Remedial Investigation Addendum

Alderwood Laundry and Dry Cleaner
3815 196th Street SW
Lynnwood, Washington
VCP NW3066

for
Lynnwood Public Facilities District

September 27, 2019

GeoEngineers
Earth Science + Technology

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GeoEngineers

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File No. 17787-001-11

September 27, 2019

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1.0 INTRODUCTION AND BACKGROUND

This report presents supplemental site characterization data collected in July 2018 and between March and May 2019 for the Alderwood Laundry and Dry Cleaner (ALDC) ("Site") (Figure 1). The ALDC was historically located at 3815 196th Street SW, in the southwest corner of the Lynnwood Public Facilities District (PFD) Property (Figure 2) in Lynnwood, Washington. Dry cleaner-related contamination in soil and groundwater has been encountered in the southwestern portion of the PFD property and the eastern portion of the west-adjacent Washington Energy Services (WES) Property (3909 196th Street Southwest).

The PFD is conducting an independent cleanup of the Site in accordance with the requirements of the Model Toxics Control Act (MTCA). The Site is enrolled in the Washington State Department of Ecology's (Ecology) Voluntary Cleanup Program (VCP), VCP NW3066. The "Remedial Investigation (RI) Report" prepared by GeoEngineers for the Site is dated February 12, 2018. Ecology reviewed the RI Report and issued an Opinion Letter dated June 4, 2018 (Appendix A). Based on Ecology's June 2018 comments, GeoEngineers prepared a "Soil Vapor Intrusion Evaluation Work Plan" dated November 13, 2018 to evaluate the west adjacent WES building, a part of which overlies contamination associated with the ALDC. Ecology reviewed the Work Plan and issued an Opinion Letter dated January 30, 2019 (Appendix A). The WES Building Soil Vapor Intrusion Evaluation is included in Appendix B.

The data gaps presented by Ecology in their two above referenced Opinion Letters are summarized below:

- Evaluate the presence/absence of perched water adjacent to the PFD Property where past drilling methods and sampling program may have missed the perched water.
- Recommend a Tier II vapor assessment of the WES Building including sub-slab soil gas sampling and indoor air sampling, due to elevated soil gas sample results, potential perched water, and elevated detections of PCE in adjacent groundwater.
- Delineate the vertical extent of groundwater contamination.

The objectives of the supplemental site characterization included filling the remaining data gaps identified by Ecology in the above referenced Opinion Letters (dated June 4, 2018 and January 30, 2019), further refining the Conceptual Site Model (CSM), and supporting development of the FS which will be completed to evaluate remedial alternatives and select a final preferred remedy. Supplemental site characterization findings presented in this report include the following:

- Chemical analytical results from shallow surface/near surface soil sampling in the southwest corner of the PFD Property following removal of the Vet building in July 2018. Documentation related to Vet building concrete sampling conducted in associated with the Vet building demolition, and associated disposal of concrete demolition debris, is included in Appendix C of this report.
- As requested by Ecology in the June 2018 Opinion Letter, the supplemental characterization further evaluated the vertical extent of contamination at the Site, the extent of perched groundwater, and the relationship between perched water/deep groundwater (the "shallow aquifer"); specifically, the westward extent of PCE-impacted groundwater (perched and shallow aquifer) on the WES Property.
- Chemical analytical results for groundwater and unsaturated zone and saturated zone soil samples collected from two new monitoring well borings completed on WES Property near the shared PFD/WES property line. One of the borings (MW-16) was completed near a shallow underground electrical utility

line; this line is the only underground utility known to extend between the PFD Property and the WES Property.

- Sub-slab soil gas sampling and indoor air sampling results at the WES Building (discussed in detail in Appendix B)

2.0 SCOPE OF SERVICES

The scope of services completed by GeoEngineers consisted of the following:

1. Obtained eight surface soil samples following removal of the PFD Property Vet building. The soil samples were obtained after removal of the Vet building's north retaining wall and concrete slab-on-grade floors. The samples were screened in the field for evidence of volatiles using visual, water sheen and headspace vapor screening methods. Soil samples were submitted for chemical analysis of select halogenated volatile organic compounds (HVOCs) by U.S. Environmental Protection Agency (EPA) Method 8260C. Based on the presence of perchloroethene (PCE) in select soils in contact with portions of the building's concrete, concrete demolition debris was also sampled and subsequently disposed of under a contained in determination (CID) from Ecology (Appendix C).
2. Monitored the completion of two borings (MW-16 and MW-17) on the west-adjacent WES Property using hollow-stem auger (HSA) drilling equipment to a total depth of 50 feet below ground surface (bgs). The upper portion (5 feet bgs) of each borehole was pre-cleared using a vacuum truck to avoid potential damage to underground utilities. The explorations were completed by a licensed drilling company under subcontract to GeoEngineers.
3. If perched groundwater was encountered in the borings, a grab perched water sample was collected for laboratory analysis. Two-inch-diameter monitoring wells were installed in each boring, with 0.01-inch slot width polyvinyl chloride (PVC) well screen in the shallow aquifer extending from 30 to 50 feet bgs. Silica sand was placed in the borehole annulus surrounding the well screen and a bentonite and concrete seal was placed above the sand. The well was fitted with a locking cap within a flush-grade well monument and bolted steel monument lid. The monitoring wells were developed using a combination of surging and purging.
4. Obtained soil samples at approximately 5-foot depth intervals from the explorations for field screening and possible chemical analytical testing. Visually classified the samples in general accordance with ASTM International (ASTM) Standard Practices Test Method D 2488 and maintained a detailed log of each exploration. Submitted soil samples and grab perched water samples (where encountered) from each boring for chemical analyses of select halogenated volatile organic compounds (HVOCs) by U.S. Environmental Protection Agency (EPA) Method 8260C.
5. Measured depths to groundwater in the new wells.
6. Obtained groundwater samples from new monitoring wells MW-16 and MW-17 using low-flow sampling methods. Submitted the water samples for chemical analysis of select HVOCs by EPA Method 8260C.
7. Evaluated soil and groundwater chemical analytical results relative to cleanup levels for the Site. Interpreted the field and chemical analytical data relative to the study objectives.

3.0 SITE SURFACE CONDITIONS

The PFD Property and the WES Property are both developed with buildings, pavement and related utility infrastructure to support their commercial uses. Details regarding site historical uses and underground utilities for these properties are explained in the RI Report[1]. Figure 2 shows the approximate layout of underground utilities in the southwestern portions of the PFD Property and eastern margin of the WES Property.

Ground surface elevations at the WES Property are generally higher than the PFD Property, ranging from only a couple of feet higher at the south end, to approximately 8 feet higher at the northern margins of the properties. At the shared property line where there is a grade change, the ground surface is sloped down from the WES Property to the PFD Property at the southern end, and transitions to a rockery or wood retaining wall in the middle and at the north end. Both properties slope gently downward to the south toward 196th Street Southwest, as illustrated in the cross sections shown in Figures 3 through 6.

The two-story Vet building structure on the PFD Property was demolished in June/July 2018. The Vet building had been vacant for some time. Following demolition, the former building area was regraded and paved for driveway access and parking uses. Final grading of the former Vet building area slopes downward from the north, which is at approximately Elevation 435 Feet, to the south at 196th Street Southwest, which is at approximately Elevation 428.5 Feet (Figure 3).

4.0 VET BUILDING DEMO SOIL SAMPLING JULY 2018

The Vet building had a concrete slab-on-grade basement with an approximately 5-foot-high concrete retaining wall at the building's northwest corner and north end. Vet building concrete (retaining wall or slab) that was in contact with soil that had been identified during prior studies to have detectable PCE was isolated from other demolition debris, temporarily stockpiled and sampled for waste profiling purposes. Based on concrete sample analytical data, the concrete that had been in direct contact with soil with detectable PCE was approved for disposal under a CID from Ecology. The CID and the concrete sample analytical data are included in Appendix C. Waste disposal documentation was provided to Ecology in accordance with the CID.

Following removal of the concrete slab and retaining walls, three soil samples were collected from the excavation sidewalls at the north end (SSW-1, SSW-2 and SSW-3) and five soil samples were obtained from the excavation base at the northwest corner and northern end of the building (SS-4, SS-5, SS-6, SS-7 and SS-8) at locations that were beneath the floor slab of the vet building. The approximate soil sample locations are indicated in Figure 2. Chemical analytical data for the samples are summarized in Table 1 and analytical laboratory reports are included in Appendix E. The post-demo soil samples were obtained from a few inches beneath the post-demo ground surface; approximate depths shown in Table 1 are in relation to current

[1] One correction regarding underground utilities at the Site was made to the figures of this Report. A deep abandoned sewer line erroneously shown in the RI Report figures west of the PFD buildings, was removed from the figures in this RI Report Addendum following confirmation with the City of Lynnwood and PFD Property files that no documentation confirms its existence.

parking lot surface grades. Figure 3 shows the orientation of the Vet building and retaining wall in relation to the former dry cleaner in the strip mall building to the north, and 196th Street SW to the south.

PCE was detected in the eight soil samples collected during the July 2018 Vet building demolition. PCE concentrations in samples SSW-1, SSW-2, SSW-3, SS-4 and SS-5 were greater than the MTCA Method A cleanup level of 0.05 milligrams per kilogram (mg/kg) (detected concentrations in these samples ranged from 0.0594 to 0.4000 mg/kg). Detected PCE concentrations in the remaining samples (SS-6, SS-7 and SS-8 were less than the MTCA Method A cleanup level. TCE was detected in two samples and cis-1,2-DCE was detected in one sample; the detected concentrations were less than the MTCA cleanup levels. Vinyl chloride was not detected in the samples submitted for analysis.

Soil represented by these samples was left-in-place and covered by imported soil, grading fill and pavement per the Vet building demolition restoration plans and is now at approximately 2.5 to 5 feet below current surface grades.

5.0 SUPPLEMENTAL INVESTIGATION WES PROPERTY MARCH TO MAY 2019

Supplemental investigation on the WES Property included indoor air, outdoor air and sub-slab soil vapor sampling in March 2019 as part of the WES Building soil vapor intrusion evaluation, along with two soil borings and groundwater monitoring wells that were completed in May 2019. Results are presented in Sections 5.1 through 5.6. The WES Building Soil Vapor Intrusion Evaluation which includes sub-slab, indoor air and outdoor air sampling on the WES Property is presented in Appendix B.

5.1. Soil Vapor Sampling

Ten sub-slab soil vapor samples were obtained in March 2019 beneath the WES building concrete slab-on-grade floor. The sub-slab soil vapor samples were obtained in connection with the indoor air vapor intrusion study for the WES building (Appendix B). Soil vapor sample locations and results for soil vapor sample SG-1 obtained in 2016 on the WES Property, and sub-slab soil vapor samples SSV-8, SSV-9 and SSV-10 on the WES Property are noted on Figure 2. Soil vapor data at these locations are relevant to the nature and extent of dry cleaner-related contamination and the interpretation of the CSM presented in Section 6.0.

5.2. Monitoring Wells

MW-16 and MW-17 were completed on May 4, 2019, using hollow-stem auger drilling technology. The upper 5 feet at MW-16 and MW-17 were pre-cleared on May 3, 2019 using pneumatic vacuum extraction (air-knife) to clear the boreholes for underground utilities prior to drilling. The approximate locations of the monitoring wells are shown in Figure 2. The exploration locations were selected based on the delineation objectives of the study, the results of prior studies and the locations of shallow underground utilities. MW-16 and MW-17 were both completed on WES Property, directly west of the PFD/WES property line. MW-16 was located in close proximity to a subsurface electrical line that extends between the PFD and WES Properties. MW-17 was located on the WES Property directly downgradient from the former dry cleaner location and adjacent to prior explorations with elevated detections of PCE in soil and groundwater (perched and the shallow aquifer). Surface elevations on the WES Property where the borings were completed are approximately 5 to 8 feet higher in elevation than the paved ground surface directly to the east on the PFD Property.

Based on depths to groundwater measured in MW-7 and MW-8 (Table 2) on the WES Property, groundwater depths on the eastern portion of the WES Property average approximately 42.5 feet bgs. MW-16 and MW-17 were initially advanced to 20 feet bgs and temporary wells were installed to evaluate the presence/absence of perched water (see Section 5.2), which was observed in select borings on the PFD property in the past, but not the borings performed to date on the WES Property. MW-16 and MW-17 were subsequently completed to 50 feet bgs and 2-inch-diameter monitoring wells were constructed in each boring.

A representative of GeoEngineers observed the drilling and well construction as well as obtained soil samples for borehole logging, field screening and potential chemical analysis. The selection of samples for chemical testing were based on sample locations and depths relative to potential source of contamination, field screening results and the objectives of the supplemental investigation. Field procedures and the exploration logs are presented in Appendix D. Field screening results for soil samples obtained during drilling are shown on the exploration logs and in Table 1 for soil samples submitted for chemical analysis. Figure 2 includes PCE and trichloroethene (TCE) data for the soil samples tested. PCE data are also presented on Figures 4 through 6 (Cross Sections B-B', C-C' and D-D'). Groundwater sample chemical analytical data are summarized in Table 3 and on Figure 7. The chemical analytical laboratory reports along with our review of the laboratory quality assurance/quality control (QA/QC) information, are included in Appendix E.

5.3. Soil Conditions

Explorations MW-16 and MW-17 extended to a depth of 50 feet bgs. The explorations generally encountered weathered till comprising loose to dense silty sand with occasional gravel, overlying very dense gray sand with occasional gravel and trace silt (glacial till). The thickness of the upper layer of loose to dense soil was approximately 18 feet. Very dense glacial till was encountered below the upper layer of loose to dense soil and extended to the base of the borings at 50 feet bgs. Glacial till, a generally dense matrix of varying proportions of gravel, sand and silt, is considered to have a low permeability and low hydraulic conductivity. The soil conditions encountered at MW-16 and MW-17 were generally consistent soil conditions encountered in previous Site explorations.

5.4. Groundwater Conditions

The borings were initially completed to 20 to 30 feet bgs[2] and the subsurface exposed to the borehole to evaluate the potential presence of perched water that had been observed in prior direct push explorations on PFD Property. Borehole MW-16 remained dry after one hour, whereas perched water accumulated in borehole MW-17 at approximately 17 feet bgs. Depths to groundwater in the permanent wells MW-16 and MW-17 were measured at 42 to 43 feet below grade on May 7, 2019.

Dense to very dense glacial till soils typically have low hydraulic conductivity, which limits the migration of groundwater laterally and vertically and groundwater gradients in the shallow aquifer at the Site have been observed to be very low.

[2] The target depth for perched groundwater was determined based on the surface elevation of the adjacent PFD Property being 5 to 8 feet lower and the depth to perched water encountered at approximately 8 to 21 feet bgs during previous drilling on the PFD property.

5.5. Soil Field Screening and Chemical Analytical Results

Discrete soil samples were obtained at approximately 5-foot depth intervals from the explorations for field screening and potential chemical analysis. Each soil sample was screened in the field for evidence of volatiles using visual, water sheen testing and headspace vapor screening methods (Table 1 and boring logs). Soil field screening methods are described in Appendix D. No field screening evidence of volatiles was observed in soil samples from the explorations.

Samples were submitted to Pace Analytical in Mt. Juliette, Tennessee for chemical analysis of select HVOCs by EPA Method 8260C. A summary of the results is presented below.

- PCE was detected in the six soil samples submitted for analysis from MW-16. PCE concentrations in the soil samples from 5 and 10 feet bgs were less than the MTCA Method A cleanup level. PCE concentrations in the soil samples from 15, 25, 35, and 45 feet bgs were greater than the MTCA Method A cleanup level. PCE concentrations in the 5 to 25 feet bgs samples in unsaturated soil increased with depth. TCE was not detected in the samples collected from 5, 10, 15 and 25 feet bgs at MW-16 and was detected at low concentrations less than the MTCA cleanup level in the soil samples at 35 and 45 feet.
- PCE was detected in the four soil samples submitted for analysis from MW-17 at 10, 20, 30 and 35 feet bgs at concentrations greater than the MTCA Method A cleanup level. PCE concentrations from 10 to 30 feet bgs in unsaturated soil increased with depth. PCE concentrations detected in soil at MW-17 were similar to the observed elevated concentrations in nearby source area borings DP-10 and MW-15, albeit at deeper depths than at the dry cleaner source area samples. MW-17 is located further away from the dry cleaner source area, and downgradient to the west. TCE was not detected in the MW-17 sample at 10 feet bgs and was detected at a low concentration less than the MTCA cleanup level in the MW-17 soil samples at 20, 30 and 35 feet bgs. TCE concentrations in these samples also increased with depth.
- Cis- and trans- 1,2-DCE were not detected except for a low concentration of cis-1,2-DCE less than the MTCA cleanup level detected in one sample from MW-17 (Table 1). Vinyl chloride was not detected in all samples submitted for analysis.

5.6. Groundwater Sampling and Chemical Analytical Results

A grab groundwater sample from perched groundwater was collected from monitoring well MW-17 during drilling on May 4, 2019. Groundwater samples from monitoring wells MW-16 and MW-17 were collected on May 7, 2019 (Table 3 and Figure 4). The groundwater samples were submitted to Pace Analytical Laboratory in Mt. Juliette, Tennessee for chemical analysis of select HVOCs by EPA Method 8260C. A summary of the results is presented below.

- PCE was detected at 35.6 micrograms per liter (µg/L), greater than the MTCA Method A Cleanup Level of 5 µg/L, in the grab sample representing perched groundwater at MW-17. The other HVOCs tested were either not detected or detected at concentrations less than MTCA cleanup levels.
- Concentrations of PCE and TCE in the MW-17 groundwater sample from the shallow aquifer exceeded MTCA Method A cleanup levels. The detected concentration of PCE in groundwater at MW-17 (339 µg/L) was similar those observed at wells MW-2 and MW-7, which is consistent with MW-17 being located in between MW-2 and MW-7 and directly west and downgradient of the former dry cleaner. The other HVOCs tested were either not detected or detected at concentrations less than MTCA cleanup levels.

- PCE was detected in the MW-16 groundwater sample from the shallow aquifer (93.1 µg/L) at a concentration exceeding the MTCA Method A cleanup level. TCE was detected in the MW-16 groundwater sample at a concentration less than the MTCA Method A cleanup level. The other HVOCs tested were either not detected or detected at concentrations less than MTCA cleanup levels.

6.0 CONCLUSIONS AND UPDATED CONCEPTUAL SITE MODEL

This section summarizes conclusions and the updated CSM incorporating the 2018 and 2019 supplemental site characterization data.

Considering the various lines of evidence from geologic and hydrogeologic information for the Site, available soil, groundwater, soil vapor and indoor air sample chemical analytical data, and historical knowledge of the Site, our interpretation of the source and extent of PCE/TCE contamination is described below:

- The most likely source of PCE (and associated breakdown products TCE and cis-1,2-DCE) detected in soil, soil vapor and groundwater samples from the Site is associated with historical releases of dry cleaning solvents at the former ALDC that operated on the southwest portion of the PFD Property from approximately 1963 to 1982. Although automotive maintenance and body work were performed in the past on the west adjacent WES Property from approximately 1969 to the mid-1990s and may have used PCE-related degreasing products, the vertical and lateral distribution of PCE in soil and groundwater at the Site do not indicate a significant source of PCE originating on the WES Property. Although the Alderwood Oldsmobile-Cadillac dealership that previously occupied the west-adjacent property reported that spent TCE was generated at the facility in 1992, TCE was only detected at low concentrations in soil samples from explorations completed at, and in the immediate vicinity, of the former dry cleaner facility located on the PFD Property. TCE was not detected in soil samples from any of the explorations completed at the west-adjacent property. Also, TCE is a breakdown product of PCE, and PCE is more typically used in dry cleaning operations versus automotive applications. Therefore, it appears the former dry cleaner is the most probable source of PCE/TCE contamination at the Site based on the information that is available to date.
- Supplemental data confirm that PCE was likely introduced into the subsurface through one or more of the following: leaks from dry cleaning equipment inside the building; spent dry cleaning solvents discharged to sewer drains with leaky underground piping; disposal of spent dry cleaning solvents onto the pavement or on the vegetated slope west of the dry cleaner back door; leaks, spills, drips or leaching of spent solvent from used dry cleaning equipment filters or solvent containers placed into the refuse dumpster in the southwest portion of the PFD Property; and/or stormwater runoff contacting spent solvent residues on the ground or in the dumpster and flowing into the storm drain in the southwest portion of the PFD Property (followed by leaks from the storm drain at cracks or pipe joints). PCE migrated laterally in soil from the source areas via the shallow more permeable lenses of soil such as utility backfill, and vertically downward.
- In general for dry cleaner sites, comparing location versus concentration of PCE in soil is considered the most direct indicator of PCE source because PCE concentrations would be expected to be the highest at locations nearest to where PCE was released. Soil samples with the highest detected concentrations of PCE at the Site are samples AB-1 at 15 feet (0.88 mg/kg), DP-10 at 4 feet (0.740 mg/kg), MW-17 at 30 feet (0.683 mg/kg), MW-17 at 35 feet (0.520) and SSW-2 at 2.5 feet (0.400 mg/kg). The shallowest of these samples (DP-10 at 4 feet and SSW-2 at 2.5 feet) are directly

southwest of the former dry cleaner tenant space where the dry cleaner sewer and storm drain lines, and dumpster are located (Figures 2 and 3) and AB-1 at 15 feet is situated directly beneath the former dry cleaner tenant space. MW-17 is west of the former dry cleaner, near the PFD property line. PCE concentrations in the MW-17 soil samples at 30 and 35 feet bgs indicate the lateral "spreading" of PCE as it migrated downward toward the water table (Figure 4), with possible contributions from PCE in soil vapor that adsorbs back onto soil.

- While samples DP-10 at 4 feet, SSW-2 at 2.5 feet and AB-1 at 15 feet are considered "source area" soil, it should be noted that the highest detected concentrations of PCE in soil are still only within the range of one order of magnitude higher than the MTCA Method A cleanup level of 0.05 mg/kg. Following building demolition, supplemental investigation will be conducted to determine PCE concentrations in soil directly beneath the building slab where the dry cleaner operated.
- Given the relatively wide distribution of PCE in soil and particularly in groundwater, the presence of PCE in soil vapor at the Site is not unexpected. However, the migration of PCE in soil vapor is highly dependent on natural and man-made preferential pathways with higher relative permeability, such as sand stringers in the glacial till, the upper unit of less dense fill/weathered fill and backfill surrounding underground utilities. Soil vapor PCE data are consistent with a dry cleaner source area except for the data from one sub-slab soil vapor sample beneath the northwest portion of the WES building (SSV-10). With the exception of sample SSV-10, in the northwest corner of the WES building, sub-slab soil vapor detections for PCE were limited primarily to locations closer to the PFD Property to the east. For more detailed information regarding the soil vapor sampling refer to the WES building Soil Vapor Intrusion Evaluation report in Appendix B.
- Indoor air vapor intrusion and indoor air risks were evaluated for the PFD Property in the RI Report and for the WES Property as presented in Appendix B. The Vet Building on the PFD Property was demolished in 2018 and the southern portion of the strip mall is planned for demolition in 2020 or 2021. Therefore, no further indoor air evaluation is planned for the PFD Property. Relative to the WES building, indoor air samples in the WES warehouse area were non-detect for PCE, with the only PCE detection occurring in a sample (IA-1) collected from the office space portion of the facility (see Appendix B). Indoor air sample results were compared to the MTCA Method B Indoor Air Cleanup Levels, the MTCA Method B Commercial Worker Indoor Air screening levels and the TCE Short-Term Worker Indoor Air Action Level. PCE and TCE concentrations in one sample exceeded the corresponding MTCA Method B Indoor Air Cleanup Levels; however, PCE and TCE concentrations were lower than the MTCA Method B Commercial Indoor Air screening levels and the TCE Short-Term Commercial Worker Indoor Air Action Level, both of which are appropriate for comparison based on the existing commercial use of the WES Building.
- PCE was detected in unsaturated zone soil samples (40 feet bgs and shallower) on the WES Property, including at GEI-1, MW-7, MW-8, MW-16 and MW-17 as summarized in Table 1 and shown on Figures 2 (plan view), 5 and 6 (cross section views). PCE concentrations in the uppermost soil samples from these borings were relatively low and in some cases were only slightly above the laboratory detection limits. PCE concentrations at MW-8, MW-16 and MW-17, the borings for which more samples along a vertical profile were collected, generally increased with depth. Based on the magnitude and distribution of PCE concentrations in unsaturated soil on the WES Property, the source of PCE in unsaturated soil on the WES Property is most likely adsorption of PCE onto soil from upward migration of vapor phase PCE from shallow groundwater.

- The vertical extent of PCE in soil at concentrations greater than the MTCA Method A cleanup level has been delineated across the Site except for one location, MW-17. Given the relatively low permeability of the dense glacial till at the Site, the mechanisms for release and contaminant migration in soil, and vertical distribution data at other explorations, this exception is not considered significant with respect to the conclusions and CSM presented here and this data gap will be addressed during remedial planning and design. Furthermore, it should be noted that the PCE concentrations in the deepest samples at both MW-16 and MW-17 were slightly lower than the PCE concentrations in the soil samples immediately above. Additional borings nearby either were non-detect for PCE or PCE was detected at concentrations less than MTCA cleanup levels, indicating that impacts deeper in the aquifer are limited in extent.
- The highest detected concentrations of PCE in groundwater have been at MW-2 (highest detection of 307 µg/L in May 2018), MW-3 (highest detection of 129 µg/L in May 2018), MW-7 (highest detection of 389 µg/L in May 2018), and MW-17 (highest detection of 307 µg/L in May 2018). These four wells are situated downgradient of the former dry cleaner footprint to the west and southwest. PCE data from these wells are consistent with the groundwater CSM; specifically, that impacts to groundwater occurred from source area PCE in soil leaching to groundwater and migrating passively in the groundwater. PCE concentrations in the remaining monitoring wells are less than 100 µg/L, and PCE concentration contours are generally consistent with the groundwater CSM given the relatively flat gradient (0.00083 to 0.00095 feet/foot). Available data suggest the groundwater plume has reached equilibrium conditions.
- Geologic and hydrogeologic data for the Site indicate that perched water in the upper 20 feet below grade at the Site is discontinuous, seasonal, and may be directly associated with underground utility lines (e.g., due to leaks and migration through utility backfill). The very dense glacial till and dense to medium dense silty soil that overlie the shallow aquifer have relatively low permeability and limit the rate of contaminant migration between perched water and deeper groundwater beneath the PFD Property. Perched water is discontinuous as evidenced by drier soil observed in some borings at the PFD Property at depths lower than the perched water and above the deeper groundwater in the glacial till. The extent of perched water appears to be in the source area where PCE is found in soil and thus its geographic distribution is within, and a subset of, the larger plume of impacted groundwater in the shallow aquifer. In places, perched water may interconnect with deeper groundwater via stringers of more permeable soil.
- The shallow aquifer is present at 30 to 50 feet below existing grades, which is relatively deep. Based on the dense glacial till soil and relatively low concentrations of PCE in soil and groundwater, it is unlikely that DNAPL is present at the Site. The vertical extent of groundwater with PCE concentrations greater than the MTCA will be addressed through remedial planning and design.

In our opinion, the lateral and vertical extents of soil and groundwater contamination, at concentrations greater than MTCA Method cleanup levels, are sufficiently delineated for the purpose of evaluating remedial alternatives for the Site and selecting a final preferred remedy.

7.0 LIMITATIONS

We have prepared this report for the exclusive use of the Lynnwood Public Facilities District and their authorized agents. We understand this report will be provided to Ecology and to others for their review. No third party may rely on the product of our services unless GeoEngineers agrees in advance, and in writing

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

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

TABLES

GeoEngineers

Table 1

Summary of Soil Field Screening and Chemical Analytical Data[1]

Halogenated Volatile Organic Compounds (HVOCs)

Former Alderwood Laundry and Dry Cleaners Site

Lynnwood, Washington

Boring Number	Sample Identification[2]	Sample Date	Sample Depth (feet bgs)	Field Screening Results[3]		HVOCs[4] (mg/kg)				
				Sheen	Headspace vapor (ppm)	Tetrachloro ethene (PCE)	Trichloro ethene (TCE)	cis-1, 2-Dichloro ethene (DCE)	trans-1, 2-Dichloro ethene (DCE)	Vinyl Chloride
March 2013 Phase II ESA										
DP-1	DP-1-4.0	3/28/2013	4.0	NS	<1	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011
DP-2	DP-2-4.0	3/28/2013	4.0	SS	<1	**0.0610**	<0.0012	<0.0012	<0.0012	<0.0012
	DP-2-8.0	3/28/2013	8.0	NS	<1	**0.0039**	<0.00089	<0.00089	<0.00089	<0.00089
DP-3	DP-3-2.0	3/28/2013	2.0	SS	<1	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	DP-3-6.0	3/28/2013	6.0	SS	<1	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011
DP-4	DP-4-4.0	3/28/2013	4.0	SS	<1	**0.160**	**0.0023**	<0.0012	<0.0012	<0.0012
	DP-4-20.0	3/28/2013	20.0	NS	<1	**0.0075**	<0.00095	<0.00095	<0.00095	<0.00095
	DP-4-25.0	3/28/2013	25.0	NS	<1	**0.0091**	<0.00087	<0.00087	<0.00087	<0.00087
DP-5	DP-5-8.0	3/28/2013	8.0	NS	<1	**0.0026**	<0.00099	**0.0046**	<0.00099	<0.00099
	DP-5-23.0	3/28/2013	23.0	NS	<1	**0.0690**	**0.0047**	**0.0034**	<0.0010	<0.0010
DP-6	DP-6-2.0	3/28/2013	2.0	SS	<1	**0.120**	**0.0017**	<0.0010	<0.0010	<0.0010
	DP-6-12.0	3/28/2013	12.0	NS	<1	**0.0210**	<0.00087	<0.00087	<0.00087	<0.00087
DP-7	DP-7-6.0	3/29/2013	6.0	NS	<1	**0.0037**	<0.00098	<0.00098	<0.00098	<0.00098
	DP-7-10.0	3/29/2013	10.0	NS	<1	**0.0080**	<0.00096	<0.00096	<0.00096	<0.00096
DP-8	DP-8-2.0	3/29/2013	2.0	NS	<1	<0.00093	<0.00093	<0.00093	<0.00093	<0.00093
	DP-8-6.0	3/29/2013	6.0	NS	<1	<0.00091	<0.00091	<0.00091	<0.00091	<0.00091
DP-10	DP-10-4.0	3/29/2013	4.0	NS	<1	**0.740**	**0.0056**	<0.0011	<0.0011	<0.0011
	DP-10-15.0	3/29/2013	15.0	NS	<1	**0.020**	**0.0012**	<0.00082	<0.00082	<0.00082
DP-11	DP-11-2.0	3/29/2013	2.0	NS	<1	**0.015**	<0.0010	<0.0010	<0.0010	<0.0010
DP-12	DP-12-6.0	3/29/2013	6.0	NS	<1	**0.0075**	<0.0084	<0.0084	<0.0084	<0.0084
June/July 2013 Supplemental Phase II ESA										
MW-1	MW-1-4.0	6/27/2013	4.0	NS	<1	<0.0008	<0.0008	<0.0008	<0.0008	<0.0008
	MW-1-35.0	6/27/2013	35.0	NS	<1	**0.0021**	<0.00073	<0.00073	<0.00073	<0.00073
MW-2	MW-2-10.0	7/8/2013	10.0	NS	<1	**0.014**	**0.0017**	**0.0010**	<0.00083	<0.00083
	MW-2-30.0	7/8/2013	30.0	NS	<1	**0.055**	**0.0027**	**0.0027**	<0.00084	<0.00084
	MW-2-35.0	7/8/2013	35.0	NS	<1	**0.043**	**0.0024**	**0.0021**	<0.00076	<0.00076
MW-3	MW-3-5.0	7/8/2013	5.0	NS	<1	**0.010**	<0.00085	<0.00085	<0.00085	<0.00085
	MW-3-35.0	7/8/2013	35.0	NS	<1	**0.038**	**0.0027**	**0.0064**	<0.00082	<0.00082
MW-4	MW-4-5.0	6/27/2013	5.0	NS	<1	<0.00096	<0.00096	<0.00096	<0.00096	<0.00096
	MW-4-30.0	6/27/2013	30.0	NS	<1	**0.0027**	<0.00092	<0.00092	<0.00092	<0.00092
March 2016 Supplemental Site Characterization										
MW-5	MW-5-25.0	3/23/2016	25.0	NS	<1	<0.0011	<0.0011	<0.0011	<0.0011	<0.0011
	MW-5-35.0	3/23/2016	35.0	NS	<1	<0.00099	<0.00099	<0.00099	<0.00099	<0.00099
MW-6	MW-6-35.0	3/23/2016	35.0	NS	<1	**0.016**	<0.001	<0.001	<0.001	<0.001
MW-7	MW-7-30.0	3/25/2016	30.0	NS	<1	**0.029**	<0.0011	<0.0011	<0.0011	<0.0011
	MW-7-35.0	3/25/2016	35.0	NS	<1	**0.052**	<0.0011	**0.0012**	<0.0011	<0.0011
	MW-7-40.0	3/25/2016	40.0	NS	<1	**0.021**	<0.0010	<0.0010	<0.0010	<0.0010
MW-8	MW-8-5.0	3/22/2016	5.0	NS	<1	<0.00093	<0.00093	<0.00093	<0.00093	<0.00093
	MW-8-10.0	3/22/2016	10.0	NS	<1	<0.00057	<0.00057	<0.00057	<0.00057	<0.00057
	MW-8-20.0	3/22/2016	20.0	NS	<1	**0.0073**	<0.00098	<0.00098	<0.00098	<0.00098
	MW-8-30.0	3/22/2016	30.0	NS	<1	**0.015**	<0.00096	<0.00096	<0.00096	<0.00096
	MW-8-35.0	3/22/2016	35.0	NS	<1	**0.0037**	<0.0011	<0.0011	<0.0011	<0.0011
	MW-8-40.0	3/22/2016	40.0	NS	<1	**0.0098**	<0.0011	<0.0011	<0.0011	<0.0011
MW-9	MW-9-25.0	3/24/2016	25.0	NS	<1	<0.00089	<0.00089	<0.00089	<0.00089	<0.00089
September 2016 Data Gaps Assessment										
GEI-1	GEI-1-5.0	9/20/2016	5.0	SS	<1	**0.013**	<0.00083	<0.00083	<0.00083	<0.00083
	GEI-1-10.0	9/20/2016	10.0	NS	<1	**0.0084**	<0.00086	<0.00086	<0.00086	<0.00086
MW-10	MW-10-5.0	9/20/2016	5.0	NS	<1	<0.0043	<0.00087	<0.00087	<0.00087	<0.00087
	MW-10-35.0	9/20/2016	35.0	NS	<1	<0.0039	<0.00078	<0.00078	<0.00078	<0.00078
MW-11	MW-11-10.0	9/21/2016	10.0	SS	<1	<0.0046	<0.00091	<0.00091	<0.00091	<0.00091
	MW-11-40.0	9/21/2016	40.0	NS	<1	<0.0043	<0.00086	<0.00086	<0.00086	<0.00086
MW-12	MW-12-5.0	9/21/2016	5.0	NS	<1	<0.0040	<0.00080	<0.00080	<0.00080	<0.00080
	MW-12-45.0	9/21/2016	45.0	NS	<1	<0.0043	<0.00087	<0.00087	<0.00087	<0.00087
MW-13	MW-13-5.0	9/22/2016	5.0	SS	<1	<0.0038	<0.00076	<0.00076	<0.00076	<0.00076
	MW-13-50.0	9/22/2016	50.0	NS	<1	<0.0044	<0.00088	<0.00088	<0.00088	<0.00088
MW-14	MW-14-10.0	9/23/2016	10.0	SS	<1	<0.0046	<0.00092	<0.00092	<0.00092	<0.00092
	MW-14-40.0	9/23/2016	40.0	NS	<1	<0.0047	<0.00095	<0.00095	<0.00095	<0.00095
MW-16	MW-16-5.0	5/4/2019	5.0	NS	<1	**0.00866**	<0.00113	<0.00283	<0.00567	<0.00283
	MW-16-10.0	5/4/2019	10.0	NS	<1	**0.0404**	<0.00117	<0.00292	<0.00583	<0.00292
	MW-16-15.0	5/4/2019	15.0	NS	<1	**0.0762**	<0.00115	<0.00287	<0.00573	<0.00287
	MW-16-25.0	5/4/2019	25.0	NS	<1	**0.130**	<0.00109	<0.00271	<0.00543	<0.00271
	MW-16-35.0	5/4/2019	35.0	NS	<1	**0.249**	**0.00156**	<0.00274	<0.00548	<0.00274
	MW-16-45.0	5/4/2019	45.0	NS	<1	**0.234**	**0.00165**	<0.00288	<0.00577	<0.00288
MW-17	MW-17-10.0	5/4/2019	10.0	NS	<1	**0.0755**	<0.00117	<0.00292	<0.00584	<0.00292
	MW-17-20.0	5/4/2019	20.0	NS	<1	**0.314**	**0.00187**	<0.00281	<0.00562	<0.00281
	MW-17-30.0	5/4/2019	30.0	NS	<1	**0.683**	**0.00538**	<0.00272	<0.00544	<0.00272
	MW-17-35.0	5/4/2019	35.0	NS	<1	**0.520**	**0.00767**	**0.00588**	<0.00547	<0.00274

Boring Number	Sample Identification[2]	Sample Date	Sample Depth (feet bgs)	Field Screening Results[3]		HVOCs[4] (mg/kg)				
				Sheen	Headspace vapor (ppm)	Tetrachloro ethene (PCE)	Trichloro ethene (TCE)	cis-1, 2-Dichloro ethene (DCE)	trans-1, 2-Dichloro ethene (DCE)	Vinyl Chloride
February 2017 Angled Explorations										
AB-1	AB-1-10.0	2/14/2017	10.0	NS	<1	**0.092**	**0.001**	<0.00083	<0.00083	<0.00083
	AB-1-15.0	2/14/2017	15.0	NS	<1	**0.88**	**0.0046**	<0.00079	<0.00079	<0.00079
	AB-1-20.0	2/14/2017	20.0	NS	<1	**0.066**	**0.00092**	<0.00068	<0.00068	<0.00068
	AB-1-25.0	2/14/2017	25.0	NS	<1	**0.02**	<0.00078	<0.00078	<0.00078	<0.00078
	AB-1-30.0	2/14/2017	30.0	NS	<1	**0.028**	<0.00093	<0.00093	<0.00093	<0.00093
AB-2	AB-2-10.0	2/15/2017	10.0	NS	<1	**0.046**	**0.00098**	<0.00075	<0.00075	<0.00075
	AB-2-15.0	2/15/2017	15.0	NS	<1	**0.076**	**0.0027**	<0.00081	<0.00081	<0.00081
	AB-2-20.0	2/15/2017	20.0	NS	<1	**0.095**	**0.0034**	**0.0013**	<0.00076	<0.00076
	AB-2-25.0	2/15/2017	25.0	NS	<1	**0.05**	**0.0018**	**0.0011**	<0.00077	<0.00077
	AB-2-30.0	2/15/2017	30.0	NS	<1	**0.064**	**0.0022**	**0.0017**	<0.00087	<0.00087
	AB-2-35.0	2/15/2017	35.0	NS	<1	**0.011**	<0.00095	<0.00095	<0.00095	<0.00095
AB-3	AB-3-15.0	2/13/2017	10.0	NS	<1	**0.02**	<0.00089	<0.00089	<0.00089	<0.00089
	AB-3-25.0	2/13/2017	40.0	NS	<1	**0.029**	**0.0014**	**0.0012**	<0.00092	<0.00092
AB-4	AB-4-20.0	2/10/2017	5.0	NS	<1	**0.029**	**0.0018**	<0.00086	<0.00086	<0.00086
	AB-4-30.0	2/10/2017	10.0	NS	<1	**0.013**	<0.00096	**0.0011**	<0.00096	<0.00096
	AB-4-60.0	2/10/2017	60.0	NS	<1	<0.00094	<0.00094	<0.00094	<0.00094	<0.00094
MW-15	MW-15-20.0	2/8/2017	20.0	NS	<1	**0.021**	**0.001**	<0.00090	<0.00090	<0.00090
	MW-15-30.0	2/8/2017	30.0	NS	<1	**0.02**	<0.001	<0.001	<0.001	<0.001
AB-6	AB-6-20.0	2/9/2017	20.0	NS	<1	**0.01**	<0.00078	<0.00078	<0.00078	<0.00078
	AB-6-30.0	2/9/2017	30.0	NS	<1	**0.0082**	<0.00079	<0.00079	<0.00079	<0.00079
July 2018 Soil Samples after Vet Building Demolition										
SSW-1	SSW-1-180727	7/27/2018	2.5	NS	<1	**0.2140**	**0.00295**	<0.00269	<0.00537	<0.00269
SSW-2	SSW-2-180727	7/27/2018	2.5	NS	<1	**0.4000**	<0.00109	<0.00273	<0.00547	<0.00273
SSW-3	SSW-3-180727	7/27/2018	2.5	NS	<1	**0.1010**	<0.00111	<0.00276	<0.00553	<0.00276
SS-4	SS-4-180727	7/27/2018	5.0	NS	<1	**0.2920**	**0.0079**	**0.00139 J**	<0.00562	<0.00281
SS-5	SS-5-180727	7/27/2018	5.0	NS	<1	**0.0594**	<0.00130	<0.00324	<0.00648	<0.00324
SS-6	SS-6-180727	7/27/2018	5.0	NS	<1	**0.0446**	<0.00118	<0.00294	<0.00589	<0.00294
SS-7	SS-7-180727	7/27/2018	5.0	NS	<1	**0.0219**	<0.00112	<0.00281	<0.00561	<0.00281
SS-8	SS-8-180727	7/27/2018	5.0	NS	<1	**0.0424**	<0.00123	<0.00308	<0.00616	<0.00308
MTCA Method A Cleanup Level - Unrestricted Land Use[5]						0.05	0.03	--	--	--
MTCA Method B Cleanup Level - Direct Contact[5]						--	--	160	1,600	0.67
Method B Cleanup Levels - Protection of Groundwater[5]						--	--	0.078	0.52	0.0017

Notes:

[1] Chemical analyses performed by OnSite Environmental of Redmond, Washington. Chemical analytical laboratory reports included in Appendix E.

[2] The approximate sample locations are shown in the Figures.

[3] Field screening methods are presented in Appendix D.

[4] HVOCs were analyzed by U.S. Environmental Protection Agency (EPA) Method 8260C. Other HVOC constituents were not detected. Refer to laboratory report for list of method analytes and detection limits.

[5] MTCA cleanup levels last updated by Ecology in May 2019.

J = The identification of the analyte is acceptable; the reported value is an estimate

-- = Where Method A cleanup levels are not established Method B are presented.

bgs = below ground surface

mg/kg = milligrams per kilogram

MTCA = Model Toxics Control Act

NS = No sheen; SS = Slight sheen; NA = Not analyzed

ppm = parts per million

Bolded value indicates analyte detected at the listed concentration.

Shaded value represents concentrations greater the MTCA cleanup level.

Table 2

Summary of Groundwater Elevation Data

Former Alderwood Laundry and Dry Cleaners Site
Lynnwood, Washington

Monitoring Well ID	Date Measured	Top of Casing Elevation[1] (feet)	Depth to Groundwater (feet below top of casing)	Groundwater Elevation[2] (feet)
MW-1	8/9/2013	438.62	38.81	399.81
	3/27/2014		38.85	399.77
	2/11/2016		38.24	400.38
	4/5/2016		37.58	401.04
	8/3/2016		39.07	399.55
	10/3/2016		39.83	398.79
	2/16/2017		36.98	401.64
	8/31/2017		38.71	399.91
	11/29/2017		38.96	399.66
	2/13/2018		37.91	400.71
	5/23/2018		37.79	400.83
MW-2	8/9/2013	435.90	36.12	399.78
	3/27/2014		36.17	399.73
	2/11/2016		35.54	400.36
	4/5/2016		34.91	400.99
	8/3/2016		36.40	399.50
	10/3/2016		37.16	398.74
	2/17/2017		34.57	401.33
	8/31/2017		36.02	399.88
	11/29/2017		36.28	399.62
	2/13/2018		35.04	400.86
	5/23/2018		35.12	400.78
MW-3	8/9/2013	435.34	35.58	399.76
	3/27/2014		36.17	399.17
	2/11/2016		34.94	400.40
	4/5/2016		34.35	400.99
	8/3/2016		35.86	399.48
	10/3/2016		36.62	398.72
	2/17/2017		34.04	401.30
	8/31/2017		35.49	399.85
	11/29/2017		35.73	399.61
	2/13/2018		34.56	400.78
	5/23/2018		34.59	400.75
MW-4	8/9/2013	430.27	30.61	399.66
	3/27/2014		30.58	399.69
	2/11/2016		29.98	400.29
	4/5/2016		29.36	400.91
	8/3/2016		30.90	399.37
	10/3/2016		31.66	398.61
	2/16/2017		28.91	401.36
	8/31/2017		30.47	399.80
	11/28/2017		30.72	399.55
	2/14/2018		29.43	400.84
	5/24/2018		29.63	400.64
MW-5	4/5/2016	428.45	27.44	401.01
	8/3/2016		29.06	399.39
	10/3/2016		29.82	398.63
	2/17/2017		27.03	401.42
	8/31/2017		28.70	399.75
	11/29/2017		28.97	399.48
	2/13/2018		27.55	400.90
	5/23/2018		27.80	400.65
MW-6	4/5/2016	440.96	40.00	400.96
	8/3/2016		41.38	399.58
	10/3/2016		42.12	398.84
	2/17/2017		39.74	401.22
	8/31/2017		41.00	399.96
	11/29/2017		41.26	399.70
	2/13/2018		39.97	400.99
	5/23/2018		40.08	400.88
MW-7	4/5/2016	443.15	42.26	400.89
	8/3/2016		43.67	399.48
	10/3/2016		44.43	398.72
	2/16/2017		41.97	401.18
	8/31/2017		43.26	399.89
	11/28/2017		43.51	399.64
	2/14/2018		42.49	400.66
	5/24/2018		42.40	400.75

Monitoring Well ID	Date Measured	Top of Casing Elevation[1] (feet)	Depth to Groundwater (feet below top of casing)	Groundwater Elevation[2] (feet)
MW-8	4/5/2016	442.30	41.43	400.87
	8/3/2016		42.88	399.42
	10/3/2016		43.64	398.66
	2/16/2017		41.08	401.22
	8/31/2017		42.47	399.83
	11/28/2017		42.71	399.59
	2/14/2018		41.60	400.70
	5/24/2018		41.59	400.71
MW-9	4/5/2016	430.09	29.22	400.87
	8/3/2016		30.74	399.35
	10/3/2016		31.46	398.63
	2/16/2017		28.88	401.21
	8/31/2017		30.32	399.77
	11/28/2017		30.59	399.50
	2/14/2018		29.43	400.66
	5/24/2018		29.43	400.66
MW-10	10/3/2016	437.38	38.62	398.76
	2/17/2017		36.19	401.19
	8/31/2017		37.50	399.88
	11/28/2017		37.75	399.63
	2/14/2018		36.71	400.67
	5/24/2018		36.65	400.73
MW-11	10/3/2016	443.18	44.42	398.76
	2/16/2017		42.06	401.12
	8/31/2017		43.24	399.94
	11/28/2017		43.51	399.67
	2/14/2018		42.58	400.60
	5/24/2018		42.40	400.78
MW-12	10/3/2016	445.21	46.41	398.80
	2/16/2017		44.24	400.97
	8/31/2017		45.22	399.99
	11/28/2017		45.48	399.73
	2/14/2018		44.47	400.74
	5/24/2018		44.29	400.92
MW-13	10/3/2016	450.32	51.47	398.85
	2/16/2017		49.60	400.72
	8/31/2017		50.29	400.03
	11/28/2017		50.56	399.76
	2/14/2018		49.83	400.49
	5/24/2018		49.43	400.89
MW-14	10/3/2016	442.98	41.77	401.21
	2/16/2017		40.72	402.26
	8/31/2017		40.66	402.32
	11/28/2017		40.90	402.08
	2/13/2018		40.95	402.03
	5/23/2018		39.74	403.24
MW-15[2]	2/16/2017	438.60	34.50	404.1
	8/31/2017		36.10	402.5
	11/28/2017		36.30	402.3
	2/13/2018		34.90	403.7
	5/23/2018		34.00	404.6
MW-16 [3]	5/7/2019	Not Surveyed	43.40	--
MW-17 [3]	5/7/2019	Not Surveyed	42.29	--
EMRI-MW-1	8/3/2016	443.44	43.98	399.46
	10/3/2016		44.72	398.72
	2/16/2017		42.56	400.88
	8/31/2017		43.52	399.92
	11/28/2017		43.78	399.66
	2/14/2018		42.86	400.58
	5/24/2018		41.89	401.55
ZZA-MW-2	8/3/2016	429.30	12.93	416.37
	10/3/2016		Dry	---
	2/28/2017		6.29	423.01
	8/31/2017		Dry	--
	11/28/2017		12.41	416.89
	2/13/2018		8.16	421.14
	5/23/2018		7.32	421.98

Monitoring Well ID	Date Measured	Top of Casing Elevation[1] (feet)	Depth to Groundwater (feet below top of casing)	Groundwater Elevation[2] (feet)
ZZA-MW-3	8/3/2016	429.89	11.78	418.11
	10/3/2016		13.10	416.79
	2/28/2017		5.02	424.87
	8/31/2017		11.67	418.22
	11/28/2017		11.90	417.99
	2/13/2018		5.86	424.03
	5/23/2018		5.01	424.88

Notes:

[1] Elevations in feet (NAV88) as referenced to Arcadis well MW-13 casing rim elevation of 427.80 feet.

[2] MW-15 is an angled monitoring well completed at a 45-degree angle relative to the existing ground surface; distance to water was measured inside the angled well casing. The calculation used to convert to a vertical depth-to-groundwater value for reporting in this table is: measured distance to water multiplied by Cosine 45°. Reported depth to groundwater and groundwater elevation should be considered approximate for this well because the actual drilling angle is approximate. Therefore, values for MW-15 are reported only to the nearest tenth of a foot.

[3] MW-16 and MW-17 were checked for perched water in the upper 20 feet during drilling. No perched water accumulated in the MW-16 shallow temporary well. Perched water was encountered at 20 feet bgs in the MW-17 shallow temporary well.

Table 3

Summary of Groundwater Chemical Analytical Data[1]

Halogenated Volatile Organic Compounds (HVOCs)

Former Alderwood Laundry and Dry Cleaners Site

Lynnwood, Washington

Sample Identification	Sample Date	VOCs[2] (µg/L)				
		Tetrachloro-ethene (PCE)	Trichloro-ethene (TCE)	cis-1,2-Dichloro-ethene (DCE)	trans-1,2-Dichloro-ethene (DCE)	Vinyl Chloride (VC)
Groundwater Samples - Grab						
DP-4-GW	3/28/2013	**28.0**	**1.2**	**0.34**	<0.2	*
DP-5-GW	3/28/2013	**11.0**	**3.2**	**14.0**	**0.39**	*
DP-7-GW	3/29/2013	**8.0**	<0.2	**0.78**	<0.2	*
DP-8-GW	3/29/2013	**0.31**	<0.2	<0.2	<0.2	*
DP-9-GW	3/29/2013	<0.2	<0.2	<0.2	<0.2	*
DP-10-GW	3/29/2013	**33.0**	**5.9**	**6.6**	**0.23**	*
DP-11-GW	3/29/2013	**18.0**	**1.6**	**1.6**	<0.2	*
Groundwater Samples - Monitoring Wells						
MW-1	7/23/2013	**1.3**	<0.2	<0.2	<0.2	*
	3/27/2014	**0.56**	<0.2	<0.2	<0.2	*
	2/11/2016	**1.8**	<0.2	<0.2	<0.2	*
	8/3/2016	**1.4**	<0.2	<0.2	<0.2	*
	2/16/2017	<0.2	<0.2	<0.2	<0.2	<0.2
	8/31/2017	**3.23**	<0.153	<0.0933	<0.152	<0.118
	11/29/2017	**3.24**	<0.153	<0.0933	<0.152	<0.118
	2/13/2018	**2.03**	<0.153	<0.0933	<0.152	<0.118
	5/23/2018	**5.60**	<0.153	<0.0933	<0.152	<0.118
MW-2	7/23/2013	**83**	**3.0**	**1.9**	<0.2	*
	3/27/2014	**98**	**3.5**	**1.6**	<1.0	*
	2/11/2016	**150**	**4.3**	**3.2**	<1.0	*
	8/3/2016[4]	**180**	**5.6**	**3.4**	<1.0	*
	2/16/2017	**210**	**7.7**	**7.3**	<1.0	
	8/31/2017	**196**	**6.60**	**4.17**	**0.246**	<0.118
	11/29/2017	**222**	**8.03**	**4.20**	**0.314**	<0.118
	2/13/2018	**192**	**4.26**	**2.57**	**0.208**	<0.118
	5/23/2018	**307**	**9.54**	**8.38**	**0.393**	<0.118
MW-3	7/23/2013	**110**	**6.0**	**21.0**	**0.41**	*
	3/27/2014	**48**	**2.1**	**4.3**	**0.20**	*
	2/11/2016	**80**	**2.9**	**7.0**	<0.8	*
	8/3/2016[4]	**110**	**5.2**	**16**	**1.8**	*
	2/16/2017	**84**	**2.9**	**3.5**	<0.4	<0.2
	8/31/2017	**192**	**8.96**	**21.0**	**0.420**	<0.118
	11/29/2017	**129**	**4.43**	**6.45**	**0.204**	<0.118
	2/13/2018	**119**	**2.47**	**3.29**	<0.152	<0.118
	5/23/2018	**129**	**4.60**	**6.65**	<0.152	<0.118
MW-4	7/23/2013	**6.8**	**2.1**	**3.7**	<0.2	*
	3/27/2014	**9.2**	**2.1**	**4.5**	**0.24**	*
	2/11/2016	**13**	**1.8**	**2.3**	<0.2	*
	8/3/2016	**14**	**2.3**	**3.4**	**0.25**	*
	2/16/2017	**10**	**1.3**	**0.98**	<0.2	<0.2
	8/31/2017	**11.8**	**2.47**	**4.06**	<0.152	<0.118
	11/28/2017	**17.1**	**1.88**	**3.68**	<0.152	<0.118
	2/13/2018	**16.6**	**1.13**	**1.63**	<0.152	<0.118
	5/24/2018	**14.0**	**1.62**	**1.63**	<0.152	<0.118
MW-5	4/5/2016	**0.55**	<0.2	<0.2	<0.2	*
	8/3/2016	**0.74**	<0.3	<0.2	a	*
	2/16/2017	**1.2**	<0.2	<0.2	<0.2	<0.2
	8/31/2017	**0.815**	<0.153	<0.0933	<0.152	<0.118
	11/29/2017	**0.867**	<0.153	<0.0933	<0.152	<0.118
	2/13/2018	**0.753**	<0.153	<0.0933	<0.152	<0.118
	5/23/2018	**1.05**	<0.153	<0.0933	<0.152	<0.118
MW-6	4/5/2016	**25**	<0.4	<0.2	<0.2	*
	8/3/2016[4]	**28**	<0.5	<0.2	<0.2	*
	2/16/2017	**33**	<0.2	<0.2	<0.2	<0.2
	8/31/2017	**32.9**	<0.153	<0.0933	<0.152	<0.118
	11/29/2017	**35.2**	<0.153	<0.0933	<0.152	<0.118
	2/13/2018	**38.8**	<0.153	<0.0933	<0.152	<0.118
	5/23/2018	**35.0**	<0.153	<0.0933	<0.152	<0.118

Sample Identification	Sample Date	VOCs[2] (µg/L)				
		Tetrachloro-ethene (PCE)	Trichloro-ethene (TCE)	cis-1,2-Dichloro-ethene (DCE)	trans-1,2-Dichloro-ethene (DCE)	Vinyl Chloride (VC)
MW-7	4/5/2016	**270**	**3.6**	<2.0	<2.0	*
	8/3/2016	**250**	**4.6**	**5.0**	<2.0	*
	2/16/2017	**230**	**4.0**	**1.1**	<1.0	<0.2
	8/30/2017	**309**	**6.11**	**4.62**	**0.217**	<0.118
	11/28/2017	**296**	**4.88**	**0.893**	<0.152	<0.118
	2/14/2018	**321**	**3.59**	**1.12**	<0.152	<0.118
	5/24/2018	**389**	**7.00**	**5.74**	<0.152	<0.118
MW-8	4/5/2016	**33**	**1.5**	**14**	<0.2	*
	8/3/2016	**40**	**1.8**	**13**	**0.36**	*
	2/16/2017	**47**	**2.2**	**14**	<0.2	<0.2
	8/30/2017	**46.3**	**3.00**	**16.9**	<0.152	<0.118
	11/28/2017	**35.9**	**3.25**	**17.3**	<0.152	<0.118
	2/14/2018	**50.7**	**2.35**	**16.5**	<0.152	<0.118
	5/24/2018	**57.2**	**4.12**	**16.5**	0.156	<0.118
MW-9	4/5/2016	<0.2	<0.10	**0.86**	<0.2	*
	8/3/2016	<0.2	<0.11	**0.44**	<0.2	*
	2/16/2017	**0.25**	<0.2	**2.0**	<0.2	<0.2
	8/30/2017	**0.224**	<0.153	<0.0933	<0.152	<0.118
	11/28/2017	**0.424**	<0.153	**1.87**	<0.152	<0.118
	2/14/2018	**0.334**	<0.153	**2.02**	<0.152	<0.118
	5/24/2018	<0.199	<0.153	**0.250**	<0.152	<0.118
MW-10	10/3/2016	<0.2	<0.12	<0.2	<0.2	*
	2/16/2017	<0.2	<0.2	<0.2	<0.2	<0.2
	8/30/2017	<0.199	<0.153	<0.0933	<0.152	<0.118
	11/28/2017	<0.199	<0.153	<0.0933	<0.152	<0.118
	2/14/2018	<0.199	<0.153	<0.0933	<0.152	<0.118
	5/24/2018	<0.199	<0.153	<0.0933	<0.152	<0.118
MW-11	10/3/2016	<0.2	<0.13	<0.2	<0.2	*
	2/16/2017	<0.2	<0.2	<0.2	<0.2	<0.2
	8/30/2017	<0.199	<0.153	<0.0933	<0.152	<0.118
	11/28/2017	<0.199	<0.153	<0.0933	<0.152	<0.118
	2/14/2018	<0.199	<0.153	<0.0933	<0.152	<0.118
	5/24/2018	<0.199	<0.153	<0.0933	<0.152	<0.118
MW-12	10/3/2016	<0.2	<0.14	<0.2	<0.2	*
	2/16/2017	<0.2	<0.2	<0.2	<0.2	<0.2
	8/30/2017	<0.199	<0.153	<0.0933	<0.152	<0.118
	11/28/2017	<0.199	<0.153	<0.0933	<0.152	<0.118
	2/14/2018	<0.199	<0.153	<0.0933	<0.152	<0.118
	5/24/2018	<0.199	<0.153	<0.0933	<0.152	<0.118
MW-13	10/3/2016	<0.2	<0.15	<0.2	<0.2	*
	2/16/2017	<0.2	<0.2	<0.2	<0.2	<0.2
	8/30/2017	<0.199	<0.153	<0.0933	<0.152	<0.118
	11/28/2017	<0.199	<0.153	<0.0933	<0.152	<0.118
	2/14/2018	<0.199	<0.153	<0.0933	<0.152	<0.118
	5/24/2018	<0.199	<0.153	<0.0933	<0.152	<0.118
MW-14	10/3/2016	<0.2	<0.16	<0.2	<0.2	*
	2/16/2017	<0.2	<0.2	<0.2	<0.2	<0.2
	8/31/2017	<0.199	<0.153	<0.0933	<0.152	<0.118
	11/28/2017	<0.199	<0.153	<0.0933	<0.152	<0.118
	2/13/2018	<0.199	<0.153	<0.0933	<0.152	<0.118
	5/24/2018	<0.199	<0.153	<0.0933	<0.152	<0.118
MW-15[3]	2/16/2017	**78**	**2.6**	**0.49**	<0.2	<0.2
	8/31/2017	**55.4**	**1.77**	**0.251**	<0.152	<0.118
	11/28/2017	**65.9**	**1.92**	**0.238**	<0.152	<0.118
	2/13/2018	**83.2**	**1.52**	**0.278**	<0.152	<0.118
	5/24/2018	**75.0**	**1.76**	**0.194**	<0.152	<0.118
MW-16	5/7/2019	**93.1**	**0.638**	<0.500	<0.500	<0.500
MW-17 Perched [5]	5/4/2019	**35.6**	**1.80**	**2.14**	<0.500	<0.500
MW-17	5/7/2019	**339**	**6.09**	**4.48**	<0.500	<0.500
EMRI-MW-1	8/3/2016	**16**	<0.17	<0.2	<0.2	*
	2/16/2017	**15**	<0.2	<0.2	<0.2	<0.2
	8/30/2017	**19.5**	<0.153	<0.0933	<0.152	<0.118
	11/28/2017	**18.0**	<0.153	<0.0933	<0.152	<0.118
	2/14/2018	**32.2**	<0.153	<0.0933	<0.152	<0.118
	5/24/2018	**34.6**	<0.153	<0.0933	<0.152	<0.118
ZZA-MW-2	8/3/2016	<0.2	<0.18	<0.2	<0.2	*
	2/28/2017	<0.2	<0.2	<0.2	<0.2	<0.2
	8/31/2017	--	--	--	--	--
	11/28/2017	<0.199	<0.153	<0.0933	<0.152	<0.118
	2/13/2018	<0.199	<0.153	<0.0933	<0.152	<0.118
	5/23/2018	<0.199	<0.153	<0.0933	<0.152	<0.118

Sample Identification	Sample Date	VOCs[2] (µg/L)				
		Tetrachloro-ethene (PCE)	Trichloro-ethene (TCE)	cis-1,2-Dichloro-ethene (DCE)	trans-1,2-Dichloro-ethene (DCE)	Vinyl Chloride (VC)
ZZA-MW-3	8/3/2016	<0.2	<0.19	<0.2	<0.2	*
	2/28/2017	<0.2	<0.2	<0.2	<0.2	<0.2
	8/31/2017	<0.199	<0.153	<0.0933	<0.152	<0.118
	11/28/2017	<0.199	<0.153	<0.0933	<0.152	<0.118
	2/13/2018	<0.199	<0.153	<0.0933	<0.152	<0.118
	5/23/2018	<0.199	<0.153	<0.0933	<0.152	<0.118
MTCA Method A/B Cleanup Levels		5	5	16[4]	160[4]	0.2

Notes:

[1] Chemical analyses performed by OnSite Environmental of Redmond, Washington or ESC Labs of Mt. Juliette, Tennessee. Chemical analytical laboratory reports included in Appendix E.

[2] Select VOCs (PCE, TCE, cis - and trans DCE and VC were analyzed by U.S. Environmental Protection Agency (EPA) Method 8260C.

[3] Monitoring well was completed at a 45 degrees angle relative to the existing ground surface. The groundwater sample represents groundwater beneath the northeast portion of the former dry cleaner tenant space.

[4] MTCA Method B Cleanup Level

[5] The May 4th sample was collected during drilling from the perched groundwater.

MTCA = Model Toxics Control Act

µg/L = micrograms per liter

Bolded value indicates analyte detected at the listed concentration.

Shaded value represents concentration greater than the MTCA cleanup level.

-- = not analyzed

* = data not available

FIGURES

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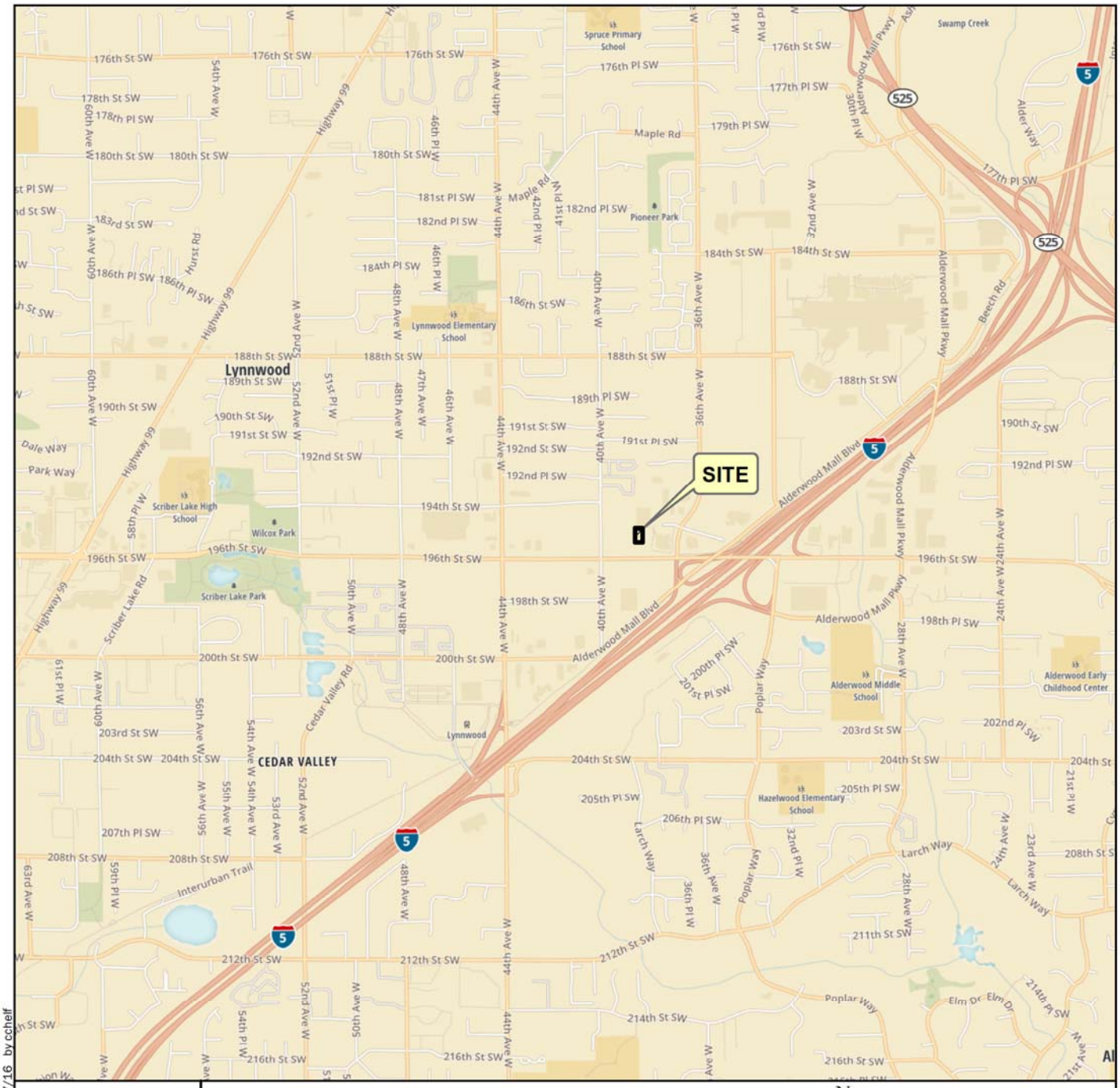

Notes:

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

Data Source: Mapbox Open Street Map, 2016

Projection: NAD 1983 UTM Zone 10N

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Vicinity Map

Alderwood Laundry and Dry Cleaners
3815 196th St SW
Lynnwood, Washington

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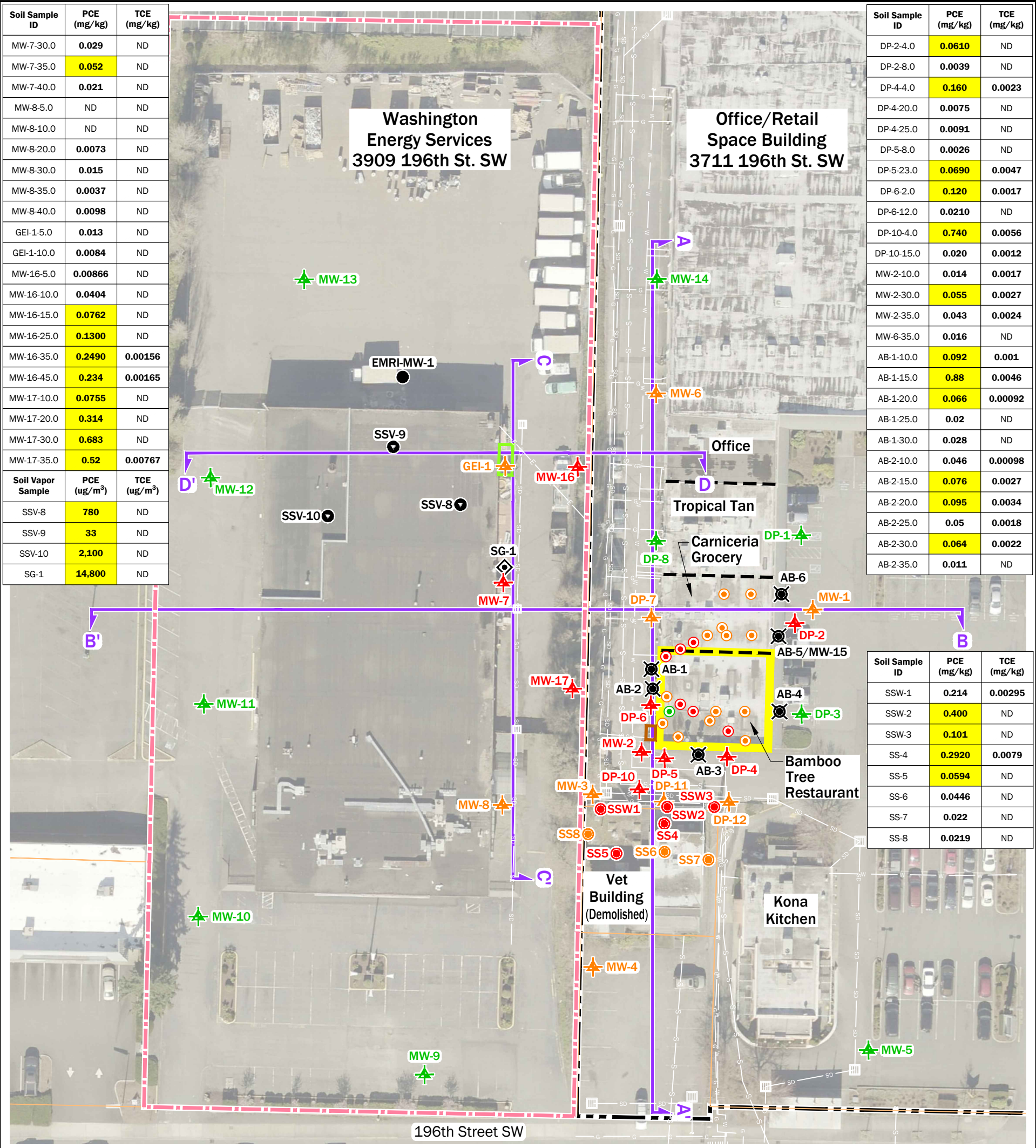
Figure 1

Soil Sample ID	PCE (mg/kg)	TCE (mg/kg)
MW-7-30.0	0.029	ND
MW-7-35.0	0.052	ND
MW-7-40.0	0.021	ND
MW-8-5.0	ND	ND
MW-8-10.0	ND	ND
MW-8-20.0	0.0073	ND
MW-8-30.0	0.015	ND
MW-8-35.0	0.0037	ND
MW-8-40.0	0.0098	ND
GEI-1-5.0	0.013	ND
GEI-1-10.0	0.0084	ND
MW-16-5.0	0.00866	ND
MW-16-10.0	0.0404	ND
MW-16-15.0	0.0762	ND
MW-16-25.0	0.1300	ND
MW-16-35.0	0.2490	0.00156
MW-16-45.0	0.234	0.00165
MW-17-10.0	0.0755	ND
MW-17-20.0	0.314	ND
MW-17-30.0	0.683	ND
MW-17-35.0	0.52	0.00767

Soil Vapor Sample	PCE (ug/m^3)	TCE (ug/m^3)
SSV-8	780	ND
SSV-9	33	ND
SSV-10	2,100	ND
SG-1	14,800	ND

Soil Sample ID	PCE (mg/kg)	TCE (mg/kg)
DP-2-4.0	0.0610	ND
DP-2-8.0	0.0039	ND
DP-4-4.0	0.160	0.0023
DP-4-20.0	0.0075	ND
DP-4-25.0	0.0091	ND
DP-5-8.0	0.0026	ND
DP-5-23.0	0.0690	0.0047
DP-6-2.0	0.120	0.0017
DP-6-12.0	0.0210	ND
DP-10-4.0	0.740	0.0056
DP-10-15.0	0.020	0.0012
MW-2-10.0	0.014	0.0017
MW-2-30.0	0.055	0.0027
MW-2-35.0	0.043	0.0024
MW-6-35.0	0.016	ND
AB-1-10.0	0.092	0.001
AB-1-15.0	0.88	0.0046
AB-1-20.0	0.066	0.00092
AB-1-25.0	0.02	ND
AB-1-30.0	0.028	ND
AB-2-10.0	0.046	0.00098
AB-2-15.0	0.076	0.0027
AB-2-20.0	0.095	0.0034
AB-2-25.0	0.05	0.0018
AB-2-30.0	0.064	0.0022
AB-2-35.0	0.011	ND

Soil Sample ID	PCE (mg/kg)	TCE (mg/kg)
SSW-1	0.214	0.00295
SSW-2	0.400	ND
SSW-3	0.101	ND
SS-4	0.2920	0.0079
SS-5	0.0594	ND
SS-6	0.0446	ND
SS-7	0.022	ND
SS-8	0.0219	ND



Legend

- DP-6/MW-2 — Exploration - MTCA Method A Cleanup Levels Exceedance for PCE/TCE in Soil
- DP-7/MW-4 — Exploration - HVOCs detected less than MTCA Method A Cleanup Levels in Soil
- DP-1/MW-9 — Exploration - HVOCs Not Detected
- AB-1 — Angled Boring by GeoEngineers, Inc.
- EMRI-MW-1 — Groundwater Monitoring Well by EMRI (1999)
- Soil Sample with PCE detection greater than MTCA Method A Cleanup Level
- Soil Sample with HVOC detections less than MTCA Method A or B Cleanup Levels
- Soil Sample with HVOCs Not Detected
- SSW1 — Confirmation Soil Sample
- SG-1 — Soil Vapor Sample Location
- SSV-8 — Sub-Slab Soil Gas Sample location and detected PCE concentration in (ug/m^3)

- Lynnwood Public Facilities District Property Boundary
- West Adjoining Property Boundary
- Parcel Boundary
- Approximate Footprint of Former Alderwood Laundry & Dry Cleaners
- Backfilled Waste Oil UST Excavation
- Existing Concrete Grease Trap
- Existing Catch Basin
- Existing Storm Drain
- Existing Gas Line
- Existing Sewer Line
- Existing Water Line
- Electric Utility
- A — A' Cross Section Location

Data Box Explanation:

PCE	Tetrachloroethylene
TCE	Trichloroethylene
ND	Not Detected
MTCA	Model Toxics Control Act
HVOC	Halogenated Volatile Organic Compounds
mg/kg	milligrams per kilogram
ug/m^3	micrograms per cubic Meter
0.160	Shading indicates concentration greater than MTCA

DP-4-4.0 — Sample Identification; Sample Depth in feet below ground surface

50 0 50 Feet

N W E S

Notes:

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

Data Source: Aerial from King County dated 2015. Vertical Datum: NAVD 88. Projection: NAD83 Washington State Planes, North Zone, US Foot.

Soil Chemical Analytical Data

Former Alderwood Laundry and Dry Cleaners
3815 196th Street SW, Lynnwood, Washington

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Figure 2

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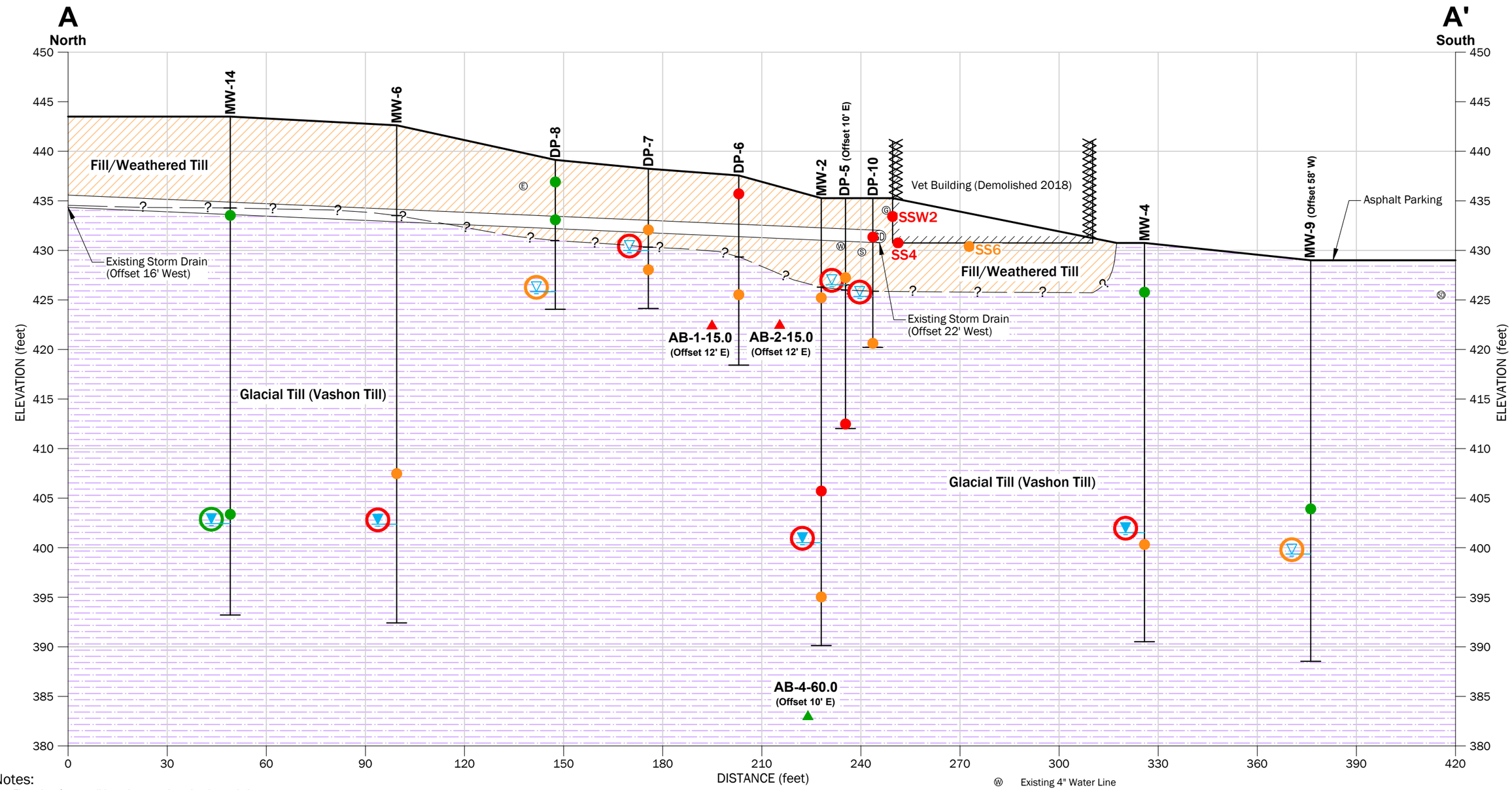


Notes:

1. The subsurface conditions shown are based on interpolation between widely spaced explorations and should be considered approximate; actual subsurface conditions may vary from those shown.
2. This figure is for informational purposes only. It is intended to assist in the identification of features discussed in a related document. Data were compiled from sources as listed in this figure. The data sources do not guarantee these data are accurate or complete. There may have been updates to the data since the publication of this figure. This figure is a copy of a master document. The hard copy is stored by GeoEngineers, Inc. and will serve as the official document of record.
3. Groundwater elevations and chemical data shown are from March 2013 and February 2017.
4. For clarity of figure, 0 - 5 ' BGS utilities running parallel to the cross section are not shown.

Datum: NAVD 88, unless otherwise noted.

Legend

- DP-7 — Exploration and Approximate Location
- ? — Interpreted Weathered Till/Dense Till Contact
- Soil Sample - PCE/TCE detection greater than MTCA Method A Cleanup Level
- Soil Sample - HVOCs detection less than MTCA Method A Cleanup Level
- Soil Sample - HVOCs Not Detected
- Angled Boring Soil Sample - PCE/TCE detection greater than MTCA Method A Cleanup Level
- Angled Boring Soil Sample - HVOCs Not Detected
- Grab Groundwater Sample
- Groundwater Sample from Monitoring Well
- MTCA — Model Toxics Control Act
- PCE/TCE detections greater than MTCA Method A Cleanup Level
- PCE/TCE detection less than MTCA Method A Cleanup Level
- HVOCs Not Detected
- PCE — Tetrachloroethylene
- TCE — Trichloroethylene
- HVOC — Halogenated Volatile Organic Compounds
- Ⓦ Existing 4" Water Line
- Ⓢⓓ Existing Storm Drain (Depth Approximated)
- Ⓢ Existing 8" Sanitary Sewer Line (Depth Approximated)
- Ⓖ Existing Gas Line
- Ⓔ Electric Utility

Horizontal Scale in Feet: 30 0 30

Vertical Scale in Feet: 10 0 10

Vertical Exaggeration: 3X

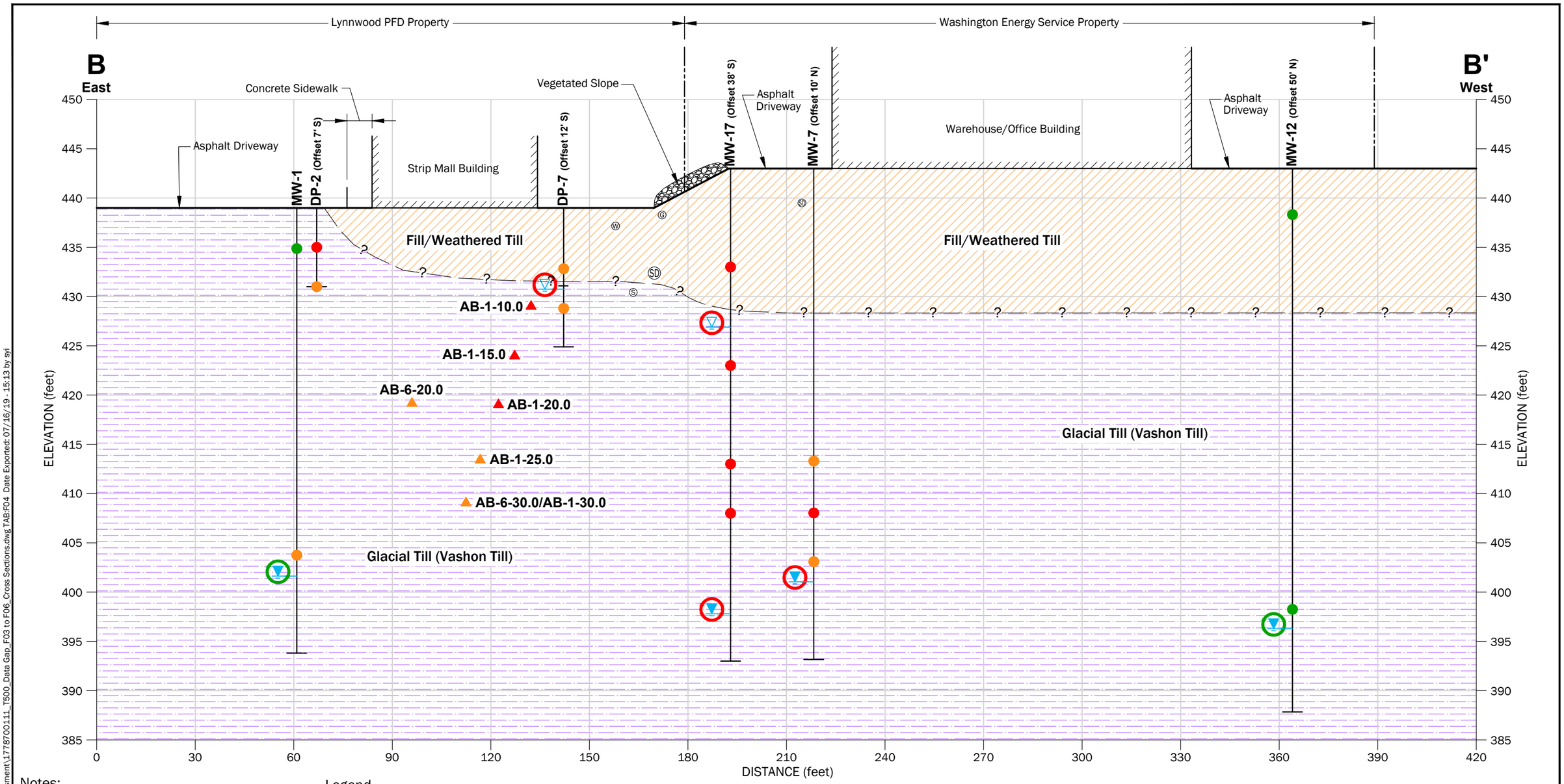
Cross Section A-A'

Former Alderwood Laundry and Dry Cleaners
3815 196th Street SW, Lynnwood, Washington

GeoEngineers

Figure 3

P:\17\17787001\CAD\11\T0500_Data Gap Site Assessment\177787001111_T500_Data Gap_F03 to F06_Cross Sections.dwg TAB:F03 Date Exported: 07/16/19 - 15:20 by syi



Notes:

1. The subsurface conditions shown are based on interpolation between widely spaced explorations and should be considered approximate; actual subsurface conditions may vary from those shown.
2. This figure is for informational purposes only. It is intended to assist in the identification of features discussed in a related document. Data were compiled from sources as listed in this figure. The data sources do not guarantee these data are accurate or complete. There may have been updates to the data since the publication of this figure. This figure is a copy of a master document. The hard copy is stored by GeoEngineers, Inc. and will serve as the official document of record.
3. Groundwater elevations and chemical data shown are from March 2013 and February 2017.

Datum: NAVD 88, unless otherwise noted.

Legend

- DP-7 — Exploration and Approximate Location
- ? — Interpreted Weathered Till/Dense Till Contact
- Soil Sample - PCE/TCE detection greater than MTCA Method A Cleanup Level
- Soil Sample - HVOCs detection less than MTCA Method A Cleanup Level
- Soil Sample - HVOCs Not Detected
- Angled Boring Soil Sample - PCE/TCE detection greater than MTCA Method A Cleanup Level
- Angled Boring Soil Sample - HVOCs detection less than MTCA Method A Cleanup Level
- Grab Groundwater Sample
- Groundwater Sample from Monitoring Well
- PCE/TCE detections greater than MTCA Method A Cleanup Level
- HVOCs Not Detected

PCE	Tetrachloroethylene
TCE	Trichloroethylene
MTCA	Model Toxics Control Act
HVOC	Halogenated Volatile Organic Compounds

- Ⓦ Existing 4" Water Line
- Ⓔ Electric Utility
- Ⓢⓓ Existing Storm Drain (Depth Approximated)
- Ⓢ Existing 8" Sanitary Sewer Line (Depth Approximated)
- Ⓖ Existing Gas Line

30 0 30
Horizontal Scale in Feet

10 0 10
Vertical Scale in Feet
Vertical Exaggeration: 3X

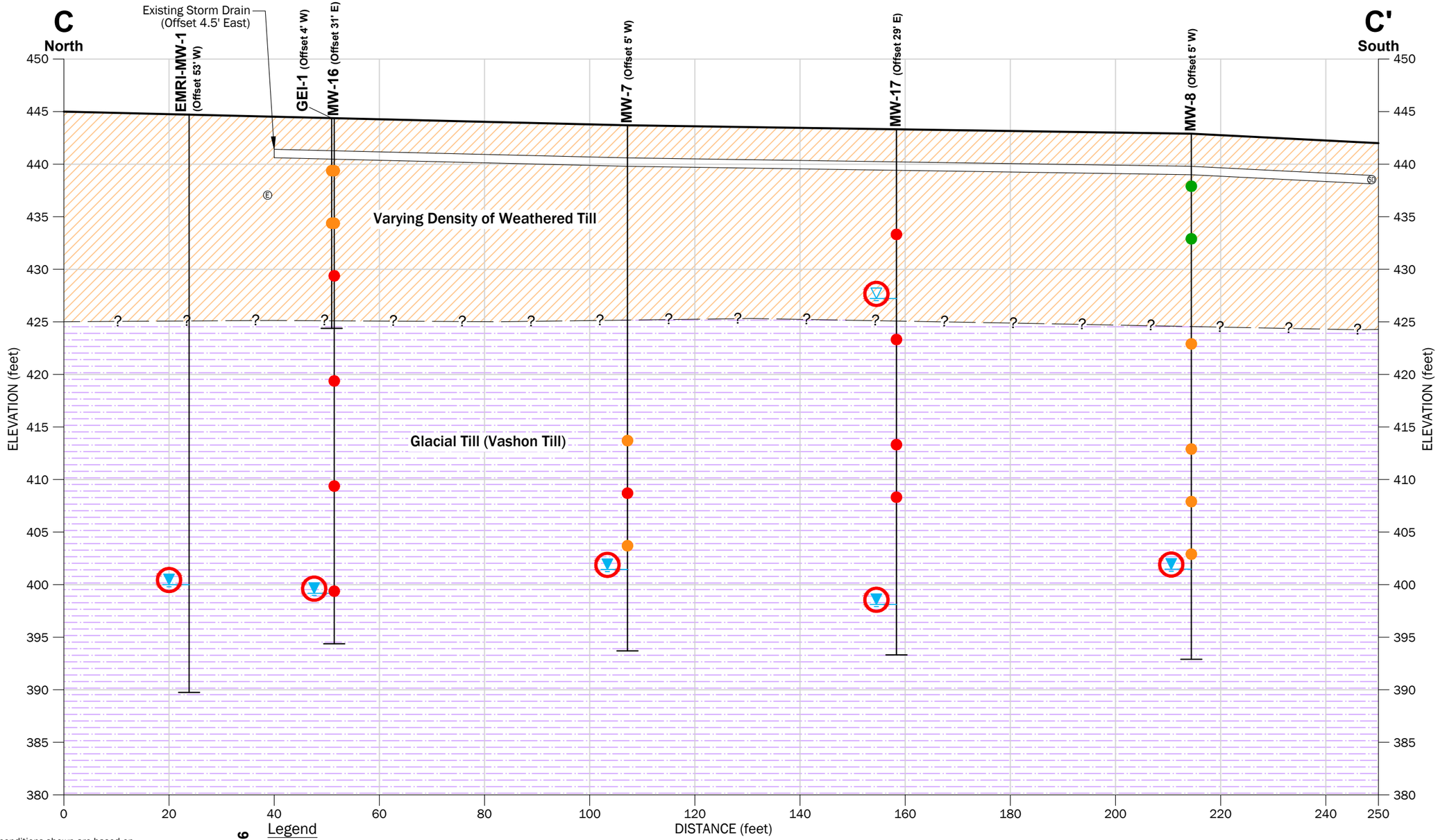
Cross Section B-B'

Former Alderwood Laundry and Dry Cleaners
3815 196th Street SW, Lynnwood, Washington

GeoEngineers

Figure 4

P:\17\17787001\CAD\11\T0500_Data Gap Site Assessment\17787001111_T500_Data Gap_F03 to F06_Cross Sections.dwg TAB:F04 Date Exported: 07/16/19 - 15:13 by syi



Notes:

1. The subsurface conditions shown are based on interpolation between widely spaced explorations and should be considered approximate; actual subsurface conditions may vary from those shown.
2. This figure is for informational purposes only. It is intended to assist in the identification of features discussed in a related document. Data were compiled from sources as listed in this figure. The data sources do not guarantee these data are accurate or complete. There may have been updates to the data since the publication of this figure. This figure is a copy of a master document. The hard copy is stored by GeoEngineers, Inc. and will serve as the official document of record.
3. Groundwater elevations and chemical data shown are from March 2013 and February 2017.

Datum: NAVD 88, unless otherwise noted.

Legend

- MW-16 — Exploration and Approximate Location
- ? — Interpreted Weathered Till/Dense Till Contact
- Soil Sample - PCE/TCE detection greater than MTCA Method A Cleanup Level
- Soil Sample - HVOCs detection less than MTCA Method A Cleanup Level
- Soil Sample - HVOCs Not Detected
- Grab Groundwater Sample
- Groundwater Sample from Monitoring Well
- PCE/TCE detections greater than MTCA Method A Cleanup Level

PCE	Tetrachloroethylene
TCE	Trichloroethylene
MTCA	Model Toxics Control Act
HVOC	Halogenated Volatile Organic Compounds
SD	Existing Storm Drain (Depth Approximated)
E	Electric Utility

20 0 20
Horizontal Scale in Feet

10 0 10
Vertical Scale in Feet
Vertical Exaggeration: 2X

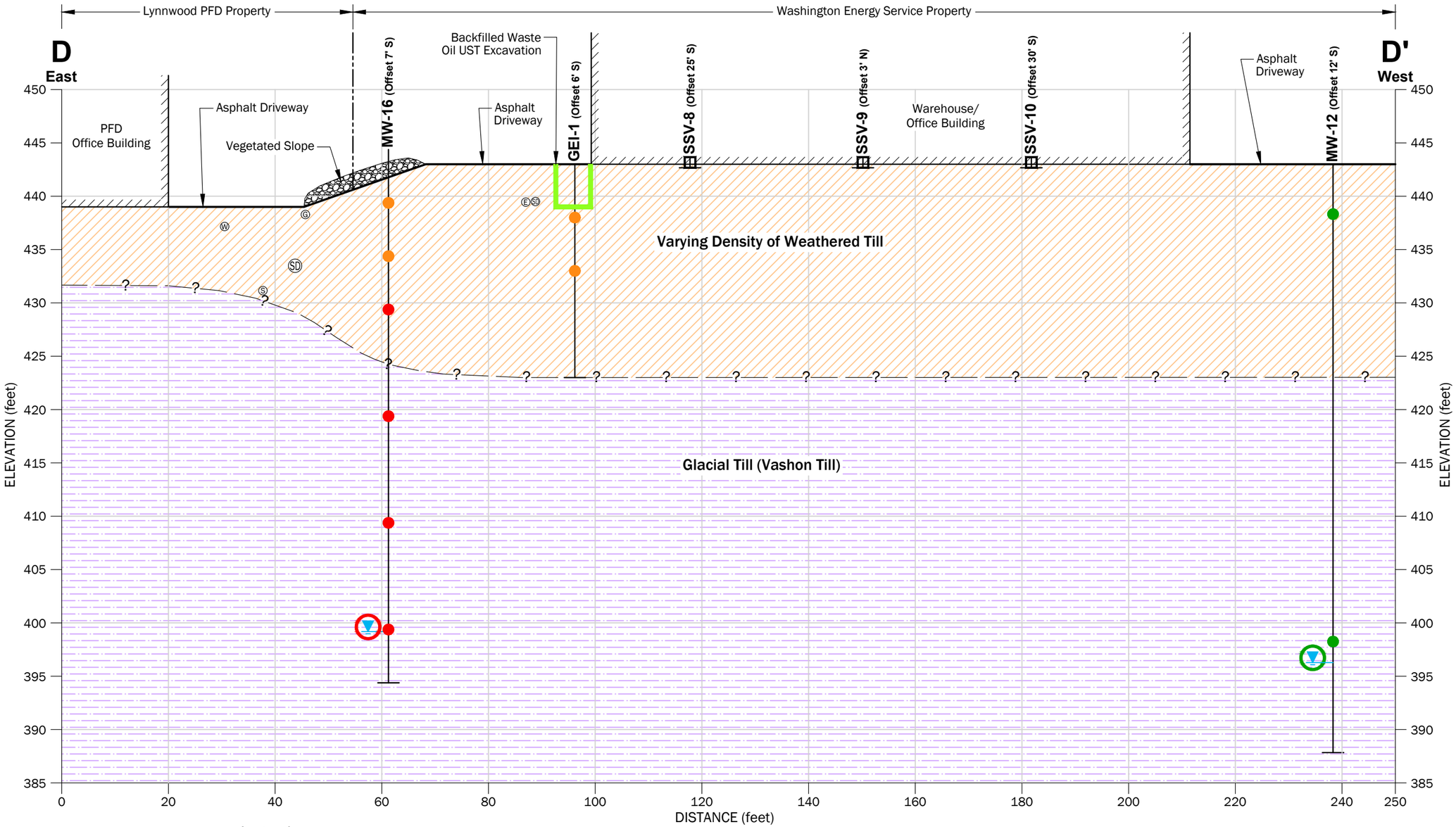
Cross Section C-C'

Former Alderwood Laundry and Dry Cleaners
3815 196th Street SW, Lynnwood, Washington

GeoEngineers

Figure 5

P:\17\17787001\CAD\11\T0500_Data Gap Site Assessment\17787001111_T500_Data Gap_F03 to F06_Cross Sections.dwg TAB:F05 Date Exported: 07/16/19 - 15:14 by syi



Notes:

1. The subsurface conditions shown are based on interpolation between widely spaced explorations and should be considered approximate; actual subsurface conditions may vary from those shown.
2. This figure is for informational purposes only. It is intended to assist in the identification of features discussed in a related document. Data were compiled from sources as listed in this figure. The data sources do not guarantee these data are accurate or complete. There may have been updates to the data since the publication of this figure. This figure is a copy of a master document. The hard copy is stored by GeoEngineers, Inc. and will serve as the official document of record.
3. Groundwater elevations and chemical data shown are from March 2013 and February 2017.

Datum: NAVD 88, unless otherwise noted.

Legend

- MW-16 — Exploration and Approximate Location
- ? — Interpreted Weathered Till/Dense Till Contact
- Soil Sample - PCE/TCE detection greater than MTCA Method A Cleanup Level
- Soil Sample - HVOCs detection less than MTCA Method A Cleanup Level
- Soil Sample - HVOCs Not Detected
- Subslab Soil Vapor Sample
- Grab Groundwater Sample
- Groundwater Sample from Monitoring Well
- PCE/TCE detections greater than MTCA Method A Cleanup Level
- HVOCs Not Detected
- PCE Tetrachloroethylene
- TCE Trichloroethylene
- MTCA Model Toxics Control Act
- HVOC Halogenated Volatile Organic Compounds
- Ⓦ Existing 4" Water Line
- Ⓢⓓ Existing Storm Drain (Depth Approximated)
- Ⓢ Existing 8" Sanitary Sewer Line (Depth Approximated)
- Ⓖ Existing Gas Line
- Ⓔ Electric Utility

20 0 20
Horizontal Scale in Feet

10 0 10
Vertical Scale in Feet
Vertical Exaggeration: 2X

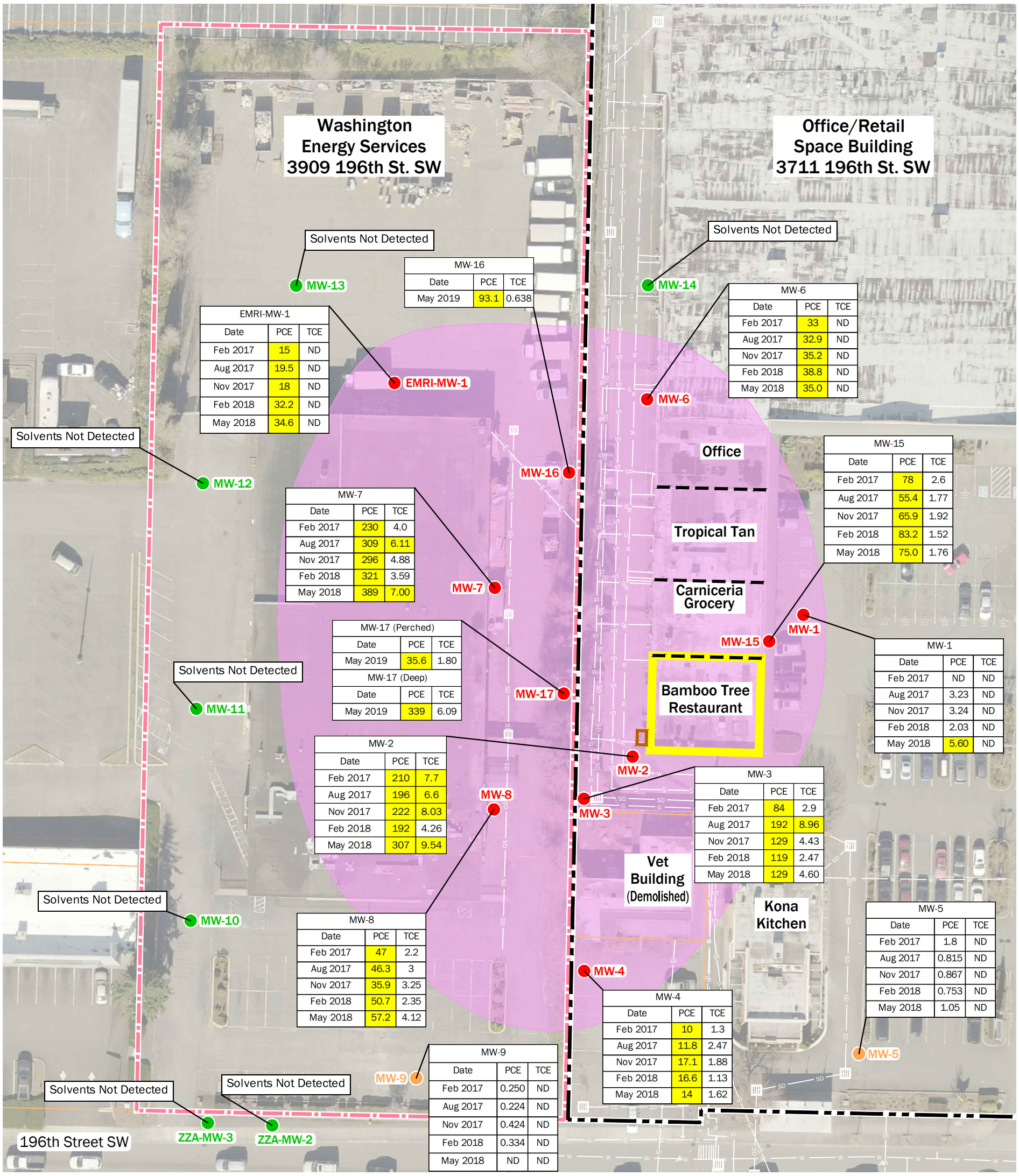
Cross Section D-D'

Former Alderwood Laundry and Dry Cleaners
3815 196th Street SW, Lynnwood, Washington

GeoEngineers

Figure 6

P:\17\17787001\CAD\11\T0500_Data Gap Site Assessment\17787001111_T500_Data Gap_F03 to F06_Cross Sections.dwg TAB:F06 Date Exported: 07/16/19 - 15:14 by syi



Legend

- MW-2 — Groundwater Sample with MTCA Method A Cleanup Level Exceedance for PCE/TCE
- MW-1 — Groundwater Sample with PCE/TCE less than MTCA Method A or B Cleanup Levels
- MW-9 — Groundwater Sample - Solvents Not Detected
- MTCA — Model Toxics Control Act
- HVOC — Halogenated Volatile Organic Compounds
- Interpreted PCE > 5 ug/L in Groundwater
- Lynnwood Public Facilities District Property Boundary
- West Adjoining Property Boundary
- Parcel Boundary
- Approximate Footprint of Former Alderwood Laundry & Dry Cleaners
- Existing Concrete Grease Trap
- Existing Catch Basin
- Existing Storm Drain
- Existing Gas Line
- Existing Sewer Line
- Existing Water Line
- Electric Utility

Data Box Explanation:

PCE	Tetrachloroethylene
TCE	Trichloroethylene
ND	Not Detected
ug/L	micrograms per liter

Data boxes are provided for monitoring wells with detections of PCE/TCE.

Shading indicates concentration greater than MTCA.

All concentrations are in micrograms per liter.

N W E S

50 0 50
Feet

Notes:

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

Data Source: Aerial from King County dated 2015. Vertical Datum: NAVD 88. Projection: NAD83 Washington State Planes, North Zone, US Foot.

Groundwater Chemical Analytical Data

Former Alderwood Laundry and Dry Cleaners
3815 196th Street SW, Lynnwood, Washington

GeoEngineers

Figure 7

P:\17\17787001\CAD\11\T0500_Data Gap Site Assessment\1778700111_T500_Data Gap_F07_Groundwater Chemical Analytical Data.dwg TAB:F07 Date Exported: 06/14/19 - 17:19 by syi

APPENDICES

GeoEngineers

APPENDIX A

Ecology Opinion Letters dated June 4, 2018 and January 30, 2019

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Regional Office • 3190 160th Ave SE • Bellevue, WA 98008-5452 • 425-649-7000
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

June 4, 2018

Mr. Grant Dull
Lynnwood Public Facilities District
3711 196th Street
Lynnwood, WA 98036

Re: Further Action at the following Site:

- **Site Name:** Alderwood Laundry & Dry Cleaners
- **Site Address:** 3815 196th Street SW, Lynnwood, WA 98036
- **Cleanup Site ID:** 12845
- **Facility/Site No.:** 17078
- **VCP Project No.:** NW3066

Dear Mr. Dull:

Thank you for submitting documents regarding the Alderwood Laundry & Dry Cleaners facility (Site) for review by the Washington State Department of Ecology (Ecology) under the Voluntary Cleanup Program (VCP). Ecology appreciates your initiative in pursuing this administrative option for cleaning up hazardous waste sites under the Model Toxics Control Act (MTCA), Chapter 70.105D RCW.

This letter constitutes an advisory opinion regarding a review of submitted documents/reports pursuant to requirements of MTCA and its implementing regulations, Chapter 70.105D RCW and Chapter 173-340 WAC. Ecology is providing this advisory opinion under the specific authority of RCW 70.105D.030(1)(i) and WAC 173-340-515(5).

This opinion does not resolve a person's liability to the state under MTCA or protect a person from contribution claims by third parties for matters addressed by the opinion. The state does not have the authority to settle with any person potentially liable under MTCA except in accordance with RCW 70.105D.040(4). The opinion is advisory only and not binding on Ecology.

Ecology's Toxics Cleanup Program has reviewed the following information regarding your remedial actions:

1. GeoEngineers, *Remedial Investigation Report and Response to Ecology Opinion Letter – Former Alderwood Laundry and Dry Cleaners*, March 7, 2018.

2. GeoEngineers, *Remedial Investigation Report, Alderwood Laundry and Dry Cleaner*, report dated March 7, 2018.

3. Department of Ecology, *Further Action Opinion, Alderwood Laundry & Dry Cleaners*, January 2, 2018.

4. GeoEngineers, *Draft Remedial Investigation Report – Alderwood Laundry and Dry Cleaner*, July 12, 2017.

The reports listed above will be kept in the Central Files of the Northwest Regional Office of Ecology (NWRO) for review by appointment only. You can make an appointment by completing a Request for Public Record form (https://www.ecology.wa.gov/About-us/Accountability-transparency/Public-records-requests) and emailing it to PublicRecordsOfficer@ecy.wa.gov, or contacting the Public Records Officer at 360-407-6040. A number of these documents are accessible in electronic form from the Site web page (https://fortress.wa.gov/ecy/gsp/Sitepage.aspx?csid=12845).

The Site is defined by the extent of contamination caused by the following releases:

- Tetrachloroethylene (PCE), trichloroethylene (TCE), cis-1,2-dichloroethylene (cis-1,2-DCE) and trans-1,2-dichloroethylene (trans-1, 2-DCE) into the soil and ground water.

- PCE, TCE, vinyl chloride, methylene chloride, trans-1,2-DCE and chloroform into the air.

The Site is more particularly described in Enclosure A to this letter. The description of the Site is based solely on the information contained in the documents listed above.

Based on a review of supporting documentation listed above, pursuant to **requirements contained in MTCA and its implementing regulations, Chapter 70.105D RCW and Chapter 173-340 WAC, for characterizing and addressing the following releases at the Site, Ecology has determined:**

- Regarding GeoEngineers' response to First Ecology comment in the March 2018 *Response to Ecology Opinion Letter*, Ecology agrees ground water encountered at shallower depths is likely perched and may be discontinuous, but it is difficult to determine the extent of the perched zone based on the existing Site data. As mentioned in the draft and final versions of the remedial investigation, the perched zone may have been missed due to the two different drilling/sampling methods used (continuous sampling with the direct-push borings versus discrete 5-foot sample intervals with the hollow-stem auger).

- The soil gas concentration of 14,800 $\mu g/m^3$ from location SG-1 was collected at a depth of 5 feet below ground surface (bgs). Ground water at adjacent monitoring well MW-7 is encountered between 42 and 44 feet bgs. Considering the dense till that underlies the Property, the high soil gas concentration measured at 5 feet bgs indicates perched ground water may be present further west than indicated by the direct-push borings. Additional soil vapor probes may be useful to determine the extent of the perched zone beyond what is currently known and assess how it may impact potential vapor intrusion issues.

- Regarding the vinyl chloride and chloroform detected at concentrations exceeding indoor air cleanup levels, the collection of sub-slab samples in conjunction with indoor air samples would provide another line of evidence to support the conclusion that the source of these contaminants is not from the subsurface. Ecology recommends the most conservative approach, which would be to conduct an additional event during the winter months and include sub-slab sampling in conjunction with indoor and outdoor air samples. Include resampling for PCE and TCE.

- Ecology recognizes that chloroform is commonly found in background indoor air at concentrations exceeding screening levels, and there is currently no immediate concern for action regarding chloroform (no short-term health or safety concerns are known, or reasonably suspected to exist), based on present concentrations and conditions. In consideration of the potential building demolition estimated to occur within the next 2 years, Ecology acknowledges it may be more appropriate to reassess the vapor intrusion pathway in the future and/or incorporate mitigation into plans for construction of a new building.

- The March 2018 *Response to Ecology Comments* discusses the vapor intrusion assessment of the west adjacent building and use of the Johnson-Ettinger Model (JEM). Chapter 6.6.1 of Ecology's *Guidance for Evaluating Soil Vapor Intrusion in Washington State revised April 2018* (VI Guidance) is referenced to support a comparison to modified MTCA Method B values based on a commercial scenario, rather than MTCA Method B indoor air cleanup levels which are based on a residential scenario. Ecology expects all relevant lines of evidence to be evaluated before deciding whether further assessment, or other vapor intrusion related action, is needed.

- A soil vapor concentration of 14,800 $\mu g/m^3$ was reported from location SG-1, which is more than 100 times the screening level of 320 $\mu g/m^3$. This sample was collected from outside of the building footprint at a shallow depth (5 feet below ground

surface). When relatively shallow samples are collected beyond the building footprint, the potential exists for underestimating soil gas concentrations immediately below the building. Samples collected outside of the building footprint should be collected from just the subsurface vapor source.

- Additional vapor intrusion considerations are the storm drain line that runs along the east side of the Washington Energy Services (WES) building and the electric line that runs to the WES building's northeast corner, which are both potential preferential pathways for the movement of gas-phase volatile organic compounds. Therefore soil gas screening levels may not be sufficiently conservative. This is considered a limitation to the use of soil gas concentrations when predicting indoor air concentrations (see VI Guidance Section 3.1.3.1, *Limitations to the use of soil gas concentrations when predicting indoor air concentrations*). In addition, the use of JEM is only recommended if soil gas screening levels are exceeded by less than 100 times (see VI Guidance Section 3.3.1.3, *Tier I: When soil gas VOC concentrations exceed screening levels*).

- The last line of evidence is the 250 µg/L PCE concentration detected in ground water collected from monitoring well MW-7 on the upgradient side of the WES building. This value is also significantly above the screening level of 23 µg/L. It is Ecology's opinion that based on all lines of evidence provided, the use of the JEM alone to end the vapor intrusion assessment is not appropriate. Ecology recommends conducting a Tier II vapor assessment for the WES building.

- Although the horizontal extent of ground water contamination is delineated, the vertical extent of contamination in ground water has not been defined. Prior to Ecology reviewing and commenting on a feasibility study and cleanup action plan for the Site, the vertical extent of contamination in ground water will need to be delineated.

This opinion does not represent a determination by Ecology that a proposed remedial action will be sufficient to characterize and address the specified contamination at the Site or that no further remedial action will be required at the Site upon completion of the proposed remedial action. To obtain either of these opinions, you must submit appropriate documentation to Ecology and request such an opinion under the VCP. **This letter also does not provide an opinion regarding the sufficiency of any other remedial action proposed for or conducted at the Site.**

Please note that this opinion is based solely on the information contained in the documents listed above. Therefore, if any of the information contained in those documents is materially false or misleading, then this opinion will automatically be rendered null and void.

The state, Ecology, and its officers and employees make no guarantees or assurances by providing this opinion, and no cause of action against the state, Ecology, its officers or employees may arise from any act or omission in providing this opinion.

Again, Ecology appreciates your initiative in conducting independent remedial action and requesting technical consultation under the VCP. As the cleanup of the Site progresses, you may request additional consultative services under the VCP, including assistance in identifying applicable regulatory requirements and opinions regarding whether remedial actions proposed for or conducted at the Site meet those requirements.

If you have any questions regarding this opinion, please contact me at (425) 649-7097.

Sincerely,

Diane Escobedo
NWRO Toxics Cleanup Program

DE: de

Enclosures: (1) A – Description and Diagram of the Site

cc: Dana Carlisle, GeoEngineers, Inc.
Sonia Fernandez, VCP Coordinator, Ecology

Site Description

This section provides Ecology's understanding and interpretation of Site conditions, and is the basis for the opinions expressed in the body of the letter.

Site: The Site is defined by the release of tetrachloroethylene (PCE), trichloroethylene (TCE), cis-1,2-dichloroethylene (cis-1,2-DCE) and trans-1,2-dichloroethylene (trans-1, 2-DCE) to soil and PCE, TCE, vinyl chloride, methylene chloride, trans-1,2-DCE and chloroform to ground water associated with the operation of a dry cleaning facility. The Site is located at 3815 196th Street Southwest in Lynnwood, Washington (Property).

Area and Property Description: The Property corresponds to Snohomish County parcel numbers 00372600400602 (12.83 acres in size), 00372600401603 (0.13 acre) and 00372600400604 (0.08 acre). The Property, which is a total of 13.04 acres in size, is occupied by six buildings, five of which are located on parcel 00372600401603. The northernmost building, built in 1969, is currently occupied by a Chuck-E-Cheese restaurant. A retail building, built in 1969, is located in the northeast portion of the Property. An office/retail building, built in 1963, with a strip mall at the southern end is located in the western central/southern portion of parcel 00372600400603. The building located in the southwestern portion of the Property was built in 1984 and is currently occupied by Tacos Guaymas, a Mexican food restaurant. The Lynnwood Convention Center (built in 2005) is located in the southeast corner of the Property. A building built in 1967, currently occupied by a veterinary practice, is located on parcel 00372600401604. None of the buildings have enclosed below-grade basements. The Property is bounded by 196th Street to the south, commercial businesses and 40th Street to the west, 36th Avenue West to the east and a residential neighborhood to the north. Land use surrounding the Site includes commercial businesses, offices and residential apartments.

Property History and Current Use: The Property was first developed with residences in the late 1940s. In the early 1960s, the residences were removed and three commercial-use buildings were constructed – the large existing office/retail building along the western Property boundary and multi-tenant retail strip mall buildings in the southwest and southeast portions of the Property. By the mid-1970s, two additional retail/commercial buildings had been developed in the northern and eastern portions of the Property. The southern two tenant spaces of the strip mall building in the southwestern portion of the Property is where the Alderwood Laundry and Dry Cleaners facility operated from 1963 to 1982. Currently, the Carniceria grocery store and Bamboo Tree restaurant occupy these tenant spaces. The northern portion of the building is currently occupied by a nail salon, administrative offices and a health spa. A former Chevron service station (Cleanup Site ID 3220), which received a No Further Action (NFA) determination in October 2009 following a cleanup, operated in the west portion of the Property beginning in the late 1960s. A second gasoline service station, ARCO 862 (Cleanup Site ID 11235) and later an automobile muffler repair shop operated in the southeast portion of the Property between the mid-1960s and mid-2000s. These automotive facilities were removed in 2004 in conjunction with the construction of the Lynnwood Convention Center. The corresponding Voluntary Cleanup Program number is NW2452. The Lynnwood Public Facilities District is currently evaluating redevelopment options for the southwest

portion of the Property where the strip mall building, veterinary building and restaurant building are currently located.

Contaminant Source and History: Alderwood Laundry and Dry Cleaner (originally named Alderwood Highland Center Laundry) operated from approximately 1963 to 1982 in the two southernmost tenant spaces of the strip mall located in the southwest portion of the Property. The former location of the dry cleaning equipment within the facility is unknown. However, based on a passive soil gas survey conducted in 2012, PCE releases likely occurred in the western and southern portions of the former dry cleaning facility footprint.

Physiographic Setting: The Site is located in the Puget Sound Lowland physiographic province of western Washington, which is bounded on the east by the Cascade Mountains and on the west by Puget Sound. Ground surface elevations range from approximately 430 to 450 feet above mean sea level. The Property slopes gradually to the southeast and south.

Surface/Storm Water System: The nearest surface water body is a small storm water retention pond located approximately 800 feet east of the Site. Storm water is collected in storm drains located southwest and south of the former dry cleaner building.

Ecological Setting: The Property is covered primarily with paved surfaces used as parking areas and buildings. A 10- to 20-foot wide vegetated slope extends along the northwestern Property line. The vegetated area is minor compared to the size of the Property and is unlikely to attract wildlife.

Geology: The Site is underlain by Vashon till, a unit of medium dense to very dense glacially deposited and compacted, poorly-sorted silt, sand, gravel and cobbles with localized silt-rich and sand-rich zones. Fill consisting of loose silty sand with occasional gravel and organics overlies the native till deposits, which consist of medium dense silty sand and varying amounts of gravel. The fill material is interpreted to be imported weathered till. Fill is encountered in the upper 8 to 15 feet, with decreasing thicknesses from the northwest to the southeast portion of the Site. Sand-rich zones were encountered within the till at approximate depths of 28 to 40 feet below ground surface (bgs) with thicknesses ranging from 15 to 20 feet. These sand-rich zones are associated with deeper ground water on the Site as described below.

Ground Water: A shallow water-bearing zone perched within the fill or weathered till was present at some locations near the contact with dense glacial till and deeper ground water located in the underlying glacial till. Perched ground water was encountered in the eastern half of the Site near the former dry cleaner at approximate depths ranging between 8 and 21 feet bgs. Ground water in the glacial till is found at depths ranging from approximately 27 to 51 feet bgs. The deeper water-bearing zone is relatively flat with hydraulic gradients ranging from 0.00083 feet per foot (ft/ft) to 0.00095 ft/ft. Ground water flow directions in the deeper water-bearing zone ranged from west to southwest

Water Supply: The Alderwood Water District provides potable water to the City. According to Ecology's well log database, the nearest domestic well is located approximately 1,000 feet west of

the Property (4221 196th Street SW). The total depth of the well is 55 feet below top of casing. Static ground water is approximately 4 feet below the top of casing.

Release and Extent of Soil and Ground Water Contamination: PCE was likely released to the subsurface through leaks from dry cleaning equipment, spills, waste disposal practices and/or cracks in sewer pipes. PCE concentrations detected in soil samples range from 0.0026 milligrams/kilograms (mg/kg) to a maximum of 0.88 mg/kg (in angled boring AB-1 at a depth corresponding to 15 feet bgs). PCE-contaminated soil above the Method A cleanup level was encountered between 4 and 35 feet bgs. The highest PCE concentrations were detected in soil collected from beneath the former dry cleaner tenant space and in the area immediately around the building. TCE and cis-1,2-DCE and trans-1,2-DCE were also detected in soil samples at concentrations below the MTCA Method A or corresponding cleanup levels protective of ground water.

PCE concentrations in ground water are highest down gradient, to the west of the former dry cleaning facility. The maximum PCE concentrations were encountered in monitoring well MW-7 ranging from 230 to 270 micrograms per liter during spring and summer events in 2016 and on February event in 2017. The plume likely extends beneath the west adjacent building (3909 196th Street Southwest) but PCE has not been detected in ground water monitoring wells MW-10 through MW-13 on the west side of the west adjacent building. PCE degradation products including TCE, cis-1,2-DCE and trans-1, 2-DCE, have been detected in soil and ground water. Vinyl chloride has not been detected in soil or ground water.

Legend

- Lynnwood Public Facilities District Property Boundary
- West Adjoining Property Boundary
- Parcel Boundary

Notes:

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

Data Source: Aerial from King County dated 2015.

Vertical Datum: NAVD 88.

Projection: NAD83 Washington State Planes, North Zone, US Foot.

N W E S

120 0 120
Feet

Site Overview

Former Alderwood Laundry and Dry Cleaners
3815 196th Street SW, Lynnwood, Washington

GeoEngineers | Figure 2

P:\17\17187001\CAD\GIS\RI Report\17187001008_T203_F02_Site Overview.dwg 1745:F02 Date Exported: 03/29/17 - 16:42 by syi

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January 30, 2019

Grant Dull
Lynnwood Public Facilities District
3711 196th Street
Lynnwood, WA 98036

Re: Opinion pursuant to WAC 173-340-515(5) on the Soil Vapor Intrusion Evaluation Work Plan for the following Hazardous Waste Site:

- **Name:** Alderwood Laundry & Dry Cleaners
- **Address:** 3815 196th Street, Lynnwood, WA 98036
- **Facility/Site No.:** 17078
- **VCP No.:** NW3066
- **Cleanup Site ID No.:** 12845

Dear Grant Dull:

Thank you for submitting documents regarding your proposed remedial action for the Alderwood Laundry & Dry Cleaners facility (Site) for review by the Washington State Department of Ecology (Ecology) under the Voluntary Cleanup Program (VCP). Ecology appreciates your initiative in pursuing this administrative option for cleaning up hazardous waste sites under the Model Toxics Control Act (MTCA), Chapter 70.105D RCW.

This letter constitutes an advisory opinion regarding a review of submitted documents/reports pursuant to requirements of MTCA and its implementing regulations, Chapter 70.105D RCW and Chapter 173-340 WAC, for characterizing and addressing the following releases at the Site:

- Tetrachloroethylene (PCE), trichloroethylene (TCE), cis-1,2-dichloroethylene (cis-1,2-DCE) and trans-1,2-dichloroethylene (trans-1, 2-DCE) into the soil and ground water.

- PCE, TCE, vinyl chloride, methylene chloride, trans-1,2-DCE and chloroform into the air.

Enclosure A to this letter includes a detailed Site diagram.

Ecology is providing this advisory opinion under the specific authority of RCW 70.105D.030(1)(i) and WAC 173-340-515(5).

This opinion does not resolve a person's liability to the state under MTCA or protect a person from contribution claims by third parties for matters addressed by the opinion. The state does not have the authority to settle with any person potentially liable under MTCA except in accordance with RCW 70.105D.040(4). The opinion is advisory only and not binding on Ecology.

Ecology's Toxics Cleanup Program has reviewed the following information regarding your proposed remedial action(s):

1. GeoEngineers, *Soil Vapor Intrusion Evaluation Work Plan – WES Building Associated with Alderwood Laundry and Dry Cleaner Site*, November 13, 2018.

2. Department of Ecology, *Further Action Opinion, Alderwood Laundry & Dry Cleaners*, June 4, 2018.

3. GeoEngineers, *Remedial Investigation Report and Response to Ecology Opinion Letter – Former Alderwood Laundry and Dry Cleaners*, March 7, 2018.

4. GeoEngineers, *Remedial Investigation Report, Alderwood Laundry and Dry Cleaner*, report dated March 7, 2018.

5. Department of Ecology, *Further Action Opinion, Alderwood Laundry & Dry Cleaners*, January 2, 2018.

6. GeoEngineers, *Draft Remedial Investigation Report – Alderwood Laundry and Dry Cleaner*, July 12, 2017.

The reports listed above will be kept in the Central Files of the Northwest Regional Office of Ecology (NWRO) for review by appointment only. You can make an appointment by completing a Request for Public Record form (https://www.ecology.wa.gov/About-us/Accountability-transparency/Public-records-requests) and emailing it to PublicRecordsOfficer@ecy.wa.gov, or contacting the Public Records Officer at 360-407-6040. A number of these documents are accessible in electronic form from the Site web page https://fortress.wa.gov/ecy/gsp/Sitepage.aspx?csid=12845.

Based on a review of supporting documentation listed above, pursuant to **requirements contained in MTCA and its implementing regulations, Chapter 70.105D RCW and Chapter 173-340 WAC, for characterizing and addressing the following release(s) at the Site, Ecology has determined:**

- Ecology agrees that, based on current knowledge of Site and building conditions,

the proposed sub-slab soil vapor, indoor air and outdoor air sampling locations (**Enclosure A**) are appropriately sited for further assessing the potential for vapor intrusion of PCE and associated breakdown products into the Washington Energy Services building located at 3909 196th Street Southwest. Ecology concurs with the rationale provided for proposed sample locations, and requests that rationale is provided in the final report if final sample locations vary significantly from those proposed.

- The *Soil Vapor Intrusion Evaluation Work Plan* includes a physical survey of the building characteristics and the building interior. This information will be used to refine the proposed sampling locations. Ecology requests a cross-sectional view of the building depicting the depth of the building foundation, any foundation features (such as sumps) and the seasonal range of depths to the water table be included as a figure in the vapor assessment report.

- Ecology requests a drawing of the building's HVAC system be included in the vapor assessment report, showing how air moves within the building and which rooms, if any, are pressurized when the HVAC system is operating.

- Ecology concurs additional sampling events may be necessary depending on the results of the first event.

This opinion does not represent a determination by Ecology that a proposed remedial action will be sufficient to characterize and address the specified contamination at the Site or that no further remedial action will be required at the Site upon completion of the proposed remedial action. To obtain either of these opinions, you must submit appropriate documentation to Ecology and request such an opinion under the VCP. **This letter also does not provide an opinion regarding the sufficiency of any other remedial action proposed for or conducted at the Site.**

Please note that this opinion is based solely on the information contained in the documents listed above. Therefore, if any of the information contained in those documents is materially false or misleading, then this opinion will automatically be rendered null and void.

The state, Ecology, and its officers and employees make no guarantees or assurances by providing this opinion, and no cause of action against the state, Ecology, its officers or employees may arise from any act or omission in providing this opinion.

Again, Ecology appreciates your initiative in conducting independent remedial action and requesting technical consultation under the VCP. As the cleanup of the Site progresses, you may request additional consultative services under the VCP, including assistance in identifying

applicable regulatory requirements and opinions regarding whether remedial actions proposed for or conducted at the Site meet those requirements.

If you have any questions regarding this opinion, please contact me at (425) 649-7097 or e-mail at diane.escobedo@ecy.wa.gov.

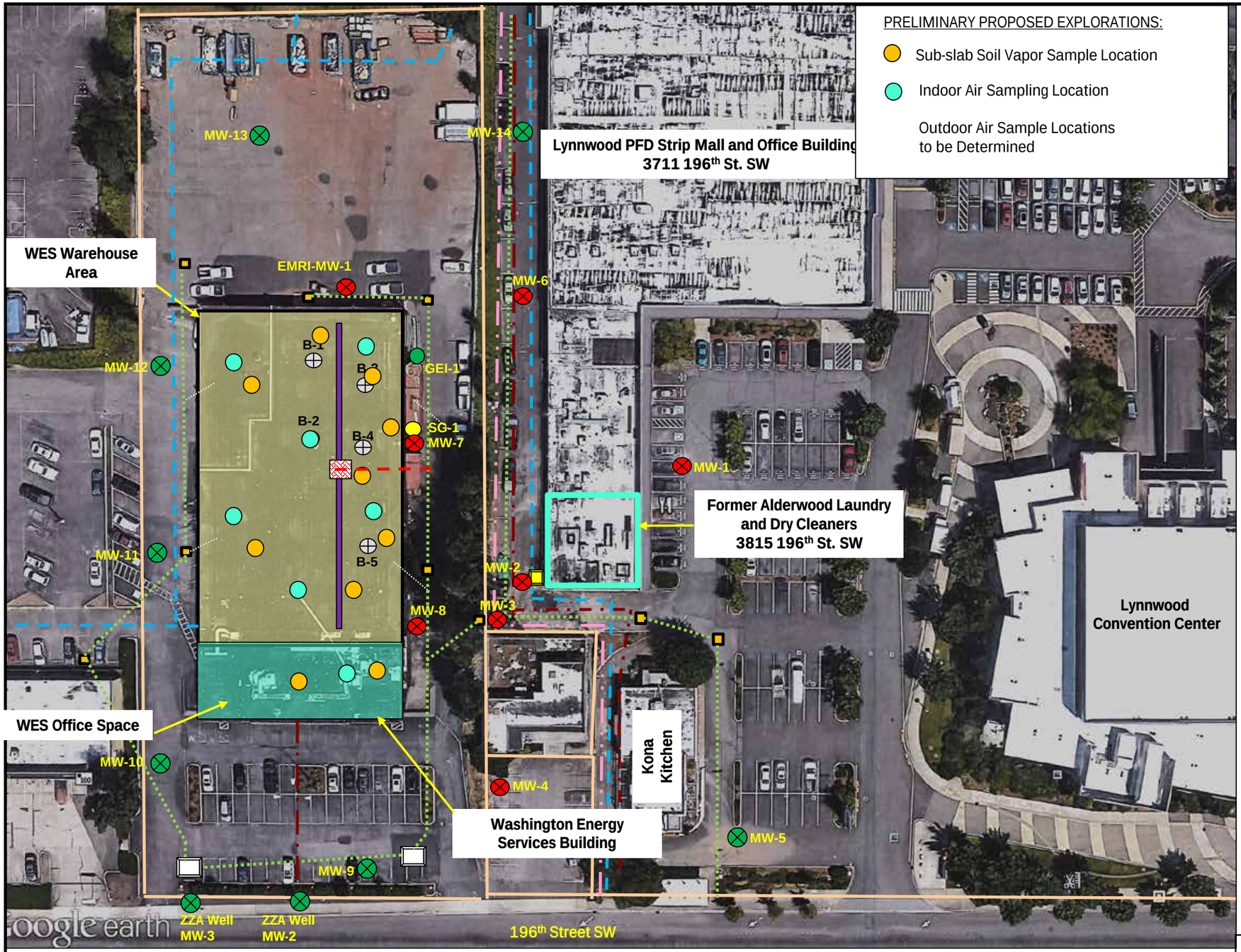
Sincerely,

Diane Escobedo
NWRO Toxics Cleanup Program

Enclosures: (1) A – Diagram of the Site

cc: Sonia Fernandez, VCP Coordinator, Ecology
Dana Carlisle, GeoEngineers, Inc.

Site Diagram



PRELIMINARY PROPOSED EXPLORATIONS:

- Sub-slab Soil Vapor Sample Location
- Indoor Air Sampling Location
- Outdoor Air Sample Locations to be Determined

LEGEND:

- MW-5 — Existing Monitoring Well – No MTCA Exceedance in Groundwater (as of 2018)
- MW-7 — Existing Monitoring Well – MTCA Exceedance In Groundwater (as of 2018)
- GEI-1 — GeoEngineers Soil Boring
- SG-1 — GeoEngineers Soil Vapor Sample
- B-5 — Soil Boring by GCI (December 1993)
- Parcel Line
- Existing Storm Drain
- Existing catch basin
- Existing Sewer Line
- Existing Water Line
- Existing Gas Line
- Existing oil water separator
- Existing concrete grease trap
- Auto shop concrete drainage trench
- Auto shop drainage trench sump
- Auto Shop discharge piping connected to storm drain
- Approximate footprint of Former Alderwood Laundry and Dry Cleaners

MTCA Model Toxics Control Act

N W E S

60 0 60

Feet

Notes:

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

Proposed Sample Locations – WES Building

Former Alderwood Laundry and Dry Cleaners Site, Lynnwood, Washington

GeoEngineers | Figure 2

APPENDIX B
Washington Energy Services Building Soil Vapor Intrusion Evaluation

GeoEngineers
17425 NE Union Hill Road, Suite 250
Redmond, Washington 98052
425.861.6000

September 27, 2019

Lynnwood Public Facilities District
3815 196th Street SW, Suite 136
Lynnwood, Washington 98036

Attention: Grant Dull

Subject: WES Building Vapor Intrusion Evaluation
Associated with Alderwood Laundry and Dry Cleaner Site
3815 196th Street SW
Lynnwood, Washington
VCP NW3066
File No. 17787-001-11

INTRODUCTION AND PURPOSE

This report presents the results of the March 2019 indoor air vapor intrusion (VI) evaluation for the Washington Energy Services (WES) Building at 3909 196th Street SW in Lynnwood, Washington (Snohomish County Tax Parcel 00372600401701, "WES Property"). The Lynnwood Public Facilities District (PFD), owner of the eastern-adjacent property, is conducting an independent cleanup of the former Alderwood Laundry and Dry Cleaners (ALDC) Site with oversight provided by the Washington State Department of Ecology's (Ecology) under the Voluntary Cleanup Program (VCP). The ALDC previously operated in a tenant space on property currently owned by the PFD. Currently available data from the remedial investigation of the ALDC Site (GeoEngineers, 2018a) indicates that the eastern portion of the WES Property are included within the ALDC Site. Figure 1 illustrates the WES Property in relation to the PFD Property and former dry cleaner, as well as the layout of the WES Building and features on the WES Property.

Remedial investigations completed on behalf of the PFD have included explorations on the WES Property and collection of soil, soil gas and groundwater samples for chemical analysis of dry cleaner-related solvents. Based on the sampling completed, dry cleaning-related solvents (i.e., tetrachloroethylene [PCE] and trichloroethene [TCE]) were detected in subsurface soil/soil vapor/groundwater samples collected from the eastern portion of the WES Property. The potential indoor air vapor intrusion risk associated with the WES Building was initially evaluated in 2016 as part of the Remedial Investigation (RI). The initial VI evaluation, completed in accordance with Ecology's published guidance as of 2016, incorporated a conservative numeric model that used available PCE data for soil vapor and groundwater samples that were collected on the WES Property. The initial VI evaluation for the WES Building concluded that predicted indoor air concentrations of contaminants of concern, including PCE and breakdown products TCE, 1,1-

dichloroethene (1,1-DCE), cis- and trans-1,2-DCE and vinyl chloride were acceptable based on the reported commercial uses of the WES Building.

The PFD requested Ecology's review and opinion on the RI Report. In Ecology's Opinion Letter dated June 4, 2018, Ecology indicated that additional VI assessment was recommended for the WES Building to confirm the predicted concentrations in indoor air. Ecology noted the following in their letter: there is a potential for unidentified shallow perched groundwater under the WES Building that could affect sub-slab soil vapor concentrations; the presence of several utility corridors on the WES Property may present preferential pathways for soil vapor; the concentration of PCE in MW-7 groundwater adjacent to the WES Building is elevated; and the results for the 2016 soil vapor sample (SG-1) adjacent to the WES Building may underestimate concentrations directly beneath the building. More recent VI guidance published by Ecology in 2018 indicates that potential VI should be evaluated using multiple lines of evidence, including collection of sub-slab soil vapor and indoor air samples to validate results of predictive modeling. On behalf of the PFD, GeoEngineers prepared a Soil Vapor Intrusion Evaluation Work Plan (Work Plan) for the WES Building (GeoEngineers 2018b). Ecology reviewed the Work Plan and issued an approval letter dated January 30, 2019. The March 2019 VI evaluation of the WES Building was performed in accordance with the Ecology opinion letter to further assess potential VI associated with past releases from the ALDC and to respond to Ecology's comments.

VAPOR INTRUSION (VI) EVALUATION

Overview and Scope

The VI evaluation for the WES Building was conducted in accordance with Ecology's "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action," updated April 2018 (Ecology 2018a) and Ecology's Implementation Memoranda #18, #21 and #22 (Ecology 2018b, 2018c and 2018d).

The scope of services for the March 2019 VI evaluation, which was consistent with the Work Plan (Appendix A), of the WES Building was as follows:

- Conduct a physical survey of the WES Property and the WES Building characteristics and building interior to identify features relevant to indoor air quality and air circulation. Identify potential indoor sources of contaminants of concern to help evaluate whether vapor intrusion is occurring.
- Install sub-slab soil vapor sampling vapor pins and collect sub-slab soil vapor samples.
- Collect indoor and outdoor air samples.
- Analyze the samples for PCE, TCE and related breakdown products following Ecology guidance.
- Collect background (ambient) outdoor air samples, consistent with Ecology guidance, to assist in identifying whether outdoor air may be a source of chlorinated solvents if detected in the indoor air samples.
- Interpret the results of the building survey and the sampling data in accordance with Ecology guidance documents for VI evaluations. The VI evaluation was performed and the conclusions developed following Ecology's lines-of-evidence approach described in Implementation Memorandum #21 (Ecology 2018c).

Cleanup and Screening Levels

The sub-slab soil gas sampling results were compared to values published in Ecology's updated Cleanup Levels and Risk Calculation (CLARC) database (Ecology 2019) for Model Toxics Control Act (MTCA) Method B (cancer or non-cancer, whichever is lower), and to commercial worker screening levels calculated based on the MTCA Method B values presented in CLARC. The screening levels are included in Table 1.

Indoor air sample results were evaluated by comparison to MTCA Method B Indoor Air Cleanup Levels for Residential Exposure and to MTCA Method B Commercial Exposure screening levels. TCE results for indoor air samples were also compared to the Short-Term Commercial Worker Indoor Air Action Level for TCE published in Ecology Implementation Memo 22 (Ecology 2018d). The respective cleanup, screening and action levels are shown in Table 2. The commercial exposure screening levels were calculated according to Ecology's Implementation Memorandum #21 (see "Frequently Asked Question No. 17").

A comparison of the exposure assumptions for MTCA Method B indoor air cleanup levels for residential exposure and MTCA Method B indoor air commercial exposure screening levels is indicated below:

MTCA Method B Indoor Air Cleanup Levels for Residential Exposure	MTCA Method B Indoor Air Commercial Exposure Screening Levels
365 days/year, 24 hours/day for 30 years (carcinogenic chemicals) or for 6 years (non-carcinogenic chemicals)	250 days/year, 10 hours/day for 20 years

WES Building and Heating, Ventilation and Air Conditioning (HVAC) Survey

Indoor air quality can be "affected by ambient (outdoor) air contamination that has come indoors, household product emissions, and other indoor materials emitting VOCs" (Ecology 2018a). To assess these factors on indoor air quality, GeoEngineers completed a survey of the WES Building on March 6, 2019, prior to conducting the indoor air and ambient outdoor air sampling. The building warehouse and offices were occupied at the time of the survey. The building was not occupied at the time of the sampling, which was completed during weekend hours to avoid disruption of warehouse and office work activities.

The WES Building was previously used as an automotive dealership and service center. Past activities in the building included automotive maintenance as well as body repair and painting. As noted in the RI Report for the ALDC, automotive service activities may have historically used solvents or cleaning products containing volatile organic compounds (VOCs). Figure 3 of the VI Work Plan shows areas of the WES Building previously used for automotive service-related activities, and the locations of documented historic waste storage and tanks based on historical information for the WES Property included in the RI for the ALDC. An interior grated floor drain trench was located inside the previous automotive maintenance area and remains today (but is not used). The location of the drain is shown in the attached Figure 1. The central drainage sump connects to the Property storm drain system. This information regarding historic locations of automotive-related uses was considered in the selection of the sample locations for this VI assessment. More definitive sampling would need to be performed in the future (for example, if the building was demolished) to assess whether historical operations have impacted the subsurface.

The March 2019 building survey was completed for the entire WES Building, including the warehouse space in the northern portion of the building and the office space in the southern portion of the building, as shown

in Figure 1. The building occupies a footprint of 28,236 square feet, of which the warehouse areas comprise approximately 23,000 square feet and office spaces comprise approximately 5,200 square feet. A partial second floor office space exists in the southern and northern ends of the building. Representative photographs of the building's warehouse and office areas are shown below.

Photograph 1 – WES Building warehouse area looking south. Grated floor drain trench visible in photo left.

The warehouse has a concrete slab-on-grade floor. Flat entry paved loading bays open to the exterior are situated along the northern and western ends of the warehouse; each bay has a rolling loading bay door to access adjacent parking lot and alley ways. The warehouse area is separated into one main inventory storage space, two storage rooms, two offices, a conference room and employee restrooms. A grated floor drain grate trench, associated with prior use of the building for automotive repair, extends through the

Photograph 2 – WES Building warehouse area looking north. Grated floor drain trench visible in photo right.

warehouse oriented north-south. The drain has a central drainage sump, which discharges into the storm drain line located outside the east side of the building (Figure 1). The interior drain was visibly dry during the survey.

Miscellaneous chemicals, materials and equipment used by WES are stored in several locations of the warehouse. Items observed during the March 2019 survey included PVC primer, cleaning solvents, cleaning supplies, tires, and machinery (see Photo 3 below).

Photograph 3 – WES Building western storage room chemical storage including PVC primer, cleaning solvents and tires.

WES' main offices are situated in the southern end of the building. Concrete floors in the office areas are covered with finishes that include carpet and linoleum. A restroom and utility room are included within the eastern portion of the office areas. The utility room has an electric water heater, a floor sink and drain. Small quantities of typical cleaning products were observed stored in the bathroom areas.

Photograph 4 – WES office space looking east towards restroom.

All spaces where building occupants are located are connected to the building's mechanical heating, ventilation and air conditioning (HVAC) system. The office and warehouse areas are served by separate HVAC systems; the HVAC units for the office area are located on the building rooftop. The rooftop units could not be safely accessed during the March 2019 survey. Suspended furnaces are used in the warehouse area.

The building HVAC systems operate when the building is normally occupied, Monday through Friday. When operating the HVAC systems typically create a neutral to slightly positive pressure inside the building relative to ambient pressure outside the building, unless the bay doors in the warehouse area are open. Outside of normal business hours the HVAC systems are typically not operating.

Field Investigation

Samples

GeoEngineers collected ten sub-slab soil-gas samples (SSV-1 through SSV-10), seven indoor air (IA-1 through IA-7) samples and three ambient outdoor air (OA-1 through OA-3) samples on March 31, 2019. Approximate sample locations are shown in Figure 1.

- **Sub-Slab Soil Gas Samples.** The sub-slab sample locations were selected based on the proximity to the suspected dry cleaner source on the eastern-adjacent PFD Property, the presumed lateral extent of the PCE plume in groundwater and groundwater monitoring well MW-7, potential preferential pathways for soil vapor migration, and past features of the WES Building as explained below. Sample locations were adjusted where necessary due to physical constraints such as interior walls and partitions. Two samples (SSV-1 and SSV-2) were collected beneath the southern office area, with SSV-2 being close to the restroom utility closet floor drain in the southeast corner of the building. Samples

SSV-5 and SSV-7 were the easternmost sample locations, near the eastern wall of the WES Building and closest to the east-adjacent PFD Property; SSV-7 was near monitoring well MW-7 and the 2016 soil gas sample (SG-1) location. Samples SSV-3, SSV-6, SSV-8 and SSV-9 were located closest to warehouse floor drain; SSV-6 was closest to the central floor drain sump and storm drain discharge pipe. SSV-10 was situated within the area of the WES Building formerly used for parts washing and painting and where a floor drain historically was located. SSV-4 was situated in the southwest margin of the warehouse to assess soil vapors furthest from the former dry cleaner and groundwater PCE plume.

- **Indoor Air Samples.** The indoor air sample locations were generally coupled with the sub-slab soil vapor sample locations or placed in between sub-slab sample locations to assess the correlation - if any - between VOC concentrations in sub-slab soil vapor and VOC concentrations in indoor air above the slab.
- **Outdoor Air Samples.** Ecology's Draft VI Guidance indicates that building-specific ambient (outdoor) air samples are to be collected as part of the Tier II VI evaluation at the same time indoor air samples are collected. Outdoor air sample results are used to assess how background outdoor air conditions can influence indoor air quality. Ecology guidance allows outdoor air results to be evaluated in conjunction with indoor air sampling to better estimate whether contaminants measured in indoor air are likely, or not likely, to be due to vapor intrusion (Ecology 2018a). The outdoor air sample locations were selected to be representative of background outdoor air that may enter the buildings via the main office doors and bay doors at the loading bays. One of the March 2019 outdoor air sample locations was on the west side of the building near a bay door (OA-1); one sample (OA-2) was located on the south end of the building near the office entry; one sample (OA-3) was located on the north end (upwind on the day of sampling).

Weather Conditions and HVAC Operation

The weather on the day of sampling was 60 to 67 degrees F, with wind at about 5 miles per hour to the south. Barometric pressure ranged from 30.05 to 30.45 inches of mercury (Weather Underground 2019), for the three days leading up to the sampling, with pressures increasing slightly over the time period.

To the extent practicable, indoor air sampling was conducted under conservative building operational conditions: bay doors were kept closed and ingress and egress activities during sampling activities were minimized. The intent was to obtain indoor air samples that were representative of normal conditions, but to reduce potential interferences by collecting samples when few to no building occupants are present and when exterior doors are not regularly opening and closing.

Sampling Procedures

Initial canister pressure start date and start time were recorded on a field data form. The inlet valve on the canister was opened to collect the sample. The canisters were filled until a vacuum equivalent of approximately 5 inches of mercury remains in each canister. At that time, the sample team closed the inlet valve and recorded the canister pressure and stop date and time on the field data form. Canisters were then prepared and delivered to the laboratory for chemical analysis.

The sub-slab samples were collected using 1.5-liter Summa canisters the day following installation of the Vapor Pins. Samples were tested for leaks using a shut-in test and then shrouded with helium during sample collection as a secondary leak test in the field and laboratory. The flow rates during sampling were laboratory calibrated to less than 200 milliliters per minute.

Indoor and outdoor air samples were obtained by placing a 6-liter Summa canister equipped with an 8-hour flow controller at the sample locations. Tubing was connected to each canister and was used to elevate the sample intake into the breathing zone at approximately 3 to 5 feet above the ground surface.

Sub-slab soil gas samples SSV-1 through SSV-10, indoor air samples IA-1 through IA-7, and outdoor air samples OA-1 through OA-3 were submitted to Friedman and Bruya, Inc. in Seattle, Washington for chemical analyses of PCE, TCE and breakdown products by U.S. Environmental Protection Agency (EPA) Method TO-15SIM. Laboratory reports are presented in Appendix B.

Chemical Analytical Results

The March 2019 sub-slab soil vapor, indoor air and outdoor air chemical analytical results are summarized in Tables 1 and 2. Prior to evaluating the indoor air sample results, indoor air results are normally adjusted to account for influences due to outdoor air (ambient air), which is consistent with Ecology's Draft VI Guidance (Ecology 2018a). However, since outdoor air sample results were non-detect for the chemicals of interest no adjustments were necessary.

Sub-Slab Soil Gas and Indoor Air Commercial Worker screening levels were calculated according to Ecology guidance.

Sub-Slab Soil Gas Results

PCE was detected in nine of the ten sub-slab soil vapor samples submitted for analysis at concentrations ranging from 24 to 2,600 micrograms per cubic meter (µg/m^3). PCE concentrations in four of these samples exceeded the Sub-Slab Commercial Worker screening level of 1,700 µg/m^3. PCE concentrations in six of the samples exceeded the more conservative MTCA Method B screening levels for residential scenarios. Other halogenated volatile organic compounds (HVOCs) were generally non-detect with minor exceptions where detected concentrations were less than the MTCA Method B residential and commercial screening levels.

Outdoor and Indoor Air Sample Results

The outdoor air samples were non-detect for PCE and related breakdown products.

Indoor air sample results for PCE and TCE were non-detect except one sample (IA-1-033119) collected from the southeast office area. The detected concentrations of PCE and TCE exceeded the MTCA Method B Indoor Air Cleanup Level for residential exposure. However, concentrations of PCE and TCE in sample IA-1-033119 were less than the MTCA Method B Commercial Worker Indoor Air screening level. The TCE concentration was also less than the TCE Short-Term Commercial Worker Indoor Air Action Level, which is intended to protect more sensitive populations in the workplace and would require more immediate action if exceeded. Trans-1,2-DCE was detected in six of the seven indoor air samples at relatively low concentrations (only slightly above laboratory reporting limits). No screening levels have been established for trans-1,2-DCE.

CONCLUSIONS

Consistent with Ecology guidance, the VI evaluation for the WES Building considers multiple lines of evidence to evaluate whether indoor air vapor intrusion is occurring at levels of regulatory concern under MTCA. A discussion of the lines of evidence is presented below.

- The March 2019 VI study results were evaluated relative to MTCA Method B soil gas screening levels or indoor air cleanup levels for residential exposure, MTCA Method B commercial worker screening levels and the short-term commercial worker indoor air action level for TCE. PCE was not detected in the indoor air samples collected in the WES warehouse area. However, PCE was detected in the indoor air in the sample (IA-1) collected from the office space portion of the building. While the results indicated that the detected concentrations of PCE and TCE exceeded the MTCA Method B Indoor Air Cleanup Levels for residential uses, they did not exceed the MTCA Method B Commercial Worker Indoor Air screening levels or the Short-Term Commercial Worker Indoor Air Action Level (applicable to TCE only).

- Sub-slab and indoor air sampling results were evaluated in relation to identified preferential vapor migration pathways to indoor air, such as underground utilities and interior drainage features, and the approximate extent of PCE in soil and groundwater. Underground utilities and interior drainage features may be preferential pathways for migration of volatiles beneath the building slab and create potential entry points for volatiles into the building. A majority of the samples collected for the March 2019 study were located within the eastern margin of the WES Building based on the proximity of the dry cleaner source to the east, the groundwater plume migrating from the east and the multiple utilities and preferential pathways identified in these areas.
- The correlation, if any, between VOC concentrations in sub-slab soil vapor and VOC concentrations in indoor air above the slab was evaluated. Given the relatively wide distribution of dry cleaner-related PCE in groundwater, the presence of PCE in sub-slab soil vapor beneath the eastern portion of the WES Building is not unexpected. However, the migration of PCE in soil vapor is highly dependent on natural and man-made preferential pathways with higher relative permeability, such as sand stringers in the glacial till, the upper unit of less dense fill/weathered fill and backfill surrounding underground utilities. The March 2019 soil vapor PCE data were consistent with a dry cleaner source area except for the data from one sub-slab soil vapor sample beneath the northwest portion of the WES Building (SSV-10). Sub-slab soil vapor detections for PCE were primarily limited to locations closer to the PFD Property to the east, with the exception of sample SSV-10 in the northwest corner of the WES Building. Auto body repair and painting activities historically were performed in this area when the WES building was used as an automotive dealership.
- Products, materials, equipment and other environmental factors inside the building (referred to as “indoor air sources”) were evaluated for their potential to be contributing to volatile contaminants in indoor air. No significant indoor air sources were identified during the March 2019 building survey aside from cleaning products. Although it was not directly observed during the building survey, workers in the building potentially may wear clothing that has been dry cleaned with PCE and this should not be ruled out as a potential indoor air source.

The WES Building is a commercial workspace; therefore, the commercial worker screening levels were considered appropriate for comparison purposes for this study in accordance with Ecology guidance. On that basis, and given that the RI findings for the ALDC Site indicate the groundwater contaminant plume is

essentially stable, we conclude that vapor intrusion of PCE and other chlorinated VOCs is not occurring at levels of regulatory concern for a commercial building.

REFERENCES

GeoEngineers, Inc. 2018a. "Remedial Investigation Report, Alderwood Laundry and Dry Cleaner, Lynnwood Public Facilities District Property" prepared for Lynnwood Public Facilities District, dated March 7, 2018.

_____ 2018b. "Soil Vapor Intrusion Evaluation Work Plan, Washington Energy Services Building, 3909 196th Street SW, Lynnwood, Washington" prepared for Lynnwood Public Facilities District, dated November 13, 2018.

Washington State Department of Ecology (Ecology). 2019. Cleanup Levels and Risk Calculation Master Spreadsheet. 2015. Accessed online July 2019. https://fortress.wa.gov/ecy/clarc/

_____ 2018a. Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action. Publication No. 09-09-047. Updated April 2018.

_____ 2018b. Petroleum Vapor Intrusion (PVI): Updated Screening Levels, Cleanup Levels, and Assessing PVI Threats to Future Buildings - Implementation Memo No. 18. January 10, 2018.

_____ 2018c. Frequently Asked Questions (FAQs) Regarding Vapor Intrusion (VI) and Ecology's 2009 Draft VI Guidance - Implementation Memo No. 21. November 15, 2018.

_____ 2018d. DRAFT Vapor Intrusion (VI) Investigations and Short-term Trichloroethene (TCE) Toxicity - Implementation Memo No. 22. November 21, 2018.

Weather Underground 2019. Weather History. Accessed on Internet in July 2019. https://www.wunderground.com/history/daily/KSEA/date/2019-2-21?req_city=Seattle-Tacoma%20International&req_state=WA&req_statename=Washington&reqdb.zip=98158&reqdb.magic=3&reqdb.wmo=99999

If you have any questions about this Vapor Intrusion Evaluation, please let us know. Thank you.

Sincerely,
GeoEngineers, Inc.

Cris J. Watkins
Project Manager

Dana Carlisle, PE
Principal

9-27-19

CJW:DC:cje

Attachments:
Table 1. Soil Vapor Samples Chemical Analytical Results
Table 2. Indoor and Outdoor Air Samples Chemical Analytical Results - March 2019
Figure 1. March 2019 VI Evaluation Sample Locations – WES Building
Appendix A. Soil Vapor Intrusion Evaluation Work Plan
Appendix B. Lab Report

Table 1

Soil Vapor Samples Chemical Analytical Results[1]

WES Building
Lynnwood, Washington

Sample Identification[2]	Sample Date	General Sample Location	VOCs4 (µg/m3)					
			1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	Trichloroethene	Vinyl Chloride
SG-1	09/20/16	Outside building footprint east of WES Building	--	<0.02	<0.006	**14,800** [3]	1.07	< 0.0850
Sub-Slab Soil Vapor Samples								
SSV-1-033119	03/31/19	WES Office Space - Center	<15	<15	<15	<260	<10	<9.7
SSV-2-033119	03/31/19	WES Office Space - East	<0.59	<0.59	<0.59	**24**	<0.4	**0.56**
SSV-3-033119	03/31/19	WES Warehouse - Southeast	<3.2	<3.2	<3.2	**810**	<2.1	<2
SSV-4-033119	03/31/19	WES Warehouse - Southwest	<0.59	<0.59	<0.59	**50**	<0.4	<0.38
SSV-5-033119	03/31/19	WES Warehouse - East - South-Middle	<16	<16	<16	**2,200**	<11	<10
SSV-6-033119	03/31/19	WES Warehouse - East-Center	<17	<17	<17	**2,600**	<11	<11
SSV-7-033119	03/31/19	WES Warehouse - Northeast-Center	<15	<15	<15	**2,300**	<10	<10
SSV-8-033119	03/31/19	WES Warehouse - Northeast	<3.1	<3.1	<3.1	**780**	<2.1	<2
SSV-9-033119	03/31/19	WES Warehouse - North-Center	<0.59	<0.59	<0.59	**33**	**2.3**	**0.47**
SSV-10-033119	03/31/19	WES Warehouse - Northwest	<15	<15	<15	**2,100**	<9.9	<9.5
MTCA Method B Sub-Slab Soil Gas Screening Levels5			3,000	NE	NE	320	12	9.4
MTCA Method B Sub-Slab Soil Gas Commercial Worker Remediation Levels[6]			23,000	NE	NE	1,700	110	50

Notes:

[1] Chemical analyses performed by Friedman and Bruya, Inc. of Seattle, Washington. Samples were analyzed for helium for sampling QA/QC purposes. Helium was not detected. Elevated detection limits were observed in sample SSV-1 due to matrix interference. Detection limits are still less than the screening and remediation levels.

[2] The approximate exploration locations are shown in Figure 1.

[3] Result is for a soil vapor sample outside the building footprint and therefore is not compared to screening levels for sub-slab soil vapor.

[4] Volatile organic compounds (VOCs) analyzed by U.S. Environmental Protection Agency (EPA) Method TO-15. VOCs analyzed include PCE, TCE and associated daughter products.

[5] Model Toxics Control Act (MTCA) Method B Sub-Slab Soil Gas Screening Levels are from Ecology's "CLARC Master Spreadsheet.xlsx" dated May 2019. These levels are calculated by dividing the MTCA Method B Air Cleanup Level (see Table 2) by the default soil vapor attenuation factor of 0.03.

[6] MTCA Method B Sub-Slab Soil Gas Commercial Worker Remediation Levels (see Table 2) are calculated by dividing the MTCA Method B Air Commercial Worker Remediation Levels by the default soil vapor attenuation factor of 0.03.

Weather conditions at the time of sampling: wind from the north at 5 mph. Weather conditions per https://www.wunderground.com/history/daily/us/wa/seattle/KSEA/date/2019-3-31

<0.4 = analyte was not detected at concentrations greater than the laboratory reporting. "--" = not tested

NE = Not Established; µg/m^3 = microgram per cubic meter

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

Gray shading indicates the detected concentration is greater than MTCA Method B Sub-Slab Soil Gas Screening Levels.

Orange shading indicates the detected concentration is greater than MTCA Method B Sub-Slab Soil Gas Screening and Commercial Worker Remediation Levels.

Table 2

Indoor and Outdoor Air Samples Chemical Analytical Results - March 2019[1]

WES Building
Lynnwood, Washington

Sample Identification[2]	Sample Date	General Sample Location	VOCs[3] (µg/m^3)					
			1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	Trichloroethene	Vinyl Chloride
Indoor Air Samples								
IA-1-033119	03/31/19	WES Office Space - Center	<0.4	<0.4	<0.4	**24**	**1.7**	<0.26
IA-2-033119	03/31/19	WES Warehouse - South-Center	<0.4	<0.4	**0.93**	<6.8	<0.27	<0.26
IA-3-033119	03/31/19	WES Warehouse - Southwest	<0.4	<0.4	**0.83**	<6.8	<0.27	<0.26
IA-4-033119	03/31/19	WES Warehouse - East-Center	<0.4	<0.4	**0.90**	<6.8	<0.27	<0.26
IA-5-033119	03/31/19	WES Warehouse - North-Center	<0.4	<0.4	**0.98**	<6.8	<0.27	<0.26
IA-6-033119	03/31/19	WES Warehouse - Northeast	<0.4	<0.4	**0.80**	<6.8	<0.27	<0.26
IA-7-033119	03/31/19	WES Warehouse - Northwest	<0.4	<0.4	**0.77**	<6.8	<0.27	<0.26
Outdoor Air Samples								
OA-1-033119	03/31/19	West of Southwest Corner of WES Warehouse	<0.4	<0.4	<0.4	<6.8	<0.27	<0.26
OA-2-033119	03/31/19	South of Southwest Corner of WES Office Space	<0.4	<0.4	<0.4	<6.8	<0.27	<0.26
OA-3-033119	03/31/19	North of WES Warehouse	<0.4	<0.4	<0.4	<6.8	<0.27	<0.26
MTCA Method B Indoor Air Cleanup Levels[4]			91	NE	NE	9.6	0.37	0.28
MTCA Method B Commercial Worker Indoor Air Screening Levels[5]			700	NE	NE	51	3.2	1.5
TCE Short-Term Commercial Worker Indoor Air Action Level[6]			NE	NE	NE	NE	7.5	NE

Notes:

[1] Chemical analyses performed by Friedman and Bruya, Inc. of Seattle, Washington.

[2] The approximate sample collection locations are shown in Figure 1.

[3] Volatile organic compounds (VOCs) analyzed by U.S. Environmental Protection Agency (EPA) Method TO-15. VOCs analyzed include PCE, TCE and associated daughter products.

[4] Model Toxics Control Act (MTCA) Method B indoor air cleanup level from Ecology's "CLARC Master Spreadsheet.xlsx" dated May 2019. These levels assume an exposure scenario of 365 days/year, 24 hours/day for 30 years.

[5] MTCA Method B indoor air cleanup level from Ecology's "CLARC Master Spreadsheet.xlsx" dated May 2019. These levels assume a commercial worker exposure scenario of 250 days/year, 10 hours/day for 20 years.

[6] The TCE short-term commercial worker indoor air action level represents maximum 3-week mean concentration for women of childbearing age and assumes a 45-hour work week (Ecology 2018).

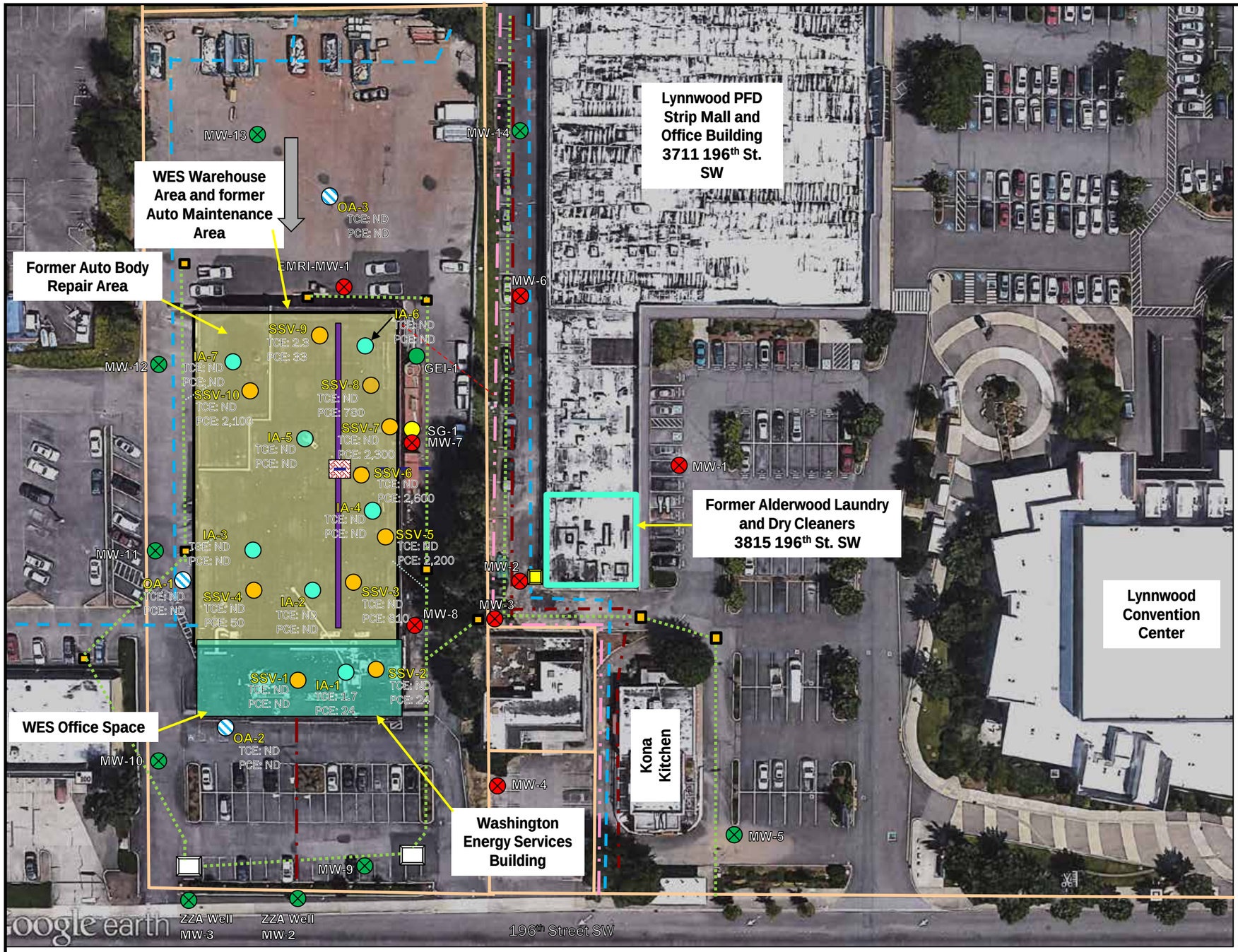
Weather conditions at the time of sampling: wind from the north at 5 mph. Weather conditions per https://www.wunderground.com/history/daily/us/wa/seattle/KSEA/date/2019-3-31

<0.4 = analyte was not detected at concentrations greater than the laboratory detection limit.

NE = Not Established; µg/m^3 = microgram per cubic meter

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

Gray shading indicates the detected concentration is greater than MTCA Method B Indoor Air Cleanup Levels, but less than the Commercial Worker Indoor Air Remediation Levels and Short-Term Commercial Worker Indoor Air Action level for TCE.



LEGEND:

- MW-5 — Existing Monitoring Well – No MTCA Exceedance in Groundwater (as of 2018)
- MW-7 — Existing Monitoring Well – MTCA Exceedance In Groundwater (as of 2018)
- GEI-1 — GeoEngineers Soil Boring
- SG-1 — GeoEngineers Soil Vapor Sample
- Sub-slab Soil Vapor Sample Location
- Indoor Air Sampling Location
- Outdoor Air Sample Locations

PCE and TCE results for sub-slab soil vapor and air samples are in micrograms per cubic meter

- Parcel Line
- Existing Storm Drain
- Existing catch basin
- Existing Sewer Line
- Existing Water Line
- Existing Gas Line
- Existing oil water separator
- Existing concrete grease trap
- Auto shop concrete drainage trench
- Auto shop drainage trench sump
- Auto Shop discharge piping connected to storm drain
- Approximate footprint of Former Alderwood Laundry and Dry Cleaners
- Subsurface Electrical Utility Between Properties
- Approximate Wind Direction on Day of Sampling

N W E S

60 0 60

Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is only for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. MTCA = Model Toxics Control Act; PCE = Tetrachloroethene; TCE = Trichloroethene; ND = Analyte not detected above laboratory detection limit

March 2019 VI Evaluation Sample Locations – WES Building

Former Alderwood Laundry and Dry Cleaners Site, Lynnwood, Washington

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Figure 1

APPENDIX A
Soil Vapor Intrusion Evaluation Work Plan

Soil Vapor Intrusion Evaluation Work Plan

Washington Energy Services Building
3909 196th Street SW
Lynnwood, Washington
Alderwood Laundry and Dry Cleaner VCP NW3066
GEI File No. 17787-001-11

for
Lynnwood Public Facilities District

November 13, 2018

GeoEngineers
Earth Science + Technology

Soil Vapor Intrusion Evaluation Work Plan

Washington Energy Services Building
3909 196th Street SW
Lynnwood, Washington
Alderwood Laundry and Dry Cleaner VCP NW3066
GEI File No. 17787-001-11

for
Lynnwood Public Facilities District

November 13, 2018

GeoEngineers

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Soil Vapor Intrusion Evaluation Work Plan

Washington Energy Services Building
3909 196th Street SW
Lynnwood, Washington

Alderwood Laundry and Dry Cleaner VCP NW3066
GEI File No. 17787-001-11

November 13, 2018

Prepared for:

Lynnwood Public Facilities District
3815 196th Street SW, Suite 136
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Table of Contents

1.0 INTRODUCTION AND BACKGROUND

The purpose of this Soil Vapor Intrusion (VI) Assessment Work Plan is to describe proposed sub-slab soil vapor and indoor air sampling intended to evaluate the potential for soil vapor intrusion of volatile organic compounds (VOCs) related to dry cleaning solvents into the Washington Energy Services (WES) Building located at 3909 196TH Street SW in Lynnwood, Washington (Snohomish County Tax Parcel 00372600401701 "WES Property"). The Lynnwood Public Facilities District (PFD), owner of the eastern-adjacent property, is conducting an independent cleanup of the former Alderwood Laundry and Dry Cleaners (ALDC) Site with oversight provided under the Washington State Department of Ecology's (Ecology) Voluntary Cleanup Program (VCP). The ALDC previously operated in a tenant space on property currently owned by the PFD. Based on findings included in the Remedial Investigation Report (RI Report) for the ALDC Site dated March 7, 2018, portions of the WES Property are included within the area identified as the ALDC Site. The general vicinity of the WES Property is shown in Figure 1. The layout of the building and features associated with the WES Building and the former dry cleaner on the eastern-adjacent PFD property are shown in Figure 2.

Remedial investigations completed on behalf of the PFD have included explorations on the WES Property and collection of soil, soil gas and groundwater samples for chemical analysis of dry cleaner-related solvents. Based on the sampling completed, dry cleaning-related solvents (i.e., tetrachloroethylene [PCE] and trichloroethene [TCE]) were detected in subsurface soil/soil vapor/groundwater samples collected from the eastern portion of the WES Property. Potential indoor air vapor intrusion risk associated with the WES Building was initially evaluated in 2016 as part of the RI. The initial evaluation, completed in accordance with Ecology's published guidance as of 2016, incorporated a conservative numeric model that used available PCE data for soil vapor and groundwater samples that had been collected on the WES Property. The initial VI evaluation concluded that predicted indoor air concentrations of contaminants of concern, including PCE and breakdown products TCE, 1,1-dichloroethene (1,1-DCE), cis- and trans 1,2-DCE and vinyl chloride were acceptable based on commercial uses of the WES Building.

Earlier this year the PFD requested Ecology's review and opinion on the RI Report. In Ecology's Opinion Letter dated June 4, 2018, Ecology indicated that additional VI assessment was recommended for the WES Building. Ecology noted the following in their letter: that there is a potential for unidentified shallow perched groundwater under the WES Building that could affect vapor concentrations, that the presence of several utility corridors on the WES Property may present preferential pathways for soil vapor, that the concentration of PCE in MW-7 groundwater adjacent to the WES Building is elevated, and that the soil vapor sample (SG-1) results adjacent to the WES Building may underestimate concentrations immediately under the building. More recent guidance published by Ecology in 2018 suggests evaluating potential VI using multiple lines of evidence, including collection of sub-slab soil vapor and indoor air samples to validate results of predictive modelling.

2.0 OBJECTIVE

The objective of the vapor intrusion assessment is to collect data regarding the nature and extent of potential vapor intrusion impacts in the WES Building resulting from PCE and related compounds in the subsurface, to identify if conditions are protective of human health as required by the Model Toxics Control Act (MTCA).

The Work Plan includes the following general tasks designed to meet the objectives of the assessment. Section 3.0 of the Work Plan presents detailed descriptions of the proposed scope and sampling activities.

- Conduct a physical survey of the building characteristics and building interior and the Property to refine the preliminary proposed sampling locations.
- Install sub-slab soil vapor sampling vapor pins and collect sub-slab soil vapor samples.
- Collect indoor air and outdoor ambient air samples.
- Interpret the data and present the findings in a Vapor Intrusion Evaluation Report for the WES Building.

3.0 VAPOR INTRUSION EVALUATION SCOPE

The VI evaluation for the WES Building will be conducted following Ecology's "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action," updated April 2018 (Draft VI Guidance) and other related Ecology guidance. Specifically, the evaluation will follow Ecology's Tier II Assessment methodology as described in this document and requested by Ecology in their June 2018 letter.

Identification of potential indoor sources within commercial businesses is critical to evaluating whether vapor intrusion is occurring. Commercial operations such as those currently conducted in the WES Building may result in indoor air sources of VOCs, which could potentially bias indoor air sampling and affect interpretation/use of the indoor air sampling data. For example, carpeting or cleaning agents are known to emit VOCs. Therefore, the first step of the evaluation is to conduct a survey of the building characteristics and interior.

Current and historic site figures were used to identify the locations of subsurface potential preferential pathways. Underground utilities entering the building or adjacent to the building are typically backfilled with pea gravel or similar materials. These types of backfill are often much more permeable than native soils and can allow for vapors to accumulate or be transported under structures. The locations of these features were considered in selecting proposed sample locations for the VI assessment. Figure 2 shows the layout of the WES Building and readily identifiable current and historic subsurface preferential pathways.

The WES Building was formerly an automotive dealership and service center. Activities in the building included automotive maintenance as well as body repair and painting. As noted in the RI Report for the ALDC, automotive service activities may have historically used VOCs. Based on historical information for the WES Property as presented in the RI for ALDC, Figure 3 shows the areas of the WES Building previously used for automotive service-related activities, and the locations of documented historic waste storage and tanks. A historic drain sump and trench (see Figures 2 and 3) with a connection to the storm drain system was present in the building during the automotive uses of the WES building. These historic use areas were considered in the selection of proposed sample locations for this VI assessment.

Sub-slab soil vapor, indoor air and outdoor air sampling are planned to evaluate the potential for vapor intrusion of PCE and related breakdown products (associated with probable past releases on the adjacent property from the ALDC) into the WES Building. Data collected through the sub-slab soil vapor and outdoor air sampling are used to assist in identifying the potential source(s) of chlorinated solvents if detected in the indoor air samples.

The rationale for the preliminary proposed sample locations is discussed below. Approximate sample locations are shown in Figures 2 and 3.

- **Indoor Air Samples (Seven Locations).** The proposed indoor air sample locations were selected for the purpose of evaluating indoor air quality in regularly occupied spaces across the footprint of building, with a slightly higher density of samples to be collected in areas closest to eastern portion of the building where the dry cleaner-related groundwater plume is known to exist. Indoor air sample locations are also proposed in the western portion of the building to provide adequate coverage and to support the interpretation of potential sources of indoor air contaminants (which include historic activities and current activities). Preferential pathways such as penetrations in the concrete floor and the locations of windows and doors that will be identified during the building survey may influence the final selection of proposed indoor air samples.
- **Sub-Slab Soil Vapor Samples (Ten Locations).** The proposed sub-slab soil vapor sample locations were selected for the purpose of evaluating contaminant concentrations in soil vapor across the footprint of building, with the focus on the areas closest to known groundwater impacts, past sampling locations and preferential pathways (e.g. former drainage trench, utility trenches).
- **Outdoor Air Samples (Two or Three Locations).** The proposed outdoor air sample locations have not yet been determined but will be selected based on the stated objective to evaluate outdoor air that may enter the building via doors and windows and the building heating, ventilation and air conditioning (HVAC) systems. The proposed locations will be selected to be upwind based on wind direction the day of sampling and will include the HVAC system air intake to more accurately estimate outdoor air influence on indoor air quality.

Samples will be analyzed for PCE and breakdown products: TCE, 1,1-DCE, cis- and trans 1,2-DCE and vinyl chloride by U.S. Environmental Protection Agency (EPA) Method TO-15 SIM (indoor and outdoor air) and EPA Method TO-15 (soil vapor). To assess sample integrity and for quality control, helium will also be analyzed (ASTM International [ASTM] Standard Practices Test Method D 1946).

The current Work Plan envisions one event of sub-slab soil vapor, indoor air and outdoor ambient air sampling. However, additional sampling events may be proposed, depending on the results from the first event. If additional events are proposed, sampling protocols will be similar to those outlined in this Work Plan.

3.1. Sampling Methodologies and Quality Assurance

The following methods will be used to collect the indoor air, outdoor air and sub-slab soil vapor samples. A more detailed sampling analysis plan (SAP) is presented in Appendix A and Vapor Pin™ installation procedures for the sub-slab soil vapor sampling are presented in Appendix B. The quality assurance project plan (QAPP) is included in this Work Plan as Appendix C.

3.1.1. Indoor Air and Outdoor Air Samples

Photo 1. Summa Canister with Intake

- Indoor and outdoor air samples will be collected at the same time over an 8-hour period using evacuated 6-Litre Summa canisters, similar to that shown in Photo 1.
- Air sampling will be conducted using a vacuum gauge and an 8-hour flow controller.
- The canisters for indoor air samples will be placed on the ground and the canister intake situated approximately 3- to 5-feet aboveground to collect samples representative of the breathing zone for building occupants.
- Outdoor air samples will be collected near the air intake for the rooftop HVAC units that directs indoor air into the WES Building.
- To the extent practicable, indoor air sampling will be conducted under conservative (i.e., "worst case") conditions as recommended by Ecology guidance. Specifically, windows will be kept closed and ingress and egress activities will be minimized to the extent possible during sampling. Indoor air samples will be collected on a weekend or a holiday when the building is presumably not occupied; however, the HVAC system will operate at least 24 hours prior and during the sampling period as if the building were occupied to maintain normal indoor air temperatures. The intent is to obtain indoor air samples that are representative of normal conditions, but sample when few to no building occupants are present and few windows and exterior doors are opening and closing, to reduce potential interferences.

3.1.2. Sub-Slab Soil Vapor Samples

Photo 2. Vapor Pin in Concrete Slab

- The sub-slab samples will be collected using Vapor Pin™ sampling devices similar to the one shown on Photo 2. The Vapor Pin™ will be installed in general accordance with the manufacturers' standard operating procedures (Appendix B), which involves drilling a hole through the concrete slab to insert the Vapor Pin™ and secure it in place with the silicone gasket.
- Pre-sampling quality control procedures (shut-in test, leak testing, and purging) and soil vapor sampling will not take place for at least 30 minutes hours following installation of the vapor pin.
- Sub-slab soil vapor samples will be collected using evacuated 1-liter Summa canisters.

3.2. Physical Survey

A physical survey will be conducted by field personnel within the building prior to sampling. The purpose of the physical survey is to obtain data that will allow a qualitative assessment of factors that potentially could influence air quality. The physical survey includes collecting data on aspects of the building configuration such as building layout, utility entrances into the building, visible remnants of the former shop drainage trench and sumps, HVAC system design, foundation conditions, building material types (e.g., recent carpeting/linoleum and/or painting), etc. The physical survey also includes collecting data related to products used in the building during WES operations and indoor storage

of chemicals, paints and/or petroleum hydrocarbon products, etc. Results of the physical survey will be used to adjust sampling locations as necessary. The physical survey will be documented by completing the Building Survey Form in Appendix D[1].

3.3. Meteorological Data

Relevant meteorological data that can influence soil vapor concentration patterns will be collected prior to and during sampling. These data may be helpful qualitatively in data interpretation and in reconciling soil vapor sample data collected on multiple occasions.

Barometric pressure data over a 2-week time span around the sampling event will be reviewed, based on data from readily available data sources (e.g. regional weather stations). If feasible, the actual sampling event will be attempted on days with relative dropping atmospheric pressure.

General weather conditions such as wind speed, snow or ice cover, significant precipitation will be obtained at the time of sampling from using direct observation (e.g., for snow or ice cover) or readily available data sources (e.g., regional weather stations).

4.0 VAPOR INTRUSION EVALUATION METHODOLOGY

The VI evaluation will be conducted to evaluate what impact, if any, vapor intrusion is having on the indoor air at the WES Building. The VI evaluation will follow the Tier II Assessment methodology outlined in Section 3.2 of Ecology's Draft VI Guidance that recommends multiple lines of evidence, including groundwater, soil vapor and air data be considered when evaluating the potential for vapor intrusion.

As noted earlier, outdoor (ambient) air samples will be collected to estimate the ambient air background contribution to detected indoor air concentrations. Ecology's VI guidance states that detected indoor air concentrations can be adjusted (that is, corrected) by subtracting the detected outdoor air concentrations from the detected indoor air concentrations. Initially, the air and soil vapor data will be compared to MTCA Method B indoor air cleanup levels and MTCA Method B sub-slab soil vapor screening levels, respectively. The indoor air data will also be compared to MTCA Method B air remediation levels based on commercial/occupational worker exposure assumptions, following a methodology allowed under Ecology guidance to better reflect exposures to an adult worker. The commercial/occupational worker remediation levels will be used to evaluate whether the indoor air concentrations, adjusted to account for contributions from outdoor air, are protective of workers and visitors in the WES Building.

[1] This form was adapted from guidance provided in the Interstate Technology Regulatory Council (ITRC) Technical and Regulatory Guidance, Vapor Intrusion Pathway: A Practical Guideline, dated January 2007.

5.0 REFERENCES

Washington State Department of Ecology (Ecology). 2007. Model Toxics Control Act (MTCA) Statute and Regulation. MTCA Cleanup Regulation Chapter 173-340 WAC. Compiled by Washington State Department of Ecology Toxics Cleanup Program, Publication No. 94- 06. Revised November. http://www.ecy.wa.gov/biblio/9406.html.

Washington State Department of Ecology (Ecology). 2018. "Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action, Review Draft," October 2009, updated April 2018.

FIGURES

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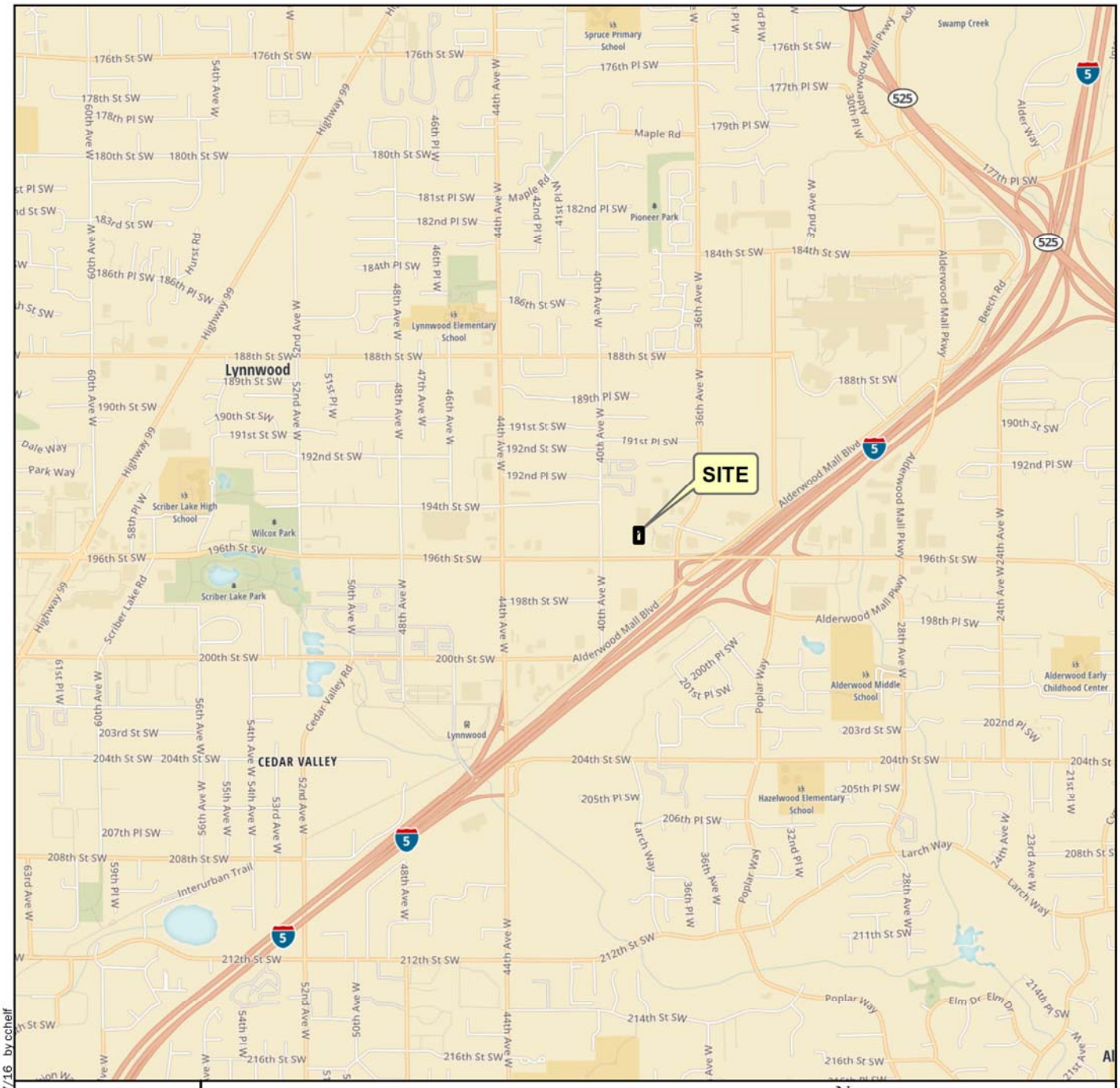

Notes:

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Data Source: Mapbox Open Street Map, 2016

Projection: NAD 1983 UTM Zone 10N

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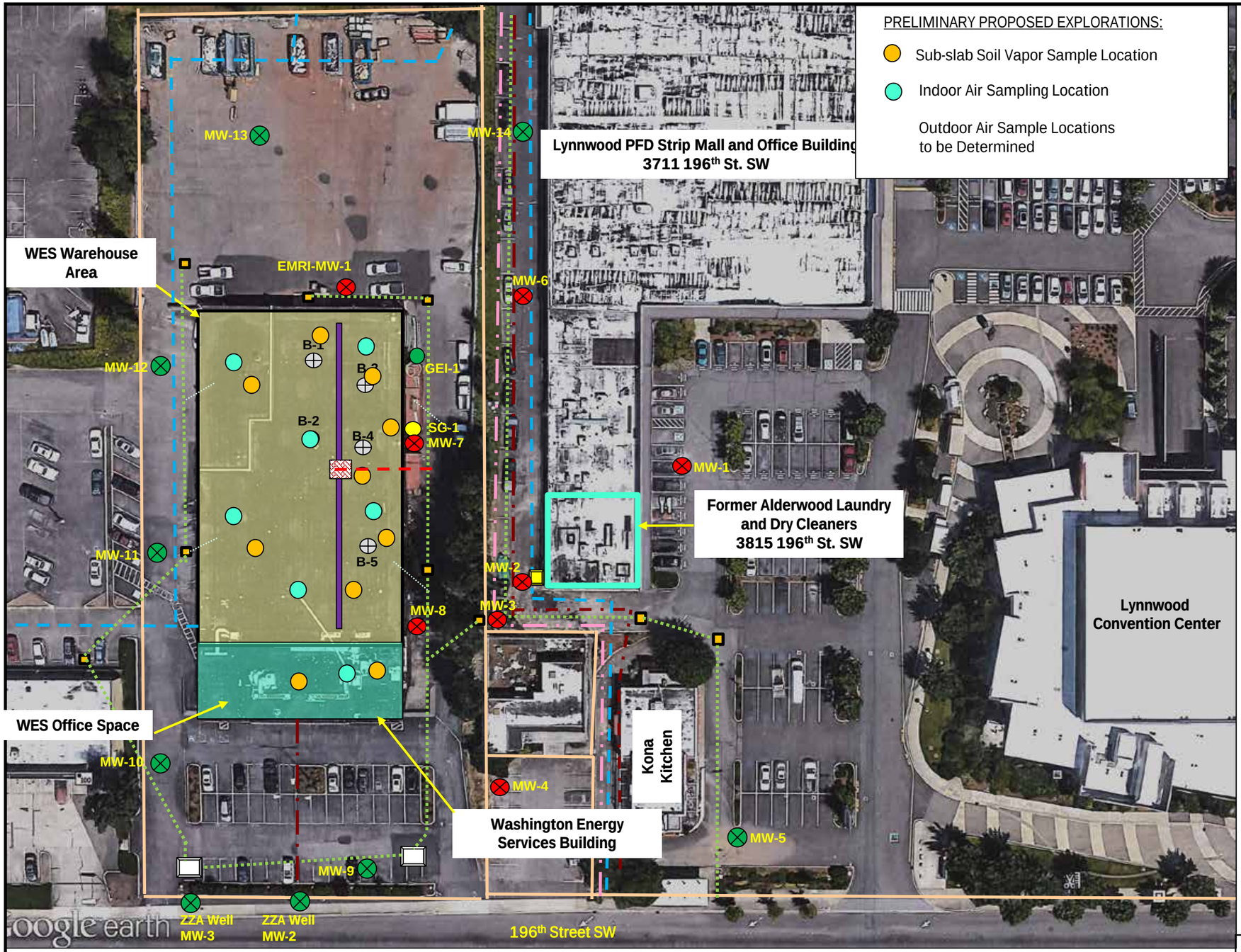
Vicinity Map

Alderwood Laundry and Dry Cleaners
3815 196th St SW
Lynnwood, Washington

GeoEngineers

Figure 1



PRELIMINARY PROPOSED EXPLORATIONS:

- Sub-slab Soil Vapor Sample Location
- Indoor Air Sampling Location
- Outdoor Air Sample Locations to be Determined

LEGEND:

- MW-5 — Existing Monitoring Well – No MTCA Exceedance in Groundwater (as of 2018)
- MW-7 — Existing Monitoring Well – MTCA Exceedance In Groundwater (as of 2018)
- GEI-1 — GeoEngineers Soil Boring
- SG-1 — GeoEngineers Soil Vapor Sample
- B-5 — Soil Boring by GCI (December 1993)
- Parcel Line
- Existing Storm Drain
- Existing catch basin
- Existing Sewer Line
- Existing Water Line
- Existing Gas Line
- Existing oil water separator
- Existing concrete grease trap
- Auto shop concrete drainage trench
- Auto shop drainage trench sump
- Auto Shop discharge piping connected to storm drain
- Approximate footprint of Former Alderwood Laundry and Dry Cleaners

MTCA Model Toxics Control Act

N W E S

60 0 60

Feet

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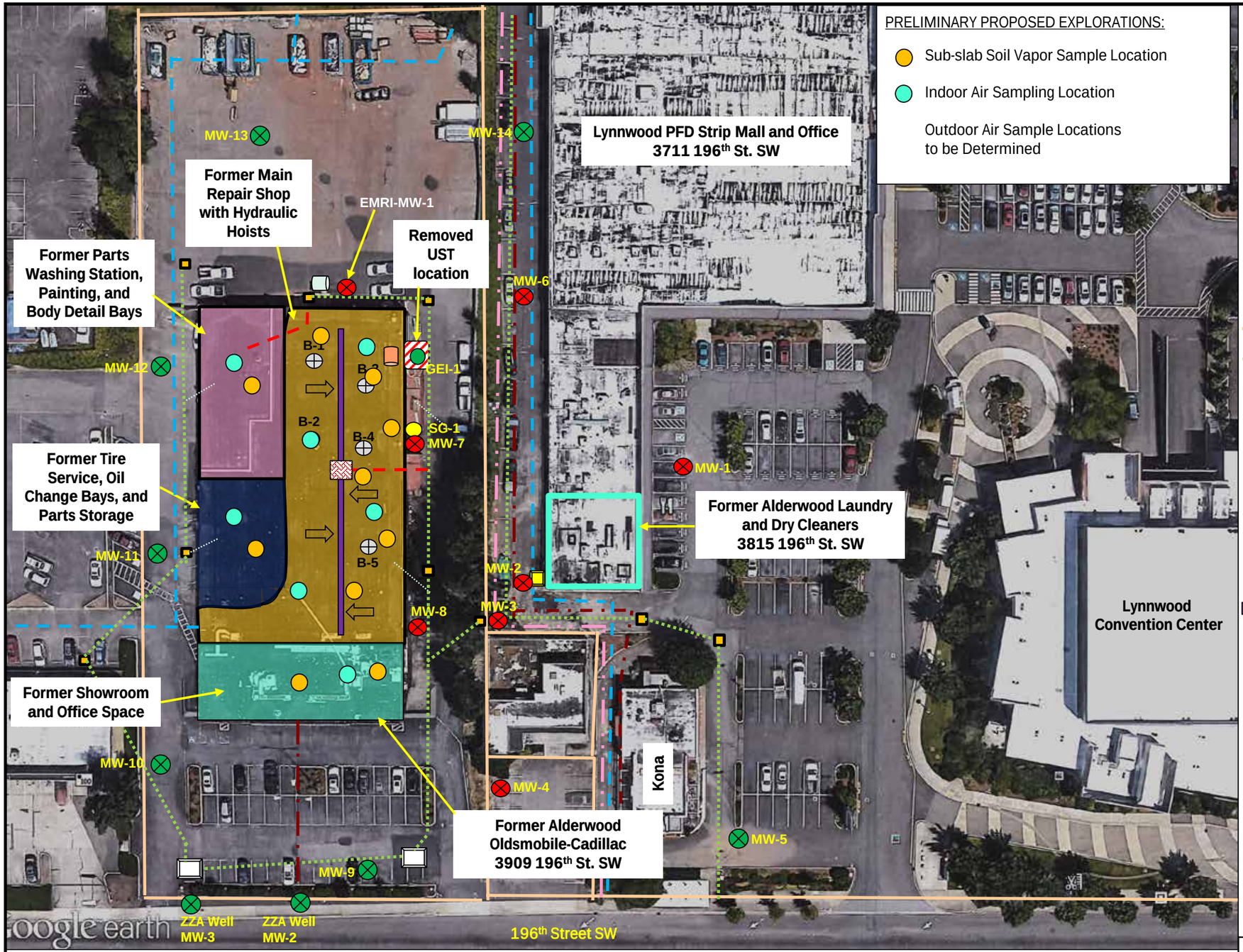
Proposed Sample Locations – WES Building

Former Alderwood Laundry and Dry Cleaners Site, Lynnwood, Washington

GeoEngineers

Figure 2



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- GEI-1 — GeoEngineers Soil Boring
- SG-1 — GeoEngineers Soil Vapor Sample
- B-5 — Soil Boring by GCI (December 1993)
- Former 500-gallon Waste Oil UST Removal & approx. limits of 1991 Petroleum-contaminated Soil Excavation
- Parcel Line
- Existing Storm Drain
- Existing catch basin
- Existing Sewer Line
- Existing Water Line
- Existing Gas Line
- Existing concrete grease trap
- Existing oil water separator
- Auto Shop discharge piping connected to storm drain
- Auto shop concrete drainage trench
- Auto shop drainage trench sump
- Car dealership service area slope toward drainage trench
- Former 465 gallon Used Oil Aboveground Storage Tank
- Former 250 gallon New Oil Aboveground Storage Tank
- Approximate footprint of Former Alderwood Laundry and Dry Cleaners
- UST — Underground Storage Tank
- MTCA — Model Toxics Control Act

N W E S

60 0 60

Feet

Notes:

1. The locations of all features shown are approximate.
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Former Automotive Dealership Building Features on WES Property

Former Alderwood Laundry and Dry Cleaners Site, Lynnwood, Washington

GeoEngineers

Figure 3

APPENDICES

GeoEngineers

APPENDIX A
Sampling Analysis Plan

APPENDIX A
SAMPLING ANALYSIS PLAN

Sub-Slab Soil Vapor Probe Installation

Sub-slab soil vapor samples will be collected inside the building using Vapor Pin™ sampling devices. The Vapor Pins™ are installed following the manufacturers' standard operating procedures (SOPs) attached to this appendix. The Vapor Pins™ will be left in place with flush-mounted stainless-steel covers for potential future use if necessary.

General installation procedures for the sub-slab sampling device were as follows:

- Check for buried obstacles (pipes, electrical lines, etc.) prior to proceeding. A subcontractor will perform a private utility locate to clear the sub-slab soil vapor sample locations.
- Set up vacuum to collect drill cuttings.
- Drill a 1.5-inch-diameter hole at least 1.75 inches into the slab.
- Drill a 5/8-inch-diameter hole through the slab and approximately 1 inch into the underlying soil to form a void.
- Remove the drill bit, brushed the hole with the bottle brush, and removed the loose cuttings with the vacuum.
- Place the lower end of sampling device assembly into the drilled hole. Place the small hole located in the handle of the extraction/installation tool over the sampling device to protect the barb fitting and cap and tapped the sampling device into place using a dead blow hammer. Make sure the extraction/installation tool is aligned parallel to the sampling device to avoid damaging the barb fitting.
- During installation, the silicone sleeve forms a slight bulge between the slab and the sample device shoulder creating a seal. Place a protective cap on sampling device to prevent vapor loss prior to sampling.
- Cover the sampling device with a stainless-steel secured cover.
- Allow at least 60 minutes for the sub-slab soil vapor conditions to equilibrate prior to sampling.

Sub-Slab Soil Vapor Sampling Procedure

The following procedure is followed to collect sub-slab soil vapor samples:

- Connect new fluoropolymer (Teflon®) tubing to the sub-slab soil vapor probe, using the barb fitting on the top of the sampling device.
- Connect the tubing (aboveground) to a sampling manifold.
- Vacuum test the sampling manifold (shut-in test) by briefly introducing a vacuum to the aboveground portion of the sampling train and checking for loss of vacuum. If vacuum loss is observed, connections and fittings in the sample train are checked and adjusted, then vacuum-tested again. This test is repeated until the sampling train has demonstrated that tightness is achieved.

- A tracer gas shroud (clear plastic bag) is placed around the entire sample train (that is, the sub-slab soil vapor probe where it enters the ground surface, the 6-liter Summa canister and associated tubing and manifold).
    - The shroud is charged (filled) with a tracer gas (spec-grade 99.995 percent helium gas) and the tracer gas concentration within the shroud is measured using a hand-held monitor (Dielectric MGD-2002 Multi-Gas Leak Detector), which is capable of measuring helium in air to a concentration of 0.5 percent) prior to, during and after completion of the sampling event. To charge the shroud a Teflon tube with a ball valve is inserted under the shroud to connect with the compressed helium bottle. This same tube is used to monitor the helium concentration within the shroud periodically throughout the sampling process. The purpose of the periodic monitoring is to make sure helium is in contact with the sample train and the ground surface while the sub-slab vapor sample is collected.
- The sampling train (aboveground and belowground components) is purged using a vacuum purge pump or a multi-gas meter. Purge volumes are calculated based on the flow rate of the purge pump and the volume of the soil vapor probe and sample train. After purging three sampling train volumes, the helium concentration within the sampling train is measured and recorded. If the helium concentration in the sample train is greater than or equal to 5 percent of the helium concentration in the shroud, the bentonite seal is re-applied, fittings re-tightened, and the previous purging and measurement tests are repeated (Cal-EPA/DTSC 2015).
- The soil vapor sample is obtained using a 1-liter evacuated Summa canister (with approximately 30 inches of mercury vacuum set by the laboratory) and tedlar bag (helium analysis) with a regulated flow rate of less than or equal to approximately 200 milliliters per minute (Cal-EPA/DTSC 2015). The canister is filled with soil vapor for approximately 5 minutes or until a vacuum equivalent of approximately 5 inches of mercury remains in the Summa canister, whichever comes first. The initial and final canister vacuums are recorded on a soil vapor sampling field form.
- The canisters are provided by the subcontracted analytical laboratory.

Air Sampling Methodology

Indoor and outdoor air samples are obtained by placing a laboratory-supplied evacuated 6-liter Summa canister equipped with an 8-hour flow controller. Tubing was connected to each canister and was used to elevate the sample intake into the breathing zone at approximately 4 to 5 feet above the ground surface. Initial canister pressure, start date and start time are recorded on a field data form. The inlet valve on the canister is opened to collect the sample. The canisters are filled until a vacuum equivalent of between 4 and 10 inches of mercury remained in each canister. At that time, the sample team closes the inlet valve and records the canister pressure, stop date and stop time on the field data form. Canisters are then prepared and delivered to the laboratory under chain-of-custody procedures for chemical analysis.

Table A-1

Test Methods, Sample Containers, Preservation and Hold Times For Air and Soil Vapor Samples

Washington Energy Services Building

Lynnwood, Washington

Matrix	Analytes	Analysis Method	Bottle Size	Preservation	Holding Times
Air	VOCs	EPA TO-15 (SIM)	6 Liter Summa Canister	None	30 days
Soil Vapor	VOCs	EPA TO-15	1 Liter Summa Canister	None	30 days
	Helium	ASTM-D1946	1 Liter Summa Canister	None	30 days

Notes:

Extraction holding time is based on elapsed time from date of sample collection.

VOCs = volatile organic compounds

EPA = U.S. Environmental Protection Agency

ASTM = ASTM International Standard Practices

Table A-2

Quality Control Samples - Type and Frequency For Air and Soil Vapor Samples

Washington Energy Services Building

Lynnwood, Washington

Matrix	Field QC			Laboratory QC			
	Field Duplicates	Trip Blanks	Rinseate	Laboratory/Method Blanks	LCS/LCSD	MS/MSD	Lab Duplicates
Air	None Proposed	None Proposed	Not Applicable	1 per batch	1 per batch	Not Applicable	Not Applicable
Soil Vapor	None Proposed	None Proposed	Not Applicable	1 per batch	1 per batch	Not Applicable	Not Applicable

Notes:

An analytical batch is defined as a group of samples taken through a preparation procedure and sharing a method blank, LCS, and lab duplicate.

No more than 20 field samples can be contained in one batch.

LCS = Laboratory control sample

MS = Matrix spike sample

MSD = Matrix spike duplicate sample

QC = Quality Control

Table A-3

Methods of Analysis and Target Reporting Limits for Air and Soil Vapor Samples

Washington Energy Services Building

Lynnwood, Washington

Matrix	Air		Soil Vapor	
Analysis Method	EPA TO-15 (SIM)		EPA TO-15	
Analyte	MTCA Method B Air Cleanup Level (µg/m^3)	Target Reporting Limit - 6 L (µg/m^3)[1]	MTCA Method B Soil Vapor Screening Level (µg/m^3)	Target Reporting Limit - 1 L (µg/m^3)[1]
Tetrachloroethene (PCE)	9.62	0.14	321	2.8
Trichloroethene (TCE)	0.37	0.11	12.3	2.2
1,1-Dichloroethene	91.4	0.079	3,050	1.58
cis-1,2-Dichloroethene	not available	0.079	not available	1.58
trans-1,2-Dichloroethene	not available	0.079	not available	1.58
Vinyl chloride	0.28	0.051	9.33	1.4

Notes:

[1] Laboratory reporting limits were obtained from Pace Analytical, a Washington State Department of Ecology-approved laboratory.

µg/m^3 = microgram per cubic meter

EPA = United State Environmental Protection Agency

APPENDIX B
Vapor Pin™ Standard Operation Procedure

Standard Operating Procedure Installation and Extraction of the Vapor Pin®

Updated March 16, 2018

Scope:

This standard operating procedure describes the installation and extraction of the VAPOR PIN® for use in sub-slab soil-gas sampling.

Purpose:

The purpose of this procedure is to assure good quality control in field operations and uniformity between field personnel in the use of the VAPOR PIN® for the collection of sub-slab soil-gas samples or pressure readings.

Equipment Needed:

- Assembled VAPOR PIN® [VAPOR PIN® and silicone sleeve(Figure 1)]; Because of sharp edges, gloves are recommended for sleeve installation;
- Hammer drill;
- 5/8-inch (16mm) diameter hammer bit (hole **must** be 5/8-inch (16mm) diameter to ensure seal. It is recommended that you use the drill guide). (Hilti™ TE-YX 5/8" x 22" (400 mm) #00206514 or equivalent);
- 1½-inch (38mm) diameter hammer bit (Hilti™ TE-YX 1½" x 23" #00293032 or equivalent) for flush mount applications;
- ¾-inch (19mm) diameter bottle brush;
- Wet/Dry vacuum with HEPA filter (optional);
- VAPOR PIN® installation/extraction tool;
- Dead blow hammer;
- VAPOR PIN® flush mount cover, if desired;
- VAPOR PIN® drilling guide, if desired;
- VAPOR PIN® protective cap; and
- VOC-free hole patching material (hydraulic cement) and putty knife or trowel for repairing the hole following the extraction of the VAPOR PIN®.

Figure 1. Assembled VAPOR PIN®

Installation Procedure:

1) Check for buried obstacles (pipes, electrical lines, etc.) prior to proceeding.

2) Set up wet/dry vacuum to collect drill cuttings.

3) If a flush mount installation is required, drill a 1½-inch (38mm) diameter hole at least 1¾-inches (45mm) into the slab. Use of a VAPOR PIN® drilling guide is recommended.

4) Drill a 5/8-inch (16mm) diameter hole through the slab and approximately 1-inch (25mm) into the underlying soil to form a void. Hole **must** be 5/8-inch (16mm) in diameter to ensure seal. It is recommended that you use the drill guide.

5) Remove the drill bit, brush the hole with the bottle brush, and remove the loose cuttings with the vacuum.

6) Place the lower end of VAPOR PIN® assembly into the drilled hole. Place the small hole located in the handle of the installation/extraction tool over the vapor pin to protect the barb fitting, and tap the vapor pin into place using a dead blow hammer (Figure 2). Make sure the installation/extraction tool is aligned parallel to the vapor pin to avoid damaging the barb fitting.

Figure 2. Installing the VAPOR PIN®

During installation, the silicone sleeve will form a slight bulge between the slab and the VAPOR PIN® shoulder. Place the protective cap on VAPOR PIN® to prevent vapor loss prior to sampling (Figure 3).

Figure 3. Installed VAPOR PIN®

7) For flush mount installations, cover the vapor pin with a flush mount cover, using either the plastic cover or the optional stainless-steel Secure Cover (Figure 4).

Figure 4. Secure Cover Installed

8) Allow 20 minutes or more (consult applicable guidance for your situation) for the sub-slab soil-gas conditions to re-equilibrate prior to sampling.

9) Remove protective cap and connect sample tubing to the barb fitting of the VAPOR PIN®. This connection can be made using a short piece of Tygon™ tubing to join the VAPOR PIN® with the

Nylaflow tubing (Figure 5). Put the Nylaflow tubing as close to the VAPOR PIN® as possible to minimize contact between soil gas and Tygon™ tubing.

Figure 5. VAPOR PIN® sample connection

10) Conduct leak tests in accordance with applicable guidance. If the method of leak testing is not specified, an alternative can be the use of a water dam and vacuum pump, as described in SOP Leak Testing the VAPOR PIN® via Mechanical Means (Figure 6). For flush-mount installations, distilled water can be poured directly into the 1 1/2 inch (38mm) hole.

Figure 6. Water dam used for leak detection

11) Collect sub-slab soil gas sample or pressure reading. When finished, replace the protective cap and flush mount cover until the next event. If the sampling is complete, extract the VAPOR PIN®.

Extraction Procedure:

1) Remove the protective cap, and thread the installation/extraction tool onto the barrel of the VAPOR PIN® (Figure 7). Turn the tool clockwise continuously, don't stop turning, the VAPOR PIN® will feed into the bottom of the installation/extraction tool and will extract from the hole like a wine cork, DO NOT PULL.

2) Fill the void with hydraulic cement and smooth with a trowel or putty knife.

Figure 7. Removing the VAPOR PIN®

- Prior to reuse, remove the silicone sleeve and protective cap and discard. Decontaminate the VAPOR PIN® in a hot water and Alconox® wash, then heat in an oven to a temperature of 265° F (130° C) for 15 to 30 minutes. For both steps, **STAINLESS – ½ hour, BRASS 8 minutes**

3) Replacement parts and supplies are available online.

APPENDIX C
Quality Assurance Project Plan

APPENDIX C
QUALITY ASSURANCE PROJECT PLAN

Introduction

This Quality Assurance Project Plan (QAPP) has been prepared to identify the air sampling and analysis methods to be performed during the indoor air, outdoor air and soil vapor sampling for the WES Building located in Lynnwood, Washington.

Field Documentation

Soil Gas and Air Sample Containers and Labeling

The Field Coordinator will manage field protocols related to sample collection, handling and documentation. Soil gas, Indoor and outdoor air samples will be submitted for chemical analysis of tetrachloroethene (PCE), trichloroethene (TCE), 1,1-dichloroethene (1,1-DCE), cis-1,2-DCE, trans-1,2-DCE and vinyl chloride by U.S. Environmental Protection Agency (EPA) Method TO-15 SIM and EPA Method TO-15. Soil gas samples will also be analyzed for helium by ASTM International [ASTM] Standard Practices Test Method D 1946 for quality control leak detection purposes.

Sample containers are listed in Table A-1. Sample containers will be labeled with the following information at the time of sample collection.

- Project number
- Sample name, which will include a reference to the building name, sample type (indoor, outdoor or soil vapor) and sample date
- Date and time of collection
- Samplers initials

Sample collection activities will be noted on the field logs and the Field Coordinator will monitor consistency between sample containers/labels, field logs, and chain of custody forms. Sample numbering conventions are described below:

Sample Labeling – Each sample will be labeled with the building name (WES), sample type and location number (sub-slab soil gas, indoor or outdoor) and the year, month, day of sample collection. For example, if an indoor air sample is collected on March 17, 2017, the sample identification would be WES-IA1-170317.

Outdoor air samples will be identified as “OA” and sub-slab soil vapor samples will be identified as “SS.”

Sample Handling

Samples will be placed in the canister shipping container after collection. Each sample will be documented on an air or soil vapor sample collection form including sample name, sample collection date and time, canister identification and canister vacuum.

Field personnel will provide for the security of samples from the time the samples are collected until the samples have been received by the courier service or laboratory personnel. A chain of custody form will be

completed for each group of samples being shipped to the laboratory per standard chain of custody protocol. Samples will be transported and delivered to the analytical laboratory in the laboratory provided shipping container. The samples will be transported by a shipping company.

Field Observations Documentation and Records

Field documentation provides important information about potential problems or special circumstances surrounding sample collection. Field personnel will record information for each air sample on field logs and will maintain a daily field report. Entries in the field logs will be made in pencil or water-resistant ink on water-resistant paper, and corrections will consist of line-out deletions. Individual logs and reports will become part of the project files at the conclusion of the field work.

At a minimum, the following information will be recorded during the collection of each sample.

- Sample location and description
- Sampler's name(s)
- Date and time of sample collection
- Sample matrix (indoor air, outdoor air or soil vapor)
- Type of sampling equipment used
- Field instrument (e.g., photoionization detector [PID]) readings
- Weather conditions (temperature, barometric pressure, wind direction, wind speed, and humidity) from a local weather station
- Surface conditions (presence of standing water and/or non-vegetative cover)
- Groundwater elevation measurements in monitoring wells in close proximity to the soil gas probes will be documented during soil gas sampling
- Field observations and details that are pertinent to the integrity/condition of the samples (e.g., performance of the sampling equipment, etc.)

In addition to the sampling information, the following specific information will also be recorded in the field log for each air sample or in a daily field report:

- Sampling team members
- Time of arrival/entry on site and time of site departure
- Other personnel present at the site
- Summary of pertinent meetings or discussions with contractor personnel
- Deviations from sampling plans and Health and Safety Plan
- Air monitoring results
- Changes in field personnel and responsibilities with reasons for the changes
- Levels of safety protection

The handling, use, and maintenance of field logs and reports are the Field Coordinator's responsibility.

Decontamination

Non-disposable tools and equipment will not be required for air sampling, so decontamination will not be required.

Disposal of Investigation-Derived Waste

Incidental waste to be generated during sampling activities includes items such as gloves, sample tubing, paper towels and similar expended and discarded field supplies. These materials are considered *de minimis* and will be disposed in a local trash receptacle or county disposal facility.

Quality Assurance and Quality Control

Environmental measurements will be conducted to produce data that are scientifically valid, of known and acceptable quality and that meet established objectives. QA/QC procedures will be implemented so that the precision, accuracy, representativeness, completeness and comparability (PARCC) of the data generated meet the specified data quality objectives within standard industry guidelines as described in Tables A-1 through A-3.

Field Quality Control

Field duplicates are not planned for this sampling effort. Trip blanks and rinseate blanks are not required for air sampling.

Data Management and Documentation

Data logs and data report packages will be located in the project file system in GeoEngineers' Sharepoint. Laboratory data reports will include internal laboratory quality control checks and sample results. Data logs and packages that are anticipated to be generated during the investigation include laboratory data report packages, field report, field sampling data sheets, site plan of sample locations and chain-of-custody forms.

Analytical data will be supplied to GeoEngineers in both electronic data deliverable (EDD) format and PDF format. The PDF will serve as the official record of laboratory results. The EDDs will contain only data reported in the hard copy reports (e.g., only reportable results).

Upon receipt of the analytical data, the EDD will be uploaded to a project database and reduced into summary tables for each group of analytes and media. Upon completion of the summary tables, the accuracy of the data reduction will be verified using the hard copy of the data received from the laboratory. Any exceptions will be noted, and corrections will be made.

Data Validation and Usability

Upon receipt of the sample data from the laboratory, the data will be validated and evaluated for usability.

Environmental Information Management System Submittal

Chemical analytical results for air and soil vapor samples collected will be submitted to the Ecology Environmental Information Management (EIM) database.

APPENDIX D
Building Survey Form

BUILDING SURVEY FORM

This form must be completed for each building involved in indoor air testing.

Preparer's Name _____ Date/Time Prepared _____

Preparer's Affiliation _____ Phone No._____

Purpose of Investigation_____

1. OCCUPANT:

Interviewed: Y / N

Last Name: _____ First Name: _____

Address: _____

County: _____

Home Phone: _____ Office Phone: _____

Number of Occupants/persons at this location _____ Age of Occupants _____

2. OWNER OR LANDLORD: (Check if same as occupant ___)

Interviewed: Y / N

Last Name: _____ First Name: _____

Address: _____

County: _____

Home Phone: _____ Office Phone: _____

3. BUILDING CHARACTERISTICS

Type of Building: (Circle appropriate response)

Residential Commercial/Multi-use Other: _____

If the property is residential, type? (Circle appropriate response)

2-Family	3-Family	
Raised Ranch	Split Level	Colonial
Cape Cod	Contemporary	Mobile Home
Duplex	Apartment House	Townhouses/Condos
Modular	Other:_____	

If multiple units, how many? _____

If the property is commercial, type?

Business Type(s) _____

Does it include residences (i.e., multi-use)? Y / N If yes, how many? _____

Other characteristics:

Number of floors_____ Building age_____

Is the building insulated? Y / N How air tight? Tight / Average / Not Tight

4. BASEMENT AND CONSTRUCTION CHARACTERISTICS (Circle all that apply)

Above grade construction:	wood frame	concrete	stone	brick
Foundation type:	crawlspace	slab-on-grade	other _____	
Foundation walls:	poured	block	stone	other _____
Foundation walls:	unsealed	sealed	sealed with _____	

If building has a crawlspace, please answer the following questions:

1) Does the crawlspace have air vents leading out of the house or building? Y / N
2) **Crawl space vents:** always open always closed open/closed based on season
3) **Crawlspace floor:** N/A dirt concrete other _____
4) Is the crawlspace lined with a plastic liner (vapor barrier)? Y / N
5) **Position of the liner:** On ground Attached to floor joist Attached to foundation
6) **Condition of liner:** whole partial torn
7) **Crawlspace is:** wet damp dry moldy

If house or building is slab-on-grade, please answer the following questions:

1) **Concrete floor:** unsealed sealed sealed with _____
2) **Concrete floor:** uncovered covered covered with _____

If the house or building has a sump, please answer the following questions:

1) **Water in sump?** Y / N / not applicable
2) **Sump lined?** Y / N / not applicable lined with _____

Lowest level depth below grade: _____(feet)

Identify potential soil vapor entry points and approximate size (e.g., cracks, utility ports, drains)

_____

_____

_____

5. HEATING, VENTING and AIR CONDITIONING (Circle all that apply)

Type of heating system(s) used in the house or building: (circle all that apply – note primary)

Hot air circulation	Heat pump	Hot water baseboard	
Space Heaters	Stream radiation	Radiant floor	
Electric baseboard	Wood stove	Outdoor wood boiler	Other _____

The primary type of fuel used is:

Natural Gas	Fuel Oil	Kerosene
Electric	Propane	Solar
Wood	Coal	

Domestic hot water tank fueled by: _____

Where is Boiler/furnace/air conditioning located:

Are there air distribution ducts present? Y / N

Describe the air intakes (where applicable), supply and cold air return ductwork, and their condition where visible, including whether there is a cold air return and the tightness of duct joints. Indicate the locations on the floor plan diagram.

_____

_____

_____

6. OCCUPANCY

Is lowest level occupied? Full-time Occasionally Seldom Almost Never

Level General Use of Each Floor (e.g., family room, store, laundry, workshop, storage)

1st Floor _____

2nd Floor _____

7. FACTORS THAT MAY INFLUENCE INDOOR AIR QUALITY

a. Is there an attached garage? Y / N

b. Does the garage have a separate heating unit? Y / N / NA

c. Are petroleum-powered machines or vehicles stored in the garage (e.g., lawnmower, atv, car) Y / N / NA
Please specify_____

d. Has the building ever had a fire? Y / N When?_____

e. Is a kerosene or unvented gas space heater present? Y / N Where? _____

f. Is there a workshop or hobby/craft area? Y / N Where & Type? _____

g. Is there smoking in the building? Y / N How frequently? _____

h. Have cleaning products been used recently? Y / N When & Type? _____

i. Have cosmetic products been used recently? Y / N When & Type? _____

j. Has painting/staining been done in the last 6 months? Y / N Where & When? _____

k. Is there new carpet, drapes or other textiles? Y / N Where & When? _____

l. Have air fresheners been used recently? Y / N When & Type? _____

m. Is there a kitchen exhaust fan? Y / N If yes, where vented?_____

n. Is there a bathroom exhaust fan? Y / N If yes, where vented?_____

o. Is there a clothes dryer? Y / N If yes, is it vented outside? Y / N

p. Has there been a pesticide application? Y / N When & Type?_____

Are there odors in the house or building? Y / N

If yes, please describe: _____

Do any of the house or building occupants use solvents at work? Y / N
(e.g., chemical manufacturing or laboratory, auto mechanic or auto body shop, painting, fuel oil delivery, boiler mechanic, pesticide application, cosmetologist)

If yes, what types of solvents are used? _____

If yes, are their clothes washed at work? Y/ N

Do any of the house or building occupants regularly use or work at a dry-cleaning service? (Circle appropriate response)

Yes, use dry-cleaning regularly (weekly) No

Yes, use dry-cleaning infrequently (monthly or less) Unknown

Yes, work at a dry-cleaning service

Is there a radon mitigation system for the house/building? Y / N Date of Installation: _____

Is the system active or passive? Active/Passive

8. FLOOR PLANS

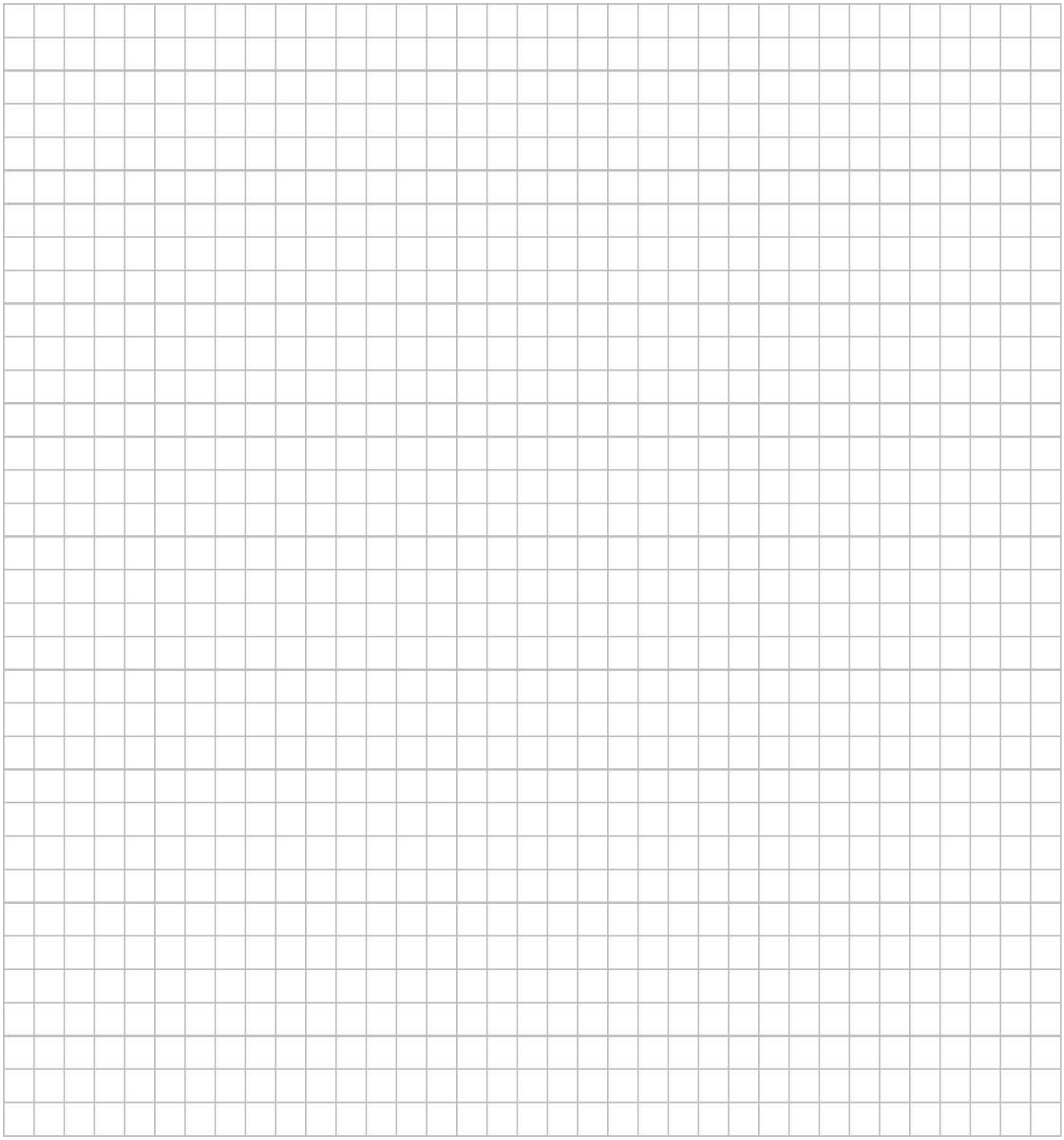
Draw a plan view sketch of the basement and first floor of the house/building. Indicate air sampling locations, possible indoor air pollution sources and PID meter readings. If the house/building does not have a basement, please note.

Basement:

First Floor:

9. OUTDOOR PLOT (Draw a sketch of the area surrounding the house/building being sampled. If applicable, provide information on spill locations, potential air contamination sources (industries, gas stations, repair shops, landfills, etc.), outdoor air sampling location(s) and PID meter readings.)

Also indicate compass direction, wind direction and speed during sampling, the locations of the well and septic system, if applicable, and a qualifying statement to help locate the site on a topographic map.



10. PRODUCT INVENTORY FORM Make & Model of field instrument used:

_____

List specific products found in the residence that have the potential to affect indoor air quality.

Location	Product Description*	Comments	PID Reading

* Describe the condition of the product containers as **Unopened (UO), Used (U),** or **Deteriorated (D)** ** Photographs of the **front and back** of product containers can replace the handwritten list of chemical ingredients. However, the photographs must be of good quality and ingredient labels must be legible.

GeoEngineers

APPENDIX B
Lab Report

DRAFT

Date of Report: 04/16/19
Date Received: 04/01/19
Project: WES VI 17787-001-11, F&BI 904017
Date Extracted: 04/15/19
Date Analyzed: 04/15/19

RESULTS FROM THE ANALYSIS OF AIR SAMPLES FOR HELIUM USING METHOD ASTM D1946

Results Reported as % Helium

Sample ID Laboratory ID	Helium
SSV-1-033119 904017-01	<0.6
SSV-2-033119 904017-02	<0.6
SSV-3-033119 904017-03	<0.6
SSV-4-033119 904017-04	<0.6
SSV-5-033119 904017-05	<0.6
SSV-6-033119 904017-06	<0.6
SSV-7-033119 904017-07	<0.6
SSV-8-033119 904017-08	<0.6
SSV-9-033119 904017-09	<0.6
SSV-10-033119 904017-10	<0.6
Method Blank	<0.6

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SSV-1-033119	Client:	GeoEngineers, Inc
Date Received:	04/01/19	Project:	WES VI 17787-001-11
Date Collected:	03/31/19	Lab ID:	904017-01 1/38
Date Analyzed:	04/10/19	Data File:	040933.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MS

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

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<9.7	<3.8
1,1-Dichloroethene	<15	<3.8
trans-1,2-Dichloroethene	<15	<3.8
cis-1,2-Dichloroethene	<15	<3.8
Trichloroethene	<10	<1.9
Tetrachloroethene	<260	<38

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SSV-2-033119	Client:	GeoEngineers, Inc
Date Received:	04/01/19	Project:	WES VI 17787-001-11
Date Collected:	03/31/19	Lab ID:	904017-02 1/1.5
Date Analyzed:	04/10/19	Data File:	040926a.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MS

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

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	0.56	0.22
1,1-Dichloroethene	<0.59	<0.15
trans-1,2-Dichloroethene	<0.59	<0.15
cis-1,2-Dichloroethene	<0.59	<0.15
Trichloroethene	<0.4	<0.075
Tetrachloroethene	24	3.6

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SSV-3-033119	Client:	GeoEngineers, Inc
Date Received:	04/01/19	Project:	WES VI 17787-001-11
Date Collected:	03/31/19	Lab ID:	904017-03 1/8
Date Analyzed:	04/10/19	Data File:	040928.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	112	70	130

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<2	<0.8
1,1-Dichloroethene	<3.2	<0.8
trans-1,2-Dichloroethene	<3.2	<0.8
cis-1,2-Dichloroethene	<3.2	<0.8
Trichloroethene	<2.1	<0.4
Tetrachloroethene	810	120

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SSV-4-033119	Client:	GeoEngineers, Inc
Date Received:	04/01/19	Project:	WES VI 17787-001-11
Date Collected:	03/31/19	Lab ID:	904017-04 1/1.5
Date Analyzed:	04/10/19	Data File:	040927.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MS

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

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<0.38	<0.15
1,1-Dichloroethene	<0.59	<0.15
trans-1,2-Dichloroethene	<0.59	<0.15
cis-1,2-Dichloroethene	<0.59	<0.15
Trichloroethene	<0.4	<0.075
Tetrachloroethene	50	7.3

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SSV-5-033119	Client:	GeoEngineers, Inc
Date Received:	04/01/19	Project:	WES VI 17787-001-11
Date Collected:	03/31/19	Lab ID:	904017-05 1/41
Date Analyzed:	04/10/19	Data File:	040930.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MS

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

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<10	<4.1
1,1-Dichloroethene	<16	<4.1
trans-1,2-Dichloroethene	<16	<4.1
cis-1,2-Dichloroethene	<16	<4.1
Trichloroethene	<11	<2
Tetrachloroethene	2,200	320

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SSV-6-033119	Client:	GeoEngineers, Inc
Date Received:	04/01/19	Project:	WES VI 17787-001-11
Date Collected:	03/31/19	Lab ID:	904017-06 1/42
Date Analyzed:	04/10/19	Data File:	040931.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MS

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

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<11	<4.2
1,1-Dichloroethene	<17	<4.2
trans-1,2-Dichloroethene	<17	<4.2
cis-1,2-Dichloroethene	<17	<4.2
Trichloroethene	<11	<2.1
Tetrachloroethene	2,600	390

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SSV-7-033119	Client:	GeoEngineers, Inc
Date Received:	04/01/19	Project:	WES VI 17787-001-11
Date Collected:	03/31/19	Lab ID:	904017-07 1/39
Date Analyzed:	04/10/19	Data File:	040932.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MS

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

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<10	<3.9
1,1-Dichloroethene	<15	<3.9
trans-1,2-Dichloroethene	<15	<3.9
cis-1,2-Dichloroethene	<15	<3.9
Trichloroethene	<10	<1.9
Tetrachloroethene	2,300	350

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SSV-8-033119	Client:	GeoEngineers, Inc
Date Received:	04/01/19	Project:	WES VI 17787-001-11
Date Collected:	03/31/19	Lab ID:	904017-08 1/7.8
Date Analyzed:	04/10/19	Data File:	040929.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MS

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

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<2	<0.78
1,1-Dichloroethene	<3.1	<0.78
trans-1,2-Dichloroethene	<3.1	<0.78
cis-1,2-Dichloroethene	<3.1	<0.78
Trichloroethene	<2.1	<0.39
Tetrachloroethene	780	110

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SSV-9-033119	Client:	GeoEngineers, Inc
Date Received:	04/01/19	Project:	WES VI 17787-001-11
Date Collected:	03/31/19	Lab ID:	904017-09 1/1.5
Date Analyzed:	04/10/19	Data File:	040935.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	94	70	130

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	0.47	0.18
1,1-Dichloroethene	<0.59	<0.15
trans-1,2-Dichloroethene	<0.59	<0.15
cis-1,2-Dichloroethene	<0.59	<0.15
Trichloroethene	2.3	0.42
Tetrachloroethene	33	4.9

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	SSV-10-033119	Client:	GeoEngineers, Inc
Date Received:	04/01/19	Project:	WES VI 17787-001-11
Date Collected:	03/31/19	Lab ID:	904017-10 1/37
Date Analyzed:	04/10/19	Data File:	040934.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	97	70	130

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<9.5	<3.7
1,1-Dichloroethene	<15	<3.7
trans-1,2-Dichloroethene	<15	<3.7
cis-1,2-Dichloroethene	<15	<3.7
Trichloroethene	<9.9	<1.8
Tetrachloroethene	2,100	310

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	IA-1-033119	Client:	GeoEngineers, Inc
Date Received:	04/01/19	Project:	WES VI 17787-001-11
Date Collected:	03/31/19	Lab ID:	904017-11
Date Analyzed:	04/11/19	Data File:	041118.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MS/bat

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

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<0.26	<0.1
1,1-Dichloroethene	<0.4	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1
Trichloroethene	1.7	0.32
Tetrachloroethene	24	3.6

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	IA-2-033119	Client:	GeoEngineers, Inc
Date Received:	04/01/19	Project:	WES VI 17787-001-11
Date Collected:	03/31/19	Lab ID:	904017-12
Date Analyzed:	04/11/19	Data File:	041119.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MS/bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	89	70	130

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<0.26	<0.1
1,1-Dichloroethene	<0.4	<0.1
trans-1,2-Dichloroethene	0.93	0.23
cis-1,2-Dichloroethene	<0.4	<0.1
Trichloroethene	<0.27	<0.05
Tetrachloroethene	<6.8	<1

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	IA-3-033119	Client:	GeoEngineers, Inc
Date Received:	04/01/19	Project:	WES VI 17787-001-11
Date Collected:	03/31/19	Lab ID:	904017-13
Date Analyzed:	04/11/19	Data File:	041120.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MS/bat

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

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<0.26	<0.1
1,1-Dichloroethene	<0.4	<0.1
trans-1,2-Dichloroethene	0.83	0.21
cis-1,2-Dichloroethene	<0.4	<0.1
Trichloroethene	<0.27	<0.05
Tetrachloroethene	<6.8	<1

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	IA-4-033119	Client:	GeoEngineers, Inc
Date Received:	04/01/19	Project:	WES VI 17787-001-11
Date Collected:	03/31/19	Lab ID:	904017-14
Date Analyzed:	04/11/19	Data File:	041121.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MS/bat

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

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<0.26	<0.1
1,1-Dichloroethene	<0.4	<0.1
trans-1,2-Dichloroethene	0.90	0.23
cis-1,2-Dichloroethene	<0.4	<0.1
Trichloroethene	<0.27	<0.05
Tetrachloroethene	<6.8	<1

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	IA-5-033119	Client:	GeoEngineers, Inc
Date Received:	04/01/19	Project:	WES VI 17787-001-11
Date Collected:	03/31/19	Lab ID:	904017-15
Date Analyzed:	04/12/19	Data File:	041122.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MS/bat

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

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<0.26	<0.1
1,1-Dichloroethene	<0.4	<0.1
trans-1,2-Dichloroethene	0.98	0.25
cis-1,2-Dichloroethene	<0.4	<0.1
Trichloroethene	<0.27	<0.05
Tetrachloroethene	<6.8	<1

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	IA-6-033119	Client:	GeoEngineers, Inc
Date Received:	04/01/19	Project:	WES VI 17787-001-11
Date Collected:	03/31/19	Lab ID:	904017-16
Date Analyzed:	04/12/19	Data File:	041123.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MS/bat

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

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<0.26	<0.1
1,1-Dichloroethene	<0.4	<0.1
trans-1,2-Dichloroethene	0.80	0.20
cis-1,2-Dichloroethene	<0.4	<0.1
Trichloroethene	<0.27	<0.05
Tetrachloroethene	<6.8	<1

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	IA-7-033119	Client:	GeoEngineers, Inc
Date Received:	04/01/19	Project:	WES VI 17787-001-11
Date Collected:	03/31/19	Lab ID:	904017-17
Date Analyzed:	04/12/19	Data File:	041124.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MS/bat

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

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<0.26	<0.1
1,1-Dichloroethene	<0.4	<0.1
trans-1,2-Dichloroethene	0.77	0.19
cis-1,2-Dichloroethene	<0.4	<0.1
Trichloroethene	<0.27	<0.05
Tetrachloroethene	<6.8	<1

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	OA-1-033119	Client:	GeoEngineers, Inc
Date Received:	04/01/19	Project:	WES VI 17787-001-11
Date Collected:	03/31/19	Lab ID:	904017-18
Date Analyzed:	04/12/19	Data File:	041125.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MS/bat

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

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<0.26	<0.1
1,1-Dichloroethene	<0.4	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1
Trichloroethene	<0.27	<0.05
Tetrachloroethene	<6.8	<1

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	OA-2-033119	Client:	GeoEngineers, Inc
Date Received:	04/01/19	Project:	WES VI 17787-001-11
Date Collected:	03/31/19	Lab ID:	904017-19
Date Analyzed:	04/12/19	Data File:	041126.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MS/bat

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	93	70	130

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<0.26	<0.1
1,1-Dichloroethene	<0.4	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1
Trichloroethene	<0.27	<0.05
Tetrachloroethene	<6.8	<1

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	OA-3-033119	Client:	GeoEngineers, Inc
Date Received:	04/01/19	Project:	WES VI 17787-001-11
Date Collected:	03/31/19	Lab ID:	904017-20
Date Analyzed:	04/12/19	Data File:	041127.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MS/bat

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

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<0.26	<0.1
1,1-Dichloroethene	<0.4	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1
Trichloroethene	<0.27	<0.05
Tetrachloroethene	<6.8	<1

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	GeoEngineers, Inc
Date Received:	Not Applicable	Project:	WES VI 17787-001-11
Date Collected:	04/11/19	Lab ID:	09-0743 mb
Date Analyzed:	04/11/19	Data File:	041112.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MS/bat

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

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<0.26	<0.1
1,1-Dichloroethene	<0.4	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1
Trichloroethene	<0.27	<0.05
Tetrachloroethene	<6.8	<1

Analysis For Volatile Compounds By Method TO-15

Client Sample ID:	Method Blank	Client:	GeoEngineers, Inc
Date Received:	Not Applicable	Project:	WES VI 17787-001-11
Date Collected:	04/09/19	Lab ID:	09-0730 mb
Date Analyzed:	04/09/19	Data File:	040914.D
Matrix:	Air	Instrument:	GCMS7
Units:	ug/m3	Operator:	MS

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
4-Bromofluorobenzene	93	70	130

Compounds:	Concentration ug/m3	ppbv
Vinyl chloride	<0.26	<0.1
1,1-Dichloroethene	<0.4	<0.1
trans-1,2-Dichloroethene	<0.4	<0.1
cis-1,2-Dichloroethene	<0.4	<0.1
Trichloroethene	<0.27	<0.05
Tetrachloroethene	<6.8	<1

904017

SAMPLE CHAIN OF CUSTODY

ME 04-01-19

Page # 1 of 3

Report To Cris Watkins

Company GeoEngineers

Address

City, State, ZIP

Phone Email cwatkins@geoengineers.com

SAMPLERS (*signature*) Katy A

PROJECT NAME: WES V1

PO #: 17787-001-11

REPORTING LEVEL: ☐ Indoor Air ☐ Deep Soil Gas ☐ Sub Slab/Soil Gas ☐ SVE/Grab

INVOICE TO

TURNAROUND TIME: ☑ Standard ☐ RUSH Rush charges authorized by:

SAMPLE DISPOSAL: ☐ Dispose after 30 days ☐ Archive Samples ☐ Other

ANALYSIS REQUESTED

Sample Name	Lab ID	Canister ID	Flow Contr. ID	Date Sampled	Field Initial Press. (Hg)	Field Initial Time	Field Final Press. (Hg)	Field Final Time	TO-15 Full Scan	TO-15 BTEXN	EPA TO-15 VOCs	ASTM-D1946 Helium	Notes
SSV-1-033119	01	4178	101	3/31/19	30	917	5	922			X	X	~~[illegible]~~
SSV-2-033119	02	4175	102	"	27	1009	5	1013			X	X	
SSV-3-033119	03	4185	03	"	29	1100	5	1106			X	X	
SSV-4-033119	04	4183	117	"	28	1129	5	1134			X	X	
SSV-5-033119	05	4177	12	"	30	1211	5	1217			X	X	
SSV-6-033119	06	2304	31	"	30	1238	5	1244			X	X	
SSV-7-033119	07	4172 (417-9 N/A)	119	"	30	1306	5	1313			X	X	Receipt received at 20 °C
SSV-8-033119	08	4180	111	"	30	1336	5	1344			X	X	

VOCs = PCE, TCE, 1,1-DCE, cis-1,2-DCE, trans-1,2-DCE, & Vinyl chloride only

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: Katy A	Katy Ataturk	GEI	4/1/19	0800
Received by:	DAVID NIACCO	FED EX	4/1/19	1:59
Relinquished by:				
Received by: Nhan Pham	Nhan Pham	FEBT	4/1/19	1435

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

904017

SAMPLE CHAIN OF CUSTODY

ME 4/1/19

Report To Cris W.

Company

Address

City, State, ZIP

Phone Email

SAMPLERS (*signature*) Katy A

PROJECT NAME: WESV1

PO #: 17787-001-11

REPORTING LEVEL
- ☐ Indoor Air
- ☐ Deep Soil Gas
- ☐ Sub Slab/Soil Gas
- ☐ SVE/Grab

INVOICE TO

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

SAMPLE DISPOSAL
- ☐ Dispose after 30 days
- ☐ Archive Samples
- ☐ Other

ANALYSIS REQUESTED

Sample Name	Lab ID	Canister ID	Flow Contr. ID	Date Sampled	Field Initial Press. (Hg)	Field Initial Time	Field Final Press. (Hg)	Field Final Time	TO-15 Full Scan	TO-15 BTEXN	EPA TO-15 VOCs (SIM)	EPA TO-15 VOCs	Helium ASTM-D1946	Notes
SSV-9-033119	09	4184	106	3/31/19	30	1403	5	1407				X	X	VOCs = PCE, TCE, 1,1-DCE, cis-1,2-DCE, trans-1,2-DCE & Vinyl Chloride Only
SSV-10-033119	10	3445	41	↓	26	1427	4	1433				X	X	
IA-1-033119	11	18565	07847		30	706	6	1508			X			
IA-2-033119	12	18575	08181		30	708	6	1532			X			
IA-3-033119	13	18561	05354		29	709	5	1333			X			
IA-4-033119	14	20551	07854		28	710	6	1447			X			
IA-5-033119	15	21484	07846		30	711	6	1530			X			
IA-6-033119	16	4088	07845		29	712	6	1502			X			Received at 20°C

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: Katy A	Katy Asalctirk	GEI	4/1/19	0800
Received by:	DAVID NELSON	FED EX	4/1/19	1:59
Relinquished by:				
Received by:	Minn Phan	FCBI	4/1/19	1435

904017

SAMPLE CHAIN OF CUSTODY

ME 04-01-19

Page # 3 of 3

Report To Chris W.

Company

Address

City, State, ZIP

Phone Email

SAMPLERS (*signature*)

PROJECT NAME: WES V1

PO #: 17787-001-11

REPORTING LEVEL
- ☐ Indoor Air
- ☐ Deep Soil Gas
- ☐ Sub Slab/Soil Gas
- ☐ SVE/Grab

INVOICE TO

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

SAMPLE DISPOSAL
- ☐ Dispose after 30 days
- ☐ Archive Samples
- ☐ Other

ANALYSIS REQUESTED

Sample Name	Lab ID	Canister ID	Flow Contr. ID	Date Sampled	Field Initial Press. (Hg)	Field Initial Time	Field Final Press. (Hg)	Field Final Time	TO-15 Full Scan	TO-15 BTEXN	GRATO-15 (SIM) VOCs		Notes
IA-1-033119	17	23234 ~~08183~~	08183	3/31/19	30	715	6	1542			X		~~VOCs = PCE, TCE,~~
OA_1-033119	18	18567	05352		29	721	6	1573			X		
OA-2-033119	19	18576	06607		29	727	6	1526			X		
OA-3-033119	20	20547	05356		29	731	6	1506			X		
													VOCs = PCE, TCE, 1,1-DCE, cis-1,2-DCE, Trans-1,2-DCE & Vinyl Chloride Only
													Cooler received at 20 °C

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: Katy Arakkirk	Katy Arakkirk	GEI	4/1/19	0800
Received by:	DAVID KEACH	FED EX	4/1/19	1:59
Relinquished by:				
Received by:	Nhan Phan			

FORMS\COC\COCTO-15.DOC

APPENDIX C

Contained in Determination and Laboratory Analytical Data for Concrete Disposal and Soil Sampling at the former Vet Building

CWMI
ESP

Please print or type. Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Manifest Tracking Number
WAD988511911	2	(800)424-9300	019236142 JJK

GENERATOR

5. Generator's Name and Mailing Address
LYNNWOOD PUBLIC FACILITIES DISTRICT
3909 196TH ST SW
LYNNWOOD WA 98036
Generator's Phone: (503)603-6661

Generator's Site Address (if different than mailing address)

6. Transporter 1 Company Name: CHEMICAL WASTE MANAGEMENT ,INC — U.S. EPA ID Number: ORD089452353

7. Transporter 2 Company Name: UNION PACIFIC RAILROAD — U.S. EPA ID Number: NED001792910

8. Designated Facility Name and Site Address
CHEMICAL WASTE MANAGEMENT, INC.
17629 CEDAR SPRINGS LANE
ARLINGTON OR 97812-9709
Facility's Phone: (503)454-2643
U.S. EPA ID Number: ORD089452353

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes		
X	1. UN3077,WASTE ENVIRONMENTALLY HAZARDOUS SUBSTANCE,SOLID,N.O.S,9,PGIII ,(TETRACHLOROETHENE) OR342074	7	DM	4,550	P	F002		
X	2. UN3082, ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. MIXTURE, 9, PG III, (TETEACHLOROETHENE) OR342075	3	DM	900	P	F002		
	3.							
	4.							

14. Special Handling Instructions and Additional Information
1. PROFILE # OR342074-LF03 - F002 soils meeting TS
2. PROFILE # OR342075- Stab15 - F002 water/sediment meeting TS

CONTAINER # WMXU 910963

15. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name: Judy Powell — Signature: Jpowell — Month: 6 Day: 18 Year: 19

INT'L

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

TRANSPORTER

17. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: G. Pinaula — Signature: [signature] — Month: 6 Day: 18 Year: 19

Transporter 2 Printed/Typed Name: — Signature: — Month: Day: Year:

DESIGNATED FACILITY

18. Discrepancy

18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

18b. Alternate Facility (or Generator) — U.S. EPA ID Number
Facility's Phone:

18c. Signature of Alternate Facility (or Generator) — Month: Day: Year:

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)

1.	2.	3.	4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a

Printed/Typed Name: — Signature: — Month: Day: Year:

CWMI
ESP

Please print or type. Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST (Continuation Sheet)

21. Generator ID Number: WAD988511911

22. Page 2 of 2

23. Manifest Tracking Number: 019236142 JJK

24. Generator's Name
LYNNWOOD PUBLIC FACILITIES DISTRICT
3909 196TH ST SW
LYNNWOOD WA 98036

25. Transporter 3 Company Name: COLUMBIA RIDGE LANDFILL — U.S. EPA ID Number: NED0017922910

26. Transporter _____ Company Name — U.S. EPA ID Number

27a. HM	27b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	28. Containers No.	28. Containers Type	29. Total Quantity	30. Unit Wt./Vol.	31. Waste Codes		

GENERATOR

32. Special Handling Instructions and Additional Information

CONTAINER # WMXU9709163

TRANSPORTER

33. Transporter _____ Acknowledgment of Receipt of Materials
Printed/Typed Name | Signature | Month | Day | Year

34. Transporter _____ Acknowledgment of Receipt of Materials
Printed/Typed Name | Signature | Month | Day | Year

DESIGNATED FACILITY

35. Discrepancy

36. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)

TAYLOR'S EXCAVATORS INC.

3134 268TH ST NW
STANWOOD, WA 98292
P 360-629-3078
F 360-629-7368

10-5-2018

ATTENTION: Grant Dull
Lynnwood Public Facilities District

FROM: Justin Taylor
Taylor's Excavators Inc
425-754-7378

Grant,

Please see attached bill of lading and invoice for the disposal of contained in concrete disposed. The material disposed of on 9-23 was "contaminated contained in concrete" as outlined on the bill of lading.

Justin Taylor
Taylor's Excavators Inc

REGIONAL DISPOSAL COMPANY
P.O. Box # 677839 DALLAS, TX 75267-7839

Account # 12826 Invoice # 154179 Date 9-26-18 Total $ 1,337.09

To: Taylor's Excavators Inc
3134 268th St NW
Stanwood, WA 98292

Amount Paid $

PROJECT: 1814 APPROVED:

REGIONAL DISPOSAL COMPANY
P.O. Box # 677839 DALLAS, TX 75267-7839
COST CODE: 04

To: Taylor's Excavators Inc
3134 268th St NW
Stanwood, WA 98292

WHOLESALE/RETAIL: USE TAX:

REC: ENTERED: VERIFY:

Account #	Invoice #	Date	Job#
12826	154179	9-26-18	TB-13841

Terms: Net 30 Days from Invoice date

Quantity	Unit	Description	Unit Price	Total
1.000	LOADS	Contained in Contaminated Soil	1,280.00	1,280.00
	Tons	Excess tons over 25	84.00	-
1.000	Each	Container/Chassis rental	10.00	10.00
		WA State Sales tax @ 10.1%		1.01
		WA State Refuse tax at 3.6%		46.08
			Total:	**$ 1,337.09**

For Billing Inquiries: (206) 332 7731 or email: chartje@republicservices.com

Recycled and Recyclable

SITE

Seattle 20 - 48 Ft --
SEATTLE ROOSEVELT , WA

CUSTOMER

012826
Taylor's Excavators Inc.
3134 268th St. NW
Stanwood, WA 98292
Contract:TB-13841

SITE	TICKET #	CELL
32	5269731	

WEIGHMASTER CHARLENE H.

DATE/TIME IN	DATE/TIME OUT
9/23/18 12:50 pm	9/23/18 12:50 pm

VEHICLE	CONTAINER
5333	RBSU300364

REFERENCE

BILL OF LADING

MANUAL IN GROSS WEIGHT 67,900 NET TONS 10.38 INBOUND
MANUAL OUT TARE WEIGHT 47,140 NET WEIGHT 20,760 INVOICE

QTY	UNIT	DESCRIPTION	RATE	EXTENSION	TAX	TOTAL
20.00	YD	Tracking QTY				
10.38	tn	Contained in Contaminated Soil Origin:Lynnwood 100%				
1.00		CONTAINER/CHASIS RENTAL				

NET AMOUNT

TENDERED

CHANGE

CHECK#

The undersigned individual signing this document on behalf of Customer acknowledges that he or she has read and understands the terms and conditions on the reverse side and that he or she has the authority to sign this document on behalf of the customer.

RS-F042UPR (07/12)

SIGNATURE _____

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
Northwest Regional Office • 3190 160th Ave SE • Bellevue, WA 98008-5452 • 425-649-7000
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

August 16, 2018

Mr. Grant Dull, Executive Director
Lynnwood Public Facilities District
3711 196th Street SW, Suite 136
Lynnwood, WA 98036

Re: Contained-in Determination for Contaminated Concrete Debris from the Former Alderwood Laundry and Dry Cleaners Site in Lynnwood, Washington

Reference: 1. Letter Report from C. Watkins and D. Carlisle, GeoEngineers to B. Maeng, Ecology, dated August 2, 2018

Dear Mr. Dull:

This letter replaces the Ecology contained-in determination letter dated August 9, 2018.

The Washington State Department of Ecology (Ecology) received a contained-in determination request from your environmental consultant, GeoEngineers for approximately 25 tons of contaminated concrete debris generated during demolition of a building adjacent to the former Alderwood Landry and Dry Cleaners site located at 3815 196th Street SW in Lynnwood, Washington (Reference 1).

Analytical data and supplemental information for the contaminated concrete debris were submitted to Ecology to determine if these concrete debris contaminated with listed dangerous waste constituents (F002) may be exempt from management as dangerous wastes per the "Contained-In Policy[1]". Ecology understands that these contaminated concrete debris do not designate under federal characteristics (WAC 173-303-090) or State-only criteria (WAC 173-303-100).

Based on the information received and reviewed, Ecology has determined that the concrete debris is contaminated with F002 listed dangerous waste constituents at concentrations that do not warrant management as dangerous wastes, and Ecology will not require disposal of these concrete debris as listed dangerous wastes at a RCRA permitted dangerous waste treatment, storage and disposal (TSD) facility, provided that all of the following conditions are implemented. This contained-in determination applies only to the contaminated concrete debris.

[1] Washington State Department of Ecology Contained-in Policy, dated February19, 1993

You or your consultant, GeoEngineers shall:

- Ensure that no standing water is present within the drums/containers holding the contaminated concrete debris. All water must be removed to the maximum extent possible from the drums/containers and managed as F002 dangerous wastes or as otherwise allowed under Chapter 173-303 WAC. Adding bentonite or similar materials to absorb standing F002 listed waste contaminated water in the containers is not allowed. Mixtures of bentonite or similar materials and the listed waste contaminated water must be managed as F002 listed dangerous wastes;

- Directly deliver the concrete debris to a solid waste landfill permitted under WAC 173-351 inside Washington State. If you plan to deliver the contaminated concrete debris to a landfill outside Washington State, you must submit Ecology written approval for the contaminated concrete debris disposal from the receiving State hazardous waste program and the out of state landfill, before the concrete debris is delivered to the out of state landfill;

- If you load the contaminated concrete debris directly onto the truck bed or the contaminated debris is transported in roll-off bins, the truck or the roll-off bins must be lined with plastic and properly covered to prevent leaks, spills or dispersion due to wind erosion;

- Dispose of the contaminated concrete debris at the solid waste landfill by September 30, 2018. The contaminated debris must be managed as dangerous wastes after September 30, 2018;

- Provide copies of all signed solid waste landfill receipts or a certificate of disposal issued by the receiving landfill for these contaminated concrete debris to Ecology, attention of Byung Maeng, by October 31, 2018. This is an important verification step for you and your consultant to follow in order for this Ecology decision to be valid;

- Do not consolidate these contaminated concrete debris with other media that do not pertain to this contained in determination;

- Notify Ecology before disposal of the concrete debris if the amount exceeds the approved amount in this letter. Ecology needs to make sure that the additional concrete debris qualifies for this contained-in determination;

- Ensure that the transporter is properly trained to handle hazardous waste so that the transporter manages the contained-in determination concrete debris during transport in a manner that is protective of human health and the environment;

- Take measures to prevent unauthorized contact with these contaminated concrete debris at all times;

- Provide instructions to the landfill operator that these concrete debris is not to be used for daily, intermediate, or final cover;

- Provide copies of all concrete debris analytical data to the landfill operator, upon request; and

- Do not send these contaminated concrete debris to any incinerator, thermal desorption unit or recycling facility unless that facility is a RCRA Subtitle C permitted dangerous waste TSD facility.

Ecology issued this determination based on the information provided and reviewed to date. Ecology will rescind this approval if the information submitted by the property owner or its environmental consultant does not accurately represent the site conditions or is materially false or misleading, or if the Ecology requirements listed above are not followed.

This written decision only applies to the 25 tons of concrete debris represented by Sample CS-4 PCE and marked as "Concrete Area for CID Disposal" (refer to Figure A2.10 Demolition Site Plan attached to this letter), and does not apply to any other area or other media. Any data used for this contained-in determination is intended for use in determining the proper disposal of the concrete debris according to the Washington State Dangerous Waste Regulations (Chapter 173-303 WAC) and the Ecology Contained-in Policy. This letter is not an Ecology approval for dangerous waste designation or disposal of contaminated concrete debris that may be generated or already excavated from other areas in this property.

This letter is not a No Further Action (NFA) letter and not written approval for any cleanup action plan you may have submitted. Regulatory decisions regarding the cleanup action, applicable soil and groundwater cleanup levels and any other cleanup issues must comply with the requirements under the Ecology Model Toxics Control Act (Chapter 173-340 WAC). Local agencies may have the authority to impose additional requirements on this waste stream.

If you fail to comply with the terms of this letter, Ecology may issue an administrative order and/or penalty as provided by the Revised Code of Washington, Sections 70.105.080 and/or .095 (Hazardous Waste Management Act).

If you have any questions concerning this letter, please contact me at (425) 649-7253 or bmae461@ecy.wa.gov.

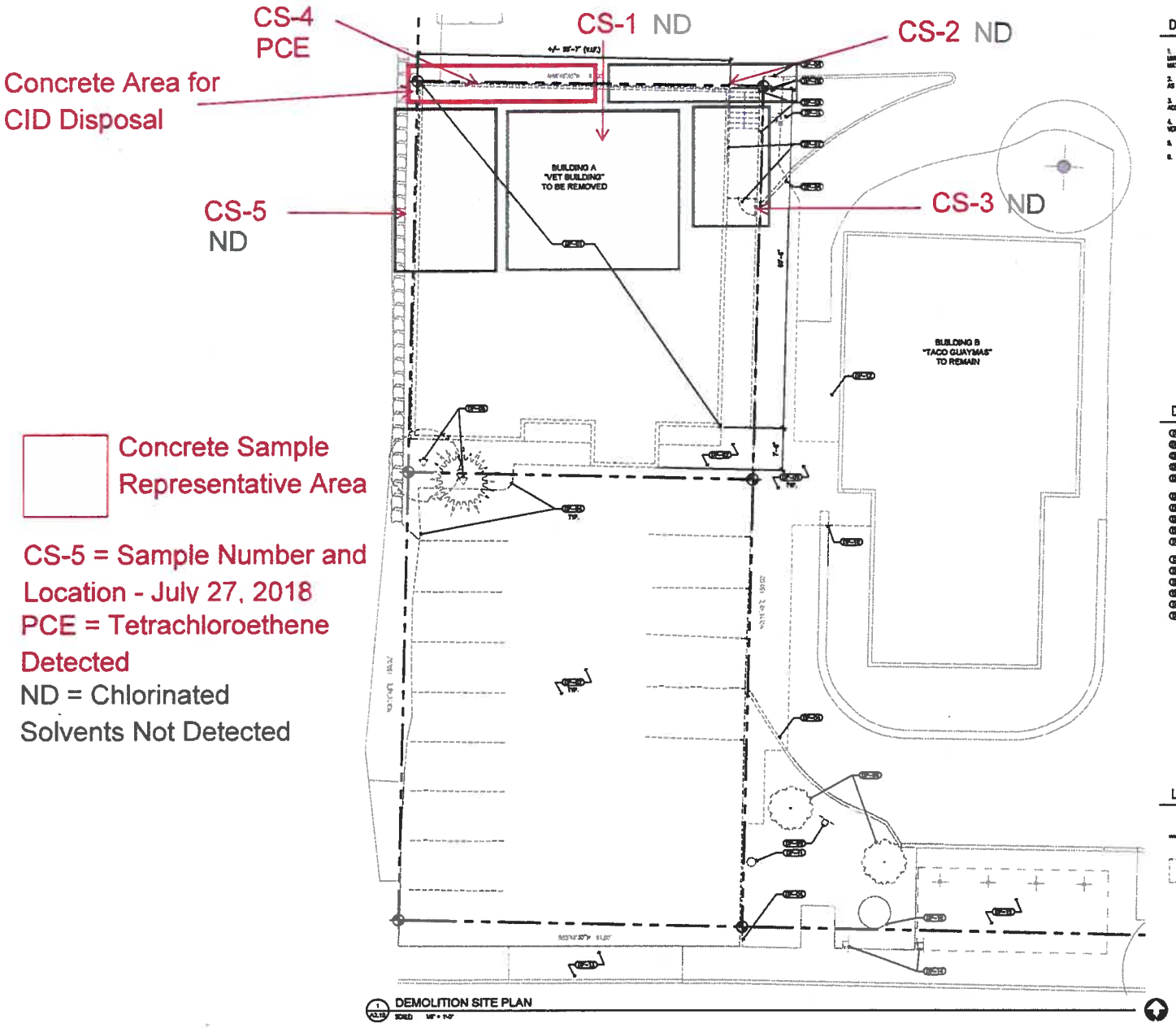
Sincerely,

Byung Maeng, PE
Hazardous Waste and Toxics Reduction Program

Sent by Certified Mail: 9171 9690 0935 0169 7338 84

Attachment: Figure A2.10 – Demolition Site Plan

ecc: Dana Carlisle, GeoEngineers (dcarlisle@geoengineers.com)
Cris Watkins, GeoEngineers (cwatkins@geoengineers.com)
Chuck Hoffman, Ecology
Greg Caron, Ecology
Mindy Collins, Ecology
Diane Escobedo, Ecology
Chuck Hoffman, Ecology
Karen Wood, Ecology
Dean Yasuda, Ecology



DEMOLITION SITE PLAN GENERAL NOTES

1. ALL SALVAGED ITEMS SHALL BE RETURNED TO BUILDING OWNER, IF REQUESTED. ALL UNWANTED MATERIAL SHALL BE DISPOSED OF IN A LEGAL MANNER. RECYCLE ALL MATERIALS WHERE POSSIBLE.
2. PROTECT ANY ITEMS TO REMAIN AGAINST DAMAGE DURING CONSTRUCTION. REPAIR AS NECESSARY.
3. REMOVE ALL ABOVE AND BELOW GRADE (E) IMPROVEMENTS THROUGHOUT TO ACCOMMODATE NEW WORK.
4. ALL DIMENSIONS SHOWN ARE APPROXIMATE. CONTRACTOR IS RESPONSIBLE TO FIELD VERIFY AS NECESSARY.
5. REFER TO CIVIL DRAWINGS FOR ADDITIONAL INFORMATION.
6. ALL HAZARDOUS MATERIALS TO BE DISPOSED OF IN A LEGAL MANNER.

DEMOLITION SITE PLAN KEYNOTES

(D1.10) REMOVE (E) BUILDING & FOUNDATION & ALL APPURTENANCES
(D1.11) REMOVE (E) ASPHALT PAVEMENT PER CIVIL
(D1.12) REMOVE (E) RETAINING WALL PER CIVIL
(D1.13) REMOVE (E) CURB PER CIVIL
(D1.14) REMOVE PORTION OF (E) DRIVE AND CONCRETE WALK TO ACCOMMODATE NEW WORK PER CIVIL
(D1.15) REMOVE (E) SHRUBS & TREES PER CIVIL
(D1.16) REMOVE (E) FENCE & GATE(S)
(D1.17) REMOVE (E) SIGN POSTS
(D1.18) REMOVE (E) SIGNS--SAVE CUT SIGN
(D1.19) REMOVE PORTION OF (E) HALF-HEIGHT WALL TO ACCOMMODATE NEW WORK PER CIVIL
(D1.20) (E) POWER POLE TO REMAIN
(D1.21) (E) CONC. DRIVEWAY TO REMAIN
(D1.22) (E) SIDEWALK W/ CURB CUT TO REMAIN
(D1.23) (E) POLE SIGNAGE TO REMAIN
(D1.24) (E) BUS STOP
(D1.25) (E) ABANDONED LIGHT POLE TO REMAIN

LEGEND

PROPERTY LINE

EXISTING CONSTRUCTION TO BE DEMOLISHED

FREIHEIT ARCHITECTURE

LYNNWOOD PUBLIC FACILITIES DISTRICT INTERIM
SITE IMPROVEMENTS: VET BUILDING DEMO
3711 196TH STREET SW
LYNNWOOD, WA 98036

REVISION LIST

PERMIT SET
BID SET

DEMOLITION SITE PLAN
A2.10

APPENDIX D
Field Procedures and Exploration Logs

APPENDIX D
FIELD PROCEDURES AND EXPLORATION LOGS

Underground Utility Locate

Prior to drilling activities, an underground utility locate was conducted in the area of the proposed boring locations to identify subsurface utilities and/or potential underground physical hazards. The underground utility check consisted of contacting a local utility alert service (one-call), hiring a private utility locating company, and using a vactor truck to perform air-knife activities.

Soil Sampling

Subsurface conditions at the site were evaluated by completing hollow-stem auger (HSA) explorations by a Washington state-licensed drilling company.

Soil samples were obtained from the borings at 5-foot depth intervals for field screening and possible chemical analysis. Soil samples from the borings were obtained using a 2.5-inch diameter, split barrel sampler. The sampler was driven a maximum of 18 inches by a 300-pound weight falling a vertical distance of approximately 30 inches. The number of blows needed to advance the sampler the final 12 inches or other specified distance is indicated to the left of the corresponding sample notation on the logs. Soil from the spit-barrel sampler was placed in clean containers provided by the testing laboratory. The remaining portion of the sample was placed in a plastic bag for field screening. The drilling equipment was decontaminated by steam cleaning prior to drilling each boring.

A representative from our staff selected the exploration locations and observed and classified the soil encountered. The borings were advanced to a depth of 50 feet below ground surface (bgs). Soil in the explorations was visually classified in general accordance with ASTM International (ASTM) Standard Practices Test Method D 2488-94. Exploration logs are presented in Figures D-2 and D-3.

Select samples from the explorations were submitted for chemical analysis. The soil samples were placed in a cooler with ice for transport to the analytical laboratory. Standard chain-of-custody procedures were followed in transporting the soil samples to the analytical laboratory.

Drill cuttings and decontamination water generated during drilling activities were temporarily stored at the Lynnwood Public Facilities District (PFD) property in labeled 55-gallon drums prior to removal for off-site disposal. Drum disposal is discussed in the section titled “Investigation Derived Waste Disposal.”

Field Screening of Soil Samples

Soil samples obtained from the borings were screened in the field for evidence of contamination using (1) visual examination; (2) sheen screening; and (3) vapor headspace screening with a photoionization detector (PID).

Visual screening consists of inspecting the soil for stains indicative of petroleum-related contamination. Visual screening is generally more effective when contamination is related to heavy petroleum hydrocarbons, such as motor oil or hydraulic oil, or when hydrocarbon concentrations are high. Sheen screening and headspace vapor screening are more sensitive methods that have been effective in detecting contamination at concentrations less than regulatory cleanup guidelines. Sheen screening

involves placing soil in a pan of water and observing the water surface for signs of sheen. Sheen classifications are as follows:

No Sheen (NS)	No visible sheen on water surface.
Slight Sheen (SS)	Light, colorless, dull sheen; spread is irregular, not rapid; sheen dissipates rapidly.
Moderate Sheen (MS)	Light to heavy sheen, may have some color/iridescence; spread is irregular to flowing; few remaining areas of no sheen on water surface.
Heavy Sheen (HS)	Heavy sheen with color/iridescence; spread is rapid; entire water surface may be covered with sheen.

Headspace vapor screening involves placing a soil sample in a plastic sample bag. Air is captured in the bag and the bag is shaken to expose the soil to the air trapped in the bag. The probe of a PID is inserted in the bag and the instrument measures the concentration of combustible vapor in the air removed from the sample headspace. The PID measures concentrations in parts per million (ppm) and is calibrated to isobutylene. The PID has a lower threshold of significance of 1 ppm in this application. Field screening results are site-specific and vary with soil type, soil moisture content, temperature and type of contaminant.

Monitoring Well Drilling and Installation

The monitoring wells were drilled to an approximate depth of 50 feet bgs using truck-mounted hollow stem auger drilling equipment. The monitoring wells were constructed using 2-inch diameter, Schedule 40, threaded, polyvinyl chloride (PVC) casing. Well screens consisted of 2-inch diameter, Schedule 40 PVC with 0.010-inch machine-cut slots. Monitoring well construction details are shown on the exploration logs in this Appendix.

A filter pack consisting of colorado silica sand was placed around the well screen to limit entry of fine-grained particles from the surrounding formation into the wells. The filter pack in each well extends from the bottom of the well screen to approximately 2 feet above the top of the well screen.

The annular seal in each well consists of 4-foot-thick concrete surface seal overlying bentonite chips overlying the filer pack. Protective steel monuments were installed over the wells and flush with the surrounding pavement.

Decontamination Procedures

Drilling equipment was steam cleaned before drilling for each monitoring well. Decontamination rinse water was collected in drums and managed as Investigative Derived Waste.

Monitoring Well Development

All monitoring wells were developed shortly after well installation to allow the sand pack to settle, remove fine soil particles from the wells and sand pack, and to establish hydraulic connection between the well and the surrounding saturated soil. Prior to development, the depth to water in the well and the total well depth was measured and recorded. The wells were developed using a submersible pump until the relative turbidity of discharge water was low.

Depth to Groundwater

Depths to groundwater in the monitoring wells were measured using an electric water level indicator. The depth to groundwater was measured relative to the top of the well casings. All down-hole equipment was decontaminated using a Liqui-Nox® solution, followed by a distilled water rinse prior to use in the well.

Groundwater Sampling

Following depth to groundwater measurements, groundwater samples were collected from the monitoring wells consistent with the U.S. Environmental Protection Agency's (EPA) low-flow groundwater sampling procedure, as described in EPA (1996) and Puls and Barcelona (1996). Disposable polyethylene tubing and a down-well bladder pump were used for groundwater purging and sampling. During purging activities, water quality parameters, including pH, temperature, conductivity, dissolved oxygen and turbidity were measured using a multi-parameter meter equipped with a flow-through cell. Groundwater samples were collected after either: (1) water quality parameters stabilized; or (2) a maximum purge time of 60 minutes, whichever occurred first. If the well went dry during purging, it was allowed to recharge as long as possible during the sampling day before collecting a grab groundwater sample using the peristaltic pump and tubing. Water quality parameter stabilization criteria included the following:

- Turbidity: ±10 percent for values greater than 5 nephelometric turbidity units (NTU)
- Conductivity: ±3 percent
- pH: ±0.1 unit
- Temperature: ±3 percent
- Dissolved oxygen: ±10 percent

Field water quality measurements were recorded on a Well Purging-Field Water Quality Measurement Form. The groundwater samples were transferred in the field to laboratory-prepared sample containers and kept cool during transport to the testing laboratory. Chain-of-custody procedures were observed from the time of sample collection to delivery to the testing laboratory.

Investigation Derived Waste Disposal

Investigation-derived waste consisting of soil cuttings, purged groundwater, and decontamination water resulting from drilling and sampling activities was placed in 55-gallon drums and temporarily stored on site. Data collected during assessment activities were submitted to Waste Management for profiling and subsequent disposal. Given the limited volumes of investigative waste, both soil and groundwater were characterized as F002-listed hazardous waste and disposed of accordingly at the Columbia Ridge Landfill in Arlington, Oregon.

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% RETAINED ON NO. 200 SIEVE	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS
				SP	POORLY-GRADED SANDS, GRAVELLY SAND
	MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
	AC	Asphalt Concrete
	CC	Cement Concrete
	CR	Crushed Rock/ Quarry Spalls
	SOD	Sod/Forest Duff
	TS	Topsoil

Groundwater Contact

Measured groundwater level in exploration, well, or piezometer

Measured free product in well or piezometer

Graphic Log Contact

Distinct contact between soil strata

Approximate contact between soil strata

Material Description Contact

Contact between geologic units

Contact between soil of the same geologic unit

Sampler Symbol Descriptions

2.4-inch I.D. split barrel

Standard Penetration Test (SPT)

Shelby tube

Piston

Direct-Push

Bulk or grab

Continuous Coring

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

"P" indicates sampler pushed using the weight of the drill rig.

"WOH" indicates sampler pushed using the weight of the hammer.

Laboratory / Field Tests

%F	Percent fines
%G	Percent gravel
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DD	Dry density
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
Mohs	Mohs hardness scale
OC	Organic content
PM	Permeability or hydraulic conductivity
PI	Plasticity index
PP	Pocket penetrometer
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
VS	Vane shear

Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

Key to Exploration Logs

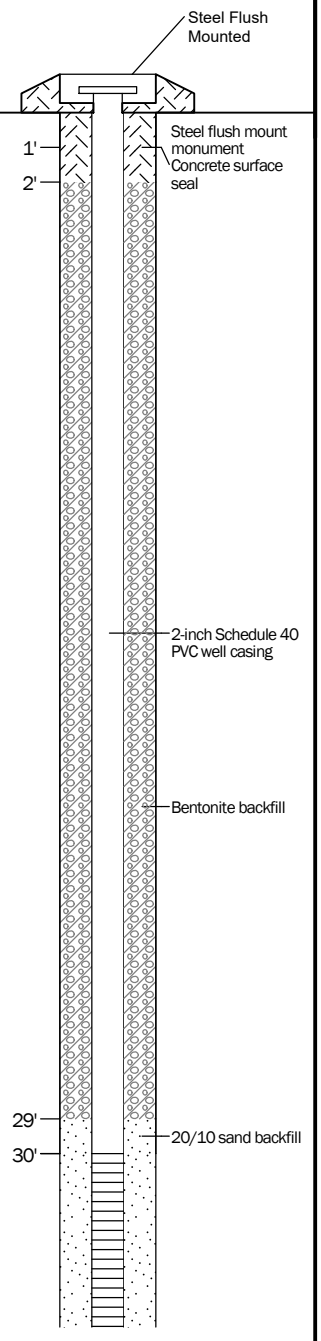
GeoEngineers

Figure D-1

Drilled Start 5/3/2019 End 5/3/2019	Total Depth (ft) 50	Logged By NRS Checked By CJW	Driller Holocene	Drilling Method Hollow-stem Auger	
Hammer Data 140 (lbs) / (in) Drop		Drilling Equipment Truck mounted drill rig		DOE Well I.D.: 1907708 A 2-in well was installed on 5/3/2019 to a depth of 50 ft.	
Surface Elevation (ft) Vertical Datum Undetermined		Top of Casing Elevation (ft)		Groundwater Date Measured 5/4/2019	Depth to Water (ft) 45.20 Elevation (ft)
Easting (X) 47.821868 Northing (Y) -122.285419		Horizontal Datum WA			

Notes: Air knife/Vac Truck 0 to 5 feet bgs. Perched water not encountered during drilling.

Elevation (feet) / Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample / Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
0						AC	3 inches asphalt concrete pavement		
						SP	Light brown fine to coarse sand with gravel (fill) (very dense, dry)		
						SM	Light brown fine to coarse silty sand with trace gravel (dense, dry)		
5	12	9	5.0 CA					NS	<1
10	18		10.0 CA				Light gray fine to medium silty sand (loose, moist)	NS	<1
15	18	7	15.0 CA					NS	<1
20	12	50/6"	20.0				Light gray to gray fine to coarse silty sand (very dense, dry)	NS	<1
							No perched groundwater at 20 feet bgs		
25	12	50/5"	25.0 CA				Gray fine to coarse silty sand with trace gravel (very dense, moist)	NS	<1
30	12	50/6"	30.0				Gray fine to coarse silty sand with gravel (very dense, moist to dry)	NS	<1
35	18	39	35.0 CA			SP	Light to dark gray fine to coarse sand with trace silt (dense, moist)	NS	<1



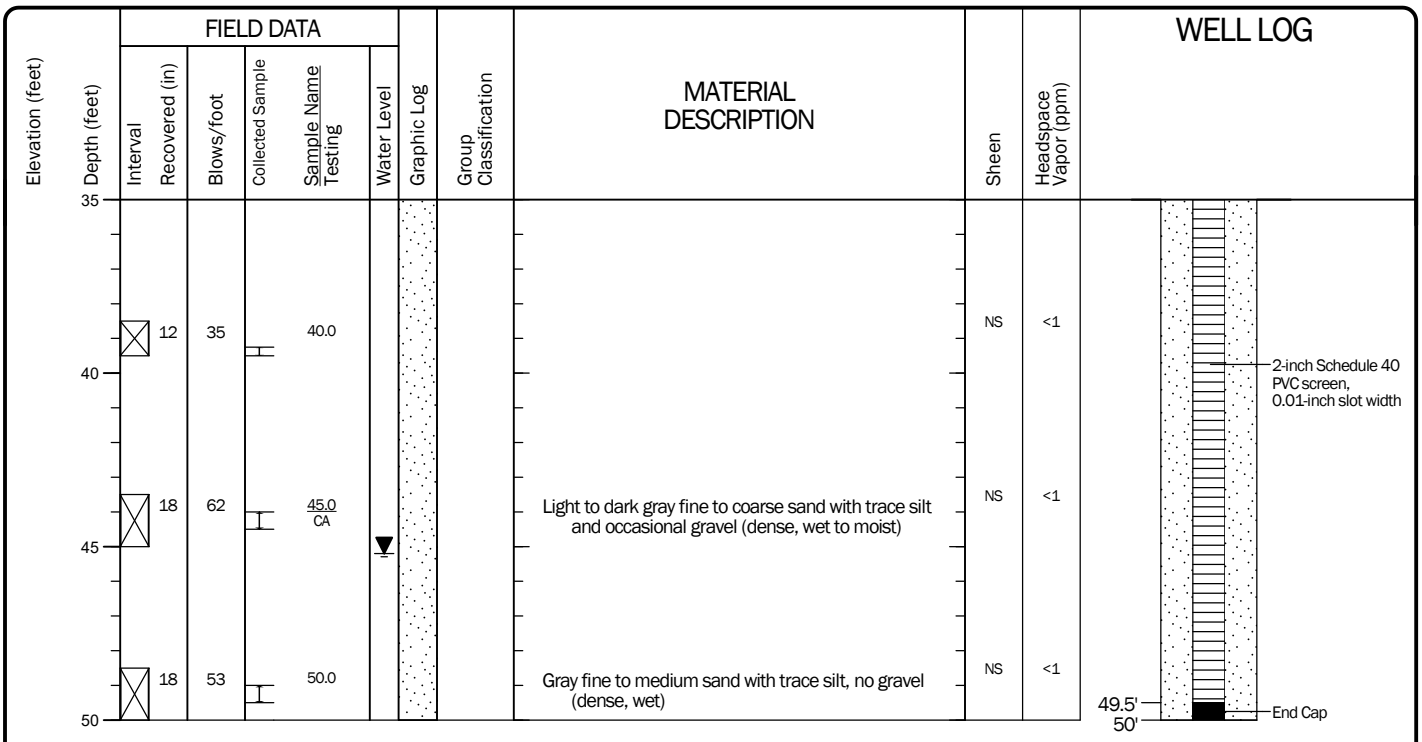
Note: See Figure D-1 for explanation of symbols.

Log of Monitoring Well MW-16

GeoEngineers

Project: Alderwood Laundry and Dry Cleaner
Project Location: 3815 196th St SW, Lynnwood, Washington
Project Number: 17787-001-11

Figure D-2
Sheet 1 of 2



Log of Monitoring Well MW-16 (continued)

GeoEngineers

Project: Alderwood Laundry and Dry Cleaner
Project Location: 3815 196th St SW, Lynnwood, Washington
Project Number: 17787-001-11

Figure D-2
Sheet 2 of 2

Drilled	Start	End	Total Depth (ft)	Logged By	Checked By	Driller	Drilling Method
	5/3/2019	5/4/2019	50	NRS	CJW	Holocene	Hollow-stem Auger

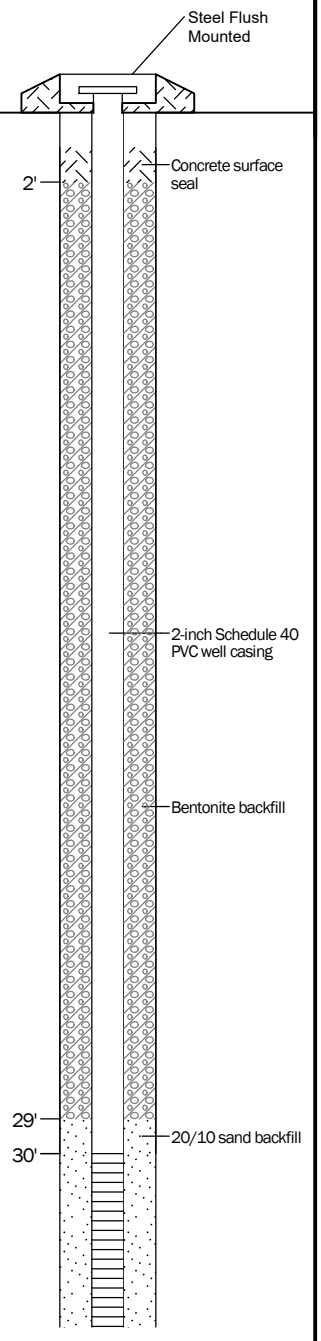
Hammer Data	140 (lbs) / (in) Drop	Drilling Equipment	Truck mounted drill rig
Surface Elevation (ft) Vertical Datum	Undetermined	Top of Casing Elevation (ft)	
Easting (X) Northing (Y)	47.821752 -122.285445	Horizontal Datum	WA

DOE Well I.D.: 1907719
A 2-in well was installed on 5/3/2019 to a depth of 50 ft.

Groundwater Date Measured	Depth to Water (ft)	Elevation (ft)
5/7/2019	42.29	

Notes: Perched water encountered during drilling measured at 16.10 feet bgs.

Elevation (feet)	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0							AC	3 inches asphalt concrete		
								SM	Light brown fine to coarse silty sand with gravel (dense, dry) (fill)		
	5	0			5.0				No recovery - large rock		
	10	12	17		10.0 CA			ML	Dark brown to orange silt with fine sand (soft, dry)	NS	<1
	15	6	16		15.0			SM	Brown fine to coarse silty sand with trace gravel (loose, moist)	NS	<1
	20	18	64		20.0 CA				Light gray fine to medium silty sand (dense, moist)	NS	<1
	25	12	50/5"		25.0			ML	Gray silt with fine to medium sand and occasional gravel (very stiff, wet to moist)	NS	<1
	30	12	50/6"		30.0 CA			SP	Dark gray fine to coarse sand with trace silt (very stiff, wet)	NS	<1
	35	18	73/4"		35.0 CA					NS	<1



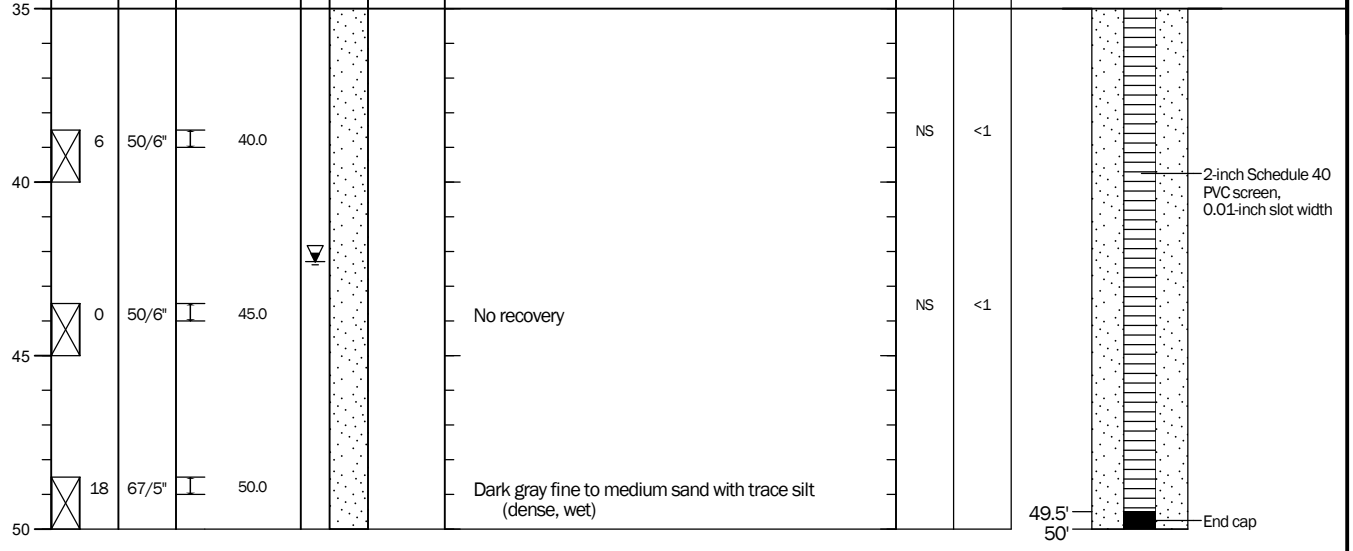
Note: See Figure D-1 for explanation of symbols.

Log of Monitoring Well MW-17

GeoEngineers

Project: Alderwood Laundry and Dry Cleaner
Project Location: 3815 196th St SW, Lynnwood, Washington
Project Number: 17787-001-11

Figure D-3
Sheet 1 of 2



Log of Monitoring Well MW-17 (continued)

GeoEngineers

Project: Alderwood Laundry and Dry Cleaner
Project Location: 3815 196th St SW, Lynnwood, Washington
Project Number: 17787-001-11

Figure D-3
Sheet 2 of 2

APPENDIX E
Chemical Analytical Program

APPENDIX E
CHEMICAL ANALYTICAL PROGRAM

Analytical Methods

Chain-of-custody procedures were followed during the transport of the field samples to the analytical laboratory. The samples were held in cold storage pending extraction and/or analysis. The analytical results, analytical methods reference and laboratory quality control (QC) records are included in this appendix. The analytical results are also summarized in the text and tables of this report.

Analytical Data Review

The laboratory maintains an internal quality assurance program as documented in its laboratory quality assurance manual. The laboratory uses a combination of blanks, surrogate recoveries, duplicates, matrix spike recoveries, matrix spike duplicate recoveries, blank spike recoveries and blank spike duplicate recoveries to evaluate the validity of the analytical results. The laboratory also uses data quality goals for individual chemicals or groups of chemicals based on the long-term performance of the test methods. The data quality goals were included in the laboratory reports. The laboratory compared each group of samples with the existing data quality goals and noted any exceptions in the laboratory report. Data quality exceptions documented by the accredited laboratory were reviewed by GeoEngineers, Inc. and are addressed in the data quality exception section of this appendix.

Analytical Data Review Summary

No data quality exceptions were noted in the laboratory reports.

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

May 14, 2019

GeoEngineers- Portland, OR

Sample Delivery Group:	L1096125
Samples Received:	05/07/2019
Project Number:	17787-001-11
Description:	Lynnwood PFD
Site:	LYNNWOOD PFD
Report To:	Cris Watkins 4000 Kruse Way Place Bldg. 3, Suite 200 Lake Oswego, OR 97035

Entire Report Reviewed By:

Jared Starkey
Project Manager

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MW-16_5.0 L1096125-01 Solid

Collected by	Collected date/time	Received date/time
Nathan Solomon	05/04/19 08:05	05/07/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1279222	1	05/13/19 08:55	05/13/19 09:04	JD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1278574	1	05/04/19 08:05	05/09/19 13:39	BMB	Mt. Juliet, TN

MW-16_45.0 L1096125-02 Solid

Collected by	Collected date/time	Received date/time
Nathan Solomon	05/04/19 10:25	05/07/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1279222	1	05/13/19 08:55	05/13/19 09:04	JD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1278574	1	05/04/19 10:25	05/09/19 13:59	BMB	Mt. Juliet, TN

MW-17_10.0 L1096125-03 Solid

Collected by	Collected date/time	Received date/time
Nathan Solomon	05/04/19 11:20	05/07/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1279222	1	05/13/19 08:55	05/13/19 09:04	JD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1278574	1	05/04/19 11:20	05/09/19 14:19	BMB	Mt. Juliet, TN

MW-17_35.0 L1096125-04 Solid

Collected by	Collected date/time	Received date/time
Nathan Solomon	05/04/19 14:00	05/07/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1279222	1	05/13/19 08:55	05/13/19 09:04	JD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1278574	1.01	05/04/19 14:00	05/09/19 14:38	BMB	Mt. Juliet, TN

MW-17_20190504 L1096125-05 GW

Collected by	Collected date/time	Received date/time
Nathan Solomon	05/04/19 12:50	05/07/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1279226	1	05/10/19 15:11	05/10/19 15:11	ACG	Mt. Juliet, TN

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Jared Starkey
Project Manager

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	88.2		1	05/13/2019 09:04	WG1279222

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
1,1-Dichloroethene	ND		0.00283	1	05/09/2019 13:39	WG1278574
cis-1,2-Dichloroethene	ND		0.00283	1	05/09/2019 13:39	WG1278574
trans-1,2-Dichloroethene	ND		0.00567	1	05/09/2019 13:39	WG1278574
Tetrachloroethene	0.00866		0.00283	1	05/09/2019 13:39	WG1278574
Trichloroethene	ND		0.00113	1	05/09/2019 13:39	WG1278574
Vinyl chloride	ND		0.00283	1	05/09/2019 13:39	WG1278574
(S) Toluene-d8	*102*		*75.0-131*		*05/09/2019 13:39*	WG1278574
(S) 4-Bromofluorobenzene	*85.2*		*67.0-138*		*05/09/2019 13:39*	WG1278574
(S) 1,2-Dichloroethane-d4	*110*		*70.0-130*		*05/09/2019 13:39*	WG1278574

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	86.7		1	05/13/2019 09:04	WG1279222

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
1,1-Dichloroethene	ND		0.00288	1	05/09/2019 13:59	WG1278574
cis-1,2-Dichloroethene	ND		0.00288	1	05/09/2019 13:59	WG1278574
trans-1,2-Dichloroethene	ND		0.00577	1	05/09/2019 13:59	WG1278574
Tetrachloroethene	0.234		0.00288	1	05/09/2019 13:59	WG1278574
Trichloroethene	0.00165		0.00115	1	05/09/2019 13:59	WG1278574
Vinyl chloride	ND		0.00288	1	05/09/2019 13:59	WG1278574
(S) Toluene-d8	*103*		*75.0-131*		*05/09/2019 13:59*	WG1278574
(S) 4-Bromofluorobenzene	*80.8*		*67.0-138*		*05/09/2019 13:59*	WG1278574
(S) 1,2-Dichloroethane-d4	*109*		*70.0-130*		*05/09/2019 13:59*	WG1278574

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	85.6		1	05/13/2019 09:04	WG1279222

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
1,1-Dichloroethene	ND		0.00292	1	05/09/2019 14:19	WG1278574
cis-1,2-Dichloroethene	ND		0.00292	1	05/09/2019 14:19	WG1278574
trans-1,2-Dichloroethene	ND		0.00584	1	05/09/2019 14:19	WG1278574
Tetrachloroethene	0.0755		0.00292	1	05/09/2019 14:19	WG1278574
Trichloroethene	ND		0.00117	1	05/09/2019 14:19	WG1278574
Vinyl chloride	ND		0.00292	1	05/09/2019 14:19	WG1278574
(S) Toluene-d8	*100*		*75.0-131*		*05/09/2019 14:19*	WG1278574
(S) 4-Bromofluorobenzene	*86.3*		*67.0-138*		*05/09/2019 14:19*	WG1278574
(S) 1,2-Dichloroethane-d4	*110*		*70.0-130*		*05/09/2019 14:19*	WG1278574

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	92.2		1	05/13/2019 09:04	WG1279222

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
1,1-Dichloroethene	ND		0.00274	1.01	05/09/2019 14:38	WG1278574
cis-1,2-Dichloroethene	0.00588		0.00274	1.01	05/09/2019 14:38	WG1278574
trans-1,2-Dichloroethene	ND		0.00547	1.01	05/09/2019 14:38	WG1278574
Tetrachloroethene	0.520		0.00274	1.01	05/09/2019 14:38	WG1278574
Trichloroethene	0.00767		0.00109	1.01	05/09/2019 14:38	WG1278574
Vinyl chloride	ND		0.00274	1.01	05/09/2019 14:38	WG1278574
(S) Toluene-d8	*101*		*75.0-131*		*05/09/2019 14:38*	WG1278574
(S) 4-Bromofluorobenzene	*85.8*		*67.0-138*		*05/09/2019 14:38*	WG1278574
(S) 1,2-Dichloroethane-d4	*109*		*70.0-130*		*05/09/2019 14:38*	WG1278574

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
1,1-Dichloroethene	ND		0.500	1	05/10/2019 15:11	WG1279226
cis-1,2-Dichloroethene	2.14		0.500	1	05/10/2019 15:11	WG1279226
trans-1,2-Dichloroethene	ND		0.500	1	05/10/2019 15:11	WG1279226
Tetrachloroethene	35.6		0.500	1	05/10/2019 15:11	WG1279226
Trichloroethene	1.80		0.500	1	05/10/2019 15:11	WG1279226
Vinyl chloride	ND		0.500	1	05/10/2019 15:11	WG1279226
(S) Toluene-d8	*96.0*		*80.0-120*		*05/10/2019 15:11*	WG1279226
(S) 4-Bromofluorobenzene	*108*		*77.0-126*		*05/10/2019 15:11*	WG1279226
(S) 1,2-Dichloroethane-d4	*103*		*70.0-130*		*05/10/2019 15:11*	WG1279226

Method Blank (MB)

(MB) R3410849-1 05/13/19 09:04

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.00100			

L1096114-23 Original Sample (OS) • Duplicate (DUP)

(OS) L1096114-23 05/13/19 09:04 • (DUP) R3410849-3 05/13/19 09:04

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	86.9	86.1	1	0.934		10

Laboratory Control Sample (LCS)

(LCS) R3410849-2 05/13/19 09:04

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	100	85.0-115	

Method Blank (MB)

(MB) R3410375-2 05/09/19 11:13

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
1,1-Dichloroethene	U		0.000500	0.00250
cis-1,2-Dichloroethene	U		0.000690	0.00250
trans-1,2-Dichloroethene	U		0.00143	0.00500
Tetrachloroethene	U		0.000700	0.00250
Trichloroethene	U		0.000400	0.00100
Vinyl chloride	U		0.000683	0.00250
(S) Toluene-d8	*102*			*75.0-131*
(S) 4-Bromofluorobenzene	*88.7*			*67.0-138*
(S) 1,2-Dichloroethane-d4	*108*			*70.0-130*

Laboratory Control Sample (LCS)

(LCS) R3410375-1 05/09/19 09:12

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
1,1-Dichloroethene	0.125	0.137	109	65.0-131	
cis-1,2-Dichloroethene	0.125	0.133	107	73.0-125	
trans-1,2-Dichloroethene	0.125	0.136	109	71.0-125	
Tetrachloroethene	0.125	0.125	99.6	70.0-136	
Trichloroethene	0.125	0.124	99.5	76.0-126	
Vinyl chloride	0.125	0.0971	77.7	63.0-134	
(S) Toluene-d8			*99.3*	*75.0-131*	
(S) 4-Bromofluorobenzene			*104*	*67.0-138*	
(S) 1,2-Dichloroethane-d4			*114*	*70.0-130*	

L1096203-10 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1096203-10 05/09/19 18:34 • (MS) R3410375-3 05/09/19 18:54 • (MSD) R3410375-4 05/09/19 19:14

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
1,1-Dichloroethene	0.125	ND	0.866	0.343	86.6	34.3	8	10.0-155		J3	86.5	37
cis-1,2-Dichloroethene	0.125	ND	0.860	0.506	86.0	50.6	8	10.0-149		J3	51.9	37
trans-1,2-Dichloroethene	0.125	ND	0.824	0.389	82.4	38.9	8	10.0-150		J3	71.6	37
Tetrachloroethene	0.125	ND	0.665	0.290	66.5	29.0	8	10.0-156		J3	78.7	39
Trichloroethene	0.125	ND	0.809	0.400	80.9	40.0	8	10.0-156		J3	67.6	38
Vinyl chloride	0.125	ND	0.115	0.0528	11.5	5.28	8	10.0-160		J3 J6	74.1	37
(S) Toluene-d8					*98.3*	*95.4*		*75.0-131*				
(S) 4-Bromofluorobenzene					*103*	*105*		*67.0-138*				
(S) 1,2-Dichloroethane-d4					*117*	*117*		*70.0-130*				

Method Blank (MB)

(MB) R3410741-3 05/10/19 10:50

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
1,1-Dichloroethene	U		0.188	0.500
cis-1,2-Dichloroethene	U		0.0933	0.500
trans-1,2-Dichloroethene	U		0.152	0.500
Tetrachloroethene	U		0.199	0.500
Trichloroethene	U		0.153	0.500
Vinyl chloride	U		0.118	0.500
(S) Toluene-d8	*93.6*			*80.0-120*
(S) 4-Bromofluorobenzene	*101*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*98.7*			*70.0-130*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3410741-1 05/10/19 09:26 • (LCSD) R3410741-2 05/10/19 09:47

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
1,1-Dichloroethene	25.0	29.3	27.4	117	110	71.0-124			6.72	20
cis-1,2-Dichloroethene	25.0	26.1	25.4	104	102	73.0-120			2.71	20
trans-1,2-Dichloroethene	25.0	25.6	25.5	102	102	73.0-120			0.508	20
Tetrachloroethene	25.0	25.1	24.5	101	97.8	72.0-132			2.72	20
Trichloroethene	25.0	25.3	24.0	101	96.1	78.0-124			5.11	20
Vinyl chloride	25.0	27.9	27.0	112	108	67.0-131			3.35	20
(S) Toluene-d8				*95.1*	*95.2*	*80.0-120*				
(S) 4-Bromofluorobenzene				*94.0*	*100*	*77.0-126*				
(S) 1,2-Dichloroethane-d4				*108*	*103*	*70.0-130*				

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
RDL (dry)	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J3	The associated batch QC was outside the established quality control range for precision.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.

Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.
* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

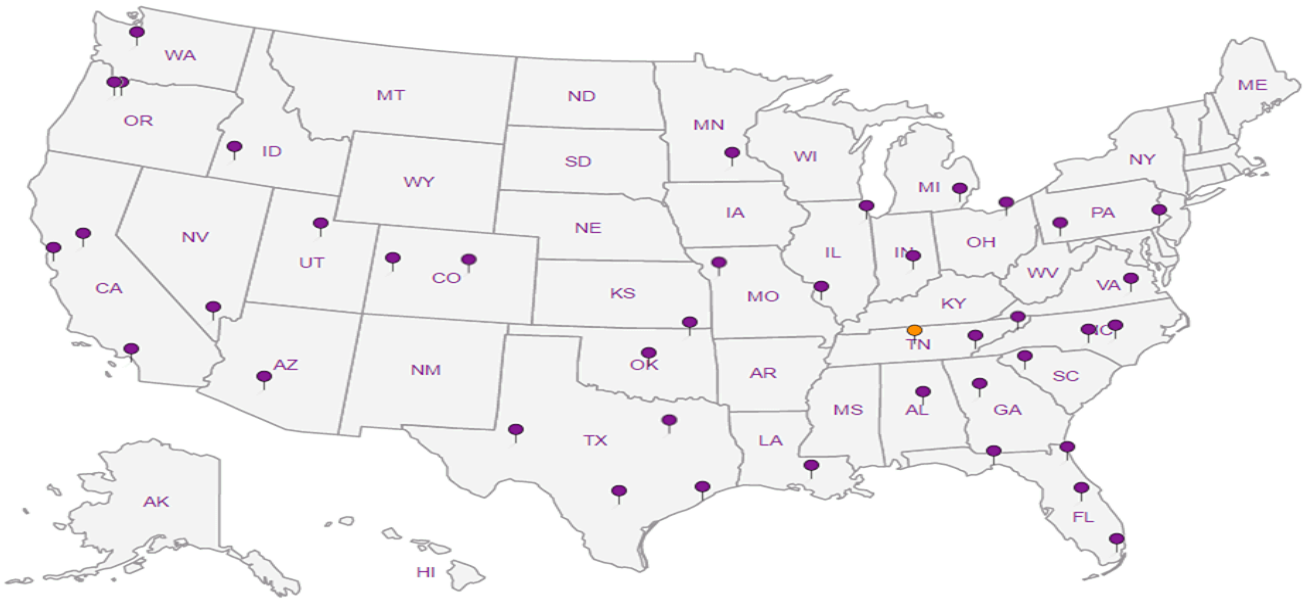
Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



GeoEngineers- Portland, OR

4000 Kruse Way Place
Bldg. 3, Suite 200
Lake Oswego, OR 97035

Billing Information:
Accounts Payable (Marlee Johnston)
17425 NE Union Hill Rd, Suite 250
Redmond, WA 98052

Pres Chk

Report to: Cris Watkins

Email To: cwatkins@geoengineers.com

Project Description: Lynnwood PFD

City/State Collected: LYNNWOOD / WA

Phone: 503-603-6661
Fax: 503-620-5940

Client Project # 17787-001-11

Lab Project # GEOENGPOR-LYNNPFD

Collected by (print): NATHAN SOLOMON

Site/Facility ID # LYNWOOD PFD

P.O. # 2119-097-00

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

No. of Cntrs

Analysis / Container / Preservative

soil VOCs 8260C 40mlAmb/MeOH5ml/Syr
soil dry weight 2ozClr-NoPres
water VOCs 8260LLC 40mlAmb-HCl

Chain of Custody Page ___ of ___

Pace Analytical®
National Center for Testing & Innovation

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# L1096125

B188

Acctnum: GEOENGPOR
Template: T149757
Prelogin: P706486
TSR: 110 - Brian Ford
PB:

Shipped Via:

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	Remarks	Sample # (lab only)
MW-16_5.0	GRAB	SS	5	5-4-19	~~0805~~		-01
MW-16_10.0		SS	10		0815		
MW-16_15.0		SS	15		0820		
MW-16_20.0		SS	20		0825		
MW-16_25.0		SS	25		0835		
MW-16_30.0		SS	30		0845		
MW-16_35.0		SS	35		1000		
MW-16_40.0		SS	40		1015		
MW-16_45.0		SS	45		1025		-02
MW-16_50.0		SS	50		1035		

RAD SCREEN: <0.5 mR/hr

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks: VOCs=PCE,TCE,11-DCE,cis-12-DCE,trans-12-DCE,VC only.

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier __ _____

Tracking # 4794 8833 8320

Sample Receipt Checklist
COC Seal Present/Intact: NP Y N
COC Signed/Accurate: Y N
Bottles arrive intact: Y N
Correct bottles used: Y N
Sufficient volume sent: Y N
If Applicable
VOA Zero Headspace: Y N
Preservation Correct/Checked: Y N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	5.6.19	0910	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Trip Blank Received: Yes / No
HCL / MeoH
TBR

Temp: 1.6+0=1.6 °C Bottles Received: 42

Date: 5/7/19 Time: 0845

If preservation required by Login: Date/Time

Hold: 5-044

Condition: NCF / OK

GeoEngineers- Portland, OR

4000 Kruse Way Place
Bldg. 3, Suite 200
Lake Oswego, OR 97035

Billing Information:
Accounts Payable (Marlee Johnston)
17425 NE Union Hill Rd, Suite 250
Redmond, WA 98052

Pres Chk

Report to: Cris Watkins

Email To: cwatkins@geoengineers.com

Project Description: Lynnwood PFD

City/State Collected: LYNNWOOD / WA

Phone: 503-603-6661
Fax: 503-620-5940

Client Project # 17787-001-11

Lab Project # GEOENGPOR-LYNNPFD

Collected by (print): NATHAN SOLOMON

Site/Facility ID # 2119-097-00

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	soil VOCs 8260C 40mlAmb/MeOH5ml/Syr	soil dry weight 2ozClr-NoPres	water VOCs 8260LLC 40mlAmb-HCl	Remarks	Sample # (lab only)
~~MW-17-5.0~~ NOT	GRAB	SS	5.0	5.4.19		2					
MW-17-10.0		SS	10.0		1120						-03
MW-17-15.0		SS	15.0		1130						
MW-17-20.0		SS	20.0		1135						
MW-17-25.0		SS	25.0		1340						
MW-17-30.0		SS	30.0		1350						
MW-17-35.0		SS	35.0		1400						-04
MW-17-40.0		SS	40.0		1410						
~~MW-17-45.0~~ NOT		SS	45.0								
MW-17-50.0		SS	50.0		1425						

RAD SCREEN: <0.5 mR/hr

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks: VOCs=PCE,TCE,11-DCE,cis-12-DCE,trans-12-DCE,VC only.

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier __ _____

Tracking #

Trip Blank Received: Yes / No
HCL / MeoH
TBR

Temp: °C Bottles Received: 1.6±0=1.6 2 42

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	5.6.19	0910	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)
			Date: 5/7/19 Time: 0845

Sample Receipt Checklist

COC Seal Present/Intact:	__NP	__Y __N
COC Signed/Accurate:		Y __N
Bottles arrive intact:		Y __N
Correct bottles used:		Y __N
Sufficient volume sent:		Y __N
If Applicable		
VOA Zero Headspace:		Y __N
Preservation Correct/Checked:		__Y __N

Chain of Custody Page ___ of ___

Pace Analytical® National Center for Testing & Innovation

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# L1096125

Table #

Acctnum: GEOENGPOR

Template: T149757

Prelogin: P706486

TSR: 110 - Brian Ford

PB:

Shipped Via:

GeoEngineers- Portland, OR

4000 Kruse Way Place
Bldg. 3, Suite 200
Lake Oswego, OR 97035

Billing Information:
Accounts Payable (Marlee Johnston)
17425 NE Union Hill Rd, Suite 250
Redmond, WA 98052

Pres Chk

Email To: cwatkins@geoengineers.com

Report to: Cris Watkins

Project Description: Lynnwood PFD

City/State Collected: LYNNWOOD/WA

Phone: 503-603-6661
Fax: 503-620-5940

Client Project # 17787-001-11

Lab Project # GEOENGPOR-LYNNPFD

Collected by (print): NATHAN SOLOMON

Site/Facility ID # LYNNWOOD PFD

P.O. # 219-097-00

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

No. of Cntrs

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	soil VOCs 8260C 40mlAmb/MeOH5ml/Syr	soil dry weight 2ozClr-NoPres	water VOCs 8260LLC 40mlAmb-HCl	Remarks	Sample # (lab only)
		SS								
MW-17-20190504	GRAB	GW	--	5.4.19	1250	6				-05
		GW								
		GW								
		GW								

RAD SCREEN: <0.5 mR/hr

Chain of Custody Page ___ of ___

Pace Analytical® National Center for Testing & Innovation

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Fax: 615-758-5859

L# L1096125

Table #

Acctnum: GEOENGPOR

Template: T149757

Prelogin: P706486

TSR: 110 - Brian Ford

PB:

Shipped Via:

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks: VOCs=PCE,TCE,11-DCE,cis-12-DCE,trans-12-DCE,VC only.

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier __ _____

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: __NP __Y __N
COC Signed/Accurate: Y __N
Bottles arrive intact: Y __N
Correct bottles used: Y __N
Sufficient volume sent: Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR
	5.6.19	0940		
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: 1.6+0=1.6 °C Bottles Received: 4
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 5/7/19 Time: 0845

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

GeoEngineers- Portland, OR

4000 Kruse Way Place
Bldg. 3, Suite 200
Lake Oswego, OR 97035

Billing Information:
Accounts Payable (Marlee Johnston)
17425 NE Union Hill Rd, Suite 250
Redmond, WA 98052

Pres Chk

Report to: Cris Watkins

Email To: cwatkins@geoengineers.com

Project Description: Lynnwood PFD

City/State Collected: LYNNWOOD / WA

Phone: 503-603-6661
Fax: 503-620-5940

Client Project # 17787-001-11

Lab Project # GEOENGPOR-LYNNPFD

Collected by (print): NATHAN SOLOMON

Site/Facility ID # LYNWOOD PFD

P.O. # 21719-097-00

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	soil VOCs 8260C 40mlAmb/MeOH5ml/Syr	soil dry weight 2ozClr-NoPres	water VOCs 8260LLC 40mlAmb-HCl	Remarks	Sample # (lab only)
MW-16_5.0	Grab	SS	5	5-4-19	0805	2	X	X			-01
MW-16_10.0		SS	10		0815					HOLD	
MW-16_15.0		SS	15		0820					HOLD	
MW-16_20.0		SS	20		0825					HOLD	
MW-16_25.0		SS	25		0835					HOLD	
MW-16_30.0		SS	30		0845					HOLD	
MW-16_35.0		SS	35		1000					HOLD	
MW-16_40.0		SS	40		1015					HOLD	
MW-16_45.0		SS	45		1025		X	X			-02
MW-16_50.0	↓	SS	50	↓	1035	↓				HOLD	

Chain of Custody Page ___ of ___

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Phone: 800-767-5859
Fax: 615-758-5859

L# L1096125

Table #

Acctnum: GEOENGPOR
Template: T149757
Prelogin: P706486
TSR: 110 - Brian Ford
PB:

Shipped Via:

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks: VOCs=PCE,TCE,11-DCE,cis-12-DCE,trans-12-DCE,VC only.

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__UPS __FedEx __Courier __ _____

Tracking #

Sample Receipt Checklist

COC Seal Present/Intact:	NP	Y N
COC Signed/Accurate:		Y N
Bottles arrive intact:		Y N
Correct bottles used:		Y N
Sufficient volume sent:		Y N
If Applicable		
VOA Zero Headspace:		Y N
Preservation Correct/Checked:		Y N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received:	If preservation required by Login: Date/Time
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: Time:	Hold: Condition: NCF / OK

GeoEngineers- Portland, OR

4000 Kruse Way Place
Bldg. 3, Suite 200
Lake Oswego, OR 97035

Billing Information:
Accounts Payable (Marlee Johnston)
17425 NE Union Hill Rd, Suite 250
Redmond, WA 98052

Pres Chk

Email To: cwatkins@geoengineers.com

Report to: Cris Watkins

Project Description: Lynnwood PFD

City/State Collected: LYNNWOOD / WA

Phone: 503-603-6661
Fax: 503-620-5940

Client Project # 17787-001-11

Lab Project # GEOENGPOR-LYNNPFD

Collected by (print): Nathan Solomon

Site/Facility ID # 2119-097-00

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

No. of Cntrs

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	soil VOCs 8260C 40mlAmb/MeOH5ml/Syr	soil dry weight 2ozClr-NoPres	water VOCs 8260LLC 40mlAmb-HCl	Remarks	Sample # (lab only)
~~MW-17-5.0~~ NS	GRAB	SS	5.0	5.4.19		2					
MW-17-10.0		SS	10.0		1120		X	X			-03
MW-17-15.0		SS	15.0		1130					HOLD	
MW-17-20.0		SS	20.0		1135					HOLD	
MW-17-25.0		SS	25.0		1340					HOLD	
MW-17-30.0		SS	30.0		1350					HOLD	
MW-17-35.0		SS	35.0		1400		X	X			-04
MW-17-40.0		SS	40.0		1410					HOLD	
~~MW-17-45.0~~ NDS		SS	45.0								
MW-17-50.0		SS	50.0		1425					HOLD	

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks: VOCs=PCE,TCE,11-DCE,cis-12-DCE,trans-12-DCE,VC only.

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: __NP __Y __N
COC Signed/Accurate: __Y __N
Bottles arrive intact: __Y __N
Correct bottles used: __Y __N
Sufficient volume sent: __Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received:
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: Time:

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

Chain of Custody Page ___ of ___

Pace Analytical®
National Center for Testing & Innovation

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# L1096125

Table #

Acctnum: GEOENGPOR
Template: T149757
Prelogin: P706486
TSR: 110 - Brian Ford
PB:

Shipped Via:

GeoEngineers- Portland, OR

4000 Kruse Way Place
Bldg. 3, Suite 200
Lake Oswego, OR 97035

Billing Information:
Accounts Payable (Marlee Johnston)
17425 NE Union Hill Rd, Suite 250
Redmond, WA 98052

Pres Chk

Report to: Cris Watkins

Email To: cwatkins@geoengineers.com

Project Description: Lynnwood PFD

City/State Collected: LYNNWOOD/WA

Phone: 503-603-6661
Fax: 503-620-5940

Client Project # 17787-001-11

Lab Project # GEOENGPOR-LYNNPFD

Collected by (print): NATHAN SOLOMON

Site/Facility ID # LYNNWOOD PFD

P.O. # 2119-097-00

Collected by (signature):

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

Immediately Packed on Ice N ___ Y X

No. of Cntrs

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	soil VOCs 8260C 40mlAmb/MeOH5ml/Syr	soil dry weight 2ozClr-NoPres	water VOCs 8260LLC 40mlAmb-HCl								Remarks	Sample # (lab only)
		SS															
MW-17-20190504	GRAB	GW	--	5.4.19	1250			X									-05
		GW															
		GW															
		GW															

Chain of Custody Page ___ of ___

Pace Analytical
National Center for Testing & Innovation

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Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# L1096125

Table #

Acctnum: GEOENGPOR
Template: T149757
Prelogin: P706486
TSR: 110 - Brian Ford
PB:
Shipped Via:

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks: VOCs=PCE,TCE,11-DCE,cis-12-DCE,trans-12-DCE,VC only.

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier __ _____

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: __NP __Y __N
COC Signed/Accurate: Y __N
Bottles arrive intact: Y __N
Correct bottles used: Y __N
Sufficient volume sent: Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received:	If preservation required by Login: Date/Time
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: Time:	Hold: Condition: NCF / OK

Katie Ingram

L1096125

From: Brian Ford
Sent: Tuesday, May 07, 2019 4:23 PM
To: Katie Ingram; Login
Subject: RE: GEOENGPOR Hold chain #5-044

Please log per the attached revised COC.

Thanks,

Brian Ford
Project Manager
Pace Analytical National Center for Testing & Innovation
12065 Lebanon Road | Mt. Juliet, TN 37122
direct 615.773.9772 | cell 615.881.4570
bford@pacenational.com | pacenational.com

From: Katie Ingram
Sent: Tuesday, May 7, 2019 4:07 PM
To: Brian Ford; Login
Subject: GEOENGPOR Hold chain #5-044

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

May 15, 2019

GeoEngineers- Portland, OR

Sample Delivery Group:	L1096708
Samples Received:	05/08/2019
Project Number:	17787-001-11
Description:	Lynnwood PFD

Report To: Cris Watkins
4000 Kruse Way Place
Bldg. 3, Suite 200
Lake Oswego, OR 97035

Entire Report Reviewed By:

Jared Starkey
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace National is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

TABLE OF CONTENTS

MW-16 L1096708-01 GW

Collected by	Collected date/time	Received date/time
	05/07/19 11:05	05/08/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1279226	1	05/10/19 15:32	05/10/19 15:32	ACG	Mt. Juliet, TN

MW-17 L1096708-02 GW

Collected by	Collected date/time	Received date/time
	05/07/19 12:20	05/08/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1279226	1	05/10/19 15:53	05/10/19 15:53	ACG	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1280426	10	05/13/19 16:56	05/13/19 16:56	BMB	Mt. Juliet, TN

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Jared Starkey
Project Manager

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
1,1-Dichloroethene	ND		0.500	1	05/10/2019 15:32	WG1279226
cis-1,2-Dichloroethene	ND		0.500	1	05/10/2019 15:32	WG1279226
trans-1,2-Dichloroethene	ND		0.500	1	05/10/2019 15:32	WG1279226
Tetrachloroethene	93.1		0.500	1	05/10/2019 15:32	WG1279226
Trichloroethene	0.638		0.500	1	05/10/2019 15:32	WG1279226
Vinyl chloride	ND		0.500	1	05/10/2019 15:32	WG1279226
(S) Toluene-d8	*93.4*		*80.0-120*		*05/10/2019 15:32*	WG1279226
(S) 4-Bromofluorobenzene	*110*		*77.0-126*		*05/10/2019 15:32*	WG1279226
(S) 1,2-Dichloroethane-d4	*102*		*70.0-130*		*05/10/2019 15:32*	WG1279226

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	ug/l		ug/l		date / time	
1,1-Dichloroethene	ND		0.500	1	05/10/2019 15:53	WG1279226
cis-1,2-Dichloroethene	4.48		0.500	1	05/10/2019 15:53	WG1279226
trans-1,2-Dichloroethene	ND		0.500	1	05/10/2019 15:53	WG1279226
Tetrachloroethene	339		5.00	10	05/13/2019 16:56	WG1280426
Trichloroethene	6.09		0.500	1	05/10/2019 15:53	WG1279226
Vinyl chloride	ND		0.500	1	05/10/2019 15:53	WG1279226
(S) Toluene-d8	*94.2*		*80.0-120*		*05/10/2019 15:53*	WG1279226
(S) Toluene-d8	*101*		*80.0-120*		*05/13/2019 16:56*	WG1280426
(S) 4-Bromofluorobenzene	*105*		*77.0-126*		*05/10/2019 15:53*	WG1279226
(S) 4-Bromofluorobenzene	*88.6*		*77.0-126*		*05/13/2019 16:56*	WG1280426
(S) 1,2-Dichloroethane-d4	*98.7*		*70.0-130*		*05/10/2019 15:53*	WG1279226
(S) 1,2-Dichloroethane-d4	*115*		*70.0-130*		*05/13/2019 16:56*	WG1280426

Method Blank (MB)

(MB) R3410741-3 05/10/19 10:50

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
1,1-Dichloroethene	U		0.188	0.500
cis-1,2-Dichloroethene	U		0.0933	0.500
trans-1,2-Dichloroethene	U		0.152	0.500
Tetrachloroethene	U		0.199	0.500
Trichloroethene	U		0.153	0.500
Vinyl chloride	U		0.118	0.500
(S) Toluene-d8	*93.6*			*80.0-120*
(S) 4-Bromofluorobenzene	*101*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*98.7*			*70.0-130*

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3410741-1 05/10/19 09:26 • (LCSD) R3410741-2 05/10/19 09:47

Analyte	Spike Amount ug/l	LCS Result ug/l	LCSD Result ug/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
1,1-Dichloroethene	25.0	29.3	27.4	117	110	71.0-124			6.72	20
cis-1,2-Dichloroethene	25.0	26.1	25.4	104	102	73.0-120			2.71	20
trans-1,2-Dichloroethene	25.0	25.6	25.5	102	102	73.0-120			0.508	20
Tetrachloroethene	25.0	25.1	24.5	101	97.8	72.0-132			2.72	20
Trichloroethene	25.0	25.3	24.0	101	96.1	78.0-124			5.11	20
Vinyl chloride	25.0	27.9	27.0	112	108	67.0-131			3.35	20
(S) Toluene-d8				*95.1*	*95.2*	*80.0-120*				
(S) 4-Bromofluorobenzene				*94.0*	*100*	*77.0-126*				
(S) 1,2-Dichloroethane-d4				*108*	*103*	*70.0-130*				

Method Blank (MB)

(MB) R3411215-2 05/13/19 11:58

Analyte	MB Result ug/l	MB Qualifier	MB MDL ug/l	MB RDL ug/l
Tetrachloroethene	U		0.199	0.500
(S) Toluene-d8	*102*			*80.0-120*
(S) 4-Bromofluorobenzene	*90.2*			*77.0-126*
(S) 1,2-Dichloroethane-d4	*113*			*70.0-130*

Laboratory Control Sample (LCS)

(LCS) R3411215-1 05/13/19 10:41

Analyte	Spike Amount ug/l	LCS Result ug/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Tetrachloroethene	25.0	28.8	115	72.0-132	
(S) Toluene-d8			*99.9*	*80.0-120*	
(S) 4-Bromofluorobenzene			*91.6*	*77.0-126*	
(S) 1,2-Dichloroethane-d4			*118*	*70.0-130*	

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description

The remainder of this page intentionally left blank, there are no qualifiers applied to this SDG.

Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.
* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

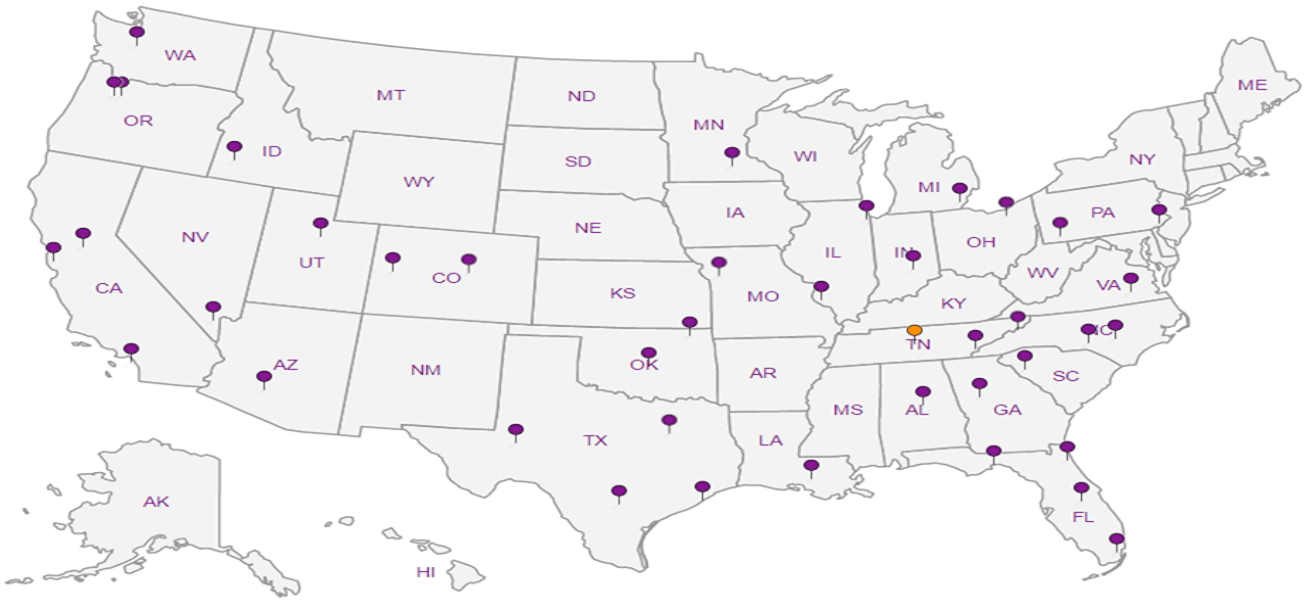
Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



GeoEngineers- Portland, OR

4000 Kruse Way Place
Bldg. 3, Suite 200
Lake Oswego, OR 97035

Billing Information:
Accounts Payable (Marlee Johnston)
17425 NE Union Hill Rd, Suite 250
Redmond, WA 98052

Pres Chk

Report to: Cris Watkins

Email To: cwatkins@geoengineers.com

Project Description: Lynnwood PFD

City/State Collected:

Phone: 503-603-6661
Fax: 503-620-5940

Client Project # 17787-001-11

Lab Project # GEOENGPOR-LYNNPFD

Collected by (print):

Site/Facility ID #

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y ___

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed: STANDARD

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No of Cntrs	VOCs 8260LLC 40mlAmb-HCl	Remarks	Sample # (lab only)
MW-16		GW		5-7-19	1105	5	Y		-01
MW-17		GW		5-7-19	1220	6	Y		02
		GW							
		GW							

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

Pace Analytical®
National Center for Testing & Innovation

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L # 1096708

C240

Acctnum: GEOENGPOR

Template: T149758

Prelogin: P706488

TSR: 110 - Brian Ford

PB:

Shipped Via:

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:
VOCs=PCE, TCE, 11-DCE, cis-12-DCE, trans-12-DCE, VC

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier __ _____

Tracking # 4794 8233 8360

Sample Receipt Checklist
COC Seal Present/Intact: NP Y N
COC Signed/Accurate: Y N
Bottles arrive intact: Y N
Correct bottles used: Y N
Sufficient volume sent: Y N
If Applicable
VOA Zero Headspace: Y N
Preservation Correct/Checked: Y N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCl / MeoH TBR
Brian Adams	5-7-19	1459		
Relinquished by : (Signature)	Date: 5-7-19	Time: 1939	Received by: (Signature)	Temp: 0 +.1 °C 1.4 & 1.5 Bottles Received: 11
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 5/8/19 Time: 0845

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

Pace Analytical®
National Center for Testing & Innovation

ANALYTICAL REPORT

May 23, 2019

GeoEngineers- Portland, OR

Sample Delivery Group:	L1099776
Samples Received:	05/07/2019
Project Number:	17787-001-11
Description:	Lynnwood PFD
Site:	LYNNWOOD PFD
Report To:	Cris Watkins 4000 Kruse Way Place Bldg. 3, Suite 200 Lake Oswego, OR 97035

Entire Report Reviewed By:

Brian Ford

Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace National is performed per guidance provided in laboratory standard operating procedures: 060302, 060303, and 060304.

MW-16_10.0 L1099776-01 Solid

Collected by: Nathan Solomon | Collected date/time: 05/04/19 08:15 | Received date/time: 05/07/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1284726	1	05/22/19 08:56	05/22/19 09:06	JD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1282848	1	05/04/19 08:15	05/17/19 12:47	BMB	Mt. Juliet, TN

MW-16_15.0 L1099776-02 Solid

Collected by: Nathan Solomon | Collected date/time: 05/04/19 08:20 | Received date/time: 05/07/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1284726	1	05/22/19 08:56	05/22/19 09:06	JD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1282848	1	05/04/19 08:20	05/17/19 13:08	BMB	Mt. Juliet, TN

MW-16_25.0 L1099776-03 Solid

Collected by: Nathan Solomon | Collected date/time: 05/04/19 08:35 | Received date/time: 05/07/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1284726	1	05/22/19 08:56	05/22/19 09:06	JD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1282848	1	05/04/19 08:35	05/17/19 13:30	BMB	Mt. Juliet, TN

MW-16_35.0 L1099776-04 Solid

Collected by: Nathan Solomon | Collected date/time: 05/04/19 10:00 | Received date/time: 05/07/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1284726	1	05/22/19 08:56	05/22/19 09:06	JD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1282848	1	05/04/19 10:00	05/17/19 13:52	BMB	Mt. Juliet, TN

MW-17_20.0 L1099776-05 Solid

Collected by: Nathan Solomon | Collected date/time: 05/04/19 11:35 | Received date/time: 05/07/19 08:45

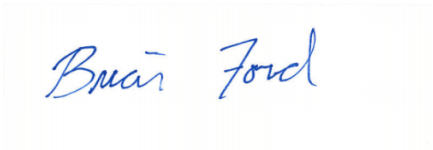
Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1284726	1	05/22/19 08:56	05/22/19 09:06	JD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1282848	1	05/04/19 11:35	05/17/19 14:14	BMB	Mt. Juliet, TN

MW-17_30.0 L1099776-06 Solid

Collected by: Nathan Solomon | Collected date/time: 05/04/19 13:50 | Received date/time: 05/07/19 08:45

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Total Solids by Method 2540 G-2011	WG1284726	1	05/22/19 08:56	05/22/19 09:06	JD	Mt. Juliet, TN
Volatile Organic Compounds (GC/MS) by Method 8260C	WG1282848	1	05/04/19 13:50	05/17/19 14:35	BMB	Mt. Juliet, TN

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.



Brian Ford
Project Manager

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	85.7		1	05/22/2019 09:06	WG1284726

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
1,1-Dichloroethene	ND		0.00292	1	05/17/2019 12:47	WG1282848
cis-1,2-Dichloroethene	ND		0.00292	1	05/17/2019 12:47	WG1282848
trans-1,2-Dichloroethene	ND		0.00583	1	05/17/2019 12:47	WG1282848
Tetrachloroethene	0.0404		0.00292	1	05/17/2019 12:47	WG1282848
Trichloroethene	ND		0.00117	1	05/17/2019 12:47	WG1282848
Vinyl chloride	ND		0.00292	1	05/17/2019 12:47	WG1282848
(S) Toluene-d8	*103*		*75.0-131*		*05/17/2019 12:47*	WG1282848
(S) 4-Bromofluorobenzene	*98.5*		*67.0-138*		*05/17/2019 12:47*	WG1282848
(S) 1,2-Dichloroethane-d4	*96.2*		*70.0-130*		*05/17/2019 12:47*	WG1282848

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	87.3		1	05/22/2019 09:06	WG1284726

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
1,1-Dichloroethene	ND		0.00287	1	05/17/2019 13:08	WG1282848
cis-1,2-Dichloroethene	ND		0.00287	1	05/17/2019 13:08	WG1282848
trans-1,2-Dichloroethene	ND		0.00573	1	05/17/2019 13:08	WG1282848
Tetrachloroethene	0.0762		0.00287	1	05/17/2019 13:08	WG1282848
Trichloroethene	ND		0.00115	1	05/17/2019 13:08	WG1282848
Vinyl chloride	ND		0.00287	1	05/17/2019 13:08	WG1282848
(S) Toluene-d8	*103*		*75.0-131*		*05/17/2019 13:08*	WG1282848
(S) 4-Bromofluorobenzene	*97.0*		*67.0-138*		*05/17/2019 13:08*	WG1282848
(S) 1,2-Dichloroethane-d4	*94.8*		*70.0-130*		*05/17/2019 13:08*	WG1282848

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	92.1		1	05/22/2019 09:06	WG1284726

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
1,1-Dichloroethene	ND		0.00271	1	05/17/2019 13:30	WG1282848
cis-1,2-Dichloroethene	ND		0.00271	1	05/17/2019 13:30	WG1282848
trans-1,2-Dichloroethene	ND		0.00543	1	05/17/2019 13:30	WG1282848
Tetrachloroethene	0.130		0.00271	1	05/17/2019 13:30	WG1282848
Trichloroethene	ND		0.00109	1	05/17/2019 13:30	WG1282848
Vinyl chloride	ND		0.00271	1	05/17/2019 13:30	WG1282848
(S) Toluene-d8	*103*		*75.0-131*		*05/17/2019 13:30*	WG1282848
(S) 4-Bromofluorobenzene	*97.8*		*67.0-138*		*05/17/2019 13:30*	WG1282848
(S) 1,2-Dichloroethane-d4	*94.5*		*70.0-130*		*05/17/2019 13:30*	WG1282848

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	91.3		1	05/22/2019 09:06	WG1284726

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
1,1-Dichloroethene	ND		0.00274	1	05/17/2019 13:52	WG1282848
cis-1,2-Dichloroethene	ND		0.00274	1	05/17/2019 13:52	WG1282848
trans-1,2-Dichloroethene	ND		0.00548	1	05/17/2019 13:52	WG1282848
Tetrachloroethene	0.249		0.00274	1	05/17/2019 13:52	WG1282848
Trichloroethene	0.00156		0.00110	1	05/17/2019 13:52	WG1282848
Vinyl chloride	ND		0.00274	1	05/17/2019 13:52	WG1282848
(S) Toluene-d8	*105*		*75.0-131*		*05/17/2019 13:52*	WG1282848
(S) 4-Bromofluorobenzene	*98.4*		*67.0-138*		*05/17/2019 13:52*	WG1282848
(S) 1,2-Dichloroethane-d4	*95.0*		*70.0-130*		*05/17/2019 13:52*	WG1282848

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	89.0		1	05/22/2019 09:06	WG1284726

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
1,1-Dichloroethene	ND		0.00281	1	05/17/2019 14:14	WG1282848
cis-1,2-Dichloroethene	ND		0.00281	1	05/17/2019 14:14	WG1282848
trans-1,2-Dichloroethene	ND		0.00562	1	05/17/2019 14:14	WG1282848
Tetrachloroethene	0.314		0.00281	1	05/17/2019 14:14	WG1282848
Trichloroethene	0.00187		0.00112	1	05/17/2019 14:14	WG1282848
Vinyl chloride	ND		0.00281	1	05/17/2019 14:14	WG1282848
(S) Toluene-d8	*104*		*75.0-131*		*05/17/2019 14:14*	WG1282848
(S) 4-Bromofluorobenzene	*99.1*		*67.0-138*		*05/17/2019 14:14*	WG1282848
(S) 1,2-Dichloroethane-d4	*95.0*		*70.0-130*		*05/17/2019 14:14*	WG1282848

Total Solids by Method 2540 G-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	%			date / time	
Total Solids	91.8		1	05/22/2019 09:06	WG1284726

Volatile Organic Compounds (GC/MS) by Method 8260C

Analyte	Result (dry)	Qualifier	RDL (dry)	Dilution	Analysis	Batch
	mg/kg		mg/kg		date / time	
1,1-Dichloroethene	ND		0.00272	1	05/17/2019 14:35	WG1282848
cis-1,2-Dichloroethene	ND		0.00272	1	05/17/2019 14:35	WG1282848
trans-1,2-Dichloroethene	ND		0.00544	1	05/17/2019 14:35	WG1282848
Tetrachloroethene	0.683		0.00272	1	05/17/2019 14:35	WG1282848
Trichloroethene	0.00538		0.00109	1	05/17/2019 14:35	WG1282848
Vinyl chloride	ND		0.00272	1	05/17/2019 14:35	WG1282848
(S) Toluene-d8	*103*		*75.0-131*		*05/17/2019 14:35*	WG1282848
(S) 4-Bromofluorobenzene	*97.9*		*67.0-138*		*05/17/2019 14:35*	WG1282848
(S) 1,2-Dichloroethane-d4	*94.7*		*70.0-130*		*05/17/2019 14:35*	WG1282848

Method Blank (MB)

(MB) R3413973-1 05/22/19 09:06

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.000			

L1099776-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1099776-03 05/22/19 09:06 • (DUP) R3413973-3 05/22/19 09:06

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	92.1	90.1	1	2.28		10

Laboratory Control Sample (LCS)

(LCS) R3413973-2 05/22/19 09:06

Analyte	Spike Amount %	LCS Result %	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Solids	50.0	50.0	100	85.0-115	

Method Blank (MB)

(MB) R3412599-2 05/17/19 11:57

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
1,1-Dichloroethene	U		0.000500	0.00250
cis-1,2-Dichloroethene	U		0.000690	0.00250
trans-1,2-Dichloroethene	U		0.00143	0.00500
Tetrachloroethene	U		0.000700	0.00250
Trichloroethene	U		0.000400	0.00100
Vinyl chloride	U		0.000683	0.00250
(S) Toluene-d8	*104*			*75.0-131*
(S) 4-Bromofluorobenzene	*99.2*			*67.0-138*
(S) 1,2-Dichloroethane-d4	*95.4*			*70.0-130*

Laboratory Control Sample (LCS)

(LCS) R3412599-1 05/17/19 10:31

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCS Rec. %	Rec. Limits %	LCS Qualifier
1,1-Dichloroethene	0.125	0.129	103	65.0-131	
cis-1,2-Dichloroethene	0.125	0.124	99.5	73.0-125	
trans-1,2-Dichloroethene	0.125	0.124	99.4	71.0-125	
Tetrachloroethene	0.125	0.127	102	70.0-136	
Trichloroethene	0.125	0.119	95.5	76.0-126	
Vinyl chloride	0.125	0.123	98.4	63.0-134	
(S) Toluene-d8			*101*	*75.0-131*	
(S) 4-Bromofluorobenzene			*100*	*67.0-138*	
(S) 1,2-Dichloroethane-d4			*98.8*	*70.0-130*	

L1098711-70 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1098711-70 05/17/19 17:05 • (MS) R3412599-3 05/17/19 20:42 • (MSD) R3412599-4 05/17/19 21:04

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
1,1-Dichloroethene	0.125	U	0.0552	0.0425	1.76	1.36	25	10.0-155	J6	J6	25.9	37
cis-1,2-Dichloroethene	0.125	U	0.0662	0.0704	2.12	2.25	25	10.0-149	J6	J6	6.11	37
trans-1,2-Dichloroethene	0.125	U	0.0552	0.0472	1.77	1.51	25	10.0-150	J6	J6	15.8	37
Tetrachloroethene	0.125	U	0.0602	0.0524	1.92	1.68	25	10.0-156	J6	J6	13.8	39
Trichloroethene	0.125	0.00355	0.0686	0.0728	2.20	2.33	25	10.0-156	J6	J6	5.90	38
Vinyl chloride	0.125	U	0.0490	0.0351	1.57	1.12	25	10.0-160	J6	J6	33.1	37
(S) Toluene-d8					*105*	*105*		*75.0-131*				
(S) 4-Bromofluorobenzene					*97.5*	*94.7*		*67.0-138*				
(S) 1,2-Dichloroethane-d4					*96.7*	*95.3*		*70.0-130*				

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
RDL	Reported Detection Limit.
RDL (dry)	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state “ND” (Not Detected) or “BDL” (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.

Pace National is the only environmental laboratory accredited/certified to support your work nationwide from one location. One phone call, one point of contact, one laboratory. No other lab is as accessible or prepared to handle your needs throughout the country. Our capacity and capability from our single location laboratory is comparable to the collective totals of the network laboratories in our industry. The most significant benefit to our one location design is the design of our laboratory campus. The model is conducive to accelerated productivity, decreasing turn-around time, and preventing cross contamination, thus protecting sample integrity. Our focus on premium quality and prompt service allows us to be YOUR LAB OF CHOICE.
* Not all certifications held by the laboratory are applicable to the results reported in the attached report.
* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace National.

State Accreditations

Alabama	40660	Nebraska	NE-OS-15-05
Alaska	17-026	Nevada	TN-03-2002-34
Arizona	AZ0612	New Hampshire	2975
Arkansas	88-0469	New Jersey–NELAP	TN002
California	2932	New Mexico [1]	n/a
Colorado	TN00003	New York	11742
Connecticut	PH-0197	North Carolina	Env375
Florida	E87487	North Carolina [1]	DW21704
Georgia	NELAP	North Carolina [3]	41
Georgia [1]	923	North Dakota	R-140
Idaho	TN00003	Ohio–VAP	CL0069
Illinois	200008	Oklahoma	9915
Indiana	C-TN-01	Oregon	TN200002
Iowa	364	Pennsylvania	68-02979
Kansas	E-10277	Rhode Island	LAO00356
Kentucky [1 6]	90010	South Carolina	84004
Kentucky [2]	16	South Dakota	n/a
Louisiana	AI30792	Tennessee [1 4]	2006
Louisiana [1]	LA180010	Texas	T104704245-18-15
Maine	TN0002	Texas [5]	LAB0152
Maryland	324	Utah	TN00003
Massachusetts	M-TN003	Vermont	VT2006
Michigan	9958	Virginia	460132
Minnesota	047-999-395	Washington	C847
Mississippi	TN00003	West Virginia	233
Missouri	340	Wisconsin	9980939910
Montana	CERT0086	Wyoming	A2LA

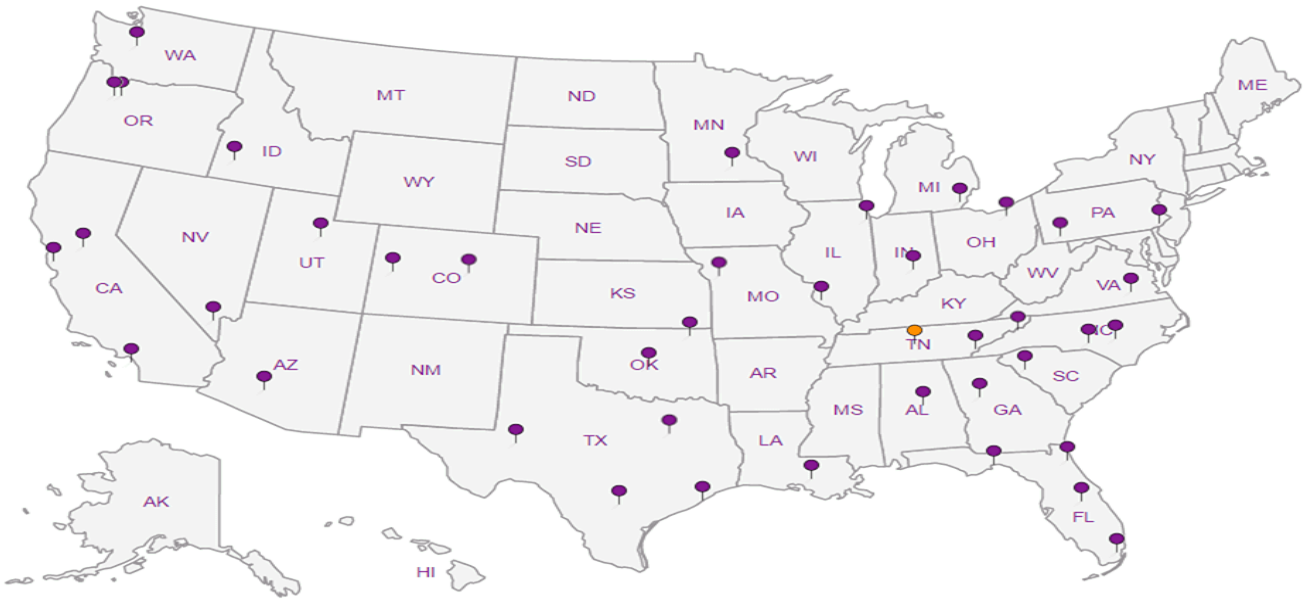
Third Party Federal Accreditations

A2LA – ISO 17025	1461.01	AIHA-LAP,LLC EMLAP	100789
A2LA – ISO 17025 [5]	1461.02	DOD	1461.01
Canada	1461.01	USDA	P330-15-00234
EPA–Crypto	TN00003		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

Our Locations

Pace National has sixty-four client support centers that provide sample pickup and/or the delivery of sampling supplies. If you would like assistance from one of our support offices, please contact our main office. Pace National performs all testing at our central laboratory.



GeoEngineers- Portland, OR

4000 Kruse Way Place
Bldg. 3, Suite 200
Lake Oswego, OR 97035

Billing Information:
Accounts Payable (Marlee Johnston)
17425 NE Union Hill Rd, Suite 250
Redmond, WA 98052

Email To: cwatkins@geoengineers.com

Report to: Cris Watkins

Project Description: Lynnwood PFD

City/State Collected: LYNNWOOD / WA

Phone: 503-603-6661
Fax: 503-620-5940

Client Project # 17787-001-11

Lab Project # GEOENGPOR-LYNNPFD

Collected by (print): NATHAN SOLOMON

Site/Facility ID # LYNWOOD PFD

P.O. # 2119-097-00

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day
Date Results Needed

Quote #

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	soil VOCs 8260C 40mlAmb/MeOH5ml/Syr	soil dry weight 2ozClr-NoPres	water VOCs 8260LLC 40mlAmb-HCl	Remarks	Sample # (lab only)
MW-16_5.0	GRAB	SS	5	5-4-19	0805	2					~~-01~~
MW-16_10.0		SS	10		0815						-01
MW-16_15.0		SS	15		0820						-02
MW-16_20.0		SS	20		0825						
MW-16_25.0		SS	25		0835						-03
MW-16_30.0		SS	30		0845						
MW-16_35.0		SS	35		1000						-04
MW-16_40.0		SS	40		1015						
MW-16_45.0		SS	45		1025						~~-05~~
MW-16_50.0	↓	SS	50	↓	1035	↓					

PAD SCREEN: <0.5 mR/hr

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks: VOCs=PCE,TCE,11-DCE,cis-12-DCE,trans-12-DCE,VC only.

pH _____ Temp _____
Flow _____ Other _____

Samples returned via: __UPS __FedEx __Courier __ _____

Tracking # 4794 8833 8320

Chain of Custody Page ___ of ___

Pace Analytical®
National Center for Testing & Innovation

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# ~~L1096125~~ L1099776

B188
~~E018~~
L1099776

Template: T149757
Prelogin: P706486
TSR: 110 - Brian Ford
PB:
Shipped Via:

Sample Receipt Checklist
COC Seal Present/Intact: NP Y N
COC Signed/Accurate: Y N
Bottles arrive intact: Y N
Correct bottles used: Y N
Sufficient volume sent: Y N
If Applicable
VOA Zero Headspace: Y N
Preservation Correct/Checked: Y N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
	5.6.19	0910	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Trip Blank Received: Yes / No
HCl / MeoH
TBR

Temp: 1.6 °C Bottles Received: 12

Date: 5/7/19 Time: 0845

If preservation required by Login: Date/Time

Hold: 5-044

Condition NCF / OK

5/10

GeoEngineers- Portland, OR

4000 Kruse Way Place
Bldg. 3, Suite 200
Lake Oswego, OR 97035

Billing Information:
Accounts Payable (Marlee Johnston)
17425 NE Union Hill Rd, Suite 250
Redmond, WA 98052

Pres Chk

Email To: cwatkins@geoengineers.com

Report to: Cris Watkins

Project Description: Lynnwood PFD

City/State Collected: LYNNWOOD / WA

Phone: 503-603-6661
Fax: 503-620-5940

Client Project # 17787-001-11

Lab Project # GEOENGPOR-LYNNPFD

Collected by (print): NATHAN SOLOMON

Site/Facility ID # 2119-097-00

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Date Results Needed

Quote #

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	soil VOCs 8260C 40mlAmb/MeOH5ml/Syr	soil dry weight 2ozClr-NoPres	water VOCs 8260LLC 40mlAmb-HCl
~~MW-17-5.0~~ NB	GRAB	SS	5.0	5.4.19		2			
MW-17-10.0		SS	10.0		1120				
MW-17-15.0		SS	15.0		1130				
MW-17-20.0		SS	20.0		1135				
MW-17-25.0		SS	25.0		1340				
MW-17-30.0		SS	30.0		1350				
MW-17-35.0		SS	35.0		1400				
MW-17-40.0		SS	40.0		1410				
~~MW-17-45.0~~ NDS		SS	45.0						
MW-17-50.0		SS	50.0		1425				

RAD SCREEN: <0.5 mR/hr

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks: VOCs=PCE,TCE,11-DCE,cis-12-DCE,trans-12-DCE,VC only.

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking #

Trip Blank Received: Yes / No
HCl / MeoH
TBR

Temp: 1.6+0=1.6 °C Bottles Received: 42

Date: 5/7/19 Time: 0845

Relinquished by : (Signature) — Date: 5.6.19 — Time: 0910 — Received by: (Signature)

Relinquished by : (Signature) — Date: — Time: — Received by: (Signature)

Relinquished by : (Signature) — Date: — Time: — Received for lab by: (Signature)

If preservation required by Login: Date/Time

Hold: — Condition: NCF / OK

Sample Receipt Checklist
COC Seal Present/Intact: __NP __Y __N
COC Signed/Accurate: ✓Y __N
Bottles arrive intact: ✓Y __N
Correct bottles used: ✓Y __N
Sufficient volume sent: ✓Y __N
If Applicable
VOA Zero Headspace: ✓Y __N
Preservation Correct/Checked: __Y __N

Chain of Custody Page ___ of ___

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Fax: 615-758-5859

L# ~~L1096125~~ KO 5/16

Table# L1097776

Acctnum: GEOENGPOR

Template: T149757

Prelogin: P706486

TSR: 110 - Brian Ford

PB:

Shipped Via:

Remarks	Sample # (lab only)
	~~-03~~
	-05
KO 5/16	-06
	~~-09~~

GeoEngineers- Portland, OR

4000 Kruse Way Place
Bldg. 3, Suite 200
Lake Oswego, OR 97035

Billing Information:
Accounts Payable (Marlee Johnston)
17425 NE Union Hill Rd, Suite 250
Redmond, WA 98052

Pres Chk

Email To: cwatkins@geoengineers.com

Report to: Cris Watkins

Project Description: Lynnwood PFD

City/State Collected: LYNNWOOD/WA

Phone: 503-603-6661
Fax: 503-620-5940

Client Project # 17787-001-11

Lab Project # GEOENGPOR-LYNNPFD

Collected by (print): NATHAN SOLOMON

Site/Facility ID # LYNNWOOD PFD

P.O. # 2119-097-00

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	soil VOCs 8260C 40mlAmb/MeOH5ml/Syr	soil dry weight 2ozClr-NoPres	water VOCs 8260LLC 40mlAmb-HCl	RAD SCREEN: 40.5 mR/hr
		SS								
MW-17-20190504	GRAB	GW	--	5.4.19	1250	6				
		GW								
		GW								
		GW								

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks: VOCs=PCE,TCE,11-DCE,cis-12-DCE,trans-12-DCE,VC only.

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking #

Trip Blank Received: Yes / No
HCL / MeOH
TBR

Bottles Received:

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
	5.6.19	0940	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)

Temp: 1.6 °C 1.6 °C Bottles Received: 42

Date: 5/7/19 Time: 0945

Sample Receipt Checklist
COC Seal Present/Intact: __NP __Y __N
COC Signed/Accurate: Y __N
Bottles arrive intact: Y __N
Correct bottles used: Y __N
Sufficient volume sent: Y __N
If Applicable
VOA Zero Headspace: Y __N
Preservation Correct/Checked: __Y __N

Chain of Custody Page ___ of ___

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Phone: 800-767-5859
Fax: 615-758-5859

L# ~~L1099125~~ KO 5/16

Table # L1099776

Acctnum: GEOENGPOR

Template: T149757

Prelogin: P706486

TSR: 110 - Brian Ford

PB:

Shipped Via:

Remarks	Sample # (lab only)
	~~005~~ KO 5/16

GeoEngineers- Portland, OR

4000 Kruse Way Place
Bldg. 3, Suite 200
Lake Oswego, OR 97035

Billing Information:
Accounts Payable (Marlee Johnston)
17425 NE Union Hill Rd, Suite 250
Redmond, WA 98052

Pres Chk

Report to: Cris Watkins

Email To: cwatkins@geoengineers.com

Project Description: Lynnwood PFD

City/State Collected: LYNNWOOD / WA

Phone: 503-603-6661
Fax: 503-620-5940

Client Project # 17787-001-11

Lab Project # GEOENGPOR-LYNNPFD

Collected by (print): NATHAN SOLOMON

Site/Facility ID # LYNWOOD PFD

P.O. # 2119-097-00

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

No. of Cntrs

Analysis / Container / Preservative

soil VOCs 8260C 40mlAmb/MeOH5ml/Syr
soil dry weight 2ozClr-NoPres
water VOCs 8260LLC 40mlAmb-HCl

Chain of Custody Page ___ of ___

Pace Analytical
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Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# L1096185 KD 5/16

Table # 1099776

Acctnum: GEOENGPOR

Template: T149757

Prelogin: P706486

TSR: 110 - Brian Ford

PB:

Shipped Via:

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	soil VOCs	soil dry wt	water VOCs	Remarks	Sample # (lab only)
MW-16_5.0	Grab	SS	5	5-4-19	0805	2	X	X			-01
MW-16_10.0		SS	10		0815					HOLD	-02
MW-16_15.0		SS	15		0820					HOLD	
MW-16_20.0		SS	20		0825					HOLD	-03
MW-16_25.0		SS	25		0835					HOLD	
MW-16_30.0		SS	30		0845					HOLD	-04
MW-16_35.0		SS	35		1000					HOLD	
MW-16_40.0		SS	40		1015						
MW-16_45.0		SS	45		1025		X	X			-02
MW-16_50.0		SS	50		1035					HOLD	

KD 5/16

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks: VOCs=PCE,TCE,11-DCE,cis-12-DCE,trans-12-DCE,VC only.

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier __ _____

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: __NP __Y __N
COC Signed/Accurate: __Y __N
Bottles arrive intact: __Y __N
Correct bottles used: __Y __N
Sufficient volume sent: __Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received:	If preservation required by Login: Date/Time
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: Time:	Hold: Condition: NCF / OK

GeoEngineers- Portland, OR

4000 Kruse Way Place
Bldg. 3, Suite 200
Lake Oswego, OR 97035

Billing Information:
Accounts Payable (Marlee Johnston)
17425 NE Union Hill Rd, Suite 250
Redmond, WA 98052

Email To: cwatkins@geoengineers.com

Report to: Cris Watkins

Project Description: Lynnwood PFD

City/State Collected: LYNNWOOD / WA

Phone: 503-603-6661
Fax: 503-620-5940

Client Project # 17787-001-11

Lab Project # GEOENGPOR-LYNNPFD

Collected by (print): Nathan Salmon

Site/Facility ID # 219-097-00

P.O. #

Collected by (signature):

Quote #

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Date Results Needed

Analysis / Container / Preservative

Chain of Custody Page ___ of ___

Pace Analytical
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L# L1099776 KD 5/16

Table # L1099776

Acctnum: GEOENGPOR
Template: T149757
Prelogin: P706486
TSR: 110 - Brian Ford
PB:

Shipped Via:

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	soil VOCs 8260C 40mlAmb/MeOH5ml/Syr	soil dry weight 2ozClr-NoPres	water VOCs 8260LLC 40mlAmb-HCl	Remarks	Sample # (lab only)
~~MW-17-5.0~~ WG	GRAB	SS	5.0	5.4.19		2					~~-03~~
MW-17-10.0		SS	10.0		1120		X	X			
MW-17-15.0		SS	15.0		1130					HOLD	
MW-17-20.0		SS	20.0		1135					HOLD	-05
MW-17-25.0		SS	25.0		1340					HOLD	
MW-17-30.0		SS	30.0		1350					HOLD	-06
MW-17-35.0		SS	35.0		1400		X	X			~~-04~~
MW-17-40.0		SS	40.0		1410					HOLD	
~~MW-17-45.0~~ NPS		SS	45.0								
MW-17-50.0		SS	50.0		1425					HOLD	

KD 5/16

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks: VOCs=PCE,TCE,11-DCE,cis-12-DCE,trans-12-DCE,VC only.

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier _____

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: __NP __Y __N
COC Signed/Accurate: __Y __N
Bottles arrive intact: __Y __N
Correct bottles used: __Y __N
Sufficient volume sent: __Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received:	If preservation required by Login: Date/Time
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: Time:	Hold: Condition: NCF / OK

GeoEngineers- Portland, OR

4000 Kruse Way Place
Bldg. 3, Suite 200
Lake Oswego, OR 97035

Billing Information:
Accounts Payable (Marlee Johnston)
17425 NE Union Hill Rd, Suite 250
Redmond, WA 98052

Pres Chk

Report to: Cris Watkins

Email To: cwatkins@geoengineers.com

Project Description: Lynnwood PFD

City/State Collected: LYNNWOOD/WA

Phone: 503-603-6661
Fax: 503-620-5940

Client Project # 17787-001-11

Lab Project # GEOENGPOR-LYNNPFD

Collected by (print): Nathan Solomon

Site/Facility ID # LYNNWOOD PFD

P.O. # 219-097-00

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	soil VOCs 8260C 40mlAmb/MeOH5ml/Syr	soil dry weight 2ozClr-NoPres	water VOCs 8260LLC 40mlAmb-HCl
		SS							
MW-17-20190504	GRAB	GW	--	5.4.19	1250				X
		GW							
		GW							
		GW							

Chain of Custody Page ___ of ___

Pace Analytical
National Center for Testing & Innovation

12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L # ~~L1096125~~ KQ 5/10

Table # L1099776

Acctnum: GEOENGPOR

Template: T149757

Prelogin: P706486

TSR: 110 Brian Ford

PB:

Shipped Via:

Remarks | Sample # (lab only)

~~25~~ KQ 5/10

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks: VOCs=PCE,TCE,11-DCE,cis-12-DCE,trans-12-DCE,VC only.

pH _____ Temp _____

Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier __ _____

Tracking #

Sample Receipt Checklist
COC Seal Present/Intact: NP Y N
COC Signed/Accurate: Y N
Bottles arrive intact: Y N
Correct bottles used: Y N
Sufficient volume sent: Y N
If Applicable
VOA Zero Headspace: Y N
Preservation Correct/Checked: Y N

Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)	Temp: °C Bottles Received:
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: Time:

If preservation required by Login: Date/Time

Hold: Condition: NCF / OK

L1099776
~~L1096125~~ KQ 5/16

Katie Ingram

From: Brian Ford
Sent: Tuesday, May 07, 2019 4:23 PM
To: Katie Ingram; Login
Subject: RE: GEOENGPOR Hold chain #5-044

Please log per the attached revised COC.

Thanks,

Brian Ford
Project Manager
Pace Analytical National Center for Testing & Innovation
12065 Lebanon Road | Mt. Juliet, TN 37122
direct 615.773.9772 | cell 615.881.4570
bford@pacenational.com | pacenational.com

From: Katie Ingram
Sent: Tuesday, May 7, 2019 4:07 PM
To: Brian Ford; Login
Subject: GEOENGPOR Hold chain #5-044

Katie Ingram L1099776

From: Brian Ford
Sent: Thursday, May 16, 2019 2:11 PM
To: Login; Sample Storage
Subject: RE: L1096125 *GEOENGPOR* log off hold ***ooh Sat***

Update. Added 3 more samples.

Please log the following off hold number 5-044 as R5 due 05/23 for V8260C and TS.

MW-16_10.0
MW-16_15.0
MW-17_20.0
MW-16_25.0
MW-16_35.0
MW-17_30.0

Thanks,

Brian Ford
Project Manager
Pace Analytical National Center for Testing & Innovation
12065 Lebanon Road | Mt. Juliet, TN 37122
direct 615.773.9772 | cell 615.881.4570
bford@pacenational.com | pacenational.com

From: Brian Ford
Sent: Thursday, May 16, 2019 10:28 AM
To: Login; Sample Storage; Brian Ford
Subject: L1096125 *GEOENGPOR* log off hold ***ooh Sat***

Please log the following off hold number 5-044 as R5 due 05/23 for V8260C and TS.

MW-16_10.0
MW-16_15.0
MW-17_20.0

Thanks,

Brian Ford
Project Manager
Pace Analytical National Center for Testing & Innovation
12065 Lebanon Road | Mt. Juliet, TN 37122
direct 615.773.9772 | cell 615.881.4570
bford@pacenational.com | pacenational.com

APPENDIX F
Report Limitations and Guidelines for Use

APPENDIX F
REPORT LIMITATIONS AND GUIDELINES FOR USE[3]

This appendix provides information to help you manage your risks with respect to the use of this report.

Read These Provisions Closely

Some clients, design professionals and contractors may not recognize that the geoscience practices (geotechnical engineering, geology and environmental science) are far less exact than other engineering and natural science disciplines. This lack of understanding can create unrealistic expectations that could lead to disappointments, claims and disputes. GeoEngineers includes these explanatory "limitations" provisions in our reports to help reduce such risks. Please confer with GeoEngineers if you are unclear how these "Report Limitations and Guidelines for Use" apply to your project or site.

Environmental Services Are Performed for Specific Purposes, Persons and Projects

This report has been prepared for the exclusive use of Lynnwood Public Facilities District and their authorized agents. This report may be provided to Ecology and to others designated by the PFD for their review. This report is not intended for use by others, and the information contained herein is not applicable to other sites.

GeoEngineers structures our services to meet the specific needs of our clients. For example, an environmental site assessment or remedial action study conducted for a property owner may not fulfill the needs of a prospective purchaser of the same property. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and project site. No one except the PFD should rely on this plan without first conferring with GeoEngineers. This report should not be applied for any purpose or project except the one originally contemplated.

This Environmental Report Is Based on a Unique Set of Project-Specific Factors

This report applies to the former Alderwood Laundry and Dry Cleaners Site located at 3815 196th Street SW in Lynnwood, Washington. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this project and report. Unless GeoEngineers specifically indicates otherwise, do not rely on this report if it was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

If important changes are made after the date of this site assessment document, GeoEngineers should be given the opportunity to review our interpretations and recommendations and provide written modifications or confirmation, as appropriate.

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[3] Developed based on material provided by ASFE, Professional Firms Practicing in the GeoSciences, www.asfe.org.

Reliance Conditions for Third Parties

No third party may rely on the product of our services unless GeoEngineers agrees in advance, and in writing to such reliance. This is to provide our firm with reasonable protection against open-ended liability claims by third parties with whom there would otherwise be no contractual limits to their actions.

Environmental Regulations Are Always Evolving

Some substances may be present in the site vicinity in quantities or under conditions that may have led, or may lead, to contamination of the subject site, but are not included in current local, state or federal regulatory definitions of hazardous substances or do not otherwise present current potential liability. GeoEngineers cannot be responsible if the standards for appropriate inquiry, or regulatory definitions of hazardous substance, change or if more stringent environmental standards are developed in the future.

Subsurface Conditions Can Change

This report is based on conditions that existed at the time our site studies were performed. The findings and conclusions of this report may be affected by the passage of time, by manmade events such as construction on or adjacent to the site, by new releases of hazardous substances, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Always contact GeoEngineers before applying this report to determine if it is still applicable.

Soil and Groundwater End Use

The cleanup levels referenced in this report are site- and situation-specific. The cleanup levels may not be applicable for other sites or for other on-Site uses of the affected media (soil and/or groundwater). Note that hazardous substances may be present in some of the Site soil and/or groundwater at detectable concentrations that are less than the referenced cleanup levels. GeoEngineers should be contacted prior to the export of soil or groundwater from the subject Site or reuse of the affected media on Site to evaluate the potential for associated environmental liabilities. We cannot be responsible for potential environmental liability arising out of the transfer of soil and/or groundwater from the subject Site to another location or its reuse on Site in instances that we were not aware of or could not control.

Biological Pollutants

GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention or assessment of the presence of Biological Pollutants. Accordingly, this report does not include any interpretations, recommendations, findings, or conclusions regarding the detecting, assessing, preventing or abating of Biological Pollutants and no conclusions or inferences should be drawn regarding Biological Pollutants, as they may relate to this project. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria, and viruses, and/or any of their byproducts.

If Client desires these specialized services, they should be obtained from a consultant who offers services in this specialized field.

Do Not Redraw the Exploration Logs

Environmental scientists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in an environmental report should never be redrawn for inclusion in other design drawings. Only photographic or electronic reproduction is acceptable, but recognize that separating logs from the report can elevate risk.

Geotechnical, Geologic and Environmental Reports Should Not Be Interchanged

The equipment, techniques and personnel used to perform an environmental study differ significantly from those used to perform a geotechnical or geologic study and vice versa. For that reason, a geotechnical engineering or geologic report does not usually relate any environmental findings, conclusions or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Similarly, environmental reports are not used to address geotechnical or geologic concerns regarding a specific project.

Most Environmental Findings Are Professional Opinions

Our interpretations of subsurface conditions are based on field observations and chemical analytical data from the sampling locations at the site documented in past reports. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied our professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in this report. There is always a potential that areas of contamination exist in portions of the site that were not sampled or tested during this or previous studies. Our remedial action plan, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

GeoEngineers