Washington.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. The sample(s) will be disposed of in 30 days unless we are contacted to arrange long term storage.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Sherry L. Chilcutt
Senior Chemist
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@gmail.com

Libby Environmental, Inc.

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Olympia, WA 98506
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LACEY URBAN CENTER PROJECT
AEG, LLC
Olympia, Washington
Libby Project # L201030-3
Client Project # 18-236

Volatile Organic Compounds by EPA Method 8260D in Soil

Sample Description		Method Blank	B24-41/MW4-41	B24-60/MW4-60	B24-81/MW4-81	B24-81/MW4-81 Dup	MW5-40
Date Sampled		N/A	10/29/2020	10/29/2020	10/30/2020	10/30/2020	10/30/2020
Date Analyzed	PQL	10/30/2020	10/30/2020	10/30/2020	10/30/2020	10/30/2020	10/30/2020
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
Vinyl Chloride (VC)	0.02	nd	nd	nd	nd	nd	nd
1,1-Dichloroethene	0.05	nd	nd	nd	nd	nd	nd
trans-1,2-Dichloroethene	0.03	nd	nd	nd	nd	nd	nd
cis-1,2-Dichloroethene	0.03	nd	nd	nd	nd	nd	nd
Trichloroethene (TCE)	0.02	nd	nd	nd	nd	nd	nd
Tetrachloroethene (PCE)	0.03	nd	nd	nd	nd	nd	nd
Surrogate Recovery							
Dibromofluoromethane		105	98	98	97	97	98
1,2-Dichloroethane-d4		95	83	80	79	78	79
Toluene-d8		95	95	95	94	95	97
4-Bromofluorobenzene		86	95	94	91	91	90

"nd" Indicates not detected at listed detection limit.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE : 65% TO 135%

ANALYSES PERFORMED BY: Sherry Chilcutt

Libby Environmental, Inc.

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Olympia, WA 98506
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Email: libbyenv@gmail.com

LACEY URBAN CENTER PROJECT
AEG, LLC
Olympia, Washington
Libby Project # L201030-3
Client Project # 18-236

Volatile Organic Compounds by EPA Method 8260D in Soil

Sample Description		MW5-60	MW5-75
Date Sampled		10/30/2020	10/30/2020
Date Analyzed	PQL	10/30/2020	10/30/2020
	(mg/kg)	(mg/kg)	(mg/kg)
Vinyl Chloride (VC)	0.02	nd	nd
1,1-Dichloroethene	0.05	nd	nd
trans-1,2-Dichloroethene	0.03	nd	nd
cis -1,2-Dichloroethene	0.03	nd	nd
Trichloroethene (TCE)	0.02	nd	nd
Tetrachloroethene (PCE)	0.03	nd	nd
Surrogate Recovery			
Dibromofluoromethane		97	108
1,2-Dichloroethane-d4		77	96
Toluene-d8		97	96
4-Bromofluorobenzene		88	92

"nd" Indicates not detected at listed detection limit.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE : 65% TO 135%

ANALYSES PERFORMED BY: Sherry Chilcutt

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LACEY URBAN CENTER PROJECT
AEG, LLC
Olympia, Washington
Libby Project # L201030-3
Client Project # 18-236

QA/QC for Volatile Organic Compounds by EPA Method 8260D in Soil

Matrix Spike Sample Identification: B24-81/MW4-81

	Spiked Conc. (mg/kg)	MS Response (mg/kg)	MSD Response (mg/kg)	MS Recovery (%)	MSD Recovery (%)	RPD (%)	Limits Recovery (%)	Data Flag
Vinyl Chloride (VC)	0.25	0.23	0.23	90	92	2.2	65-135	
1,1-Dichloroethene	0.25	0.27	0.26	107	102	4.6	65-135	
trans-1,2-Dichloroethene	0.25	0.34	0.30	137	120	13.0	65-135	S
cis -1,2-Dichloroethene	0.25	0.27	0.26	108	102	6.1	65-135	
Trichloroethene (TCE)	0.25	0.24	0.23	95	92	2.6	65-135	
Tetrachloroethene (PCE)	0.25	0.23	0.26	91	104	13.1	65-135	

Surrogate Recovery (%)	MS	MSD	
Dibromofluoromethane	99	96	65-135
1,2-Dichloroethane-d4	78	78	65-135
Toluene-d8	97	96	65-135
4-Bromofluorobenzene	95	98	65-135

ACCEPTABLE RPD IS 35%

"S" Spike compound recovery is outside acceptance limits.

ANALYSES PERFORMED BY: Sherry Chilcutt

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LACEY URBAN CENTER PROJECT
AEG, LLC
Olympia, Washington
Libby Project # L201030-3
Client Project # 18-236

Laboratory Control Sample

	Spiked Conc. (mg/kg)	LCS Response (mg/kg)	LCS Recovery (%)	LCS Recovery Limits (%)	Data Flag
Vinyl Chloride (VC)	0.25	0.24	97	80-120	
1,1-Dichloroethene	0.25	0.25	100	80-120	
trans-1,2-Dichloroethene	0.25	0.30	120	80-120	
cis -1,2-Dichloroethene	0.25	0.25	101	80-120	
Trichloroethene (TCE)	0.25	0.24	98	80-120	
Tetrachloroethene (PCE)	0.25	0.27	107	80-120	
Surrogate Recovery					
Dibromofluoromethane			104	65-135	
1,2-Dichloroethane-d4			96	65-135	
Toluene-d8			97	65-135	
4-Bromofluorobenzene			96	65-135	

ANALYSES PERFORMED BY: Sherry Chilcutt

Libby Environmental, Inc.

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Olympia, WA 98506
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Email: libbyenv@gmail.com

LACEY URBAN CENTER PROJECT
AEG, LLC
Libby Project # L201030-3
Date Received 10/30/2020
Time Received 3:19 PM

Received By JC

Sample Receipt Checklist

Chain of Custody

1. Is the Chain of Custody complete?	☑ Yes	☐ No	
2. How was the sample delivered?	☐ Hand Delivered	☑ Picked Up	☐ Shipped

Log In

3. Cooler or Shipping Container is present.	☑ Yes	☐ No	☐ N/A
4. Cooler or Shipping Container is in good condition.	☑ Yes	☐ No	☐ N/A
5. Cooler or Shipping Container has Custody Seals present.	☐ Yes	☑ No	☐ N/A
6. Was an attempt made to cool the samples?	☑ Yes	☐ No	☐ N/A
7. Temperature of cooler (0°C to 8°C recommended)	3.5 °C		
8. Temperature of sample(s) (0°C to 8°C recommended)	12.5 °C		
9. Did all containers arrive in good condition (unbroken)?	☑ Yes	☐ No	
10. Is it clear what analyses were requested?	☑ Yes	☐ No	
11. Did container labels match Chain of Custody?	☑ Yes	☐ No	
12. Are matrices correctly identified on Chain of Custody?	☑ Yes	☐ No	
13. Are correct containers used for the analysis indicated?	☑ Yes	☐ No	
14. Is there sufficient sample volume for indicated analysis?	☑ Yes	☐ No	
15. Were all containers properly preserved per each analysis?	☑ Yes	☐ No	
16. Were VOA vials collected correctly (no headspace)?	☑ Yes	☐ No	☐ N/A
17. Were all holding times able to be met?	☑ Yes	☐ No	

Discrepancies/ Notes

18. Was client notified of all discrepancies? ☐ Yes ☐ No ☑ N/A

Person Notified: _____ Date: _____

By Whom: _____ Via: _____

Regarding: _____

19. Comments. _____

Libby Environmental, Inc.

3322 South Bay Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Chain of Custody Record

www.LibbyEnvironmental.com

Date: 10/30/20 Page: 1 of 2

Client: AEG
Address:
City: State: Zip:
Phone: Fax:
Client Project # 18-236

Project Manager: B.D.
Project Name: Lacey Urban Center
Location: 7131 Martin Way East. City, State: Olympia, WA
Collector: B.D. Date of Collection: 10/29/2020 - 10/30
Email:

Sample Number	Depth	Time	Sample Type	Container Type	VOC 8260	PCE & Daughter Prod.	NWTPH-Gx	BTEX (8260) / (8021)	NWTPH-HCID	NWTPH-Dx / Dx	PCB 8082	MTCA 5 Metals	RCRA 8 Metals	c PAH 8270	PAH 8270	Semi Vol 8270	Field Notes
1 B24-5 / MW4-5	5	1002	Soil	Voa x2 / jar													10/29
2 B24-10 / MW4-10	10	1012															
3 B24-16 / MW4-16	16	1028															
4 B24-21 / MW4-21	21	1036															
5 B24-26 / MW4-26	26	1041															
6 B24-31 / MW4-31	31	1058															
7 B24-36 / MW4-36	36	1116															
8 B24-41 / MW4-41	41	1122				X											
9 B24-45 / MW4-45	45	1134															
10 B24-56 / MW4-56	56	1254															
11 B24-60 / MW4-60	60	1321				Y											
12 B24-74 / MW4-74	74	830															10/30
13 B24-78 / MW4-78	78	841															
14 B24-81 / MW4-81	81	901				X											
15 MW5-40	40	1321				X											
16 MW5-45	45	1322															
17 MW5-60	60	1406				X											

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	10/30/2020 1640	Jodie Chalmers	10/30/2020 1839
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt

Good Condition?	Y	N
Cooler Temp.		°C
Sample Temp.		°C
Total Number of Containers		

Remarks:

TAT: 24HR 48HR 5-DAY

LEGAL ACTION CLAUSE: *In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.*

Distribution: White - Lab, Yellow - Originator

Libby Environmental, Inc.

3322 South Bay Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Chain of Custody Record

www.LibbyEnvironmental.com

Date: 10/30/2020 Page: 2 of 2

Client: AGI
Project Manager: BD
Address:
Project Name: Lacey Urban Center
City: State: Zip:
Location: City, State: Olympia, WA
Phone: Fax:
Collector: BD Date of Collection: 10/30/2020
Client Project # 18-2936
Email:

	Sample Number	Depth	Time	Sample Type	Container Type	VOC 8260	PCE & Daughter Prod.	NWTPH-Gx	BTEX (8260) / (8021)	NWTPH-HCID	NWTPH-Dx / Dx	PCB 8082	MTCA 5 Metals	RCRA 8 Metals	c PAH 8270	PAH 8270	Semi Vol 8270			Field Notes
1	MW5-65	65	1722	Soil	VOAx2/Jar															
2	MW5-70	70	1420	〃	〃															
3	MW5-75	75	1435	〃	〃		X													
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	10/30/2020 1640	[signature]	10/30/20 3:19
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt

Good Condition?	Y	N
Cooler Temp.		°C
Sample Temp.		°C
Total Number of Containers		

Remarks:

TAT: 24HR 48HR (5-DAY)

LEGAL ACTION CLAUSE: *In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.*

Distribution: White - Lab, Yellow - Originator

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
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November 13, 2020

Becky Dilba, Project Manager
AEG
2633 Parkmont Lane SW, Suite A
Olympia, WA 98502

Dear Ms Dilba:

Included are the results from the testing of material submitted on November 2, 2020 from the Lacey urban center PO 18-238, F&BI 011016 project. There are 11 pages included in this report.

We appreciate this opportunity to be of service to you and hope you will call if you should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
AEG1113R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on November 2, 2020 by Friedman & Bruya, Inc. from the AEG Lacey urban center PO 18-238, F&BI 011016 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	AEG
011016 -01	Indoor-1
011016 -02	Indoor-2
011016 -03	Ambient-1
011016 -04	SS-1
011016 -05	SS-2

All quality control requirements were acceptable.

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Indoor-1	Client:	AEG
Date Received:	11/02/20	Project:	Lacey urban center PO 18-238
Date Collected:	10/29/20	Lab ID:	011016-01
Date Analyzed:	11/06/20	Data File:	100212.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	79	70	130

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<0.26	<0.1
Chloroethane	<2.6	<1
1,1-Dichloroethene	<0.4	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1
1,1-Dichloroethane	<0.4	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1
1,2-Dichloroethane (EDC)	0.14	0.034
1,1,1-Trichloroethane	<0.55	<0.1
Trichloroethene	<0.11	<0.02
1,1,2-Trichloroethane	<0.055	<0.01
Tetrachloroethene	<6.8	<1

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Indoor-2	Client:	AEG
Date Received:	11/02/20	Project:	Lacey urban center PO 18-238
Date Collected:	10/29/20	Lab ID:	011016-02
Date Analyzed:	11/06/20	Data File:	100213.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	88	70	130

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<0.26	<0.1
Chloroethane	<2.6	<1
1,1-Dichloroethene	<0.4	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1
1,1-Dichloroethane	<0.4	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1
1,2-Dichloroethane (EDC)	0.13	0.033
1,1,1-Trichloroethane	<0.55	<0.1
Trichloroethene	<0.11	<0.02
1,1,2-Trichloroethane	<0.055	<0.01
Tetrachloroethene	<6.8	<1

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Ambient-1	Client:	AEG
Date Received:	11/02/20	Project:	Lacey urban center PO 18-238
Date Collected:	10/29/20	Lab ID:	011016-03
Date Analyzed:	11/06/20	Data File:	100214.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	95	70	130

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<0.26	<0.1
Chloroethane	<2.6	<1
1,1-Dichloroethene	<0.4	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1
1,1-Dichloroethane	<0.4	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1
1,2-Dichloroethane (EDC)	0.073	0.018
1,1,1-Trichloroethane	<0.55	<0.1
Trichloroethene	<0.11	<0.02
1,1,2-Trichloroethane	<0.055	<0.01
Tetrachloroethene	<6.8	<1

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SS-1	Client:	AEG
Date Received:	11/02/20	Project:	Lacey urban center PO 18-238
Date Collected:	10/29/20	Lab ID:	011016-04 1/35
Date Analyzed:	11/04/20	Data File:	110339.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	101	70	130

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<8.9	<3.5
Chloroethane	<92	<35
1,1-Dichloroethene	<14	<3.5
trans-1,2-Dichloroethene	<14	<3.5
1,1-Dichloroethane	<14	<3.5
cis-1,2-Dichloroethene	<14	<3.5
1,2-Dichloroethane (EDC)	<1.4	<0.35
1,1,1-Trichloroethane	<19	<3.5
Trichloroethene	<3.8	<0.7
1,1,2-Trichloroethane	<1.9	<0.35
Tetrachloroethene	1,600	230

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SS-2	Client:	AEG
Date Received:	11/02/20	Project:	Lacey urban center PO 18-238
Date Collected:	10/30/20	Lab ID:	011016-05 1/7
Date Analyzed:	11/04/20	Data File:	110338.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	99	70	130

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<1.8	<0.7
Chloroethane	<18	<7
1,1-Dichloroethene	<2.8	<0.7
trans-1,2-Dichloroethene	<2.8	<0.7
1,1-Dichloroethane	<2.8	<0.7
cis-1,2-Dichloroethene	<2.8	<0.7
1,2-Dichloroethane (EDC)	<0.28	<0.07
1,1,1-Trichloroethane	<3.8	<0.7
Trichloroethene	<0.75	<0.14
1,1,2-Trichloroethane	<0.38	<0.07
Tetrachloroethene	410	60

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	AEG
Date Received:	Not Applicable	Project:	Lacey urban center PO 18-238
Date Collected:	Not Applicable	Lab ID:	00-2664 MB
Date Analyzed:	11/06/20	Data File:	100211.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	101	70	130

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<0.26	<0.1
Chloroethane	<2.6	<1
1,1-Dichloroethene	<0.4	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1
1,1-Dichloroethane	<0.4	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1
1,2-Dichloroethane (EDC)	<0.04	<0.01
1,1,1-Trichloroethane	<0.55	<0.1
Trichloroethene	<0.11	<0.02
1,1,2-Trichloroethane	<0.055	<0.01
Tetrachloroethene	<6.8	<1

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	AEG
Date Received:	Not Applicable	Project:	Lacey urban center PO 18-238
Date Collected:	Not Applicable	Lab ID:	00-2649 MB
Date Analyzed:	11/03/20	Data File:	110327.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	96	70	130

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<0.26	<0.1
Chloroethane	<2.6	<1
1,1-Dichloroethene	<0.4	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1
1,1-Dichloroethane	<0.4	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1
1,2-Dichloroethane (EDC)	<0.04	<0.01
1,1,1-Trichloroethane	<0.55	<0.1
Trichloroethene	<0.11	<0.02
1,1,2-Trichloroethane	<0.055	<0.01
Tetrachloroethene	<6.8	<1

Date of Report: 11/13/20
Date Received: 11/02/20
Project: Lacey urban center PO 18-238, F&BI 011016

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD TO-15

Laboratory Code: 011057-01 1/2.7 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Vinyl chloride	ug/m3	<0.69	<0.69	nm
Chloroethane	ug/m3	<7.1	<7.1	nm
1,1-Dichloroethene	ug/m3	<1.1	<1.1	nm
trans-1,2-Dichloroethene	ug/m3	<1.1	<1.1	nm
1,1-Dichloroethane	ug/m3	<1.1	<1.1	nm
cis-1,2-Dichloroethene	ug/m3	<1.1	<1.1	nm
1,2-Dichloroethane (EDC)	ug/m3	<0.11	<0.11	nm
1,1,1-Trichloroethane	ug/m3	<1.5	<1.5	nm
Trichloroethene	ug/m3	0.30	0.30	0
1,1,2-Trichloroethane	ug/m3	<0.15	<0.15	nm
Tetrachloroethene	ug/m3	21	21	0

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Vinyl chloride	ug/m3	35	96	70-130
Chloroethane	ug/m3	36	95	70-130
1,1-Dichloroethene	ug/m3	54	105	70-130
trans-1,2-Dichloroethene	ug/m3	54	102	70-130
1,1-Dichloroethane	ug/m3	55	100	70-130
cis-1,2-Dichloroethene	ug/m3	54	105	70-130
1,2-Dichloroethane (EDC)	ug/m3	55	100	70-130
1,1,1-Trichloroethane	ug/m3	74	101	70-130
Trichloroethene	ug/m3	73	108	70-130
1,1,2-Trichloroethane	ug/m3	74	110	70-130
Tetrachloroethene	ug/m3	92	109	70-130

Date of Report: 11/13/20
Date Received: 11/02/20
Project: Lacey urban center PO 18-238, F&BI 011016

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF AIR SAMPLES FOR VOLATILES BY METHOD TO-15

Laboratory Code: 011008-02 1/3.7 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 30)
Vinyl chloride	ug/m3	<0.95	<0.95	nm
Chloroethane	ug/m3	<9.8	<9.8	nm
1,1-Dichloroethene	ug/m3	<1.5	<1.5	nm
trans-1,2-Dichloroethene	ug/m3	<1.5	<1.5	nm
1,1-Dichloroethane	ug/m3	<1.5	<1.5	nm
cis-1,2-Dichloroethene	ug/m3	<1.5	<1.5	nm
1,2-Dichloroethane (EDC)	ug/m3	<0.15	<0.15	nm
1,1,1-Trichloroethane	ug/m3	<2	<2	nm
Trichloroethene	ug/m3	<0.4	<0.4	nm
1,1,2-Trichloroethane	ug/m3	<0.2	<0.2	nm
Tetrachloroethene	ug/m3	<25	<25	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Vinyl chloride	ug/m3	35	101	70-130
Chloroethane	ug/m3	36	98	70-130
1,1-Dichloroethene	ug/m3	54	108	70-130
trans-1,2-Dichloroethene	ug/m3	54	102	70-130
1,1-Dichloroethane	ug/m3	55	103	70-130
cis-1,2-Dichloroethene	ug/m3	54	107	70-130
1,2-Dichloroethane (EDC)	ug/m3	55	104	70-130
1,1,1-Trichloroethane	ug/m3	74	103	70-130
Trichloroethene	ug/m3	73	108	70-130
1,1,2-Trichloroethane	ug/m3	74	110	70-130
Tetrachloroethene	ug/m3	92	108	70-130

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

SAMPLE CHAIN OF CUSTODY

011016

ME 11/2/20

Report To Becky Dilba

Company AEG

Address

City, State, ZIP

Phone Email bdilba@aegwa.com

SAMPLERS (signature)

PROJECT NAME & ADDRESS: Lacey Urban Center

PO #: 18-238

NOTES:

INVOICE TO: AEG

Page # of

TURNAROUND TIME
- [x] Standard
- [ ] RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- [x] Default: Clean after 3 days
- [ ] Archive (Fee may apply)

SAMPLE INFORMATION										ANALYSIS REQUESTED						
Sample Name	Lab ID	Canister ID	Flow Cont. ID	Reporting Level: IA=Indoor Air SG=Soil Gas (Circle One)	Date Sampled	Initial Vac. ("Hg)	Field Initial Time	Final Vac. ("Hg)	Field Final Time	TO15 Full Scan	TO15 BTEXN	TO15 cVOCs	APH	Helium	PCE, daughters	Notes
Indoor-1	01	~~18572~~ 20543	n/a	(IA) / SG	10/29/2020	-30	1026	-12	1745 ~~1745~~						X	
Indoor-2	02	18564	n/a	(IA) / SG		-28	1028	-12	1742 ~~1742~~						X	
Ambient-1	03	18572	n/a	(IA) / SG		-30	1030	-12	1747 ~~1747~~						X	
SS-1	04	3387	222	IA / (SG)	10/30/2020	-30	1558	~~1628~~	1609						X	
SS-2	05	3251	240	IA / (SG)	10/30/2020	-30	1600	[illegible]	1629						X	
				IA / SG												
				IA / SG												
				IA / SG												

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Becky Dilba	AEG	10/30/2020	1706
Received by:	Liz Webber-Bruya	F?B	11/2/20	1440
Relinquished by:				
Received by:				

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

FORMS\COC\COCTO-15.DOC

Samples received at 22 °C

Libby Environmental, Inc.
3322 South Bay Road NE • Olympia, WA 98506-2957

October 19, 2020

Scott Rose
Associated Environmental Group, LLC
2633 Parkmont Lane SW, Suite A
Olympia, WA 98502

Dear Mr. Rose:

Please find enclosed the analytical data report for the Lacey Urban Center Project located in Olympia, Washington.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. The sample(s) will be disposed of in 30 days unless we are contacted to arrange long term storage.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Sherry L. Chilcutt
Senior Chemist
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@gmail.com

Libby Environmental, Inc.

3322 South Bay Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@gmail.com

LACEY URBAN CENTER PROJECT
AEG, LLC
Lacey, Washington
Libby Project # L201016-8
Client Project # 18-236

Volatile Organic Compounds by EPA Method 8260D in Water

Sample Description		Method Blank	MW-1	MW-2	MW-3	MW-3 Dup
Date Sampled		N/A	10/16/2020	10/16/2020	10/16/2020	10/16/2020
Date Analyzed	PQL (µg/L)	10/17/2020 (µg/L)	10/17/2020 (µg/L)	10/17/2020 (µg/L)	10/17/2020 (µg/L)	10/17/2020 (µg/L)
Vinyl Chloride (VC)	0.2	nd	nd	nd	nd	nd
1,1-Dichloroethene	0.5	nd	nd	nd	nd	nd
trans-1,2-Dichloroethene	1.0	nd	nd	nd	nd	nd
cis -1,2-Dichloroethene	1.0	nd	nd	nd	nd	nd
Trichloroethene (TCE)	0.4	nd	nd	nd	nd	nd
Tetrachloroethene (PCE)	1.0	nd	0.7 J	0.6 J	nd	nd
Surrogate Recovery						
Dibromofluoromethane		100	100	101	101	101
1,2-Dichloroethane-d4		90	89	89	90	90
Toluene-d8		94	94	96	95	95
4-Bromofluorobenzene		93	93	92	110	94

"nd" Indicates not detected at listed detection limit.
“J” Result is less than the PQL but greater than the MDL. Reported value is approximate.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE : 65% TO 135%

ANALYSES PERFORMED BY: Sherry Chilcutt

Libby Environmental, Inc.

3322 South Bay Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@gmail.com

LACEY URBAN CENTER PROJECT
AEG, LLC
Lacey, Washington
Libby Project # L201016-8
Client Project # 18-236

QA/QC for Volatile Organic Compounds by EPA Method 8260D in Water

Matrix Spike Sample Identification: L201013-7

	Spiked Conc. (µg/L)	MS Response (µg/L)	MSD Response (µg/L)	MS Recovery (%)	MSD Recovery (%)	RPD (%)	Limits Recovery (%)	Data Flag
Vinyl Chloride (VC)	5.0	6.0	5.1	120	102	16.2	65-135	
1,1-Dichloroethene	5.0	9.0	6.7	180	134	29.3	65-135	S
trans-1,2-Dichloroethene	5.0	8.0	6.4	160	128	22.2	65-135	S
cis -1,2-Dichloroethene	5.0	6.4	5.0	128	100	24.6	65-135	
Trichloroethene (TCE)	5.0	5.6	4.2	112	84	28.6	65-135	
Tetrachloroethene (PCE)	5.0	5.8	4.5	116	90	25.2	65-135	

Surrogate Recovery (%)	MS	MSD	
Dibromofluoromethane	102	100	65-135
1,2-Dichloroethane-d4	89	90	65-135
Toluene-d8	98	98	65-135
4-Bromofluorobenzene	97	97	65-135

ACCEPTABLE RPD IS 35%

"S" Spike compound recovery is outside acceptance limits.

ANALYSES PERFORMED BY: Sherry Chilcutt

Libby Environmental, Inc.

3322 South Bay Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@gmail.com

LACEY URBAN CENTER PROJECT
AEG, LLC
Lacey, Washington
Libby Project # L201016-8
Client Project # 18-236

Laboratory Control Sample

	Spiked Conc. (µg/L)	LCS Response (µg/L)	LCS Recovery (%)	LCS Recovery Limits (%)	Data Flag
Vinyl Chloride (VC)	5.0	4.6	92	80-120	
1,1-Dichloroethene	5.0	6.0	120	80-120	
trans-1,2-Dichloroethene	5.0	5.6	112	80-120	
cis -1,2-Dichloroethene	5.0	5.3	106	80-120	
Trichloroethene (TCE)	5.0	4.4	88	80-120	
Tetrachloroethene (PCE)	5.0	5.8	116	80-120	
Surrogate Recovery					
Dibromofluoromethane			97	65-135	
1,2-Dichloroethane-d4			86	65-135	
Toluene-d8			96	65-135	
4-Bromofluorobenzene			97	65-135	

ANALYSES PERFORMED BY: Sherry Chilcutt

Libby Environmental, Inc.

3322 South Bay Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@gmail.com

LACEY URBAN CENTER PROJECT
AEG, LLC
Libby Project # L201016-8
Date Received 10/16/2020
Time Received 11:45 AM

Received By PB

Sample Receipt Checklist

Chain of Custody

1. Is the Chain of Custody complete?	☑ Yes	☐ No	
2. How was the sample delivered?	☑ Hand Delivered	☐ Picked Up	☐ Shipped

Log In

3. Cooler or Shipping Container is present.	☑ Yes	☐ No	☐ N/A
4. Cooler or Shipping Container is in good condition.	☑ Yes	☐ No	☐ N/A
5. Cooler or Shipping Container has Custody Seals present.	☐ Yes	☑ No	☐ N/A
6. Was an attempt made to cool the samples?	☑ Yes	☐ No	☐ N/A
7. Temperature of cooler (0°C to 8°C recommended)	0.0 °C		
8. Temperature of sample(s) (0°C to 8°C recommended)	1.9 °C		
9. Did all containers arrive in good condition (unbroken)?	☑ Yes	☐ No	
10. Is it clear what analyses were requested?	☑ Yes	☐ No	
11. Did container labels match Chain of Custody?	☑ Yes	☐ No	
12. Are matrices correctly identified on Chain of Custody?	☑ Yes	☐ No	
13. Are correct containers used for the analysis indicated?	☑ Yes	☐ No	
14. Is there sufficient sample volume for indicated analysis?	☑ Yes	☐ No	
15. Were all containers properly preserved per each analysis?	☑ Yes	☐ No	
16. Were VOA vials collected correctly (no headspace)?	☑ Yes	☐ No	☐ N/A
17. Were all holding times able to be met?	☑ Yes	☐ No	

Discrepancies/ Notes

18. Was client notified of all discrepancies? ☐ Yes ☐ No ☑ N/A

Person Notified: _____ Date: _____

By Whom: _____ Via: _____

Regarding: _____

19. Comments. _____

Libby Environmental, Inc.

Chain of Custody Record

www.LibbyEnvironmental.com

4139 Libby Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Date: 10/16/20 Page: 1 of 1

Client: AEG

Project Manager: Scott Rose

Address: ~~7239 Martin Way East~~ 605 11th Ave SE Suite 201

Project Name: Lacey Urban Center

City: Olympia State: WA Zip: 98501

Location: 7239 Martin Way E City, State: Olympia WA

Phone: (360) 352-9835 Fax:

Collector: Foster Koetzel Date of Collection: 10/16/20

Client Project # R-236

Email: SRose@AEGWA.com

	Sample Number	Depth	Time	Sample Type	Container Type	VOA 8021B	VOA 8021B BTEX Only	VOA 8260	SEMI VOL 8270	NWTPH-HCID	NWTPH-Gx	NWTPH-Dx	NWTPH-Dx Ext.	PAH 8270	PCB's 8082	MTCA 5 Metals	PCE & Daughter Products			Field Notes
1	MW-1		0943	GW	3-VOA											X				
2	MW-2		1021	GW	3-VOA											X				
3	MW-3		0906	GW	3-VOA											X				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				

Relinquished by:	Date / Time	Received by:	Date / Time
	10/16/20		10/16/20 1145
	10/16/20 1230		10/16/20 1230
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt:

Good Condition?	
Cold?	
Seals Intact?	
Total Number of Containers	

Remarks:

1.9 sample
U.O cool

TAT: 24HR 48HR (5-DAY)

LEGAL ACTION CLAUSE: *In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.*

Distribution: White - Lab, Yellow - File, Pink - Originator

Libby Environmental, Inc.
3322 South Bay Road NE • Olympia, WA 98506-2957

January 11, 2021

Scott Rose
Associated Environmental Group, LLC
2633 Parkmont Lane SW, Suite A
Olympia, WA 98502

Dear Mr. Rose:

Please find enclosed the analytical data report for the Lacey Urban Center Project located in Olympia, Washington.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. The sample(s) will be disposed of in 30 days unless we are contacted to arrange long term storage.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Sherry L. Chilcutt
Senior Chemist
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@gmail.com

Libby Environmental, Inc.

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Olympia, WA 98506
Phone: (360) 352-2110
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Email: libbyenv@gmail.com

LACEY URBAN CENTER PROJECT
AEG, LLC
Olympia, Washington
Libby Project # L210107-5
Client Project # 18-236

Volatile Organic Compounds by EPA Method 8260D in Water

Sample Description		Method Blank	MW-1	MW-1 Dup	MW-2	MW-3	MW-4
Date Sampled		N/A	1/7/2021	1/7/2021	1/7/2021	1/7/2021	1/7/2021
Date Analyzed	PQL (µg/L)	1/8/2021 (µg/L)	1/8/2021 (µg/L)	1/8/2021 (µg/L)	1/8/2021 (µg/L)	1/8/2021 (µg/L)	1/8/2021 (µg/L)
Vinyl Chloride (VC)	0.2	nd	nd	nd	nd	nd	nd
1,1-Dichloroethene	0.5	nd	nd	nd	nd	nd	nd
trans-1,2-Dichloroethene	1.0	nd	nd	nd	nd	nd	nd
cis -1,2-Dichloroethene	1.0	nd	nd	nd	nd	nd	nd
Trichloroethene (TCE)	0.4	nd	nd	nd	nd	nd	nd
Tetrachloroethene (PCE)	1.0	nd	nd	nd	nd	nd	nd
Surrogate Recovery							
Dibromofluoromethane		102	105	107	109	115	110
1,2-Dichloroethane-d4		104	101	107	118	106	102
Toluene-d8		96	91	96	95	101	99
4-Bromofluorobenzene		92	88	81	81	89	88

"nd" Indicates not detected at listed detection limit.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE : 65% TO 135%

ANALYSES PERFORMED BY: Melissa Harrington

Libby Environmental, Inc.

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Olympia, WA 98506
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Email: libbyenv@gmail.com

LACEY URBAN CENTER PROJECT
AEG, LLC
Olympia, Washington
Libby Project # L210107-5
Client Project # 18-236

Volatile Organic Compounds by EPA Method 8260D in Water

Sample Description		MW-5
Date Sampled		1/7/2021
Date Analyzed	PQL (µg/L)	1/8/2021 (µg/L)
Vinyl Chloride (VC)	0.2	nd
1,1-Dichloroethene	0.5	nd
trans-1,2-Dichloroethene	1.0	nd
cis -1,2-Dichloroethene	1.0	nd
Trichloroethene (TCE)	0.4	nd
Tetrachloroethene (PCE)	1.0	nd
Surrogate Recovery		
Dibromofluoromethane		112
1,2-Dichloroethane-d4		104
Toluene-d8		98
4-Bromofluorobenzene		86

"nd" Indicates not detected at listed detection limit.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE : 65% TO 135%

ANALYSES PERFORMED BY: Melissa Harrington

Libby Environmental, Inc.

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LACEY URBAN CENTER PROJECT
AEG, LLC
Olympia, Washington
Libby Project # L210107-5
Client Project # 18-236

QA/QC for Volatile Organic Compounds by EPA Method 8260D in Water

Matrix Spike Sample Identification: MW-1

Date Analyzed: 1/8/2021

	Spiked Conc. (µg/L)	MS Response (µg/L)	MSD Response (µg/L)	MS Recovery (%)	MSD Recovery (%)	RPD (%)	Limits Recovery (%)	Data Flag
Vinyl Chloride (VC)	4.0	3.4	3.4	85	85	0.0	65-135	
1,1-Dichloroethene	4.0	4.2	4.5	105	113	6.9	65-135	
trans-1,2-Dichloroethene	4.0	4.4	4.2	110	105	4.7	65-135	
cis -1,2-Dichloroethene	4.0	4.1	4.5	103	113	9.3	65-135	
Trichloroethene (TCE)	4.0	3.5	4.3	88	108	20.5	65-135	
Tetrachloroethene (PCE)	4.0	4.6	5.0	115	125	8.3	65-135	

Surrogate Recovery (%)	MS	MSD	
Dibromofluoromethane	110	112	65-135
1,2-Dichloroethane-d4	103	104	65-135
Toluene-d8	99	99	65-135
4-Bromofluorobenzene	94	91	65-135

ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Melissa Harrington

Laboratory Control Sample

Date Analyzed: 1/8/2021

	Spiked Conc. (µg/L)	LCS Response (µg/L)	LCS Recovery (%)	LCS Recovery Limits (%)	Data Flag
Vinyl Chloride (VC)	4.0	3.4	85	80-120	
1,1-Dichloroethene	4.0	4.4	110	80-120	
trans-1,2-Dichloroethene	4.0	4.3	108	80-120	
cis -1,2-Dichloroethene	4.0	4.2	105	80-120	
Trichloroethene (TCE)	4.0	3.9	98	80-120	
Tetrachloroethene (PCE)	4.0	4.8	120	80-120	

Surrogate Recovery			
Dibromofluoromethane	104	65-135	
1,2-Dichloroethane-d4	96	65-135	
Toluene-d8	95	65-135	
4-Bromofluorobenzene	92	65-135	

ANALYSES PERFORMED BY: Melissa Harrington

Libby Environmental, Inc.

3322 South Bay Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@gmail.com

LACEY URBAN CENTER PROJECT
AEG, LLC
Libby Project # L210107-5
Date Received 1/7/2021 14:55

Received By KD

Sample Receipt Checklist

Chain of Custody

1. Is the Chain of Custody complete?	☑ Yes	☐ No	
2. How was the sample delivered?	☑ Hand Delivered	☐ Picked Up	☐ Shipped

Log In

3. Cooler or Shipping Container is present.	☑ Yes	☐ No	☐ N/A
4. Cooler or Shipping Container is in good condition.	☑ Yes	☐ No	☐ N/A
5. Cooler or Shipping Container has Custody Seals present.	☐ Yes	☑ No	☐ N/A
6. Was an attempt made to cool the samples?	☑ Yes	☐ No	☐ N/A
7. Temperature of cooler (0°C to 8°C recommended)	-3.0 °C		
8. Temperature of sample(s) (0°C to 8°C recommended)	3.1 °C		
9. Did all containers arrive in good condition (unbroken)?	☑ Yes	☐ No	
10. Is it clear what analyses were requested?	☑ Yes	☐ No	
11. Did container labels match Chain of Custody?	☑ Yes	☐ No	
12. Are matrices correctly identified on Chain of Custody?	☑ Yes	☐ No	
13. Are correct containers used for the analysis indicated?	☑ Yes	☐ No	
14. Is there sufficient sample volume for indicated analysis?	☑ Yes	☐ No	
15. Were all containers properly preserved per each analysis?	☑ Yes	☐ No	
16. Were VOA vials collected correctly (no headspace)?	☑ Yes	☐ No	☐ N/A
17. Were all holding times able to be met?	☑ Yes	☐ No	

Discrepancies/ Notes

18. Was client notified of all discrepancies? ☐ Yes ☐ No ☑ N/A

Person Notified: _____ Date: _____

By Whom: _____ Via: _____

Regarding: _____

19. Comments. _____

Libby Environmental, Inc.

Chain of Custody Record

www.LibbyEnvironmental.com

3322 South Bay Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Date: 1/7/21 Page: 1 of 1

Client: AEG
Project Manager: Scott Rose
Address: 605 11th Ave SE Suite 201
Project Name: Lacey urban center
City: Olympia State: WA Zip: 98501
Location: 7239 Martin Way E City, State: Olympia WA
Phone: (360) 352 9835 Fax:
Collector: Andrew Lucas Date of Collection: 1/7/21
Client Project # 18-236
Email: SRose@AEGWA.com

	Sample Number	Depth	Time	Sample Type	Container Type	VOC 8260	PCE & Daughter Prod.	NWTPH-Gx	BTEX (8260) / (8021)	NWTPH-HCID	NWTPH-Dx / Dx	PCB 8082	MTCA 5 Metals	RCRA 8 Metals	c PAH 8270	PAH 8270	Semi Vol 8270			Field Notes
1	MW-1		1217	GW	VOA	X														
2	MW-2		1423	GW	VOA	X														
3	MW-3		1149	GW	VOA	X														
4	MW-4		1255	GW	VOA	X														
5	MW-5		1339	GW	VOA	X														
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	1/7/21 1450	[signature]	1/7/21 1455
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt

Good Condition?	Y	N
Cooler Temp.		°C
Sample Temp.		°C
Total Number of Containers		

Remarks:

TAT: 24HR 48HR (5-DAY)

LEGAL ACTION CLAUSE: *In the event of default of payment and/or failure to pay, Client agrees to pay the costs of collection including court costs and reasonable attorney fees to be determined by a court of law.*

Distribution: White - Lab, Yellow - ~~Originator~~

Voluntary Cleanup Program

Washington State Department of Ecology
Toxics Cleanup Program

TERRESTRIAL ECOLOGICAL EVALUATION FORM

Under the Model Toxics Control Act (MTCA), a terrestrial ecological evaluation is necessary if hazardous substances are released into the soils at a Site. In the event of such a release, you must take one of the following three actions as part of your investigation and cleanup of the Site:

1. Document an exclusion from further evaluation using the criteria in WAC 173-340-7491.
2. Conduct a simplified evaluation as set forth in WAC 173-340-7492.
3. Conduct a site-specific evaluation as set forth in WAC 173-340-7493.

When requesting a written opinion under the Voluntary Cleanup Program (VCP), you must complete this form and submit it to the Department of Ecology (Ecology). The form documents the type and results of your evaluation.

Completion of this form is not sufficient to document your evaluation. You still need to document your analysis and the basis for your conclusion in your cleanup plan or report.

If you have questions about how to conduct a terrestrial ecological evaluation, please contact the Ecology site manager assigned to your Site. For additional guidance, please refer to www.ecy.wa.gov/programs/tcp/policies/terrestrial/TEEHome.htm.

Step 1: IDENTIFY HAZARDOUS WASTE SITE	
Please identify below the hazardous waste site for which you are documenting an evaluation.	
Facility/Site Name: Lacey Urban Center	
Facility/Site Address: 7131 - 7269 Martin Way East, Olympia, WA 98516	
Facility/Site No:	VCP Project No.:

Step 2: IDENTIFY EVALUATOR		
Please identify below the person who conducted the evaluation and their contact information.		
Name: Charles Swift		Title: Project Manager
Organization: Associated Environmental Group		
Mailing address: 2633 Parkmont Lane SW, Suite A		
City: Olympia	State: WA	Zip code: 98502
Phone: 360-352-9835	Fax: 360-352-8164	E-mail: cswift@aegwa.com

Step 3: DOCUMENT EVALUATION TYPE AND RESULTS

A. Exclusion from further evaluation.

1. Does the Site qualify for an exclusion from further evaluation?

☒ Yes *If you answered **"YES,"** then answer **Question 2**.*

☐ No or Unknown *If you answered **"NO" or "UKNOWN,"** then skip to **Step 3B** of this form.*

2. What is the basis for the exclusion? *Check all that apply. Then skip to **Step 4** of this form.*

Point of Compliance: WAC 173-340-7491(1)(a)

☐ All soil contamination is, or will be,* at least 15 feet below the surface.

☐ All soil contamination is, or will be,* at least 6 feet below the surface (or alternative depth if approved by Ecology), and institutional controls are used to manage remaining contamination.

Barriers to Exposure: WAC 173-340-7491(1)(b)

☒ All contaminated soil, is or will be,* covered by physical barriers (such as buildings or paved roads) that prevent exposure to plants and wildlife, and institutional controls are used to manage remaining contamination.

Undeveloped Land: WAC 173-340-7491(1)(c)

☐ There is less than 0.25 acres of contiguous[#] undeveloped[±] land on or within 500 feet of any area of the Site and any of the following chemicals is present: chlorinated dioxins or furans, PCB mixtures, DDT, DDE, DDD, aldrin, chlordane, dieldrin, endosulfan, endrin, heptachlor, heptachlor epoxide, benzene hexachloride, toxaphene, hexachlorobenzene, pentachlorophenol, or pentachlorobenzene.

☒ For sites not containing any of the chemicals mentioned above, there is less than 1.5 acres of contiguous[#] undeveloped[±] land on or within 500 feet of any area of the Site.

Background Concentrations: WAC 173-340-7491(1)(d)

☐ Concentrations of hazardous substances in soil do not exceed natural background levels as described in WAC 173-340-200 and 173-340-709.

* An exclusion based on future land use must have a completion date for future development that is acceptable to Ecology.

[±] "Undeveloped land" is land that is not covered by building, roads, paved areas, or other barriers that would prevent wildlife from feeding on plants, earthworms, insects, or other food in or on the soil.

[#] "Contiguous" undeveloped land is an area of undeveloped land that is not divided into smaller areas of highways, extensive paving, or similar structures that are likely to reduce the potential use of the overall area by wildlife.

B. Simplified evaluation.

1. Does the Site qualify for a simplified evaluation?

☐ Yes *If you answered **"YES,"** then answer **Question 2** below.*

☐ No or Unknown *If you answered **"NO"** or **"UNKNOWN,"** then skip to **Step 3C** of this form.*

2. Did you conduct a simplified evaluation?

☐ Yes *If you answered **"YES,"** then answer **Question 3** below.*

☐ No *If you answered **"NO,"** then skip to **Step 3C** of this form.*

3. Was further evaluation necessary?

☐ Yes *If you answered **"YES,"** then answer **Question 4** below.*

☐ No *If you answered **"NO,"** then answer **Question 5** below.*

4. If further evaluation was necessary, what did you do?

☐ Used the concentrations listed in Table 749-2 as cleanup levels. *If so, then skip to **Step 4** of this form.*

☐ Conducted a site-specific evaluation. *If so, then skip to **Step 3C** of this form.*

5. If no further evaluation was necessary, what was the reason? *Check all that apply. Then skip to **Step 4** of this form.*

Exposure Analysis: WAC 173-340-7492(2)(a)

☐ Area of soil contamination at the Site is not more than 350 square feet.

☐ Current or planned land use makes wildlife exposure unlikely. Used Table 749-1.

Pathway Analysis: WAC 173-340-7492(2)(b)

☐ No potential exposure pathways from soil contamination to ecological receptors.

Contaminant Analysis: WAC 173-340-7492(2)(c)

☐ No contaminant listed in Table 749-2 is, or will be, present in the upper 15 feet at concentrations that exceed the values listed in Table 749-2.

☐ No contaminant listed in Table 749-2 is, or will be, present in the upper 6 feet (or alternative depth if approved by Ecology) at concentrations that exceed the values listed in Table 749-2, and institutional controls are used to manage remaining contamination.

☐ No contaminant listed in Table 749-2 is, or will be, present in the upper 15 feet at concentrations likely to be toxic or have the potential to bioaccumulate as determined using Ecology-approved bioassays.

☐ No contaminant listed in Table 749-2 is, or will be, present in the upper 6 feet (or alternative depth if approved by Ecology) at concentrations likely to be toxic or have the potential to bioaccumulate as determined using Ecology-approved bioassays, and institutional controls are used to manage remaining contamination.

C. Site-specific evaluation. A site-specific evaluation process consists of two parts: (1) formulating the problem, and (2) selecting the methods for addressing the identified problem. Both steps require consultation with and approval by Ecology. *See* WAC 173-340-7493(1)(c).

1. Was there a problem? *See* WAC 173-340-7493(2).

☐ Yes *If you answered **"YES,"** then answer **Question 2** below.*

☐ No *If you answered **"NO,"** then identify the reason here and then skip to **Question 5** below:*

- ☐ No issues were identified during the problem formulation step.
- ☐ While issues were identified, those issues were addressed by the cleanup actions for protecting human health.

2. What did you do to resolve the problem? *See* WAC 173-340-7493(3).

- ☐ Used the concentrations listed in Table 749-3 as cleanup levels. *If so, then skip to **Question 5** below.*
- ☐ Used one or more of the methods listed in WAC 173-340-7493(3) to evaluate and address the identified problem. *If so, then answer **Questions 3 and 4** below.*

3. If you conducted further site-specific evaluations, what methods did you use?
Check all that apply. See WAC 173-340-7493(3).

- ☐ Literature surveys.
- ☐ Soil bioassays.
- ☐ Wildlife exposure model.
- ☐ Biomarkers.
- ☐ Site-specific field studies.
- ☐ Weight of evidence.
- ☐ Other methods approved by Ecology. If so, please specify:

4. What was the result of those evaluations?

- ☐ Confirmed there was no problem.
- ☐ Confirmed there was a problem and established site-specific cleanup levels.

5. Have you already obtained Ecology's approval of both your problem formulation and problem resolution steps?

☐ Yes If so, please identify the Ecology staff who approved those steps:

☐ No

Step 4: SUBMITTAL

Please mail your completed form to the Ecology site manager assigned to your Site. If a site manager has not yet been assigned, please mail your completed form to the Ecology regional office for the County in which your Site is located.

Northwest Region: Attn: VCP Coordinator 3190 160th Ave. SE Bellevue, WA 98008-5452	**Central Region:** Attn: VCP Coordinator 15 W. Yakima Ave., Suite 200 Yakima, WA 98902
Southwest Region: Attn: VCP Coordinator P.O. Box 47775 Olympia, WA 98504-7775	**Eastern Region:** Attn: VCP Coordinator N. 4601 Monroe Spokane WA 99205-1295

If you need this publication in an alternate format, please call the Toxics Cleanup Program at 360-407-7170. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.