Remedial Investigation Report

Former Plaid Pantry Store #324

10645 16th Avenue SW

White Center/King County, Washington

Washington Department of Ecology VCP Site ID NW2585

Prepared For

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1 INTRODUCTION

EES Environmental Consulting, Inc. (EES) has prepared this Remedial Investigation (RI) Report on behalf of Plaid Pantries, Inc. (Plaid) for the former Plaid Pantry #324 retail gasoline station located at 10645 16th Avenue SW, White Center/King County, Washington (Property, Figure 1).

In accordance with Washington Administrative Code (WAC) 173-340, the purpose of this RI is to present data that adequately characterize the Site for the purpose of developing and evaluating cleanup action alternatives. Specifically, the RI:

- Characterizes the nature, extent, and magnitude of contamination for affected media (i.e., soil, soil vapor, and groundwater) using data from field investigations;
- Presents a detailed conceptual Site model; and
- Identifies the applicable cleanup regulations and standards for affected media

1.1 GENERAL SITE INFORMATION

The Property is located at the northwest corner of SW 107th Street and 16th Avenue SW in Seattle, Washington. The coordinates for the Site are 47°30'27.80" longitude and -122°21'20.04" latitude. The King County Tax Parcel Number is 630340-0316, and is located in the southeast quarter of Section 1, Township 23, Range 23. The Site is currently occupied by a convenience store and restaurant, and was used for retail fueling by various operators between 1964 and 2006.

Following confirmation of a fuel release in 2006-2007, Plaid conducted remedial investigation and cleanup evaluation activities and enrolled in the Washington Department of Ecology (Ecology) Voluntary Cleanup Program (VCP) to facilitate Site characterization and cleanup. The following Ecology identification numbers have been assigned to the Site:

- Cleanup Site Identification Number 8195;
- Facility Site Identification Number 18113426; and
- Voluntary Cleanup Program (VCP) Site Identification Number NW2585

The Ecology Project Manager for this project is Michael Warfel (425-649-7257). The Property has been owned since 2012 by 10645 16th Avenue SW LLC, and Property owner representative is Richard Piacentini (206-448-1975). This report was prepared on behalf of Plaid Pantries, Inc. (Beaverton, Oregon). The contact for Plaid is Jonathan Polonsky (503-646-4246). Plaid's consultant is Paul Ecker of EES Environmental Consulting in Portland Oregon (503-847-2740).

1.2 SITE HISTORY

Available information indicates that the Property was utilized as a gasoline filling station between approximately 1964 and 2006. Fueling infrastructure including underground storage tanks (USTs), transmission piping, and dispensing equipment were previously located at two separate locations based on historic records. As shown on Figures 2A, 2B, and 2C, two distinct fueling systems were located on

the Property, and are referred to herein as the Pre-Plaid Fuel Area (1964-1985) and the Plaid Fuel Area (1986-2006), respectively. The Pre-Plaid Fuel Area was operated by other entities including Gulf Oil Corporation (1964-1975), R.W. Dyke and Astro Oil Co. (1975-1982), and Gull Industries (1982-1985). Historical aerial photographs and other documentation showing the two separate fueling systems are included in Appendix A.

Plaid operated the Store #324 retail fueling station at the Property between September 1986 and November 30, 1990, then sub-leased the store building and sold the underground storage tank (UST) system fixtures and equipment to Young Kil Kim and Chae Yop Kim. The fuel system was first registered by Plaid as Ecology UST Facility 97464. Fuel storage at the Plaid facility was provided by three gasoline USTs (two 12,000-gallon capacity tanks and one 10,000-gallon tank) which were decommissioned independently by the sub-tenants in 2006 (Figure 2A). Plaid remained the primary lessee of the Property until August 31, 2006 when the lease was terminated.

During operations by Plaid and its sub-tenant, the UST was located in the central area of the Site, and the fuel dispenser island was located southeast of the UST, near the street intersection (Figure 2A). The fueling station was reportedly closed in March 2006, and the USTs were decommissioned by excavation and removal on May 3, 2006. UST closure activities were documented in a "UST Closure Action Report, Zip Market & Gas", dated January 10, 2007.

Only gasoline is known to have been stored and dispensed at the Property during operation of the Plaid system. Leaded gasoline may have been dispensed at the Property prior to the phase-out of that product in the mid-1980s. Neither Plaid nor its sub-tenants stored or dispensed other hydrocarbons such as diesel fuel, bulk motor oil, or bulk solvents at any time during facility operations.

Plaid and its sub-tenants operated a leak detection system in accordance with Ecology requirements. No releases from the fueling system are known to have occurred during Plaid's period of operation between 1986 and 1990 (Section 2.1), and no releases from the UST system were reported by Plaid's sub-tenant. Tank decommissioning data provided to Plaid in 2007 by the property owner and subsequent investigations conducted by Plaid indicate that gasoline constituents were identified in soil located in the vicinity of the Pre-Plaid Fuel Area, north of the former Plaid Fuel Area (Figures 4 through 6). Soil vapor concentrations are also centered at the same historical pre-Plaid fueling area (Figures 7A/7B).

Soil impacts were first confirmed north of the Plaid Fuel Area during system decommissioning in 2006. The identified gasoline release (source) area is located on the Property and appears to be associated with historical fueling infrastructure that pre-dates Plaid's operations at this Property. Soil impacts are present beyond the Property boundary to the east, extending beneath a limited portion of the adjacent sidewalk and 16th Avenue SW roadway. Collectively, the area affected by gasoline contamination originating at the subject Property is designated as the Site.

1.3 SITE USE

The Property includes a single commercial building occupied by a convenience store and restaurant (Figure 2A).

The subject Property is located in unincorporated King County and is zoned as Community Business Special Overlay (CB-SO). The Property is bounded to the north by an automotive repair shop facility zoned as Community Business (CB), to the east and south by public roadways, and to the west by an alley and beyond the alley by residences zoned as Urban Residential (R-24). Vicinity properties are zoned for commercial and urban residential purposes. A zoning map for the Property and vicinity is provided in Appendix B. The intent of these zoning types, as described in Title 21A of the King County Municipal Code, is summarized below.

- Community Business and Community Business Special Overlay: The intent and function of these zones is to provide convenience and comparison retail and personal services. This zoning designation requires that buildings have a "minimum setback of 10 feet from the street right-of-way or the edge of a surface improvement which extends beyond a right-of-way, whichever is closer to the structure."
- Urban Residential: The R-24 zone provides for a mix of predominantly apartment and townhouse dwelling units, mixed-use and other development types, with a variety of densities and sizes in locations appropriate for urban densities.

There are no known future land use changes for the subject Property.

2 FIELD INVESTIGATIONS

2.1 PREVIOUS INVESTIGATIONS

Results of historic Site characterization tasks conducted by Plaid are summarized below and on Tables 1 and 2, and illustrated on Figures 4 through 7. Supporting details are provided under separate cover.

2.1.1 UST DECOMMISSIONING – 2006

The former Plaid fueling infrastructure was decommissioned by KEE, LLC (KEE) on behalf of the Plaid sub-tenant, as documented in the UST Closure Action Report (KEE, 2007). In May 2006, soil contamination was discovered northeast of the Plaid Fuel Area during UST decommissioning by KEE. KEE collected a total of 10 soil samples at various locations surrounding and beneath the fueling infrastructure. Visible contamination was not observed in the backfill materials surrounding the USTs, and no evidence of a release associated with the decommissioned equipment was identified. Groundwater was not encountered during tank decommissioning activities.

Results of the UST decommissioning activities performed by KEE in 2006 indicated gasoline, benzene, and other gasoline constituents were present at concentrations above the MTCA Method A cleanup criteria in one soil sample collected at the northeast corner of the UST cavity. No release from the

former Plaid fueling system was suspected or confirmed. Over-excavation and further characterization of contaminated soils was not performed at the time of decommissioning.

2.1.2 Initial Site Assessment – 2007

On behalf of Plaid, PNG Environmental, Inc. (PNG) conducted an Initial Site Assessment in November 2007, as detailed in the Site Assessment Report (PNG, 2008a). A total of four soil borings (B-1 through B-4) located north of the former Plaid Fueling Area, were sampled to a maximum depth of 29 feet below ground surface (bgs). Gasoline and benzene, toluene, ethylbenzene, total xylenes, and naphthalene (BTEX+N) impacts above the MTCA Method A soil cleanup criteria were detected in three of the four soil borings. Site-specific lead concentrations were found below representative natural background concentrations. Groundwater was not encountered in any of the borings.

2.1.3 Site Characterization and Soil Vapor Extraction Pilot Test – 2008

Additional characterization was conducted by PNG in July 2008 as described in the Site Characterization and SVE Pilot Test Report (PNG, 2008b). Activities included advancing ten additional soil borings (B-5 through B-14) and conducting a preliminary soil vapor extraction (SVE) test.

Soil analytical results identified gasoline-range hydrocarbons and related constituents exceeding MTCA Method A soil cleanup levels in an area that extends northeast of the former UST cavity toward the north and northeast Property boundaries. The greatest relative contaminant concentrations were measured at depths between four and ten feet bgs. Deeper borings extending to 50 feet bgs were advanced at three Site locations to provide representative vertical contaminant delineation. Soil impacts were not observed at depths below approximately 14 feet bgs at any Site location, and groundwater was not encountered to maximum exploration depths of 50 feet.

PNG collected soil gas samples during the SVE tests performed on B-9, B-11, B-13, and B-14. Gasoline and related volatile constituents were detected in each soil gas sample. The distribution of detected gasoline constituents is consistent with soil analytical results for these borings. In general, results of the pilot test indicated soil conditions did not appear to be conducive to typical SVE technologies.

2.1.4 Supplemental Site Characterization – 2009

In an effort to delineate the lateral extent of gasoline impacts, PNG advanced nine borings (B-15 through B-23) to depths between eight and 15 feet bgs in April 2009, as detailed in the Supplemental Site Characterization report (PNG, 2009). Consistent with previous investigations, observed gasoline-range hydrocarbons and related constituent impacts were generally located between four and ten feet bgs and groundwater was not encountered during April 2009 Site characterization activities.

Gasoline impacts were defined to the north, south, and west, but contamination extending beyond Property boundaries to the east was not characterized.

2.1.5 Follow-Up SVE Pilot Test – 2009

PNG completed follow-up pilot testing in November 2009, as described in the Site Status Report – Remedial Alternative Screening (PNG, 2010). Because Site-wide remedial excavation targeting MTCA Method A cleanup levels was deemed generally not feasible, a second phase of pilot testing was conducted using both air injection and extraction at varying rates and vacuum/pressure settings. The purpose of this work, which included additional soil borings B-24 through B-27, was to determine whether modified SVE/air/oxidant injection might be an effective in-situ treatment approach at this Site. The 2009 air injection and SVE pilot testing results were consistent with preliminary observations and indicated Site soil conditions within the contaminated zone are not conducive to traditional in-situ treatment technologies based on air injection or extraction.

2.1.6 Site Remediation Planning – 2011

Gasoline contaminant conditions at the Site were recognized as greatly exceeding default MTCA Method A cleanup levels. Remedial excavation was not regarded as a viable cleanup approach due to site business operations and source-area access limitations and complexities including buildings, the adjacent 16th Avenue right-of-way, and underground utility infrastructure. Although air injection/extraction was determined not to be readily implementable based on prior pilot testing, other in-situ treatment technologies were retained for further evaluation in an effort to avoid excavation if possible.

In May 2011, PNG collected limited additional soil samples at borings B-28 and B-29 along the eastern Property boundary to evaluate baseline conditions for planned in-situ chemical oxidant (ISCO) pilot treatment, as detailed in the Former Plaid Pantry #324 – Sodium Persulfate Injection Status memorandum (PNG, 2011).

2.1.7 Off-Site Investigation – 2012

For purposes of delineating the extent of contamination and fully characterizing Site conditions, off-Site investigation activities were conducted in August 2012 by EES, as described in the Off-Site Investigation Report (EES, 2012). Investigation activities included soil sampling at 10 boring locations (ROW-1 through ROW-10) in the 16th Avenue Roadway. Analytical results show gasoline concentrations exceeding Ecology's MTCA Method A soil cleanup level extend off-Site to the east, beneath the 16th Avenue roadway. Observed gasoline impacts exceeding MTCA Method A soil cleanup criteria extend laterally approximately 20 feet into the roadway area at depths between approximately 9 and 12 feet (Figures 5A/5B/6A). The off-Site investigation data confirm that gasoline concentrations decrease both laterally and vertically with distance from the former on-Site fueling areas. Groundwater was not encountered during off-Site investigation activities.

2.1.8 ISCO Pilot Test – 2013

In April 2013, EES conducted an ISCO pilot test to follow-up 2011 planning goals, and evaluated the effectiveness of this technology at the Site as detailed in the ISCO Pilot Test Results and Status of

Remedial Action Planning Technical Memorandum (EES, 2013). A total of six temporary injection borings (B-31 through B-36) were advanced to depths between 8 and 15 feet bgs. Sodium persulfate was injected both under pressure, and then passively by infiltration. Treatment solution volumes were limited by low soil permeability. Approximately three months following pilot injection activities in July 2013, confirmation soil samples were collected at the Site to evaluate ISCO product distribution and treatment effectiveness. A total of four confirmation borings (B-32/CS-1 through B-35/CS-4) were co-located with the original ISCO injection borings (B-32 through B-35), and advanced to depths between 15 and 20 feet bgs. Generally, gasoline-range hydrocarbons and BTEX were detected at concentrations and depths similar to previous Site investigation results. The pilot test results indicate that injection of liquid persulfate solution through vertical borings does not provide adequate subsurface distribution in the target treatment zone due to the low permeability of Site soils. No measurable destruction of gasoline contaminants using this delivery approach was observed.

2.1.9 Supplemental Site Investigation – 2014

Limited additional Site investigation activities were conducted by EES in March 2014 as described in the Site Characterization and Risk Assessment Report (EES, 2014). Four soil borings (B-38 through B-41) and seven soil gas borings (SG-1 through SG-7) were advanced to terminal depths of approximately 15 and 5 feet bgs at the Property, respectively. A fifth soil boring (B-37) was advanced to 50 feet bgs to confirm groundwater conditions, as requested by Ecology. Soil data and field observations were consistent with prior conclusions indicating gasoline impacts appear limited to the zone above 14 feet. Groundwater was not encountered in any of the five soil borings.

Gasoline and related vapors were present in vadose-zone soils at the Site based on sampling in and around the contaminant core (Figures 7A/7B). The distribution of contaminant soil vapors at the Site generally was similar to the extent of identified soil impacts, as expected for low-permeability contaminated media. Soil vapor contaminant concentrations were observed to attenuate with proximity to the Property's commercial building (Section 2.4.2).

2.1.10 Site Investigation Summary

Based on Site investigation findings to date, subsurface conditions include a low-permeability till unit, extending to approximately 14 feet bgs, underlain by sand and gravel. Soil contaminated with gasoline and related volatile constituents including benzene is located north and northeast of the former Plaid UST cavity and extends east of the Property beneath the adjacent 16th Avenue sidewalk and roadway. These soil impacts are a source of gasoline and related constituents in Site soil gas, as shown on Figure sets 5 through 7.

Identified soil impacts present among low-permeability fine-grained soils appear limited to within 14 feet of the ground surface, with the greatest gasoline impacts identified between approximately 4 and 10 feet depth. Groundwater has not been encountered on the Property at maximum drilling depths up to 50 feet. Based on the identified Site characteristics and as discussed with Ecology, groundwater is not expected to be threatened or impacted by the gasoline release originating at the Property.

The source of identified gasoline contamination is centered north of the former Plaid fueling area, and is attributed to historical fueling operations by other parties, with gasoline release(s) occurring between the 1960s and early 1980s during a period that pre-dates Plaid's use of the Property. As discussed in Section 1.2, the Plaid gasoline UST system was installed in 1986 and was removed and decommissioned in 2006. No releases from the Plaid fueling system are known or suspected to have occurred.

2.2 NATURAL CONDITIONS

General subsurface conditions including Site stratigraphy and regional hydrogeology are described below. Copies of Site boring logs are included for reference in Appendix C.

2.2.1 SITE AREA GEOLOGY

The majority of the Property is paved with asphalt and concrete, with base fill extending to depths up to two feet below the paved surface. Subgrade fill is underlain by fine-grained native soil consisting of silt with variable sand and gravel to depths around 14 feet bgs. Beneath the shallow silt material, gravels with varying sand content have been encountered to depths up to 50 feet bgs, the total depth explored to date.

According to the USGS Geologic Map of Seattle (Troost et al, 2005), the Property is located in an area mapped as Quaternary-aged Vashon Till. The Vashon Till is composed of silt, sand, and gravel that was glacially transported and deposited. The silty till unit is underlain by dense sandy gravel. This mapped alluvial unit is generally consistent with EES stratigraphic observations to date, with low permeability fine-grained soils predominantly within the shallowest 14 feet horizon.

2.2.2 SITE SURFACE WATER

Surface water runoff is predominantly collected in the two on-Site catch basins and routed into the public stormwater sewer network located beneath the adjacent 16th Avenue SW. There are no unpaved areas located on the Site, except for perimeter landscaping on the north, southeast, and southwest Property margins, so very little stormwater infiltration is expected to occur on the Site. Stormwater is isolated from impacted soil present at the Site by asphalt pavement and/or stormwater management infrastructure (i.e., catch basins and piping) and gasoline contaminant migration therefore is not anticipated via stormwater runoff, infiltration, or leaching to groundwater.

2.2.3 SITE HYDROGEOLOGY

Groundwater has not been encountered on the Property at maximum exploration depths up to 50 feet. To confirm local and regional groundwater conditions, EES reviewed available well log information published by Ecology's Water Resources Department (EES, 2014). Based on available literature and Site-specific observations and as previously discussed with Ecology, groundwater is not anticipated within 60 to 100 feet bgs in the Site vicinity.

- Based on the results of the database review, wells in the Site vicinity appear to be rare and screened in the regional aquifer at depths below approximately 100 feet, with first water

expected at similar depths. Findings of this well search are consistent with our observation that groundwater was not encountered within 50 feet of the Property ground surface.

- The local water table is expected to flow generally west or southwestwards following local topography and towards the nearby Puget Sound.
- No beneficial groundwater use appears likely within 0.25-mile of the Site. The primary local and regional drinking water supply is from two surface water sources (Cedar River system and South Fork Tolt Reservoir) and supplemented, if and when needed, by a small groundwater source (Seattle Well Fields). The water supply units are located more than 20 miles east to southeast from the Site.
- The Seattle Well Field consists of the Riverton and Boulevard well fields. Underlying the well field area are three water-bearing sand and gravel formations known as the Shallow, Intermediate, and Deep Aquifers. The aquifers are arranged in layers and separated by various aquitards. At the surface, over much the well field areas, is a highly compacted layer composed of glacial till. Three municipal production wells are tapped into the Intermediate Aquifer, which is typically encountered at depths below 100 feet.

2.3 SITE DRAINAGE AND UNDERGROUND UTILITIES

Stormwater runoff and surface drainage generally flow to the east at the Property. Surface runoff in this area is collected by a series of catch basins that discharge to the north-flowing municipal storm sewer located along the western margin of 16th Avenue SW. The sanitary sewer connection from the Property building flows to the south, discharging to an east-flowing sewer located beneath SW 107th Street, which then discharges into a north-flowing sewer located beneath 16th Avenue SW (fronting the Property).

Water supply piping appears to extend from the meter box located along the southern Property boundary directly to the Property building. Other identified underground utilities that are present at the Site include electrical power, cable, telephone, and natural gas, all of which are likely located within three feet of the ground surface. Power supply to the on-Site building is overhead; however, an underground power line serves the store sign (located at the southeast corner of the Property). Identified underground utilities at the Property are illustrated on Figure 3.

Site utilities do not appear to be in direct contact with identified gasoline contamination based on available data (Figures 6A/6B/6C). The depths of several on- and off-Site utilities could not be determined based on available information, as noted below.

2.3.1 UTILITY MAPPING

EES reviewed available information regarding the construction, location, and orientation of utility corridors in the vicinity of the Site (Figure 3).

This 2014 research was initiated by contacting the Northwest Utility Notification Center (NUNC) for a list of utility operators for the Site vicinity. The utility operators identified by NUNC included:

- Comcast Cable;
- King County Roads;

- King County Department of Transportation;
- Puget Sound Energy & Gas;
- CTLQL-CenturyLink;
- Seattle City Light;
- Seattle Public Utilities-Water; and
- SW Suburban Sewer District.

Information regarding utility construction was requested from each of the utility operators. In addition, local city and county agencies were contacted regarding utility infrastructure in the right-of way adjacent to the Property. Utility maps and as built diagrams were provided by King County Department of Public Works and Seattle Public Utilities.

Identified infrastructure at the Property and adjacent Site locations is summarized below, and illustrated in Figures 3 through 6. Identified Site drainage and storm sewer components are generally located between two and three feet below ground surface.

- **Property Storm Sewer System:**
  - One on-Site catch basin is located along the center of the eastern margin of the Property. The base of this catch basin is approximately two feet bgs. In addition to receiving surface runoff, historical Site plans indicate this catch basin receives roof runoff from a tight-line downspout drain system along the south side of the Property building, but this line may have been disconnected and removed by KEE during UST removal activities in 2006. The Property building plans show storm sewer piping at an unspecified depth running east from the south side of the Property building to the catch basin.
  - A second on-Site catch basin with oil/water separator is located on the northeast corner of the Property at a base depth of approximately three feet. This catch basin receives stormwater from the southern catch basin via storm sewer piping. The storm sewer then flows east to an off-Site catch basin, described below.
- **Off-Property Storm Sewer System:**
  - Stormwater from the on-Site catch basin in the northeast corner of the Property flows east to a catch basin along the western margin of 16th Avenue SW. This catch basin discharges to the north in a storm sewer immediately east of the Property at a depth of approximately two feet.
  - Further to the east, a separate north-flowing municipal storm sewer is located beneath 16th Avenue SW at a depth of approximately three feet.
  - Immediately south of the Property a municipal storm sewer flows east along the northern margin of SW 107th Street. This storm sewer connects to an off-Property catch basin near the southeast corner of the Property before discharging to the eastern storm sewer beneath 16th Avenue SW.

- **Sanitary Sewers:** The Property's sanitary sewer flows south along the east side of the existing Property building and connects to an east-flowing main line located along the north side of SW 107th Street. This sewer main connects to a north-flowing main located beneath the western side of 16th Avenue SW. The north-flowing sewer main fronts the Property sloping to the south from a depth of approximately six to eight feet.
- **Water Service:** Historical building records show water service to the Property originating from an approximately 7-foot deep main line located along SW 107th Avenue, with the service line along the east side of the store building. However, Seattle Public Utilities records show water service entering the Property from the three-foot-deep water main located beneath 16th Avenue SW. A water meter has been identified along the southern Property boundary and appears to be servicing the Property. It is anticipated that the water supply extends from the meter box to the Property building. Water supply to the Property building is via PVC pipe, and as such, was not readily traceable during RI efforts to date. The depth and location of the Property's water service piping could not be verified based on available information.
- **Electrical Service:** Electrical power to the existing Site building is provided by overhead service. One underground powerline has been identified serving the store sign located in the southeast corner of the Property via an approximately three-foot-deep line. Additional underground power lines have been identified in the center of the Property at depths of approximately three feet but their purpose could not be determined based on available information. An underground electrical utility line was identified beneath the western sidewalk of 16th Avenue SW but this does not appear to serve the Property.
- **Natural Gas Service:** Natural gas service is provided to the Property building from a gas main that runs along the west side of 16th Avenue SW. The natural gas supply line runs along the northern Site margin from 16th Avenue SW to the northeast corner of the building at an unspecified depth. Historical city records identify an additional gas line entering the southern portion of the Property from the gas main beneath 16th Avenue SW. The presence of the additional natural gas supply line could not be verified based on available information.
- **Telephone and Cable Service:** Telephone service at the Property is provided from an underground telephone line running along the western margin of 16th Avenue SW. An underground telephone line runs from the northeast corner of the Property to approximately the center of the Property. A cable service utility is also present beneath the west margin of 16th Avenue SW but does not appear to serve the Property. The depth of the telephone and cable utilities could not be determined based on available information.

2.4 SITE CHARACTERIZATION AND ANALYTICAL RESULTS

This section describes Site characterization and laboratory analytical testing results of soil and soil gas samples collected between May 2006 and March 2014. Based on the limited vertical extent of soil contamination identified and groundwater depths at the Site of greater than 50 feet, groundwater was not encountered and is not expected to be impacted by the gasoline release originating at the Property. No groundwater testing has been conducted to date. Site media were evaluated for gasoline and related common constituents including benzene, toluene, ethylbenzene, xylenes, methyl tertiary butyl ether (MTBE), 1,2-dibromoethane (EDB), 1,2-dichloroethane (EDC), naphthalene, hexane,

1,2,4-trimethylbenzene (1,2,4-TMB), 1,3,5-trimethylbenzene (1,3,5-TMB), and lead. These chemicals are considered Site contaminants of interest (COI) and were evaluated during this RI.

Analytical testing results are summarized in Table 1 (soil) and Table 2 (soil gas). Site data are compared to MTCA Method B cleanup levels. The Site's product-specific MTCA Method B gasoline cleanup levels were calculated for soil, as described in Section 4.2. Laboratory analytical testing results were attached to all interim RI reports previously submitted to Ecology (Section 2.1) and have been electronically uploaded to the Department's Environmental Information Management (EIM) system. Supporting laboratory documentation is available upon request.

2.4.1 Soil

Laboratory analytical testing data are evaluated with respect to contaminant occurrence and likely movement at the Site. COI concentrations detected in soil are summarized on Table 1. Figure sets 5 and 6 illustrate the lateral and vertical extent of gasoline impacts in soil at the Site.

2.4.1.1 Gasoline

Gasoline was detected in Site soil samples at concentrations ranging between 2.0 and 5,970 milligrams per kilogram (mg/kg, Table 1). Gasoline impacts were limited to depths between approximately four and 14 feet below ground surface. Initially, one exception regarding vertical extent was identified at boring location B-1 at 23 feet bgs (50 mg/kg), but subsequent confirmation soil testing at the same location (boring B-37A) identified no gasoline impacts at or near this depth of 23 feet, as discussed with and acknowledged by Ecology. As discussed in Section 4.2, EES developed a product-specific MTCA Method B soil cleanup level for gasoline of 2,919 mg/kg for this Site. Gasoline concentrations exceeding this cleanup level were identified at three boring locations (four soil samples total). These four elevated concentrations ranged between 3,700 and 5,970 mg/kg, and were collected from the gasoline source area at the eastern margin of the Property, at depths between 5 and 7.5 feet below ground surface. Soil samples collected in this area above and below these specific depths indicated much lower gasoline concentrations (see Figures 5A/6A/6C and Table 1).

Gasoline was not detected in soils surrounding the former Plaid UST cavity or associated fuel dispensers. Based upon laboratory testing results, gasoline impacts in soil appear to originate from the historical Pre-Plaid Fuel Area that pre-dates Plaid Pantry operations, extending to the east beneath the 16th Avenue right of way (Figure sets 5 and 6). No gasoline releases are known to have occurred or have been identified within the Plaid Fuel Area.

2.4.1.2 Diesel and Oil

Diesel and oil are not known or suspected to have been stored or sold by Plaid or its sub-tenant at the Property, and therefore have not been evaluated as COIs.

2.4.1.3 BENZENE

Benzene was co-located with residual gasoline in approximately half of the soil samples analyzed, within the same source area vertical interval between four and 14 feet bgs (Table 1). Detected benzene concentrations ranged from 0.014 to 11 mg/kg, which is uniformly below the MTCA Method B soil cleanup level of 18 mg/kg.

2.4.1.4 OTHER GASOLINE CONSTITUENTS

In accordance with MTCA criteria (Table 830-1 in WAC 173-340-900), soil samples were tested for gasoline-related constituents including toluene, ethylbenzene, xylenes, MTBE, EDB, EDC, naphthalene, hexane, 1,2,4-TMB, 1,3,5-TMB, and lead.

- EDB, EDC, MTBE, 1,2,4-TMB, 1,3,5-TMB, and hexane were not detected in any of the soil samples analyzed.
- Toluene, ethylbenzene, xylenes, and/or naphthalene were detected in 54 of 151 (36%) of the soil samples analyzed. Where detected, these constituent concentrations were all below their respective MTCA Method B soil cleanup levels.
- Lead was detected in each of the five soil samples analyzed from among gasoline contaminated soils, but at concentrations below the MTCA Method B soil cleanup levels.

2.4.2 SUBSURFACE VAPORS/SOIL GAS

A total of 11 soil gas samples have been collected at the Property, seven of which were analyzed as part of a Tier I Vapor Intrusion Assessment (EES, 2014). The remaining four vapor samples were collected during SVE pilot testing in 2008 and are not representative of current conditions.

The 2014 Tier 1 soil gas samples were collected to determine whether a vapor intrusion condition may exist at the Property's existing convenience store and restaurant building. Although benzene and gasoline constituents are present in soil gas at the Site, these vapors are concentrated above the gasoline source area, diminish rapidly with distance from the source, and do not appear to create unacceptable vapor intrusion conditions in close proximity to the current Property building, as supported by published Ecology guidance (Ecology 2009, 2016).

As discussed in Section 3.1 and 4.1.2 of this RI report, Ecology's soil vapor intrusion guidance allows for site-specific exposure adjustments to evaluate protective indoor air conditions inside non-residential, non-industrial buildings, which include the commercial building currently located on the subject Property. As a basis of comparison to the unrestricted use MTCA standard Method B air and soil gas criteria published in the CLARC database, EES therefore calculated site-specific non-residential Method B indoor air cleanup levels and corresponding sub-slab soil gas screening levels for indoor air exposures to gasoline, benzene, and other gasoline related volatile constituents. These modified Method B air CULs better represent likely exposures to an adult worker at the site, and were calculated using adjusted inputs to the MTCA exposure model as presented in WAC 173-340-750 Equations 750-1 and 750-2 (see Section 4.1.2).

Gasoline-range hydrocarbon and benzene concentrations detected in soil gas are summarized on Table 2 and illustrated on Figures 7A/7B. Findings are summarized below.

2.4.2.1 GASOLINE IN SOIL GAS

Gasoline-range hydrocarbons were detected in subsurface soil gas samples collected at five-foot depths, with concentrations ranging from 940 to 10,000,000 micrograms per cubic meter (ug/m^3). The greatest concentrations were detected in samples B-9, B-13, B-14, SG-4, and SG-5 collected near the core of the soil contaminant source area, located away from the building. Gasoline-range hydrocarbon vapor concentrations attenuated by three to four orders of magnitude (ranging from 940 to 1,500 ug/m^3) in samples collected further from the source area and near the current Property building (SG-1, SG-2, and SG-7). This data demonstrates significant vapor attenuation laterally from the source area as expected for an old, degraded gasoline source within fine-grained soils. No MTCA standard Method B soil gas screening levels have been established for gasoline.

2.4.2.2 BENZENE IN SOIL GAS

Benzene was detected in soil gas samples at concentrations ranging from 4.8 to 100,000 ug/m^3. Similar to the gasoline-range delineation, benzene vapor concentrations are greatest near the contaminant core, and attenuate rapidly by up to five orders of magnitude near the Property building, where the maximum observed benzene concentration was 8.9 ug/m^3.

- Soil gas concentrations adjacent to the Property building (SG-1, SG-2, and SG-7) were uniformly below the published MTCA Method B screening level of 10.7 ug/m^3 for benzene. For comparison, the site-specific MTCA modified Method B soil gas screening level for benzene was calculated to be 56.2 ug/m^3 (based on a soil gas vapor intrusion attenuation factor of 0.03 as recommended by USEPA (2015) and used by Ecology in the development of the CLARC-published soil gas screening levels).
- Further east of the Property building at locations in close proximity to and above the gasoline source area, benzene concentrations measured in soil gas samples exceeded the MTCA standard and modified Method B screening levels.
- Benzene was also detected in soil gas sample SG-3, collected near the northern Property boundary where an adjacent automotive repair facility is located, at a concentration of 260 ug/m^3.

2.4.2.3 OTHER GASOLINE CONSTITUENTS IN SOIL GAS

Soil gas samples were tested for other gasoline COIs including toluene, ethylbenzene, xylenes, MTBE, EDB, EDC, hexane, 1,3,5-TMB, and 1,2,4-TMB. Similar to the gasoline and benzene results, gasoline constituent vapor concentrations were generally greater within the source area, and attenuated with distance towards the Property building.

- Concentrations of toluene, ethylbenzene, xylenes, and 1,2,4-TMB in source area soil gas samples exceeded their respective default MTCA Method B screening levels. Much lower

concentrations of these vapors adjacent to the Property building were below MTCA standard Method B soil gas screening levels.

- MTBE, EDB, and EDC have not been detected in any soil gas samples collected at the Site.
- MTCA screening levels have not been established for hexane or 1,3,5-trimethylbenzene.

2.4.3 GROUNDWATER

Groundwater has not been encountered and is not anticipated on the Property at maximum drilling depths up to 50 feet. Based on the limited vertical extent of soil contamination identified within 14 feet of the ground surface, groundwater is not expected to be impacted by the gasoline release originating at the Property and is not regarded as a medium of concern for this Site.

2.4.4 SITE CHARACTERIZATION SUMMARY

Site characterization findings are summarized below with respect to applicable MTCA criteria.

- Gasoline impacts identified at the Site originate from historic fueling operations that occurred during the period 1964 through 1985.
- Impacts identified in soil are present at depths up to 14 feet below ground surface, and extend to the east beneath the 16th Avenue right-of-way.
- Contaminant characteristics indicate degraded gasoline, with diminished constituent concentrations. Among 132 representative soil samples collected within 15 feet of the Site ground surface, gasoline and related constituent concentrations in soil are below MTCA Method B cleanup levels in all cases except for three isolated Property margin locations adjacent to the right-of-way, at depths between approximately 5 and 7.5 feet. At these three locations, gasoline concentrations range between 3,700 and 5,970 mg/kg, compared to the calculated Method B cleanup level of 2,919 mg/kg. Statistically, these three locations are anomalous and representative Site-wide soil exposure concentrations were calculated to be 792 mg/kg. Implications for soil cleanup are discussed in Sections 4 and 5 of this RI report.
- Gasoline and related vapors are present in vadose-zone soils at the Site based on sampling in and around the contaminant core. The distribution of gasoline-related soil vapors at the Site is generally consistent with pre-Plaid related impacts (Figure sets 5 through 7).
    - Soil gas samples collected near the Property building are below Tier 1 screening criteria for gasoline-related vapor intrusion. Ecology's published guidance indicates a low potential for vapor intrusion in view of current Site conditions. Using non-residential site exposure considerations for the commercial store building indicates that current Property building conditions are protective of workers and customers, and that there are no identified vapor intrusion concerns for current uses of the Property. Further evaluation and analysis of site exposure considerations would be required for proposed future uses of the Property.
    - East of the Property building, soil gas data collected in proximity to the core of the gasoline source area exhibits corresponding elevated vapor concentrations that exceed Tier 1 vapor intrusion screening criteria. Potential future

building/infrastructure construction at those developable portions of the Property should consider vapor intrusion issues.

- King County zoning criteria (Section 2.1.1) specifies a 10-foot building setback from the adjacent public rights-of-way, and therefore future developable portions of the Site must account for setback limitations (Figures 9A/9B). Although soil impacts extend east of the setback line (where localized impacts exceeding the soil cleanup level were identified) and beneath a portion of the adjacent 16th Avenue right-of-way, the right-of-way includes a sidewalk and active public roadway which are not considered to be a developable portion of the Site. Underground utility infrastructure may need to be evaluated with regard to potential gasoline vapors and vapor migration issues.

- Gasoline and benzene vapor concentrations at the SG-3 sample location, collected near the northern Property boundary and near a neighboring commercial building currently used for automotive repairs, exceed both default and non-residential MTCA Method B soil gas vapor intrusion screening criteria. Given the apparent history of vehicle maintenance operations at that neighboring facility, the source of soil gas vapors identified at SG-3 has not been confirmed. Furthermore, since the chemicals encountered and generated during vehicle maintenance are likely to include the same gasoline substances identified at the subject Property, the source and significance of sub-slab vapors, if present at the neighboring building, may be difficult to discern from Site COIs.
- The water table (deeper than 50 feet) is far below the base of identified zone of soil contamination (between four and 14 feet deep). Contaminants leaching from soil to groundwater do not appear likely at this Site. No Site-related groundwater impacts are known or suspected, and groundwater is not regarded as a medium of concern.

3 CONCEPTUAL SITE MODEL

A Conceptual Site Model (CSM) is a required element of the RI and Site cleanup planning. The CSM evaluates current and reasonably likely future Site conditions, and identifies potential sources of hazardous substances, potentially affected media, and potential migration and exposure pathways for anticipated human and ecological receptors.

3.1 HUMAN EXPOSURES

A summary diagram of the CSM is provided as Figure 8. Only complete contaminant migration pathways can result in exposure. Complete exposure pathways must include each of the following components:

- A source and mechanism of contaminant release.
- An exposure route by which contact with contaminants can occur.
- A receptor.

RI characterization indicates the primary source of gasoline contamination at the Site is associated with fueling operations conducted between 1964 and 1985 (Figure sets 5 and 6). Affected media include source-area soils between 4 and 14 feet depth, and soil vapors. Groundwater is not known or suspected to be impacted by the Property's historic gasoline release(s).

Potential human receptors were identified for the Site based on current and reasonably likely future land use. It is anticipated that the on-Property portion of the Site will retain its commercial character and that future land uses will be consistent with the current commercial use. King County zoning does not allow residential use at the Site. Where COIs extend beyond Property boundaries to the east beneath the adjacent 16th Avenue and sidewalk, only roadway maintenance and excavation (non-residential) exposures are anticipated.

Current and potential future human receptors include:

- Commercial/Occupational Workers at Site businesses: employees/workers.
- Retail Store Customers: periodic retail market shoppers and restaurant patrons.
- Construction Workers: personnel working at the Site during normal construction activities.
- Trench or Excavation Workers: personnel conducting Site activities that involve excavation and/or trenching for utility work.
- Roadway Maintenance: personnel working during roadway maintenance activities at the adjacent 16th Avenue ROW (re-paving, short-term shallow excavations, etc.).

Identified complete exposure pathways are limited to occupational/commercial scenarios, based on the following qualitative evaluation:

- Potential exposure of current and future commercial/occupational workers and retail store customers to COIs via inhalation of volatile compounds in indoor air originating from subsurface soil.
- Potential exposure of current and future commercial/occupational workers and retail customers to COIs via ingestion, dermal contact, and inhalation of fugitive dust from shallow soil. This exposure pathway is very unlikely due to pavement covering the Property soils, and the lack of near-surface Site contaminants accessible for physical disturbance.
- Potential exposure of future construction workers to COIs via ingestion, dermal contact, and inhalation of shallow “surface” soils up to three feet in depth.
- Potential exposure of future trench and/or excavation workers to COIs via ingestion, dermal contact, and inhalation of fugitive dust from surface and subsurface soil extending to 15 feet depth.
- Potential exposure of highway maintenance workers to COIs via ingestion, dermal contact, and inhalation of fugitive dust from shallow “surface” soil up to three feet in depth.

Although the exposure pathways noted above are intended to be representative of realistic and allowable Site conditions, the standard (default) Method B soil cleanup levels reflect risk-based criteria that are regarded under MTCA as being protective of unrestricted land-use including long-term residential exposures. Given the site’s commercial use and current zoning that prohibits future residential development, published MTCA standard Method B cleanup levels are overly protective and not representative of current potential site exposures.

The February 2016 revision to Ecology's *Guidance for Evaluating Soil Vapor Intrusion in Washington State* notes that the use of MTCA standard Method B CULs "are likely to be overly conservative" for commercial sites and indicates that site specific inputs to Equations 750-1 and/or 750-2 can be used to calculate fully protective CULs. For comparison to published default CULs, EES calculated alternative Method B CULs for indoor air according to the approach recommended by Ecology, using modified exposure inputs for various store building receptors, including store workers and customers. Using the modified indoor air CULs as a point of compliance, sub-slab soil gas screening levels are then back-calculated to determine acceptable soil gas concentrations, based on very conservative attenuation factors (current federal guidance published by the USEPA (2015) recommends an attenuation factor of 0.03 for soil vapors migrating to indoor air based on empirical studies using chlorinated solvent vapor migration which, unlike the site's gasoline vapors in soil gas, do not bioattenuate). Bioattenuation of gasoline vapors is likely to reduce the potential even further for migration of soil gas vapors to indoor air, although the conservative attenuation factor of 0.03 adopted under MTCA is maintained in the site-specific soil gas screening level calculations (Section 4.1.2).

Compared to the default published MTCA standard Method B criteria, the modified site-specific indoor air cleanup levels account for more representative and very protective occupational exposures in the Property's non-residential building. The associated sub-slab soil gas screening levels are based on conservative assumptions that assume no petroleum vapor degradation occurs in the environment, and therefore are likely to indicate much lower allowable soil gas concentrations than necessary to be protective of vapor intrusion to indoor air. Thus, as explained in the sections that follow, under both the MTCA Standard Method B criteria for un-restricted use or the site-specific calculated MTCA Modified Method B indoor air cleanup levels for commercial use, there is no current vapor intrusion exposure risk for commercial workers and retail customers at the Property.

3.2 ECOLOGICAL RECEPTORS

No ecological receptors are known or suspected at the Site. Although MTCA requires consideration of terrestrial plants and animals that may potentially be exposed to hazardous substances, the urban Site qualifies for exclusion from further terrestrial ecological evaluation under WAC 173-340-7491(1)(c) because there is less than 1.5 acres of undeveloped contiguous land within 500 feet of the Site. A terrestrial ecological evaluation exclusion assessment was conducted for the Site, as summarized in Section 4.4.

4 PROPOSED CLEANUP STANDARDS

In accordance with MTCA regulations (WAC 173-340) and published Ecology Guidance (2009, 2011, 2015, 2016), EES evaluated Site cleanup standards as summarized below.

4.1 GENERAL

Based on our understanding of current and reasonably likely future Site conditions, MTCA Method B cleanup levels (CULs) are proposed for use at this Site. In addition, indoor air CULs and soil gas screening

levels were also calculated using modified Method B criteria for site-specific receptors as recommended in Ecology's revised vapor intrusion guidance. (Ecology 2009/2016), as discussed in Section 3.1 and elsewhere in Section 4 of this RI report.

4.1.1 Soil Cleanup Levels

The table below summarizes the MTCA Method B CULs for indicator compounds detected in soil at the Site based on MTCA's Required Testing for Petroleum Releases (Table 830-1, WAC 173-340-900). The source of these numeric cleanup levels is Ecology's CLARC database (revised August 2015).

MTCA Method B Soil Cleanup Levels for Gasoline Contamination

PARAMETER	SOIL CLEANUP LEVEL (mg/kg)	MAXIMUM SITE SOIL CONCENTRATION IDENTIFIED (mg/kg)
Individual Substances		
Benzene	18	11
Toluene	6,400	170
Ethylbenzene	8,000	122
Xylenes	16,000	623
Naphthalene	1,600 (nc)	22
Total Lead	3,000 (gw)	8.0
Total Petroleum Hydrocarbons		
Gasoline Range Organics	2,919*	5,970

*Site-specific MTCA modified Method B CUL was calculated for gasoline in soil using MTCA methodology. See discussion below for details.
nc = non-cancer endpoint
gw = groundwater protection

A Site-specific MTCA Method B CUL was calculated for total petroleum hydrocarbons (TPH) as gasoline in soil using the fractionated analytical approach (Ecology, 2007, 2011). The following lines of evidence support development of this Site-specific Method B cleanup level:

- Site gasoline impacts including TPH fraction have been delineated within vadose-zone soils extending between approximately four and 14 feet bgs. Deeper impacts are not known or suspected.
- Groundwater at the Site is present at depths exceeding 50 feet and is not expected to be affected by gasoline release(s) originating at the Property. Although the calculated Site-specific median soil CUL exceeds the 1,000 mg/kg residual saturation screening level published for weathered gasoline (Table 745-1 in WAC 173-340-900), the calculated CUL remains protective

of groundwater due to the limits of soil contamination and significant depth to groundwater at this Site.

- Although no residential use of the Site is anticipated, the MTCA-approved TPH fractionation approach used in developing this CUL is regarded as protective of unrestricted Site use. Current and reasonably likely future land use at the Site is described in Sections 3 and 4.2.

The Site-specific MTCA Method B soil cleanup level for TPH was calculated using the MTCATPH calculator (version 11.1 [2007]). In order to provide representative data for contaminated soil, five samples (B-37, B-38, B-39, B-40, and B-41) were collected from the most highly-contaminated portions of the Site and analyzed using the EPH and VPH analytical method. After discussions with Mr. Hun Sean Park of Ecology, it was determined that use of the MTCATPH calculator was inappropriate for one of the samples (B-38) because of the low concentration of TPH at that location. Therefore, only the remaining four samples were evaluated using the MTCATPH calculator to derive a cleanup level. The most stringent clean-up level was selected for each sample. The final cleanup value is derived by calculating the median of the four cleanup levels. Based on these parameters, the Site-specific MTCA Method B cleanup level for gasoline in soil is 2,919 mg/kg. The MTCATPH calculation details are provided in Appendix D1.

4.1.2 VAPORS (INDOOR AIR AND SOIL GAS)

Published Ecology guidance describes the rationale and process for evaluating subsurface vapor conditions with respect to potential indoor air vapor intrusion (Ecology 2009, 2011, 2016). MTCA standard Method B cleanup levels for indoor air are published in the 2015 CLARC Data Tables, along with sub-slab soil gas screening levels establishing protective attenuation factors. The sub-slab soil gas screening levels are not strictly intended for use to govern contaminant cleanup, but are evaluated as a first step to determine whether subsequent indoor air sampling and mitigation are necessary. In cases where the sub-slab/soil gas data are below MTCA Method B screening criteria, the vapor intrusion pathway can generally be ruled out.

The site-specific modified Method B air CUL calculation details are provided in Appendix D2. Standard (unrestricted use) and the calculated non-residential use modified Method B air CUL and corresponding soil gas screening criteria are summarized in the following table.

Standard vs Modified MTCA Method B Air CULs & Sub-Slab Soil Gas Screening Levels for Gasoline Vapors

PARAMETER	INDOOR AIR			SOIL GAS			
	MTCA STANDARD METHOD B CLEANUP LEVEL ($\mu g/m^3$) Unrestricted Use (Residential)	**MTCA MODIFIED METHOD B CLEANUP LEVEL ($\mu g/m^3$)** Non-Residential (Occupational and Customer)	**MAXIMUM CON-CENTRATION IDENTIFIED ($\mu g/m^3$)**	**MTCA STANDARD METHOD B SUBSLAB SCREENING LEVEL ($\mu g/m^3$)**	**MTCA MODIFIED METHOD B SCREENING LEVEL** ($\mu g/m^3$)**	**ADJACENT TO BUILDING: MAXIMUM CONCENTRATION IDENTIFIED ($\mu g/m^3$)**	**SOIL SOURCE AREA: MAXIMUM CONCENTRATION IDENTIFIED ($\mu g/m^3$)**
Individual Substances							
Benzene	0.32	1.7	NE	10.7	56.2	8.9	100,000
Toluene	2,290 (nc)	22,000	NE	76,200 (nc)	733,000	9.4	480,000
Ethylbenzene	457 (nc)	5.3	NE	15,200 (nc)	176	Not detected (<5.2)	97,000
Xylenes	45.7 (nc)	440	NE	1,520 (nc)	14,666	Not detected (<10)	560,000
Naphthalene	0.07	13	NE	2.45	433	NE	NE

**Assumed soil gas to indoor air attenuation factor = 0.03 based on CLARC database and USEPA PVI guidance (2015)
NA = not available
nc = non-cancer endpoint
NE = not evaluated (naphthalene was eliminated as a COI in soil gas; see Appendix D2)

4.2 RISK CHARACTERIZATION SUMMARY

The Conceptual Site Model is presented in Section 3 and illustrated on Figure 8. RI and CSM conclusions indicate the following human health receptor scenarios for this Site.

4.2.1 ON-PROPERTY RECEPTORS

Potential contaminant exposures on the Property are attributed to incidental ingestion of soil and inhalation of volatiles intruding into indoor air from gasoline-contaminated soils (Figure sets 5 through 8). Current and future occupational workers, store/restaurant customers, and future construction and excavation workers were identified as the potential on-site receptors.

- Identified soil impacts are limited to the zone between four and 14 feet below ground surface. Under MTCA, soil within 15 feet of the ground surface is regarded as a point of compliance. However, no direct contact soil exposures are anticipated for any site receptor except potential future construction and excavation work. Representative contaminant concentrations on the

Property are below calculated site-specific MTCA Method B soil CULs and therefore, no unacceptable direct contact human health impacts are anticipated for any Site receptors.

- Soil vapor intrusion represents a potential indirect contaminant exposure pathway. Tier 1 VIA findings (Section 4.1.2) indicate that soil gas concentrations for COIs are below MTCA Method B screening criteria and under current Property use conditions, no vapor intrusion concerns are anticipated for the Property's commercial building. Site specific MTCA modified Method B CULs confirm this conclusion. Based on soil gas samples collected near the Property's commercial building, no unacceptable human health risks are expected for occupational workers or retail customers at the Property.
- If Site redevelopment occurs and new buildings are constructed at other Property locations near the gasoline contaminated soil source area, then potential vapor intrusion conditions and indoor air/inhalation exposures should be re-evaluated and anticipated as necessary.

4.2.2 Off-Property Receptors

Gasoline impacts originating at the Property extend in soil beyond the Property boundary to the east, beneath a small portion of the adjacent 16th Avenue sidewalk/roadway. Potential contaminant exposures at the ROW are attributed to incidental ingestion and dermal contact with soil by (future) excavation/trench workers and roadway maintenance workers.

- Representative contaminant concentrations in the right-of-way are below MTCA Method B soil CULs and therefore, no unacceptable direct contact human health impacts are anticipated for any Site receptors including right-of-way workers.
- No buildings are present or allowable within the right-of-way and therefore vapor intrusion has not been evaluated in this portion of the Site.
- Soil gas sampling near the northern Property boundary identified gasoline and benzene concentrations that slightly exceed the Tier 1 screening levels for the adjacent, neighboring automotive repair shop commercial building. It is likely that workers in that adjacent shop building are routinely exposed to the same gasoline-related chemicals during their normal job activities as are being addressed at the subject Property. Since the chemicals used in such a maintenance shop setting are likely to include the same gasoline substances identified as COIs at the subject Property, the source and significance of soil gas vapors in this area would be difficult to discern. To our knowledge, vapor intrusion assessment has not been conducted for this neighboring building.

4.3 POINTS OF COMPLIANCE

Points of compliance are the locations and media where Site cleanup levels identified in Section 4.1 must be attained. Points of compliance have been determined in accordance with the regulatory requirements contained within WAC 173-340-740(6).

4.3.1 Soil

Soil cleanup levels are based on human exposure via direct contact from soil. The standard soil point of compliance extends from the ground surface to a depth of 15 feet. RI characterization indicates that

with four exceptions, all representative Site data demonstrate compliance with MTCA Method B soil cleanup levels. Among 132 representative point of compliance soil samples collected throughout the Site within 15 feet of the ground surface, the four samples exceeding the calculated gasoline TPH cleanup level of 2,919 mg/kg represent 3% of the sample population (Table 1). These four samples were collected from three borings located near the eastern Property margin, adjacent to the 16th Avenue right-of-way (Figure 5A). All gasoline-related constituent concentrations (BTEX, etc.) uniformly meet the MTCA cleanup criteria for all soil points of compliance.

Ecology guidance recognizes that a point-by-point comparison to MTCA cleanup levels is not necessarily representative of actual Site contaminant exposures. In addition to conducting direct comparison between individual soil samples and applicable soil cleanup levels, MTCA allows for a statistical approach that accurately compares representative (95% upper confidence limit [95 UCL]) Site-wide soil conditions to the cleanup levels. Because only 3% of the sample population exceeded the MTCA Method B soil point of compliance criteria, EES conducted a statistical evaluation of sampling data to determine soil cleanup compliance. This statistical evaluation was conducted in accordance with Ecology's *Guidance for Remediation of Petroleum Contaminated Sites* (2011).

Two modeling approaches approved under Ecology guidance were used to provide a statistical basis for calculating compliance statistics. These models include MTCAstats (Ecology 2007, and online at http://www.ecy.wa.gov/programs/tcp/tools/toolmain.html) and the USEPA's ProUCL v5.1. The analytical data set for gasoline includes a majority (53%) of non-detect values, which as a very protective assumption were input at 100% of the laboratory analytical reporting limits.

Ecology guidance indicates that when using a statistical method for compliance comparison, no single sample can exceed two times the soil cleanup level. Only two of 132 compliance samples approached (but were essentially equivalent to) this 2x criteria:

- Sample B-35 at 5,960 mg/kg = 2.042x the soil CUL of 2,919 mg/kg
- Sample B-39 at 5,970 mg/kg = 2.045x the soil CUL of 2,919 mg/kg

These two individual sample points do not significantly exceed the 2x rule-of-thumb, and are statistical outliers that do not accurately represent site conditions or reasonable exposure conditions.

Based on this statistical comparison and in view of a robust sample population, current soil conditions based on direct contact exposures are adequately protective of human health, and meet the MTCA Method B soil point of compliance throughout this Site.

Statistical calculation details and worksheets are provided in Appendix E and summarized below.

4.3.1.1 MTCAStats Calculations

Soil data was first evaluated using the MTCAstats program, but no reliable 95 UCL could be developed because model parameters did not accept the data distribution due to the range of laboratory analytical reporting limits.

4.3.1.2 USEPA ProUCL v5.1 Calculations

The site-wide 95 UCL was calculated to be 792.2 mg/kg using EPA's current model. In view of the extensive representative data set, more than 50% of which indicates no gasoline detections, this 95 UCL is regarded as a very protective statistical basis for estimating the Site-wide exposure concentration.

4.3.2 Other Soil-Related Exposure Pathways

Other soil-related potential Site exposure pathways were evaluated, as follows:

- Soil cleanup levels based on leaching (protection of groundwater) do not apply because Site soil impacts are limited to within approximately 14 feet of the ground surface and have been demonstrated in this RI to be isolated from vicinity groundwater by a minimum of at least 35 feet of non-contaminated soils. Gasoline-related contaminant leaching from soil to groundwater is therefore determined to be an incomplete exposure pathway and eliminated from further consideration.
- Soil cleanup levels based on protection of ecological receptors (the "environment") do not apply because ecological receptors in significant numbers are not anticipated at or near the highly urbanized and developed Site and Site vicinity (see Section 4.4).
- Soil vapor intrusion (an indirect exposure pathway) was evaluated for the commercial Property building under current conditions. The identified soil conditions appear to be adequately protective and no vapor intrusion concerns were identified for the Property building based on Ecology's Tier 1 VIA criteria and the published MTCA Method B sub-slab soil gas screening levels. Site-specific MTCA modified Method B CULs are based on likely indoor air exposures at this commercial building, and confirm that observed soil gas concentrations adjacent to the building are far below screening levels.
- Site conditions appear protective to the extent that petroleum vapor intrusion does not pose any known risk to humans working in the existing commercial and retail building. However, gasoline contaminated soils present at northeastern portions of the Property represent a continuing source of subsurface vapors that should be considered with regard to potential future vapor intrusion if a new building were to be constructed near that area. Soil cleanup and/or vapor mitigation may be necessary to establish protective indoor air conditions near or above the existing source of soil contamination.

4.3.3 Air

Ambient air is regarded under MTCA as a standard point of compliance (WAC 173-340-750(b)). In accordance with Ecology's vapor intrusion guidance, ambient air conditions were not evaluated during this RI based on Tier 1 vapor intrusion assessment findings indicating a low potential for concern under current conditions for the commercial building at the Property. "Sub-slab" soil gas concentrations adjacent to the Property building were found to below published MTCA standard Method B screening levels, which are based on the most protective exposure assumptions for a residential building. In an effort to account for more representative conditions and likely employee scenarios at the Property's commercial building, EES also calculated site-specific air CULs using common occupational exposure assumptions. Because these occupational exposures are based on an eight-hour workday, they are

protective of other short-term inhalation exposures that occur at the Property, such as for retail store and/or restaurant customers. The modified Method B air CULs for occupational and commercial building exposures are approximately five to ten times greater than for the standard CULs (see Section 4.1.2).

- Soil gas data collected from within five feet of ground surface are appropriate based on human exposure to vapors migrating from shallow soil to indoor air since (1) groundwater is not involved and no vapor migration from groundwater is attributed to the Site gasoline source (see Section 4.3.4), and (2) shallow soil gas within this uppermost five-foot zone is representative of upward-migrating vapors originating from Site-related soil contamination. This upper five feet of the soil column is most appropriate for soil gas compliance sampling based on the soil contaminant source and the vapor intrusion route of exposure.
- Contaminated soil at the Site does not exceed cleanup levels based on direct contact compliance criteria, and soil vapor concentrations attenuate with distance from the source to the extent that no vapor intrusion concerns were identified or anticipated for the existing commercial Property building. However, gasoline-contaminated soils are a continuing source of subsurface vapors that exceed corresponding vapor intrusion screening levels in localized but developable portions of the Site. Potential vapor intrusion should be considered for future developable areas on the Property where buildings could be constructed. In those areas, future mitigation and/or cleanup actions may be necessary to address the indoor air compliance criteria.
- Air conditions at the neighboring auto repair facility were not evaluated.

4.3.4 GROUNDWATER

As previously discussed with Ecology and evaluated during this RI, groundwater is not an affected media of concern at this Site. Where identified, gasoline-related contaminants are limited to the uppermost 14 feet of vadose-zone soils. No gasoline contamination has been identified at depths extending to 50 feet. Groundwater was not encountered at the Site and is not anticipated within 60 to 100 feet of the ground surface in this vicinity.

Where present, contaminants leaching from relatively shallow soil to the much deeper water table is determined to be an incomplete exposure pathway and eliminated from further consideration at this Site. Therefore, no groundwater point of compliance is applicable at this Site.

4.4 TERRESTRIAL ECOLOGICAL EVALUATION

In accordance with Ecology's guidance, EES evaluated terrestrial ecological evaluation (TEE) criteria to determine whether the Site poses a potential threat of significant adverse effects to terrestrial ecological receptors. The first step of a TEE is an exclusion analysis using the criteria in WAC 173-340-7491. A TEE exclusion analysis was previously conducted for the Site in 2014 (EES 2014). In order to reflect current Site conditions, EES conducted a new TEE exclusion in 2017 to support this RI. Based on the most recent evaluation, the Site meets the undeveloped land exclusion because there is less than

1.5 acres of contiguous undeveloped land within 500 feet of the Site. Therefore, no TEE is required. A copy of this evaluation is included in Appendix F.

5 AREAS POTENTIALLY REQUIRING CLEANUP

The areas of the Site potentially requiring cleanup are delineated as detailed in this RI report and are summarized in subsections 5.1 and 5.2 below. MTCA Method B CULs are selected to govern Site cleanup considerations. Based on this evaluation, protective conditions exist with regard to current commercial Property use. Potential cleanup actions related to gasoline impacts are driven by future Property use scenarios for inhalation exposures related to petroleum vapor migration and potential impacts to ambient indoor air, as discussed below.

5.1 SOIL

Under current Site conditions, a comparison to Method B cleanup levels indicates the soil point of compliance appears adequately protective for human exposures, and no ecological exposures are anticipated. Potential future site redevelopment may require soil cleanup to achieve compliance criteria under MTCA. The extent to which soil cleanup may be required at the Site, if any, will require further evaluation and discussion with Ecology.

Gasoline and related constituent impacts at the Site are fully delineated. Among 132 soil samples representing the Site soil point of compliance for direct contact exposures, a total of four samples (3%) exceed the Site-specific Method B CUL of 2,919 mg/kg as calculated using MTCA protocols, but none of those four exceed this CUL by a factor greater than 2x and are therefore within allowable variability under MTCA guidance. No other gasoline constituents or other contaminants exceed Method B soil CULs at this Site. A statistical comparison indicates the point of soil compliance is achieved based on a 95 UCL of 792 mg/kg representing Site-wide exposures. EES believes this calculated 95 UCL value demonstrates protective conditions with regard to direct contact soil exposures, and no soil cleanup is appropriate under current Site conditions.

Acknowledging Ecology's criteria regarding the 2x CUL exceedance limits for the statistical TPH compliance comparison however, identified gasoline impacts may require remediation or mitigation measures to achieve regulatory Site closure. The basis for soil cleanup will need to address the following unique factors:

- No actionable soil impacts exceeding MTCA Method B CULs have been identified within the point of compliance for developable portions of the Property or within the adjacent 16th Avenue right-of-way, and therefore no remediation is required in these areas.
- Method B soil CUL exceedances for gasoline were identified at three locations (four samples total) located along the eastern margin of the Property, within the county's building setback zone adjacent to the 16th Avenue right-of-way (Figures 5A and 9A). The identified exceedances are localized laterally and vertically, and are located at depths below four feet in the setback area adjacent to the right-of-way. Statistical evaluation indicates that representative Site

exposures (95 UCL = 792 mg/kg) are well below the calculated gasoline CUL of 2,919 mg/kg and may not compel further soil cleanup anywhere at the Site.

- Although identified soil impacts do not appear likely to present a vapor intrusion concern with regard to current Property building conditions, residual contaminated soils represent a continuing source of subsurface vapors that could potentially migrate to indoor air if future Site building(s) were to be constructed above or near the source area (Figure 9B). Soil cleanup and/or vapor control may be required for protection of indoor air based on future development planning (Section 5.2).

5.2 AMBIENT AIR

Ambient air conditions at the Site have not been directly evaluated, but are not expected to require cleanup based on characterization of current Site usage as completed under this RI. Soil gas data indicate residual soil contamination represents a source of subsurface gasoline-related vapors that could potentially migrate to indoor air at concentrations exceeding ambient air CULs, if in the future Property buildings were to be constructed near the source area.

- The Property's existing commercial-use building appears to be located beyond the extent of vapor intrusion concerns based on the Tier 1 assessment, and no soil cleanup or vapor mitigation appears necessary for protection of indoor air at this building under current conditions. This conclusion is valid for both the most conservative "unrestricted land use" assumptions used in the development of default published MTCA standard Method B air CULs, and also for more representative non-residential scenarios calculated for the Property using MTCA modified Method B occupational exposure assumptions for air.
- Soil gas conditions near the neighboring auto repair facility may exceed MTCA screening criteria and may need to be further evaluated in view of the operational history and future use of that Property. The source and characteristics of soil gas vapors identified near that neighboring building have not been fully evaluated, and it is premature at this time to consider potential cleanup requirements with respect to the neighboring auto repair facility.

5.3 FEASIBILITY STUDY

Depending on future use scenarios and cleanup decision-making, a feasibility study may be necessary to evaluate the most appropriate final remedy for the Site. A feasibility study is not required if Model Remedies are implemented for Site cleanup (Ecology 2015).

6 SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Site characterization appears complete and indicates gasoline impacts are limited to soil and soil gas located in the north-central and north-eastern portions of the Property. Soil impacts extend east of the Property boundary beneath a portion of the adjacent sidewalk and 16th Avenue roadway. The source of these gasoline impacts appears to be from fueling operations conducted at the Property prior to 1985. In 1986, Plaid Pantries redeveloped the Property and installed a new and distinct fueling system further to the south, and this system was operated until it was decommissioned and removed in 2006. No releases are known or suspected to have occurred during operation of the Plaid fueling system.

Where identified, the extent of gasoline and related contaminants is limited to vadose-zone soils between approximately four and 14 feet in depth. No impacts have been identified among underlying soils in the source area. Groundwater has not been encountered to maximum exploration depths of 50 feet at the Property. Regionally, first-occurring groundwater is anticipated at depths near 100 feet. Groundwater is not expected to be impacted by the gasoline release originating at the Property and is not regarded as a medium of concern for this Site.

Potential human health risks for direct contact exposure are based on the following current and reasonably likely future Site receptors:

- Current and future occupational worker
- Current and future retail store customer
- Current and future restaurant diner
- Future construction worker
- Future trench worker (Property and 16th Avenue right-of-way)
- Future roadway maintenance worker

In accordance with published guidance, EES used fractionated TPH data to calculate a Site-specific MTCA Method B soil cleanup level of 2,919 mg/kg for gasoline based on direct-contact exposures. Standard MTCA Method B cleanup levels are intended to be protective for all direct contact human exposures and are defined as an unrestricted use cleanup level. Therefore, the use of Method B cleanup levels at this commercial-use site has multiple layers of protectiveness, since the most sensitive residential exposure conditions are addressed but not allowed by current zoning and therefore will not be encountered at this time.

Soil conditions throughout the Site satisfy the Method B cleanup levels for all contaminants of interest except three locations along the northeastern Property margin, adjacent to the 16th Avenue right-of-way. Gasoline concentrations at those three locations range between 3,700 and 5,970 mg/kg, exceeding the 2,919 mg/kg soil cleanup level. Based on a statistical evaluation conducted using the USEPA's ProUCL model, representative Site-wide soil concentrations (95 UCL = 792 mg/kg) were determined to be far below the cleanup level and therefore satisfy the point of compliance for soil direct contact exposures. Furthermore, these three sampling locations are adjacent to the 16th Avenue right-of-way and are therefore subject to county setback restrictions limiting future construction. As a result, no significant exposures to these most highly-contaminated but isolated Site soils are anticipated. These multiple lines of evidence indicate that current Site conditions are adequately protective and are compliant with soil cleanup levels established under MTCA.

With regard to potential petroleum vapor intrusion from residual contaminated soils, no concerns were identified for this pathway based on current building conditions. Standard MTCA Method B air CULs were also compared to site-specific MTCA modified Method B CULs to establish the most representative indoor air exposure scenarios at the Property's existing non-residential building. Site-specific calculations confirm that lower overall occupational exposures (compared to residential exposures)

result in protective modified MTCA Method B air CULs that are approximately 5 to 10 times greater for this commercial building, versus standard Method B air CULs for unrestricted use conditions. The protective MTCA modified Method B air CULs can be incorporated into future site planning if redevelopment is anticipated.

Although residual soil impacts appear to be adequately protective of direct contact exposures, the gasoline contaminated soil represents a continuing source of subsurface vapors. RI soil gas data collected adjacent to the existing Property building are below MTCA screening criteria and indicate no significant vapor intrusion condition is likely to affect this building based on the Tier 1 assessment. The risk characterization indicates that under current Site conditions, no unacceptable vapor intrusion risks are anticipated because:

- Soil gas concentrations adjacent to the current Property building are below the most conservative unrestricted use Method B sub-slab soil gas screening levels and do not cause unacceptable vapor intrusion conditions with regard to indoor air based on Ecology's Tier 1 criteria. Screening against site-specific MTCA modified Method B CULs further minimizes vapor intrusion concerns for this commercial building.
- No buildings are located or are anticipated at other portions of the Property or elsewhere at the Site, including the 16th Avenue ROW and its setback restrictions extending onto the subject Property.
- The neighboring automotive repair facility may have unique operational conditions and vapor intrusion criteria for that building were not evaluated during this RI.

Soil cleanup may be required in consideration of future land use conditions. Soil gas concentrations are much greater around the core of residual soil contamination, and future building construction in this area must consider potential vapor intrusion issues in order to address the ambient air point of compliance for indirect exposures to soil contamination. Soil cleanup may therefore be required to meet future Site conditions and possible development goals.

Contaminated soil on the Property is the source of identified soil vapors and some portion of these Property soils may require treatment or removal to be protective of future Property use and redevelopment and to satisfy Ecology cleanup requirements. EES recommends the findings of this report be evaluated and discussed in consultation with Ecology.

7 LIMITATIONS

EES has prepared this report for use by Plaid Pantries and its agents. This report may be made available to other parties and to regulatory agencies at the discretion of Plaid. This report is not intended for use by others and the information contained herein is not applicable to other Sites.

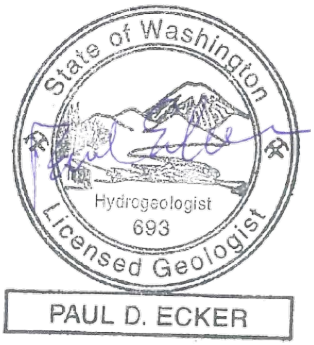
Our interpretation of subsurface conditions and risk criteria is based on field observations and chemical analytical data within the areas explored. Areas with contamination may exist in portions of the Site that were not explored or analyzed.

Within the limitations of scope, schedule, and budget, our services have been executed in accordance with generally accepted practices and laws, rules, and regulations at the time that the report was prepared. No other conditions, expressed or implied, should be understood.

EES ENVIRONMENTAL CONSULTING, INC.

Chris Rhea, LG
Project Geologist

Paul Ecker, LHG
Principal



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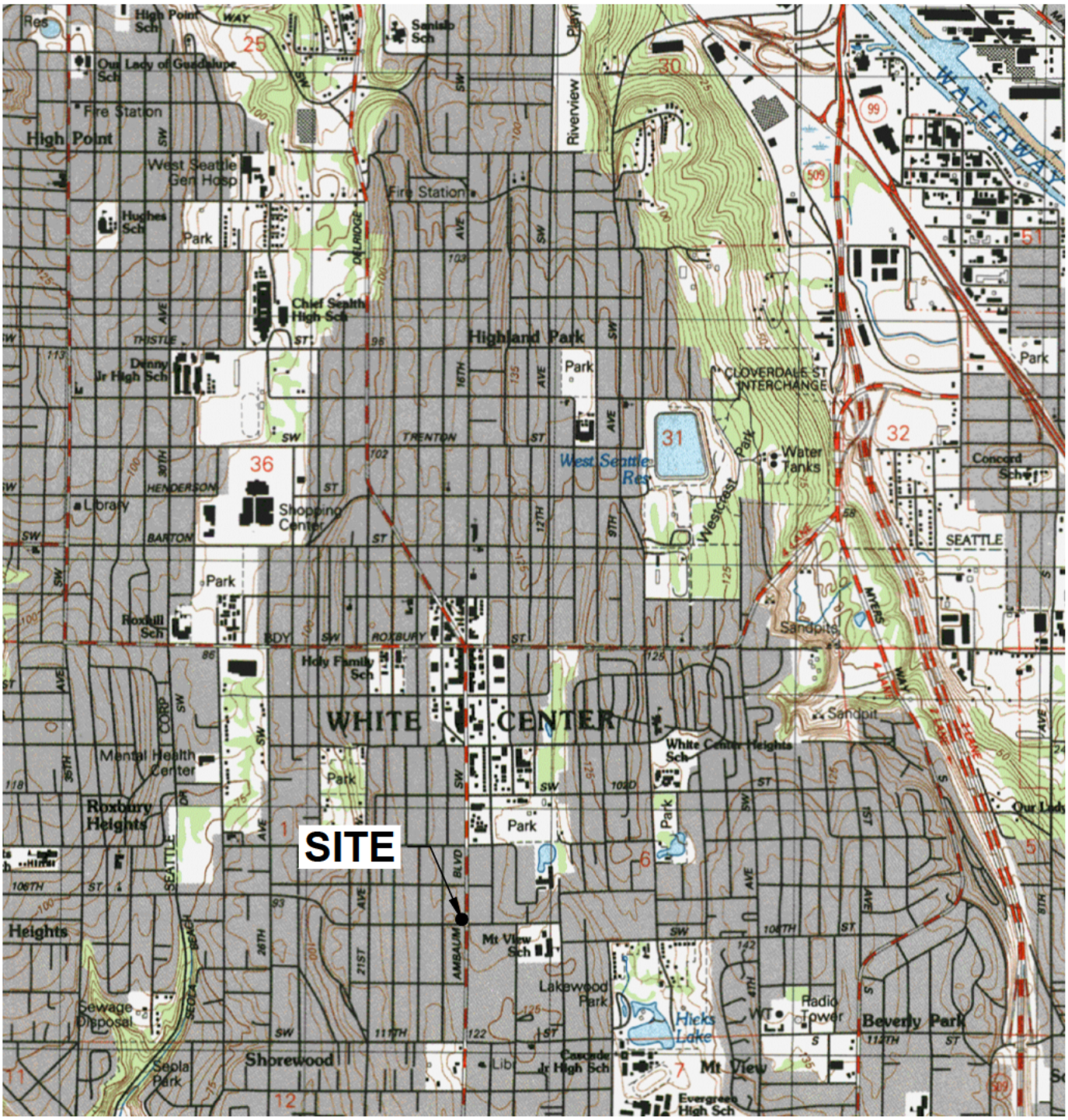
Figures



SOURCE:
USGS, SEATTLE SOUTH QUADRANGLE
WASHINGTON – SNOHOMISH CO.
7.5 X 15 MINUTE SERIES (TOPOGRAPHIC) 1983

APPROXIMATE SCALE IN FEET

0 1000 2000 4000

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VICINITY MAP

PLAID PANTRY #324
10645 16TH AVE SW.
WHITE CENTER, KING CO., WA.

DATE:	*7–20–17*	*PROJECT NO.*
FILE:	*1133–01*	*1133–01*
DRAWN:	*JJT*	*FIGURE NO.*
APPROVED:	*CR*	*1*

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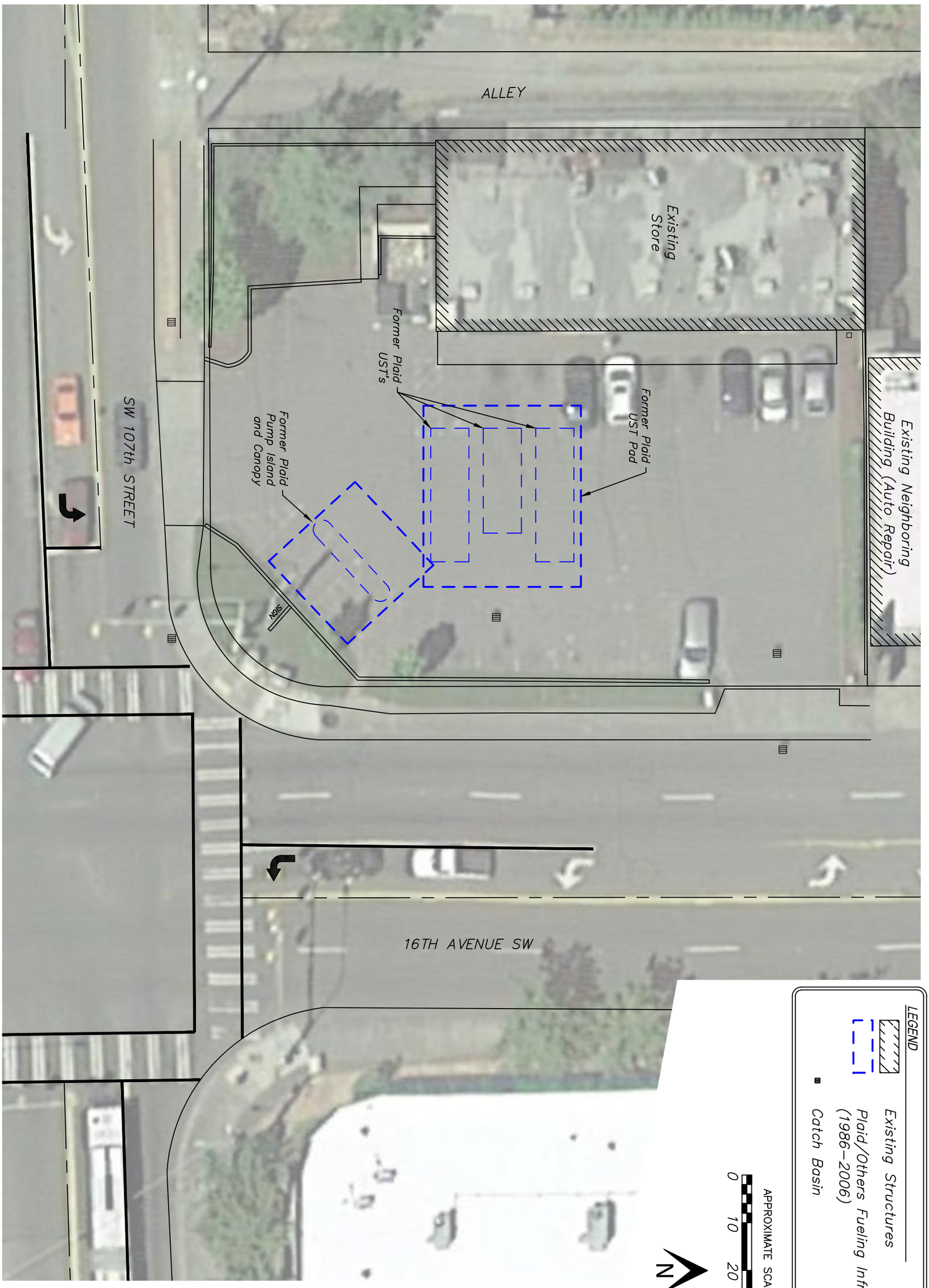

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PLAID PANTRY #324
10645 16TH AVE SW.
WHITE CENTER, KING COUNTY, WA.

SITE FEATURES AND
FUELING INFRASTRUCTURE
(1986–2006)

DATE:	3–20–18	PROJECT NO.	
FILE:	1133–01	1133–01	
DRAWN:	JJT	FIGURE NO.	
APPROVED:	CR	2A	

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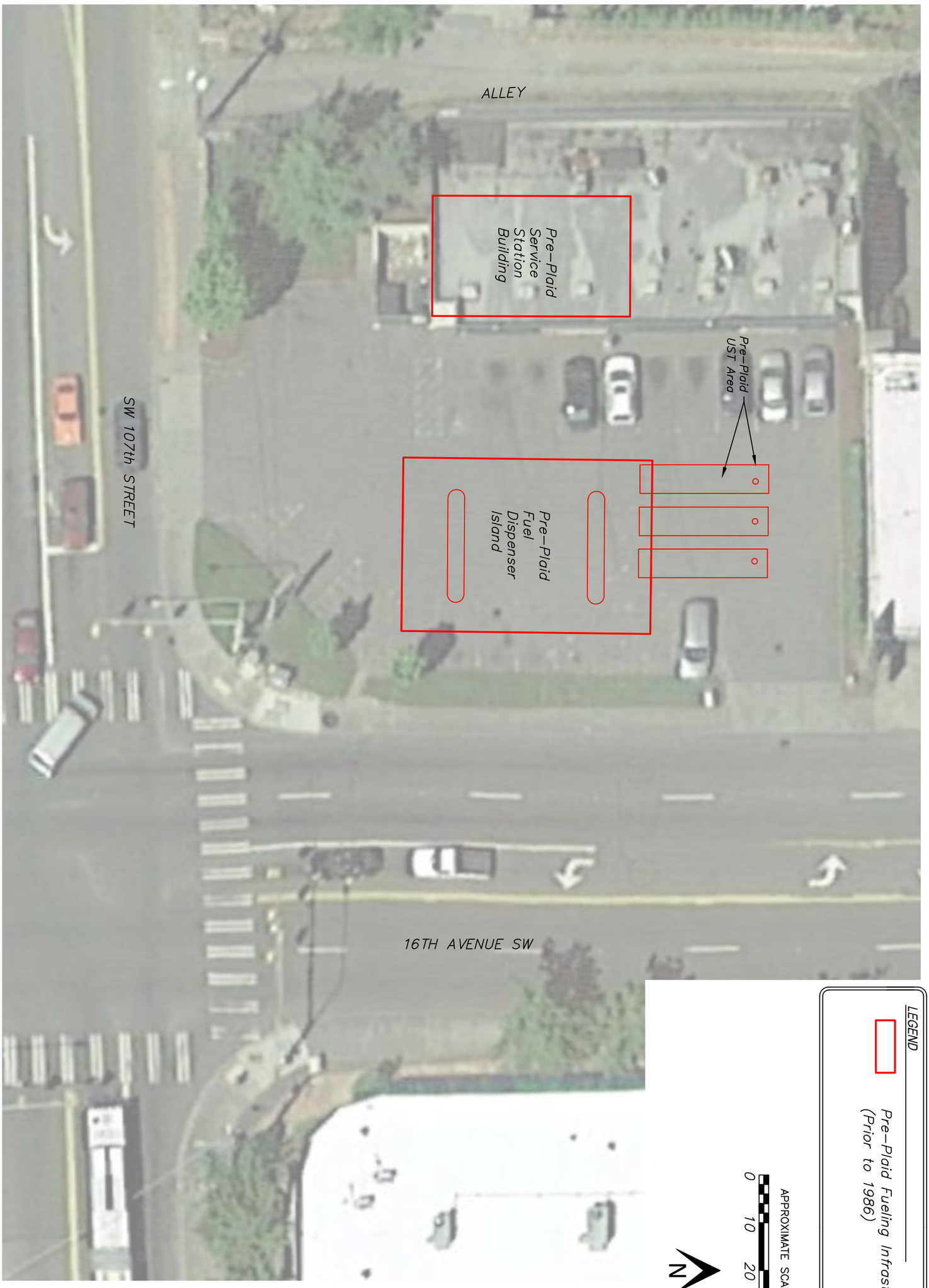

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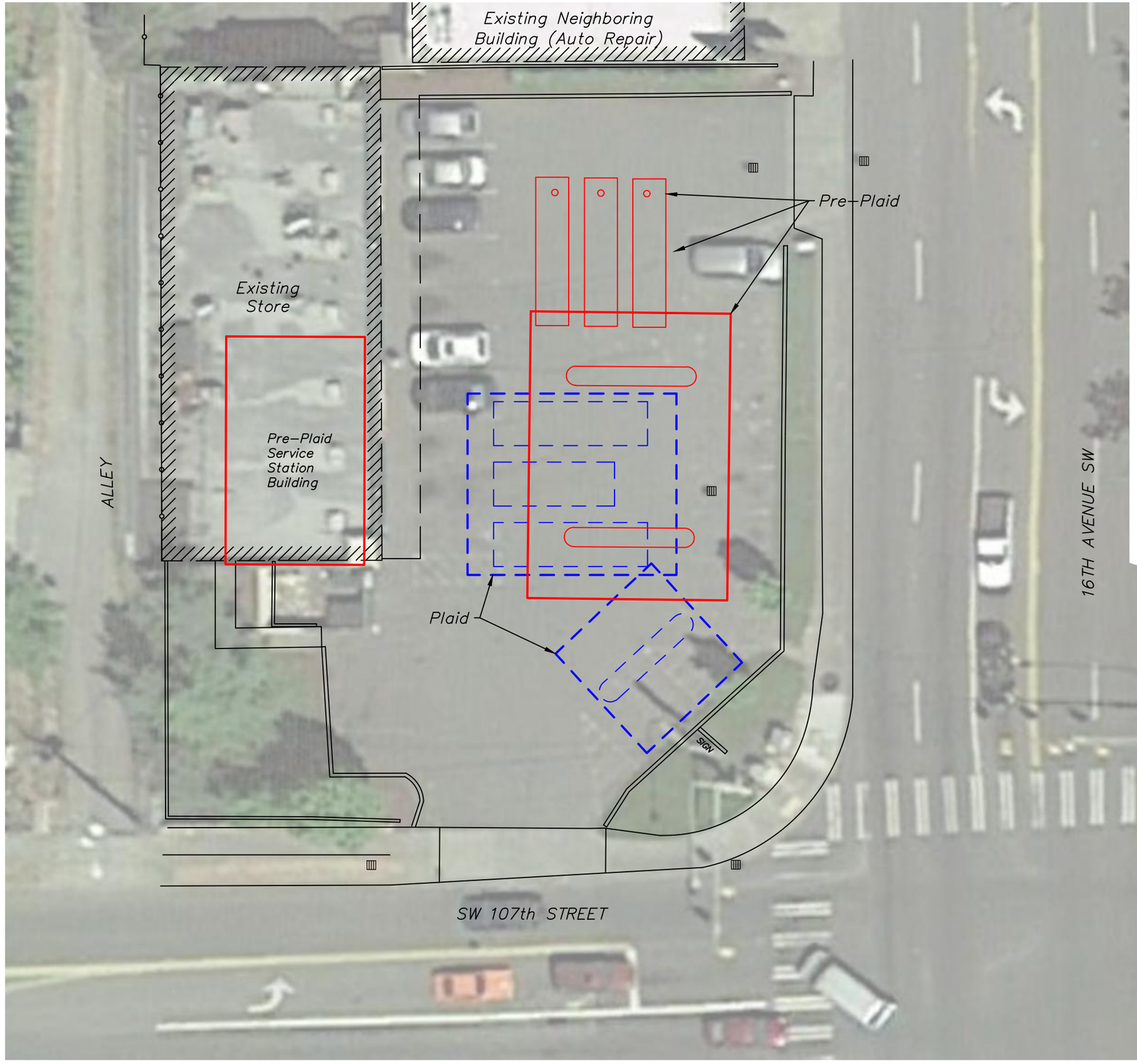
WHITE CENTER, KING COUNTY, WA.

PRE-PLAID
FORMER FUELING INFRASTRUCTURE
(PRE-1986)

DATE:	3-20-18	PROJECT NO.	1133-01
FILE:	1133-01		
DRAWN:	JJT	FIGURE NO.	2B
APPROVED:	CR		



LEGEND

- Existing Structures
- Pre-Plaid Fueling Infrastructure (Prior to 1986)
- Plaid/Others Fueling Infrastructure (1986-2006)
- Catch Basin

APPROXIMATE SCALE IN FEET

0 10 20 40

N

PROJECT NO.	1133-01
DATE:	3-20-18
FILE:	1133-01
DRAWN:	JJT
APPROVED:	CR
FIGURE NO.	2C

DISTINCT FUELING INFRASTRUCTURE LOCATIONS (PRE-2006)

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10645 16TH AVE SW.
WHITE CENTER, KING COUNTY, WA.

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Neighboring Building
(Auto Repair)

ALLEY

Existing
Store

Sidewalk

Parking
Lot

SIGN

Sidewalk

SW 107th STREET

EX. SSMH

EX. SSMH

16TH AVENUE SW

LEGEND

- Existing Structures
- Pre-Plaid Fueling Infrastructure (Prior to 1986)
- Plaid/Others Fueling Infrastructure (1986-2006)
- Catch Basin
- GAS — Gas
- P — Power
- ST — Storm
- SS — Sewer
- T — Telephone

APPROXIMATE SCALE IN FEET

0 10 20 40

N

DATE:	10-6-17
FILE:	1133-01
DRAWN:	JJT
APPROVED:	CR
PROJECT NO.	1133-01
FIGURE NO.	3

SITE UTILITY LOCATIONS

PLAID PANTRY #324
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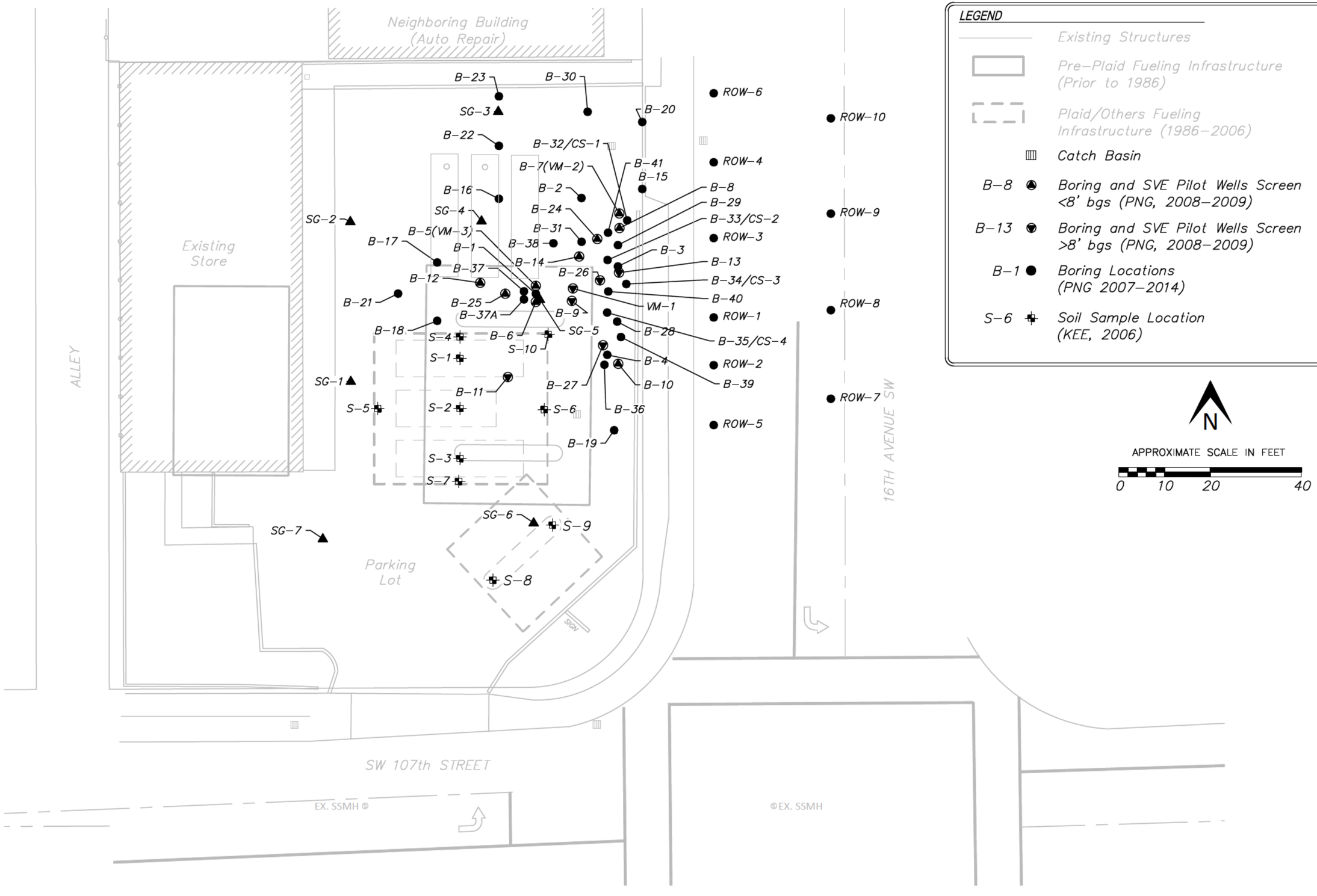

LEGEND

- Existing Structures
- Pre-Plaid Fueling Infrastructure (Prior to 1986)
- Plaid/Others Fueling Infrastructure (1986-2006)
- Catch Basin
- B-8 — Boring and SVE Pilot Wells Screen <8' bgs (PNG, 2008-2009)
- B-13 — Boring and SVE Pilot Wells Screen >8' bgs (PNG, 2008-2009)
- B-1 — Boring Locations (PNG 2007-2014)
- S-6 — Soil Sample Location (KEE, 2006)

N

APPROXIMATE SCALE IN FEET

0 10 20 40

DATE:	10-6-17	PROJECT NO.	1133-01
FILE:	1133-01	FIGURE NO.	4
DRAWN:	JJT		
APPROVED:	CR		

SAMPLE LOCATIONS
(2006-2014)

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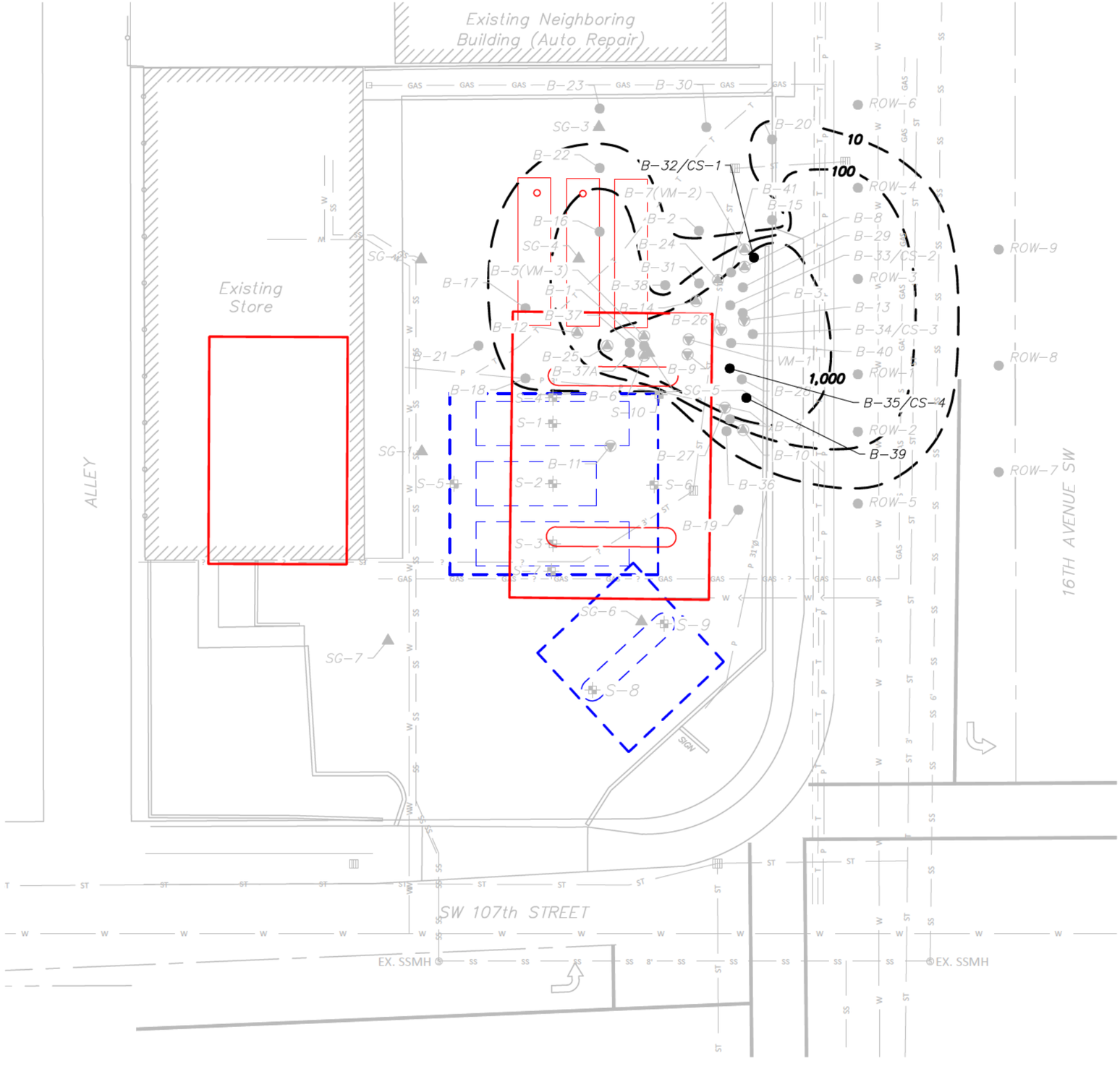

LEGEND

- Existing Structures
- Pre-Plaid Fueling Infrastructure (Prior to 1986)
- Plaid/Others Fueling Infrastructure (1986-2006)
- Catch Basin
- S-6 — Soil Sample Location (KEE, 2006)
- B-8 — Boring and SVE Pilot Wells Screen <8' bgs (PNG, 2008-2009)
- B-13 — Boring and SVE Pilot Wells Screen >8' bgs (PNG, 2008-2009)
- B-1 — Boring Locations (2007-2014)
- SG-1 — Soil Gas Locations (EES, 2014)
- GAS — Gas
- P — Power
- ST — Storm
- SS — Sewer
- T — Telephone
- 10 — Gasoline Isocontour in Soil (mg/kg)
- B-39 — Sample Location Exceeding Site-Specific MTCA Method B Soil Cleanup Level for Gasoline (2,919 mg/kg)

N

APPROXIMATE SCALE IN FEET

0 10 20 40

APPROXIMATE EXTENT OF GASOLINE IMPACTS IN SOIL

PLAID PANTRY #324
10645 16TH AVE SW.
WHITE CENTER, KING COUNTY, WA.

DATE:	10-6-17	PROJECT NO.	1133-01
FILE:	1133-01	FIGURE NO.	5A
DRAWN:	JJT		
APPROVED:	CR		

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LEGEND

- Existing Structures
- Pre-Plaid Fueling Infrastructure (Prior to 1986)
- Plaid/Others Fueling Infrastructure (1986-2006)
- Catch Basin
- 10 — Gasoline Isocontour in Soil (mg/kg)
- A — A' Cross Section Locations

PROJECT NO.	1133-01
DATE: 10-6-17	FIGURE NO. 5B
FILE: 1133-01	
DRAWN: JJT	
APPROVED: CR	

CROSS SECTION LOCATIONS

PLAID PANTRY #324
10645 16TH AVE SW.
WHITE CENTER, KING COUNTY, WA.

N

APPROXIMATE SCALE IN FEET

0 10 20 40

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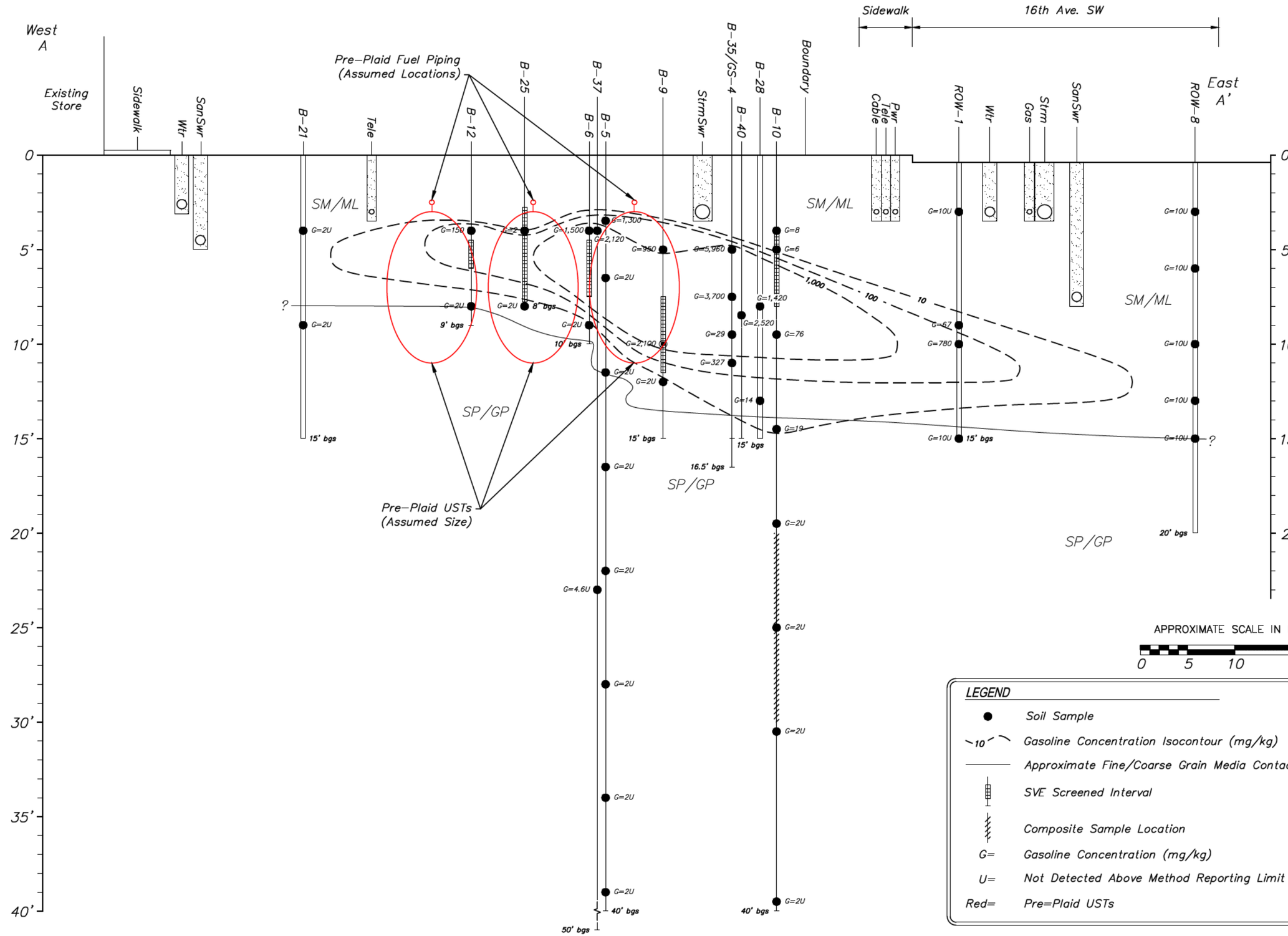

DATE: 10-6-17	PROJECT NO. 1133-01
FILE: 1133-01	FIGURE NO. 6A
DRAWN: JJT	
APPROVED: CR	

CROSS SECTION A-A'

PLAID PANTRY #324
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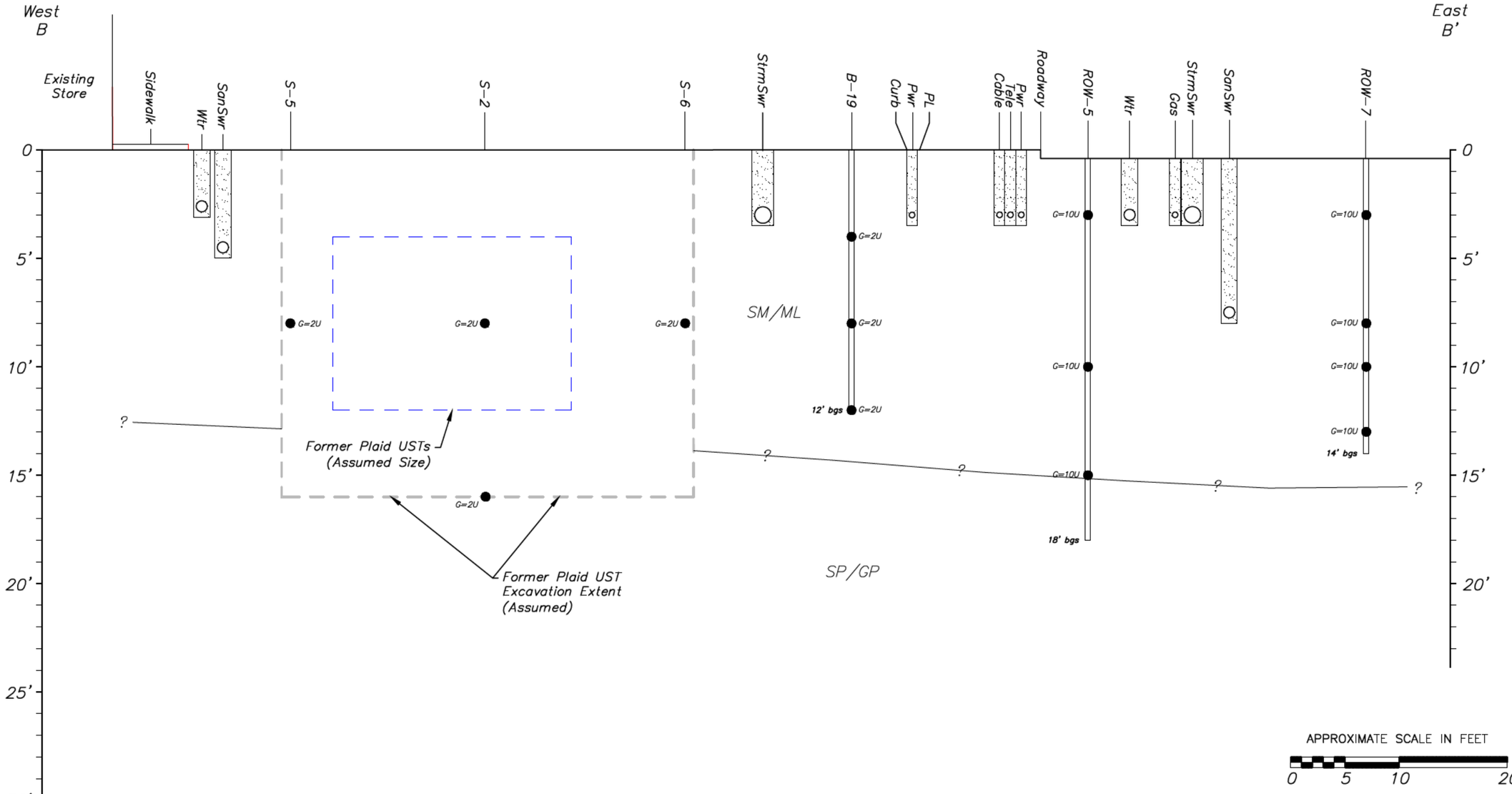

PROJECT NO.	1133-01
DATE: 10-6-17	FIGURE NO. 6B
FILE: 1133-01	
DRAWN: JJT	
APPROVED: CR	

EAST-WEST
CROSS SECTION B-B'

PLAID PANTRY #324
10645 16TH AVE SW.
WHITE CENTER, KING COUNTY, WA.

LEGEND

- Soil Sample
- 10 — Gasoline Concentration Isocontour (mg/kg)
- Approximate Fine/Coarse Grain Media Contact
- SVE Screened Interval
- G= Gasoline Concentration (mg/kg)
- U= Not Detected Above Method Reporting Limit
- Blue= Former Plaid USTs

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North
C

South
C'

Auto Repair Building

PL

Gas

Curb

B-23

B-22

B-16

B-38

B-5/VM-3

B-37

B-6

S-10 Pwr

S-4

S-1

S-2

S-6

StmSwr

S-3

Gas

S-7

S-9

S-8

PL=23.5'

Pre-Plaid Fuel Piping (Assumed Locations)

Pre-Plaid Fuel Dispensers

Former Plaid Fuel Dispensers

0

5'

10'

15'

20'

25'

30'

35'

40'

VERTICAL SCALE AS SHOWN IN FEET (BGS)

SM/ML

SP/GP

Pre-Plaid USTs (Assumed Size)

Former-Plaid Fuel Piping

Former-Plaid USTs (Assumed Dimensions)

Former Plaid Excavation Extents (Assumed)

G=2U

G=93

8' bgs

12' bgs

G=120

G=22

15' bgs

10

100

1,000

G=1,300

G=2,120

G=1,500

G=310

10' bgs

G=4.6U

40' bgs

50' bgs

?

APPROXIMATE SCALE IN FEET

0 5 10 20

LEGEND

- Soil Sample
- 10 — Gasoline Concentration Isocontour (mg/kg)
- Approximate Fine/Coarse Grain Media Contact
- SVE Screened Interval
- G= Gasoline Concentration (mg/kg)
- U= Not Detected Above Method Reporting Limit
- Red= Pre=Plaid USTs
- Blue= Former Plaid USTs

PROJECT NO.	1133-01
DATE: 10-4-17	FIGURE NO. 6C
FILE: 1133-01	
DRAWN: JJT	
APPROVED: CR	

NORTH – SOUTH
CROSS SECTION C-C'

PLAID PANTRY #324
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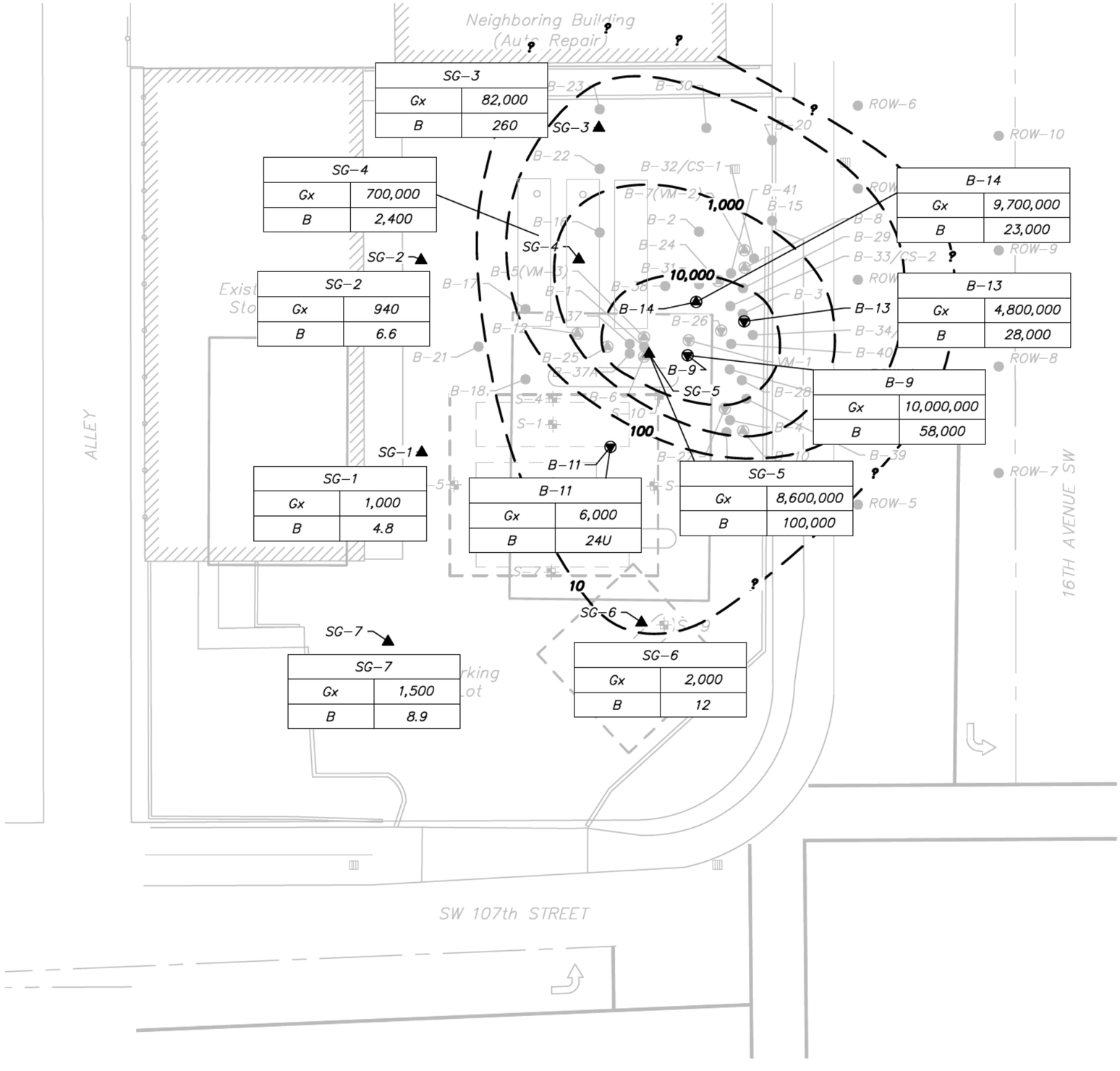

LEGEND

- Existing Structures
- Pre-Plaid Fueling Infrastructure (Prior to 1986)
- Plaid/Others Fueling Infrastructure (1986-2006)
- Catch Basin
- S-6 — Soil Sample Location (KEE, 2006)
- B-8 — Boring and SVE Pilot Wells Screen <8' bgs (PNG, 2008-2009)
- B-13 — Boring and SVE Pilot Wells Screen >8' bgs (PNG, 2008-2009)
- B-1 — Boring Locations (2007-2014)
- SG-1 — Soil Gas Locations (EES, 2014)
- 10 — Benzene Isocontour in Soil Gas (ug/m^3)
- Gx = Gasoline Concentration in Soil Gas (ug/m^3)
- B = Benzene Concentration in Soil Gas (ug/m^3)

N

APPROXIMATE SCALE IN FEET

0 10 20 40

PROJECT NO.	1133-01
FIGURE NO.	7A
DATE:	10-6-17
FILE:	1133-01
DRAWN:	JJT
APPROVED:	CR

GASOLINE AND BENZENE CONCENTRATIONS IN SOIL GAS (2008-2014)

PLAID PANTRY #324
10645 16TH AVE SW.
WHITE CENTER, KING COUNTY, WA.

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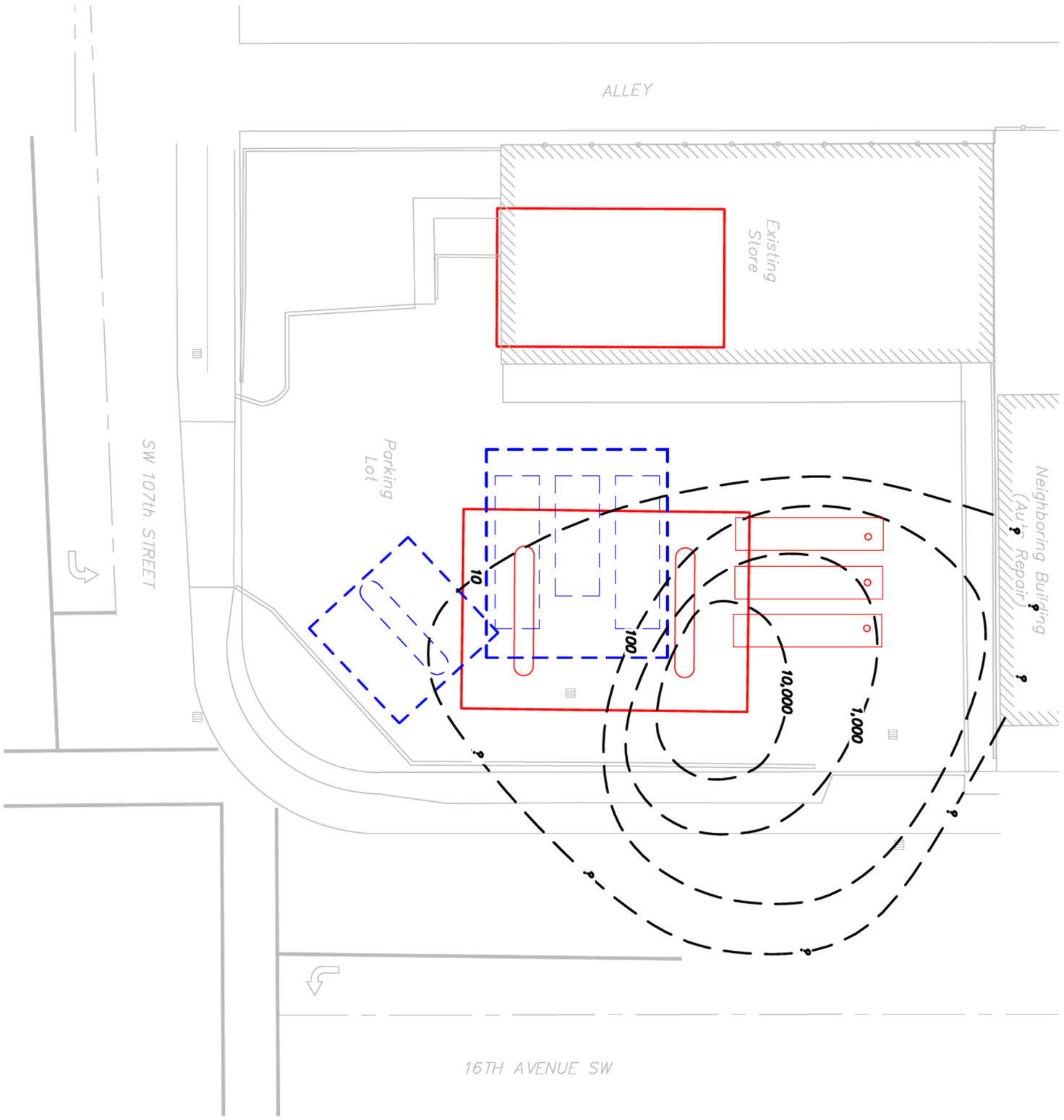

LEGEND

- Existing Structures
- Pre-Plaid Fueling Infrastructure (Prior to 1986)
- Plaid/Others Fueling Infrastructure (1986–2006)
- Catch Basin
- 10 — Benzene Isocontour in Soil Gas (ug/m^3)

APPROXIMATE SCALE IN FEET
0 10 20 40

N

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PLAID PANTRY #324
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GASOLINE AND BENZENE DISTRIBUTION IN SOIL GAS (2008–2014)

DATE:	10–6–17	PROJECT NO.	1133–01
FILE:	1133–01		
DRAWN:	JJT	FIGURE NO.	7B
APPROVED:	CR		

CONCEPTUAL SITE MODEL OF COMPLETE EXPOSURE PATHWAYS

PRIMARY SOURCE	PRIMARY RELEASE MECHANISM	SECONDARY SOURCE	SECONDARY RELEASE MECHANISMS	TERTIARY SOURCE	TERTIARY RELEASE MECHANISMS	QUATERNARY SOURCE	EXPOSURE ROUTE	RETAIL CUSTOMER (0–3 FEET)	OCCUPATIONAL WORKERS (0–3 FEET)	CONSTRUCTION WORKERS (0–3 FEET)	EXCAVATION/ TRENCH WORKERS (0–15 FEET)	HIGHWAY MAINTENANCE WORKERS (0–3 FEET)
FORMER USTs & ASSOCIATED SYSTEMS	PREVIOUS ACCIDENTAL SPILLS & RELEASES	SOIL	DIRECT CONTACT WITH SURFACE SOIL (0–3 FEET)				DERMAL ABSORPTION	▨	▨	●	●	●
							INGESTION	▨	▨	●	●	●
							INHALATION OF FUGITIVE DUST PARTICLES	▨	▨	●	●	●
			VOLATILIZATION/ VAPOR INTRUSION	VOLATILIZATION EMISSIONS			INHALATION OF INDOOR AIR	●	●	○	○	○
							INHALATION OF OUTDOOR AIR	●	●	●	●	●
				SUBSURFACE SOIL	DIRECT CONTACT WITH SUBSURFACE SOIL (3–15 FEET)		DERMAL ABSORPTION	○	○	○	●	○
							INGESTION	○	○	○	●	○
							INHALATION OF FUGITIVE DUST PARTICLES	○	○	○	●	○
			LEACHING/ INFILTRATION/ PERCOLATION	GROUNDWATER ①	DIRECT CONTACT WITH GROUNDWATER		DERMAL ABSORPTION	○	○	○	○	○
							INGESTION	○	○	○	○	○
					GROUNDWATER MIGRATION → VOLATILIZATION	VOLATILIZED EMISSIONS	INHALATION OF INDOOR AIR	○	○	○	○	○
							INHALATION OF OUTDOOR AIR	○	○	○	○	○
			STORMWATER RUNOFF	SURFACE WATER ②	DIRECT CONTACT WITH SURFACE WATER		DERMAL ABSORPTION	○	○	○	○	○
							INGESTION	○	○	○	○	○
					SEDIMENTATION ADSORPTION	SEDIMENT	DERMAL ABSORPTION	○	○	○	○	○
							INGESTION	○	○	○	○	○

LEGEND

○ INCOMPLETE OR INSIGNIFICANT EXPOSURE PATHWAY (NOT QUANTIFIED)

▨ EXPOSURE PATHWAY POTENTIALLY COMPLETE BUT INSIGNIFICANT

● EXPOSURE PATHWAY COMPLETE

1. GROUNDWATER IS NOT AN AFFECTED MEDIA AT THIS SITE.
2. THE SITE IS PREDOMINANTLY PAVED. NO SURFACE WATER CONTACT WITH CONTAMINATED MEDIA IS ANTICIPATED.

PROJECT NO. 1133-01 | FIGURE NO. 8
DATE: 2-14-18 | FILE: 1133-01 | DRAWN: JJT | APPROVED: CR

CONCEPTUAL SITE MODEL

PLAID PANTRY #324
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WHITE CENTER, KING COUNTY, WA.

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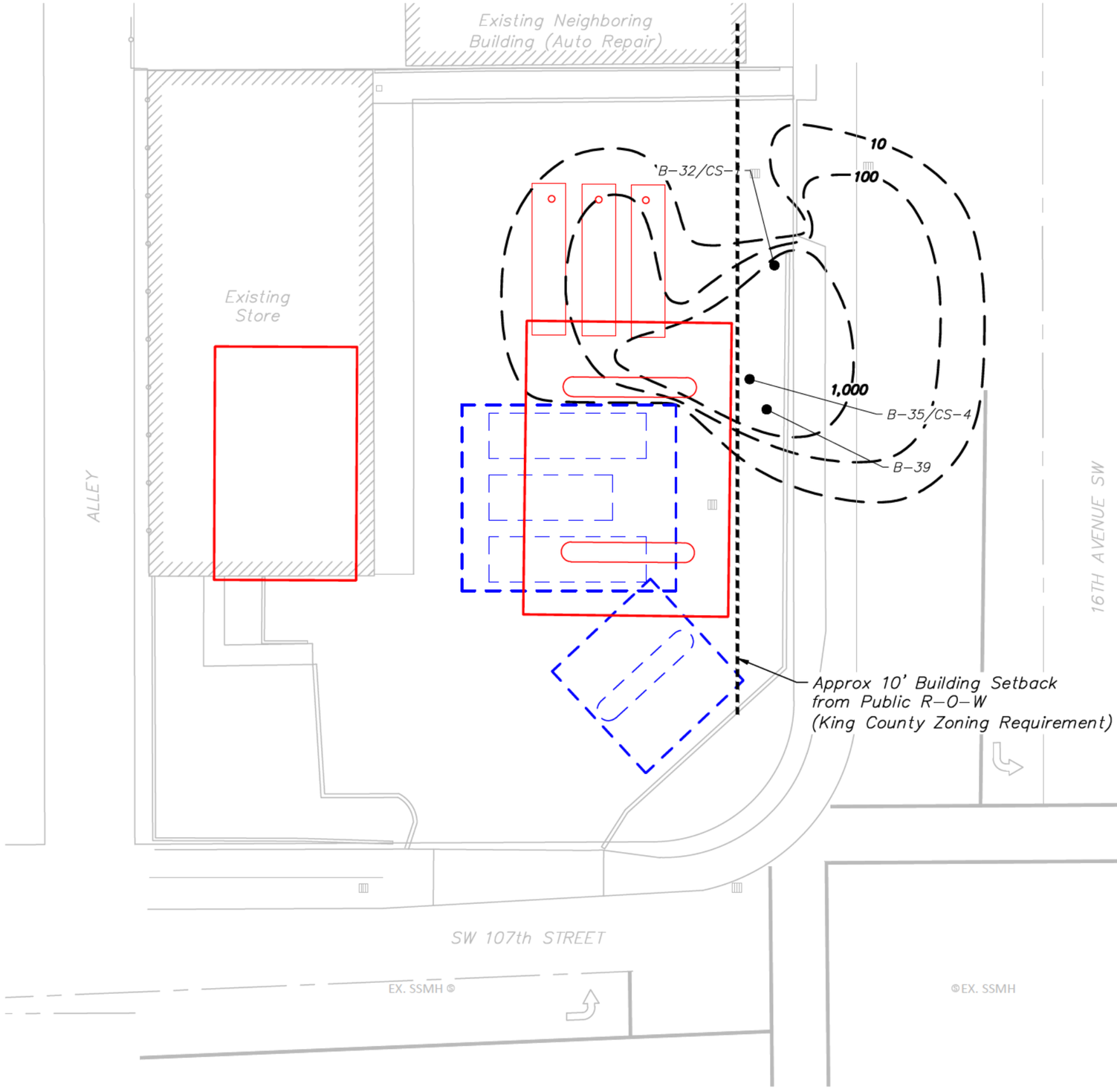

LEGEND

- Existing Structures
- Pre-Plaid Fueling Infrastructure (Prior to 1986)
- Plaid/Others Fueling Infrastructure (1986-2006)
- Catch Basin
- 10 — Gasoline Isocontour in Soil (mg/kg)
- B-39 — Sample Location Exceeding Site-Specific MTCA Method B Soil Cleanup Level for Gasoline (2,919 mg/kg)
- No Soil Cleanup Required Based on Direct Contact (See R.I. Text)

PROJECT NO.	1133-01
FIGURE NO.	9A
DATE:	10-6-17
FILE:	1133-01
DRAWN:	JJT
APPROVED:	CR

NO REQUIRED SOIL CLEANUP BASED ON DIRECT CONTACT

PLAID PANTRY #324
10645 16TH AVE SW.
WHITE CENTER, KING COUNTY, WA.

N

APPROXIMATE SCALE IN FEET

0 10 20 40

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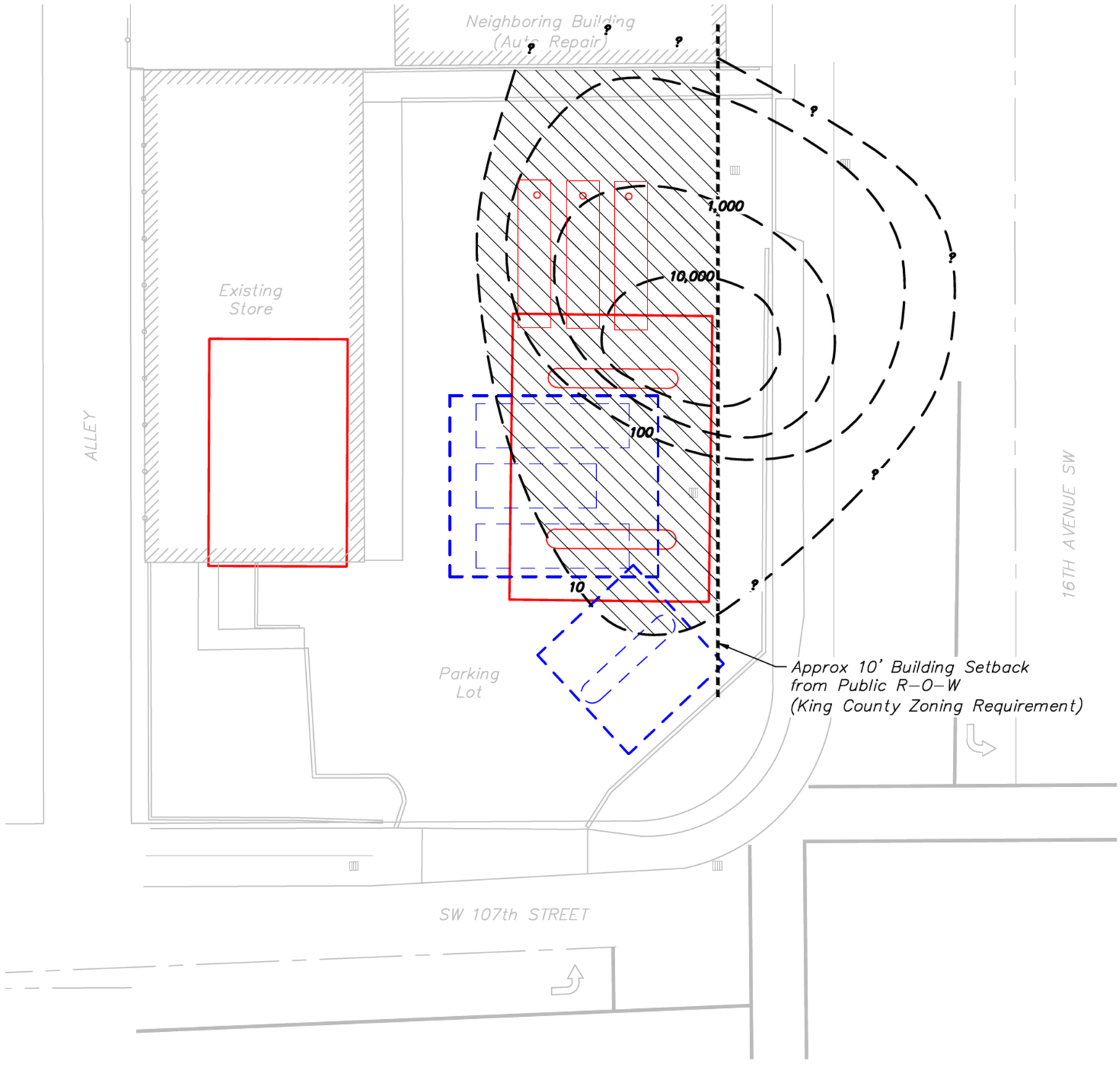

LEGEND

- Existing Structures
- Pre-Plaid Fueling Infrastructure (Prior to 1986)
- Plaid/Others Fueling Infrastructure (1986-2006)
- Catch Basin
- 10 — Benzene Isocontour in Soil Gas (ug/m^3)

Area Potentially Requiring Soil Vapor Mitigation based on Protection of Indoor Air (future developable building area)

PROJECT NO.	1133-01
DATE:	10-6-17
FILE:	1133-01
FIGURE NO.	9B
DRAWN:	JJT
APPROVED:	CR

AREA POTENTIALLY REQUIRING SOIL VAPOR MITIGATION - BASED ON PROTECTION OF INDOOR AIR

PLAID PANTRY #324
10645 16TH AVE SW.
WHITE CENTER, KING COUNTY, WA.

N

APPROXIMATE SCALE IN FEET

0 10 20 40

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Tables

TABLE 1
Soil Analytical Results - Gasoline and Related Constituents (mg/Kg)
Plaid Pantry #324
White Center/King County, Washington

Sample ID	Date	Sample Depth (feet bgs)	Gasoline	Benzene	Toluene	Ethylbenzene	Total Xylenes	Methyl t-butyl ether	1,2-Dibromoethane	1,2-Dichloroethane	Naphthalene	Hexane	1,2,4-TMB	1,3,5-TMB	Total Lead
MTCA Method B Soil Cleanup Levels[a]			2,919[b]	18	6,400	8,000	16,000	556	0.5	11	1,600	4,800	NA	800	N/A
S-1	05/04/2006	16	2.0 U	0.020 U	0.020 U	0.020 U	0.060 U	-	-	-	-	-	-	-	-
S-2	05/04/2006	16	2.0 U	0.020 U	0.020 U	0.020 U	0.060 U	-	-	-	-	-	-	-	-
S-3	05/04/2006	16	2.0 U	0.020 U	0.020 U	0.020 U	0.060 U	-	-	-	-	-	-	-	-
S-4	05/04/2006	8	2.0 U	0.020 U	0.020 U	0.020 U	0.060 U	-	-	-	-	-	-	-	-
S-5	05/04/2006	8	2.0 U	0.020 U	0.020 U	0.020 U	0.060 U	-	-	-	-	-	-	-	-
S-6	05/04/2006	8	2.0 U	0.020 U	0.020 U	0.020 U	0.060 U	-	-	-	-	-	-	-	-
S-7	05/04/2006	8	2.0 U	0.020 U	0.020 U	0.020 U	0.060 U	-	-	-	-	-	-	-	-
S-8	05/04/2006	8	2.0 U	0.020 U	0.020 U	0.020 U	0.060 U	-	-	-	-	-	-	-	-
S-9	05/04/2006	8	2.0 U	0.020 U	0.020 U	0.020 U	0.060 U	-	-	-	-	-	-	-	-
S-10	05/04/2006	4	310	0 23	0.85	2.0	16	-	-	-	-	-	-	-	-
B1-5	11/12/2007	5	1,400	4.8	92	55	580	0.050 U	0.050 U	0.050 U	13	-	210	84	8.0
B1-8	11/12/2007	8	11	0.030 U	0.050 U	0.050 U	0.21	0.050 U	0.050 U	0.050 U	0.050 U	-	0.13	0.077	2.4
B1-23	11/12/2007	23	50	0.29	6.2	3.8	60	0.050 U	0.050 U	0.050 U	3.2	-	32	13	-
B2-9	11/12/2007	9	2.0 U	0.030 U	0.050 U	0.050 U	0.15 U	0.050 U	0.050 U	0.050 U	0.050 U	-	0.050 U	0.050 U	2.5
B3-8	11/12/2007	8	390	0.86	28	21	136	0.050 U	0.050 U	0.050 U	5.0 U	-	57	16	4.1
B4-5	11/12/2007	5	2.0	0.030 U	0.065	0.059	0.30	0.050 U	0.050 U	0.050 U	0.057	-	0.23	0.059	2.6
B4-8	11/12/2007	8	2.0 U	0.030 U	0.050 U	0.050 U	0.15 U	0.050 U	0.050 U	0.050 U	0.050 U	-	0.050 U	0.050 U	-
B-5@4	07/16/2008	4	1,300	0.80 U	4.2	12	120	-	-	-	-	-	-	-	-
B-5@7	07/16/2008	7	2.0 U	0.020 U	0.020 U	0.020 U	0.060 U	-	-	-	-	-	-	-	-
B-5@12	07/16/2008	12	2.0 U	0.020 U	0.020 U	0.020 U	0.060 U	-	-	-	-	-	-	-	-
B-5@17	07/16/2008	17	2.0 U	-	-	-	-	-	-	-	-	-	-	-	-
B-5@22	07/16/2008	22	2.0 U	0.020 U	0.020 U	0.020 U	0.060 U	-	-	-	-	-	-	-	-
B-5@28	07/16/2008	28	2.0 U	-	-	-	-	-	-	-	-	-	-	-	-
B-5@34	07/16/2008	34	2.0 U	0.020 U	0.020 U	0.020 U	0.060 U	-	-	-	-	-	-	-	-
B-5@39	07/16/2008	39	2.0 U	-	-	-	-	-	-	-	-	-	-	-	-
B-6@4	07/17/2008	4	1,500	1.5	65	12	250	-	-	-	-	-	-	-	-
B-6@9	07/17/2008	4	2.0 U	0.020 U	0.020 U	0.020 U	0.060 U	-	-	-	-	-	-	-	-
B-7@4	07/16/2008	4	2.0 U	0.020 U	0.020 U	0.020 U	0.060 U	-	-	-	-	-	-	-	-
B-7@8	07/16/2008	8	580 U	0.50	6.1	9.2	38	-	-	-	-	-	-	-	-
B-7@11	07/16/2008	11	2.0 U	0.020 U	0.020 U	0.020 U	0.060 U	-	-	-	-	-	-	-	-
B-7@19	07/16/2008	19	2.0 U	-	-	-	-	-	-	-	-	-	-	-	-
B-7@21	07/16/2008	21	2.0 U	0.020 U	0.020 U	0.020 U	0.060 U	-	-	-	-	-	-	-	-
B-7@26	07/16/2008	26	2.0 U	0.020 U	0.020 U	0.020 U	0.060 U	-	-	-	-	-	-	-	-
B-7@34	07/16/2008	34	2.0 U	0.020 U	0.020 U	0.020 U	0.060 U	-	-	-	-	-	-	-	-
B-7@39	07/16/2008	39	2.0 U	-	-	-	-	-	-	-	-	-	-	-	-
B-8@6	07/17/2008	6	1,200	0.73	16	17	150	-	-	-	-	-	-	-	-
B-8@9	07/17/2008	9	18	0.03	1.0	0.50	0.78	-	-	-	-	-	-	-	-
B-9@5	07/17/2008	5	950	1.5	42	14	120	-	-	-	-	-	-	-	-
B-9@10	07/17/2008	10	2,100	9.9	99	31	200	-	-	-	-	-	-	-	-
B-9@12	07/17/2008	12	2.0 U	0.020 U	0.030	0.020 U	0.060 U	-	-	-	-	-	-	-	-
B-10@4	07/15/2008	4	8	0.060	0.22	0.17	0.92	-	-	-	-	-	-	-	-
B-10@6	07/15/2008	6	6	0.070	0.40	0.24	0.74	-	-	-	-	-	-	-	-
B-10@10	07/15/2008	10	76	0.020 U	0.45	0.57	3.9	-	-	-	-	-	-	-	-
B-10@14.5	07/15/2008	14.5	19	0.020 U	0.17	0.15	0.97	-	-	-	-	-	-	-	-
B-10@19	07/15/2008	19	2.0 U	0.020 U	0.020 U	0.020 U	0.060 U	-	-	-	-	-	-	-	-
B-10@20-30	07/15/2008	20-30	2.0 U	0.020 U	0.020 U	0.020 U	0.060 U	-	-	-	-	-	-	-	-
B-10@31	07/16/2008	31	2.0 U	0.020 U	0.020 U	0.020 U	0.060 U	-	-	-	-	-	-	-	-
B-10@39.5	07/16/2008	39.5	2.0 U	-	-	-	-	-	-	-	-	-	-	-	-
B-12@4	07/17/2008	4	150	0.020 U	0.27	0.020 U	3.6	-	-	-	-	-	-	-	-
B-12@8	07/17/2008	8	2.0 U	0.020 U	0.020 U	0.020 U	0.060 U	-	-	-	-	-	-	-	-
B-13@5	07/17/2008	5	140	0.020 U	1.8	1.6	11	-	-	-	-	-	-	-	-
B-13@12	07/17/2008	12	3.0	0.12	0.26	0.060	0.3	-	-	-	-	-	-	-	-
B-15/4	04/22/2009	4	2.0 U	0.030 U	0.050 U	0.050 U	0.15 U	0.050 U	0.050 U	0.050 U	0.050 U	0.25 U	-	-	-
B-15/8	04/22/2009	8	2.0 U	0.030 U	0.050 U	0.050 U	0.15 U	0.050 U	0.050 U	0.050 U	0.050 U	0.25 U	-	-	-
B-15/12	04/22/2009	12	2.0 U	0.030 U	0.050 U	0.050 U	0.15 U	0.050 U	0.050 U	0.050 U	0.050 U	0.25 U	-	-	-
B-16/4	04/22/2009	4	2.0 U	0.030 U	0.050 U	0.050 U	0.15 U	-	-	-	0.050 U	0.25 U	-	-	-
B-16/8	04/22/2009	8	120	0.030 U	0.050 U	0.33	0.98	-	-	-	1.0	0.25 U	-	-	-

TABLE 1
Soil Analytical Results - Gasoline and Related Constituents (mg/Kg)
Plaid Pantry #324
White Center/King County, Washington

Sample ID	Date	Sample Depth (feet bgs)	Gasoline	Benzene	Toluene	Ethylbenzene	Total Xylenes	Methyl t-butyl ether	1,2-Dibromoethane	1,2-Dichloroethane	Naphthalene	Hexane	1,2,4-TMB	1,3,5-TMB	Total Lead
MTCA Method B Soil Cleanup Levels[a]			2,919[b]	18	6,400	8,000	16,000	556	0.5	11	1,600	4,800	NA	800	N/A
B-16/11	04/22/2009	11	2.0 U	0.030 U	0.050 U	0.050 U	0.15 U	-	-	-	0.050 U	0.25 U	-	-	-
B-17/4	04/22/2009	4	2.0 U	0.030 U	0.050 U	0.050 U	0.15 U	-	-	-	0.050 U	0.25 U	-	-	-
B-17/7	04/22/2009	7	46	0.030 U	0.050 U	0.060	0.15 U	-	-	-	0.32	0.25 U	-	-	-
B-17/10	04/22/2009	10	90	0.030 U	0.050 U	0.050 U	0.15 U	-	-	-	0.050 U	0.25 U	-	-	-
B-17/13	04/22/2009	13	2.0 U	0.030 U	0.050 U	0.050 U	0.15 U	-	-	-	0.050 U	0.25 U	-	-	-
B-18/4	04/22/2009	4	54	0.030 U	0.050 U	0.050 U	0.15 U	0.050 U	0.005 U	0.050 U	0.092	0.25 U	-	-	-
B-18/8	04/22/2009	8	2.0 U	0.030 U	0.050 U	0.050 U	0.15 U	0.050 U	0.050 U	0.050 U	0.050 U	0.25 U	-	-	-
B-18/12	04/22/2009	12	2.0 U	0.030 U	0.050 U	0.050 U	0.15 U	0.050 U	0.050 U	0.050 U	0.050 U	0.25 U	-	-	-
B-19/4	04/22/2009	4	2.0 U	0.030 U	0.050 U	0.050 U	0.15 U	0.050 U	0.050 U	0.050 U	0.050 U	0.25 U	-	-	-
B-19/8	04/22/2009	8	2.0 U	0.030 U	0.050 U	0.050 U	0.15 U	0.050 U	0.050 U	0.050 U	0.050 U	0.25 U	-	-	-
B-19/12	04/22/2009	12	2.0 U	0.030 U	0.050 U	0.050 U	0.15 U	0.050 U	0.050 U	0.050 U	0.050 U	0.25 U	-	-	-
B-20/4	04/22/2009	4	2.0 U	0.030 U	0.050 U	0.050 U	0.15 U	0.050 U	0.050 U	0.050 U	0.050 U	0.25 U	-	-	-
B-20/6	04/22/2009	6	93	0.030 U	0.050 U	0.050 U	0.15 U	0.050 U	0.005 U	0.050 U	0.050 U	0.25 U	-	-	-
B-20/10	04/22/2009	10	2.0 U	0.030 U	0.050 U	0.050 U	0.15 U	0.050 U	0.050 U	0.050 U	0.050 U	0.25 U	-	-	-
B-21/4	04/22/2009	4	2.0 U	0.030 U	0.050 U	0.050 U	0.15 U	0.050 U	0.050 U	0.050 U	0.050 U	0.25 U	-	-	-
B-21/9	04/22/2009	9	2.0 U	0.030 U	0.050 U	0.050 U	0.15 U	0.050 U	0.050 U	0.050 U	0.050 U	0.25 U	-	-	-
B-22/4	04/22/2009	4	2.0 U	0.030 U	0.050 U	0.050 U	0.15 U	-	-	-	0.050 U	0.25 U	-	-	-
B-22/7	04/22/2009	7	93	0.030 U	0.050 U	0.12	0.10	-	-	-	0.32	0.25 U	-	-	-
B-23/5	04/22/2009	5	2.0 U	0.030 U	0.050 U	0.050 U	0.15 U	0.050 U	0.050 U	0.050 U	0.050 U	0.25 U	-	-	-
B-23/10	04/22/2009	10	2.0 U	0.030 U	0.050 U	0.050 U	0.15 U	0.050 U	0.050 U	0.050 U	0.050 U	0.25 U	-	-	-
B-24/4	11/10/2009	4	2.0	0.020 U	0.020	0.020 U	0.060 U	-	-	-	-	-	-	-	-
B-24/8	11/10/2009	8	990	0.50	15	17	96	-	-	-	-	-	-	-	-
B-25/4	11/10/2009	4	2.0	0.020 U	0.020	0.020 U	0.060 U	-	-	-	-	-	-	-	-
B-25/8	11/10/2009	8	2.0 U	0.020 U	0.020 U	0.020 U	0.060 U	-	-	-	-	-	-	-	-
B-26/4	11/10/2009	4	27	0.23	0.15	0.76	3 8	-	-	-	-	-	-	-	-
B-26/8	11/10/2009	8	130	0.25	4.4	2.0	13	-	-	-	-	-	-	-	-
B-26/12	11/10/2009	12	17	0.60	0 99	0.37	2.0	-	-	-	-	-	-	-	-
B-27/4	11/11/2009	4	1,000	0.90	24	20	100	-	-	-	-	-	-	-	-
B-27/8	11/11/2009	8	12	0.020 U	0 21	0.17	1.1	-	-	-	-	-	-	-	-
B-27/12	11/11/2009	12	5.0	0.020 U	0 26	0.080	0.45	-	-	-	-	-	-	-	-
B-28/8	05/18/2011	8	1,420	3.38 J	51	21	126	-	-	-	-	-	-	-	-
B-28/13	05/18/2011	13	14	0.88 J	1.3	0.23	1.4	-	-	-	-	-	-	-	-
B-29/8	05/18/2011	8	1,420	0.57	32	27	147	-	-	-	-	-	-	-	-
B-29/16	05/18/2011	16	3.5 U	0.0088 UJ	0.076	0.033	0.20	-	-	-	-	-	-	-	-
ROW-1/3	08/22/2012	3	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-1/9	08/22/2012	9	67	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-1/10	08/22/2012	10	780	0.020 U	0.050 U	1.6	3.9	-	-	-	-	-	-	-	-
ROW-1/15	08/22/2012	15	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-2/3	08/22/2012	3	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-2/3 (duplicate)	08/22/2012	3	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-2/10	08/22/2012	10	200	0.020 U	0.050 U	0.24	0.28	-	-	-	-	-	-	-	-
ROW-2/16	08/22/2012	16	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-2/18	08/22/2012	18	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-3/3	08/22/2012	3	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-3/9	08/22/2012	9	35	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-3/12	08/22/2012	12	300	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-3/18	08/22/2012	18	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-4/3	08/23/2012	3	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-4/10	08/23/2012	10	260	0.020 U	0.050 U	0.070	0.15 U	-	-	-	-	-	-	-	-
ROW-4/11	08/23/2012	11	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-4/15	08/23/2012	15	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-5/3	08/23/2012	3	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-5/10	08/23/2012	10	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-5/15	08/23/2012	15	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-5/15 (duplicate)	08/23/2012	15	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-6/3	08/23/2012	3	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-6/8.5	08/23/2012	8.5	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-6/10	08/23/2012	10	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-6/16	08/23/2012	16	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-

TABLE 1
Soil Analytical Results - Gasoline and Related Constituents (mg/Kg)
Plaid Pantry #324
White Center/King County, Washington

Sample ID	Date	Sample Depth (feet bgs)	Gasoline	Benzene	Toluene	Ethylbenzene	Total Xylenes	Methyl t-butyl ether	1,2-Dibromoethane	1,2-Dichloroethane	Naphthalene	Hexane	1,2,4-TMB	1,3,5-TMB	Total Lead
MTCA Method B Soil Cleanup Levels[a]			2,919[b]	18	6,400	8,000	16,000	556	0.5	11	1,600	4,800	NA	800	N/A
ROW-7/3	08/24/2012	3	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-7/8	08/24/2012	8	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-7/10	08/24/2012	10	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-7/14	08/24/2012	14	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-8/3	08/24/2012	3	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-8/7	08/24/2012	7	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-8/10	08/24/2012	10	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-8/14	08/24/2012	14	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-8/14 (duplicate)	08/24/2012	14	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-8/16	08/24/2012	16	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-9/3	08/24/2012	3	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-9/7	08/24/2012	7	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-9/10	08/24/2012	10	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-9/15	08/24/2012	15	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-10/3	08/24/2012	3	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-10/8	08/25/2012	8	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-10/10	08/25/2012	10	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-10/15	08/25/2012	15	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
ROW-10/15 (duplicate)	08/25/2012	15	10 U	0.020 U	0.050 U	0.050 U	0.15 U	-	-	-	-	-	-	-	-
B-32/CS-1 (5-5.5)	07/11/2013	5-5.5	5.9 U	0.015 U	0.059 U	0.029 U	0.088 U	-	-	-	-	-	-	-	-
B-32/CS-1 (7-7.5)	07/11/2013	7-7.5	**4,210**	0.29 U	20	62	318	-	-	-	-	-	-	-	-
B-32/CS-1 (9-9.5)	07/11/2013	9-9.5	11	0.014	1.0	0.28	1.3	-	-	-	-	-	-	-	-
B-32/CS-1 (11-11.5)	07/11/2013	11-11.5	10	0.020	1.3	0.43	0.61	-	-	-	-	-	-	-	-
B-33/CS-2 (5-5.5)	07/11/2013	5-5.5	5.0 U	0.013 U	0.050 U	0.025 U	0.075 U	-	-	-	-	-	-	-	-
B-33/CS-2 (7-7.5)	07/11/2013	7-7.5	1,700	1.0	21	26	117	-	-	-	-	-	-	-	-
B-33/CS-2 (9-9.5)	07/11/2013	9-9.5	42	0.48	4.0	0.67	4.0	-	-	-	-	-	-	-	-
B-33/CS-2 (11-11.5)	07/11/2013	11-11.5	23	0.61	3.7	0.33	2.0	-	-	-	-	-	-	-	-
B-34/CS-3 (5-5.5)	07/11/2013	5-5.5	2,660	1.1	51	45	282	-	-	-	-	-	-	-	-
B-34/CS-3 (7-7.5)	07/11/2013	7-7.5	2,900	6.5	146	49	295	-	-	-	-	-	-	-	-
B-34/CS-3 (9-9.5)	07/11/2013	9-9.5	13	0.80	1.4	0.21	1.3	-	-	-	-	-	-	-	-
B-34/CS-3 (11-11.5)	07/11/2013	11-11.5	36	2.6	4.2	0.70	3.4	-	-	-	-	-	-	-	-
B-35/CS-4 (5-5.5)	07/11/2013	5-5.5	**5,960**	6.3	170	108	623	-	-	-	-	-	-	-	-
B-35/CS-4 (7-7.5)	07/11/2013	7-7.5	**3,700**	8.3	159	57	332	-	-	-	-	-	-	-	-
B-35/CS-4 (9-9.5)	07/11/2013	9-9.5	29	1.7	3.6	0.53	3.1	-	-	-	-	-	-	-	-
B-35/CS-4 (11-11.5)	07/11/2013	11-11.5	327	2.2	0.70	4.4	2.0	-	-	-	-	-	-	-	-
B-37 (4.5-5)	03/05/2014	4-4.5	2,120 J	1.6 J	14 J	18 J	160 J	0.40 U	0.40 U	0.20 U	6.2 J	-	-	-	-
B-37A (23-23.5)	03/05/2014	23-23.5	4.6 UJ	0.012 U	0.046 U	0.023 U	0.069 U	0.046 U	0.046 U	0.023 U	0.092 U	-	-	-	-
B-38 (4.5-5)	03/05/2014	4.5-5	22 J	0.34 J	0.73 J	0.32 J	1.9 J	0.040 U	0.040 U	0.020 U	0.095 J	-	-	-	-
B-39 (7-7.5)	03/05/2014	7-7.5	**5,970** J	11 J	96	122 J	234	0.71 U	0.71 U	0.36 U	22 J	-	-	-	-
B-40 (8-8.5)	03/05/2014	8-8.5	2,520 J	6.6 J	115	37 J	232 J	0.49 U	0.49 U	0.25 U	9.0 J	-	-	-	-
B-41 (8-8.5)	03/05/2014	8-8.5	2,910 J	0.45 J	51 J	49 J	286 J	0.59 U	0.59 U	0.30 U	9.6 J	-	-	-	-

Notes:

[a] Washington Department of Ecology (WDOE), Standard Method B Direct Contact Soil Cleanup Levels based on CLARC database values (August 2015).

[b] Site -Specific MTCA Method B Soil Cleanup Level calculated using MTCA TPH Calculator (Version 11.1 [2007]).

Volatile organic compounds (VOCs) analyzed by EPA Method 8260B

Gasoline analyzed by Method NWTPH-Gx

Total lead analyzed by EPA Method 6010

mg/Kg = Milligrams per kilogram (parts per million)

bgs = Below ground surface

TMB - Trimethylbenzene

U = Not detected at method reporting limit shown

UJ = Data Validation Qualifier. The analyte was analyzed for, but not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise. See corresponding data validation report for further explanation.

J = Data Validation Qualifier. The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample. See corresponding data validation report for further explanation.

- = Not measured

NA = Not Applicable/Not Available

Values in **bold** indicate the concentration exceeds applicable cleanup criteria.

TABLE 2

Soil Gas Analytical Results - Gasoline and Related Constituents (ug/m^3)

Plaid Pantry #324

White Center/King County, Washington

Sample ID	Date	Sample Depth (feet bgs)	Gasoline	Benzene	Toluene	Ethylbenzene	Total Xylenes	Methyl t-butyl ether	1,2-Dibromoethane	1,2-Dichloroethane	Hexane	1,3,5-Trimethylbenzene	1,2,4-Trimethylbenzene
MTCA Method B Soil Gas Screening Levels[a]			NA	10.7	76,200	15,200	1,520[b]	321	0.14	3.2	NA	NA	107
B-9	07/30/2008	7-12	10,000,000	**58,000**	**200,000**	**44,000**	**219,000**	*2,700 U*	*5,800 U*	*3,100 U*	320,000	13,000	**34,000**
B-11	07/30/2008	7.5-11	6,000	*24 U*	200	140	870	27 U	*58 U*	*31 U*	67	93	**280**
B-13	07/31/2008	8-12	4,800,000	**28,000**	**120,000**	**36,000**	**156,000**	*2,800 U*	*6,000 U*	*3,100 U*	130,000	8,700	**20,000**
B-14	07/30/2008	4-8	9,700,000	**23,000**	73,000	**36,000**	**168,000**	*2,700 U*	*5,700 U*	*3,000 U*	320,000	7,100	**13,000**
SG-1	03/04/2014	5	1,000	4.8	5.3	5.2 U	10 U	4.4 U	*9.3 U*	*4.9 U*	22	5.9 U	5.9 U
SG-2	03/04/2014	5	940	6.6	9.1	5.1 U	10 U	4.2 U	*9.0 U*	*4.8 U*	15	5.8 U	5.8 U
SG-3	03/04/2014	5	82,000	**260**	5,000	1,900	**13,000**	29 U	*61 U*	*32 U*	1,800	1,200	**3,000**
SG-4	03/04/2014	5	700,000	**2,400**	18,000	9,300	**41,000**	150 U	*320 U*	*170 U*	18,000	18,000	**34,000**
SG-5	03/04/2014	5	8,600,000	**100,000**	**480,000**	**97,000**	**560,000**	*750 U*	*1,600 U*	*840 U*	250,000	29,000	**86,000**
SG-6	03/04/2014	5	2,000	**12**	16	5.5	29	4.2 U	*9.0 U*	*4.7 U*	47	5.7 U	5.7 U
SG-7	03/04/2014	5	1,500	8.9	9.4	5.2 U	10 U	4.3 U	*9.2 U*	*4.8 U*	37	5.9 U	5.9 U

Notes:

2008 volatiles analyses performed by EPA Method TO-14A (modified).

2008 gasoline analyses performed by EPA Method TO-3 (modified). Results were reported in ug/L (micrograms per liter) and converted to ug/m3.

2014 volatiles analyzed by EPA Method TO-15.

[a] Washington Department of Ecology (WDOE) Soil Vapor Intrusion DRAFT Guidance, Method B Shallow Soil Gas Screening Levels (WDOE, October 2009, revised February 2016). Updated based on CLARC database values (August 2015).

[b] Screening level shown is for o-Xylene

bgs = below ground surface

ug/m^3 = Micrograms per cubic meter of air

NA = not available

Bold values indicate concentrations exceed the Method B Soil Gas Screening Levels.

Italics indicate analytical reporting limits exceed Method B Soil Gas Screening Levels.

Appendix A

Appendix A: 1985 Building Plan
Former Plaid Pantry #324
White Center/King County, WA

L86-0736

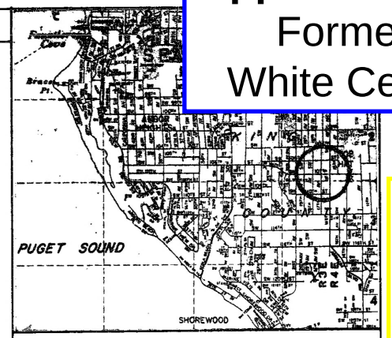
PRE-1986 Buildings/ Infrastructure

Planned (1986) Buildings/ Infrastructure

PROJECT DATA

PROJECT NAME - WHITE CENTER STORE # 325
OWNER - PLAID PANTRY FOOD STORES
AGENTS - MONTE STRUCK (CONST. DIR.) OR JOHN GREINER (ARCHITECT)
2540 N.E. RIVERSIDE WAY — PO BOX 1927
PORTLAND, ORE. 97211 — BELLEVUE, WA. 98009
(503) 288-9216 — (206) 455-5236
SITE AREA - 15,850 SF OR .363 ACRES
EXISTING ZONING - CG (GENERAL COMMERCIAL)
SEISMIC ZONE - 3
FIRE ZONE - 3
DESIGN LOADS - FLOOR - SLAB on GRADE / ROOF - 40 PSF / WIND - 80 MPH, EXP. C
PROPOSED USAGE - COMMERCIAL
OCCUPANCY GROUP - B
" LOAD - 30 SF PER PERSON w/ MAX. CAPACITY - SOUTH PORTION 80
- NORTH PORTION 40
TYPE OF CONSTRUCTION - V N
FLOOR/BUILDING AREA - 3600 SF (ONE LEVEL ONLY)
VALUATION - $120,000
PARKING - REQUIRED 18 - SHOWN 18 (10 STANDARD - 8 COMPACT)

LEGAL DESCRIPTION - LOTS 8 & 9, BLOCK 8, OAK PARK, VOL. 22 PAGE 72 RECORDS OF KING COUNTY, WA.
STRUCTURES TO BE DEMOLISHED ARE TO COMPLY w/ KING CO. INFO. BULLETIN #3

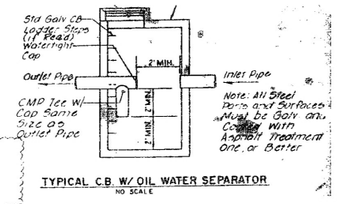


VICINITY MAP NO SCALE

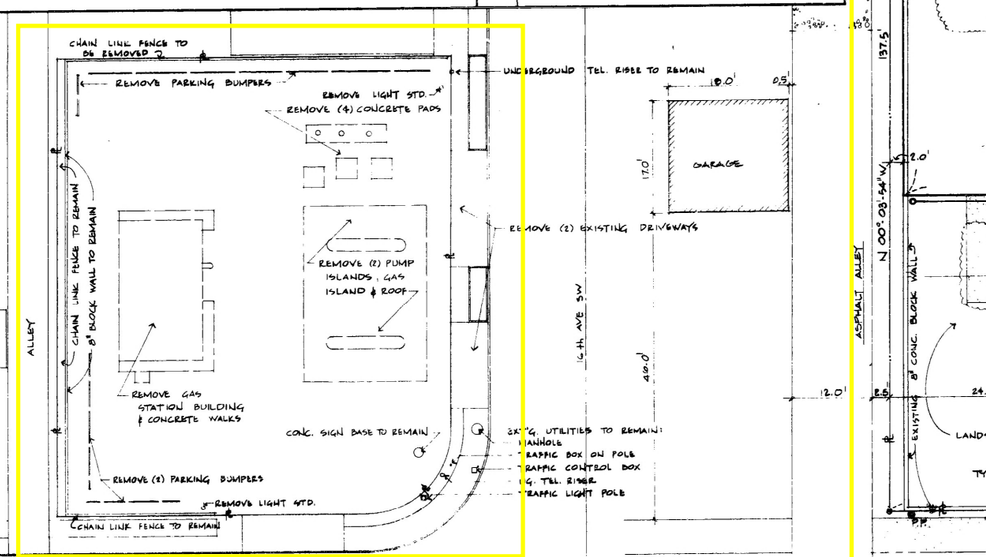
DRAWING INDEX

1	DEMOLITION PLAN · SITE PLAN · PROJECT DATA · VICINITY MAP · DRAWING INDEX
2	FLOOR PLAN · BUILDING SECTION · DOOR SCHEDULE IN; BRICK FINISH SCHEDULE · ROOF FRAMING PLAN
2A	FLOOR PLAN · ROOF PLAN · DETAILS
3	FOUNDATION PLAN · DETAILS
4	EXTERIOR ELEVATIONS · DETAILS
4A	EXTERIOR ELEVATIONS
5	POWER AND LIGHTING LAYOUT
6	PLUMBING LAYOUT
⚠	HVAC LAYOUT
L1	LANDSCAPE DESIGN

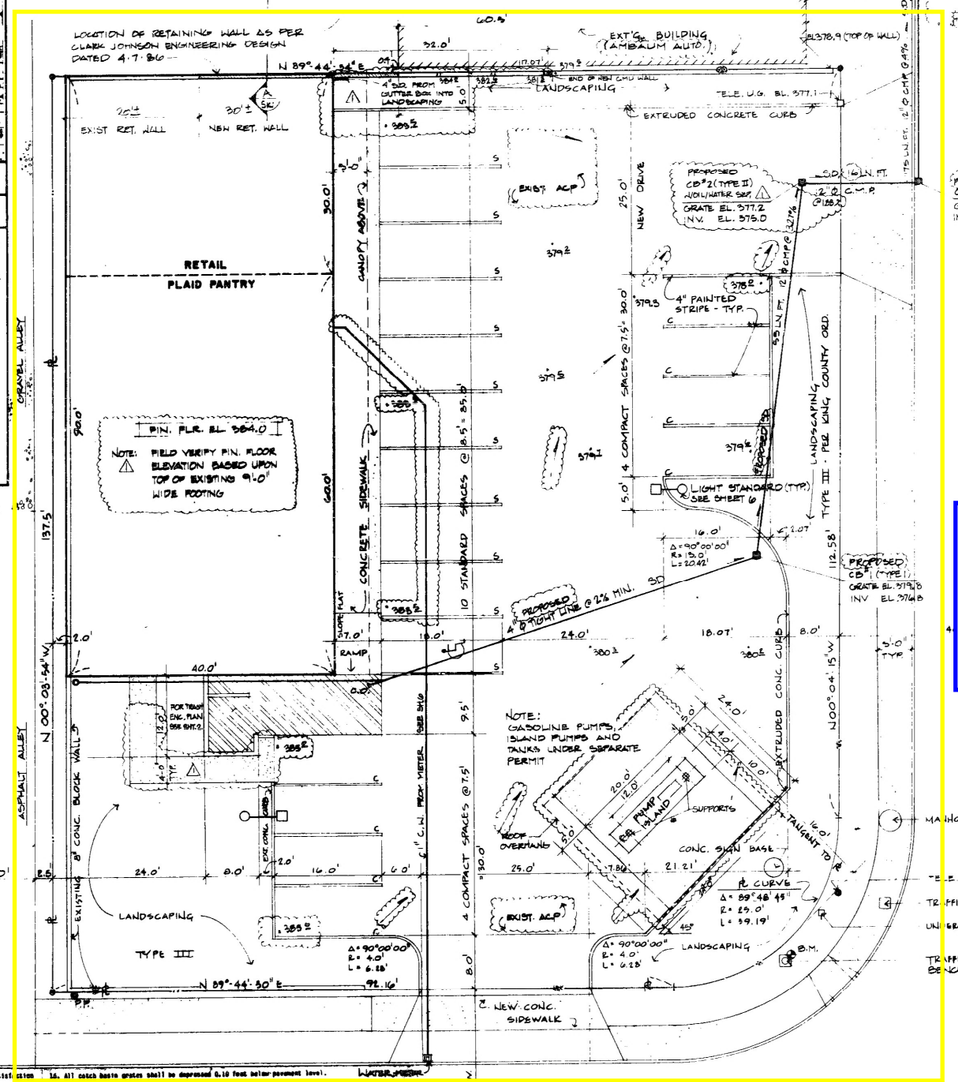
⚠ NEW WALL ELEVATION 1"=10'-0"



TYPICAL C.B. W/ OIL WATER SEPARATOR
NO SCALE



SITE PLAN (N)
DEMOLITION PLAN
1" = 20.0'
— DASHED LINES INDICATE OBJECTS TO BE REMOVED



SITE PLAN (N)
PROPOSED PLAN
SCALE 1" = 10.0'

EROSION/SEDIMENTATION CONTROL NOTES

Department: King County Department of Public Works, Surface Water Management Division

1. All limits of clearing and areas of vegetation preservation as prescribed on the plan shall be clearly flagged in the field and observed during construction.
2. All required sedimentation/erosion control facilities must be constructed and in operation prior to land clearing and/or other construction to insure that sediment laden water does not enter the natural drainage system. All erosion and sediment facilities shall be maintained in a satisfactory condition until such time that clearing and/or construction is completed and potential for onsite erosion has passed. The implementation, maintenance, replacement and additions to any sedimentation control systems shall be the responsibility of the permittee.
3. The erosion and sedimentation control systems depicted on this drawing are intended to be minimum requirements to meet anticipated site conditions. As construction progresses and unexpected or seasonal conditions dictate, the permittee should anticipate that more erosion and sedimentation control facilities will be necessary to insure complete siltation control on the proposed site. During the course of construction, it shall be the responsibility and responsibility of the permittee to address any new conditions that may be created by his activities and to provide additional facilities, over and above minimum requirements, as may be needed to protect adjacent properties and water quality of the receiving drainage system.
4. Approval of this plan is for erosion/sedimentation control only. It does not constitute an approval of storm drainage design, size or location of pipes, restrictors, channels or reception facilities.
5. Any disturbed area which has been stripped of vegetation and unless no further work is anticipated for a period of 30 days or more must be immediately stabilized with mulching, grass planting or other approved erosion control treatment applicable to the time of year in question. Grass seeding alone will be acceptable only during the months of April thru September inclusive. Seeding may proceed outside the specified time period whenever it is a subcontractor of the permittee, but must be augmented with mulching, matting, or other treatment approved by the Department.
6. All erosion/sedimentation control ponds with a dead storage depth exceeding 6 inches must have a fence with a minimum height of 3 feet.

STORMWATER DRAINAGE PLAN NOTES

Department: King County Department of Public Works Surface Water Management Division

1. All construction shall be in accordance with King County Specifications.
2. The storm drainage system shall be constructed according to the approved plans which are on file in the Department's Central Records. Any deviation from the approved plans will require written approval from the proper agency, currently the Department.
3. A copy of these approved plans must be on the job site whenever construction is in progress.
4. Datum shall be N.G.V.D. unless otherwise approved by the Department.
5. Before any construction/development activity occurs, a pre-construction meeting must be held with the Department's Development Inspection Section.
6. A requirement which must be met before this pre-construction meeting is to provide the original or a certified copy of the liability policy required by King County Code 20.10.190(B) to the Department's Development Inspection Section.
7. All sediment/erosion facilities must be in operation prior to clearing and building construction, and they must be satisfactorily maintained until construction is completed and the potential for on-site erosion has passed.
8. All DETENTION/RETENTION FACILITIES MUST BE INSTALLED AND IN OPERATION PRIOR TO ANY ON-SITE GRADING. This with all CONSTRUCTION ACTIVITY UNLESS THE CAPACITY AND INTENT OF THE EROSION/SEDIMENTATION CONTROL FACILITIES IS UNLESS OTHERWISE APPROVED BY THE DEPARTMENT.
9. All disturbed areas shall be seeded and mulched or otherwise stabilized to the satisfaction of the Department for the prevention of dust or erosion after the completion of construction.
10. Grass shall be established by hydroseeding or as otherwise approved by the Department. Hydroseeding shall be used with mulch and reinforced with jute mesh. Additional values otherwise approved by the Department.
11. All pipe and appurtenances shall be laid on a properly prepared foundation in accordance with Section 7-02.3(1) of the current State of Washington Standard Specifications for Road and Bridge Construction. This shall include necessary leveling of the trench bottom or the top of the foundation material as well as placement and compaction of required bedding material to uniform grade so that the entire length of the pipe will be supported on a uniformly dense foundation. If in native material is over bedding unless such meets the requirements for "Gravel Backfill for Pipe Zone Bedding" the first lift of backfilling may be omitted provided the material in the bottom of the trench is loosened, regraded and compacted to form a dense supporting base.
12. Construction of dewatering (groundwater) system shall be in accordance with the above Standard Specifications, Section 02-3.3(6).
13. Subsurface input plan utilizing an approved infiltration shall have minimum groundwater 30 or other methods and outlets.
14. Dewatering shall not be permitted within 50' of any flowing river or any other drainage channel, or 25' from the top of any channel bank.
15. All drainage structures on on public rights-of-way shall have grates unless otherwise approved by the Department.
16. All catch basin grates shall be depressed 0.10 feet below pavement level.
17. Catch basin grates installed on County right-of-way shall conform to standard drawings 620 or 640 which includes the stamping "Outfall to Stream, Dump to Pollutants" and "Property of King County."
18. Plans showing all underground utilities must be provided to the Department's Development Inspection Section. Plans for water and sanitary sewers may be provided prior to the pre-construction meeting. Plans for all other utilities must be provided prior to the installation of those utilities. Any work done in King County right-of-way must have the location of the manholes which will be taken to provide soil erosion and sedimentation.
19. Open cut road crossings for utility trenches on existing bituminous roadway shall be backfilled only with pea gravel or 5/8-inch crushed rock and immediately compacted. Soils backfilling shall be used for road base and will not be used for surface course material.
20. Cut and fill slopes shall be no steeper than 2:1 (horizontal:vertical) and shall be stabilized immediately after backfill and compaction.
21. Any existing ditch, pond, or drainage channel affected by the proposed work must be restored to its original condition or better.
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the greiner architects
A PROFESSIONAL CORPORATION
PO BOX 1927 • BELLEVUE, WA 98009 • (206) 455-5236

TCA

issued 10-21-85
revised
⚠ 1-15-86
⚠ 3-24-86 RET. WALL

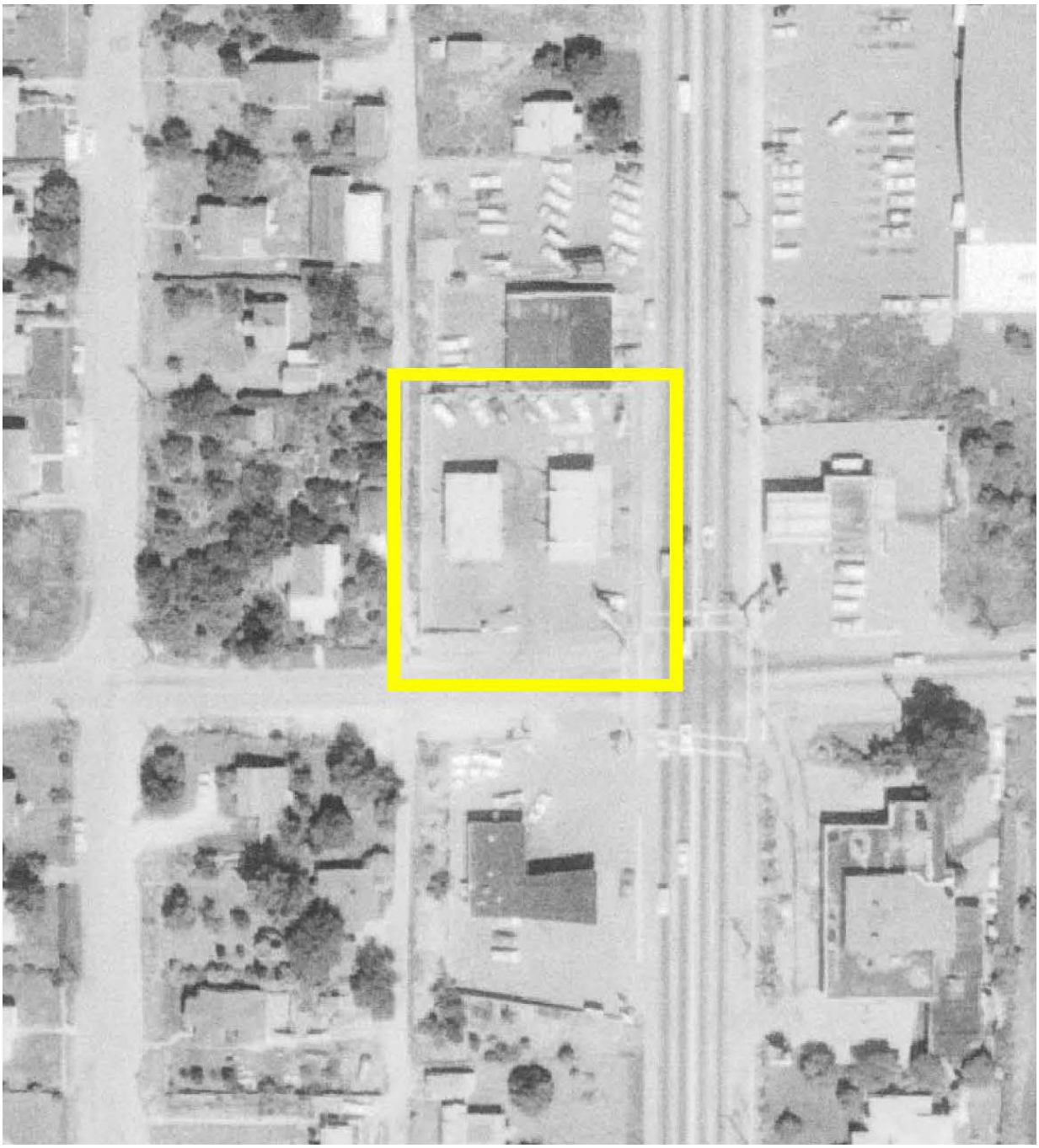
sheet description
SITE PLANS - DEMOLITION AND PROPOSED
PROJECT DATA
VICINITY MAP
DRAWING INDEX

1

85-14

REGISTERED PROFESSIONAL ENGINEER
1/17/86

1969 Aerial Photograph

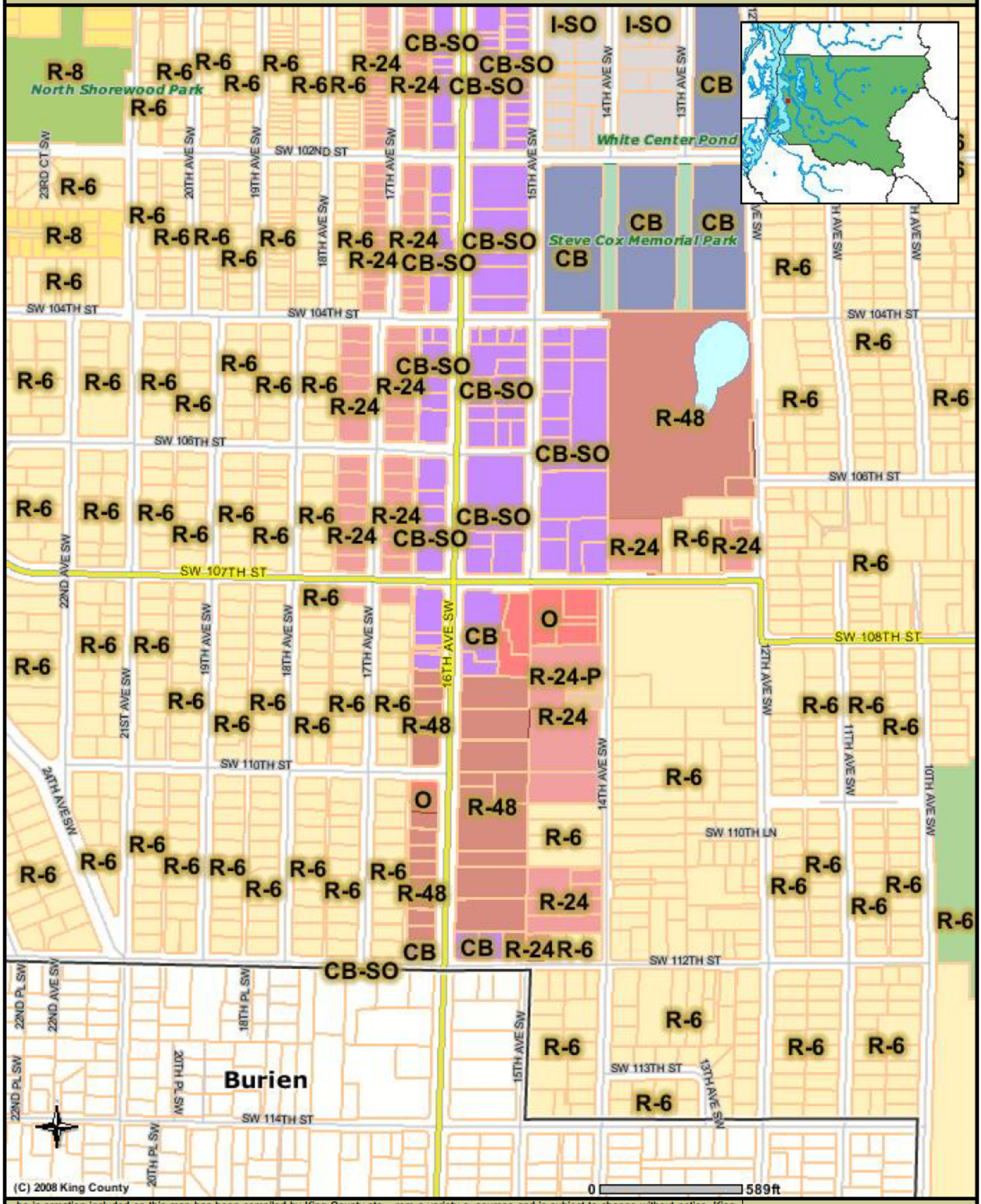


1985 Aerial Photograph

1990 Aerial Photograph

Appendix B

iMAP



Date 4/2/2014 Source King County iMAP - Property n ormation (http //www metrokc gov/G S/iMAP)

King County

iMAP

Legend

- County Boundary
- Mountain Peaks
- Highways
- Forest Production District Boundary
- Agricultural Production District Boundary
- Urban Growth Area Line
- Incorporated Area
- Streets
  - Highway
  - Arterials
  - Local
- Lakes and Large Rivers
- Streams
- Tribal Lands
- Parcels
- Parks

Unincorporated KC Zoning

- A-10 - Agricultural, one DU per 10 acres
- A-35 - Agricultural, one DU per 35 acres
- F - Forest
- M - Mineral
- RA-2.5 - Rural Area, one DU per 5 acres
- RA-5 - Rural Area, one DU per 5 acres
- RA-10 - Rural Area, one DU per 10 acres
- UR - Urban Reserve, one DU per 5 acres
- R-1 - Residential, one DU per acre
- R-4 - Residential, 4 DU per acre
- R-6 - Residential, 6 DU per acre
- R-8 - Residential, 8 DU per acre
- R-12 - Residential, 12 DU per acre
- R-18 - Residential, 18 DU per acre
- R-24 - Residential, 24 DU per acre
- R-48 - Residential, 48 DU per acre

(cont)

- NB - Neighborhood Business
- CB - Community Business
- RB - Regional Business
- O - Office
- I - Industrial
- Other

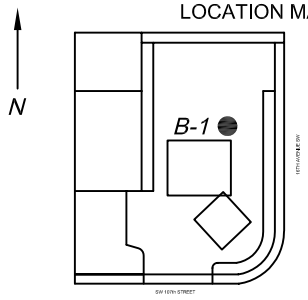
Date 4/2/2014 Source King County iMAP - Property n ormation (http //www metrokc gov/G S/iMAP)

King County

Appendix C

PNG ENVIRONMENTAL, INC.
7130 SW Elmhurst Street
Tigard, Oregon 97223
TEL (503) 620-2387
FAX (503) 620-2977

LOCATION MAP



WELL/BORING NUMBER B-1

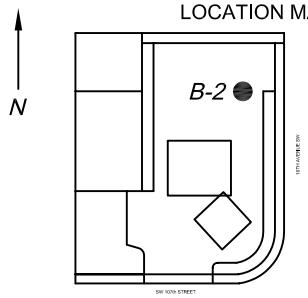
PROJECT NAME: Plaid Pantry #324
PROJECT NUMBER: 1133-01
LOCATION: Seattle, Washington
LOGGED BY: C. Hultgren
REVIEWED BY: C. Hultgren
DATE: 1-11-08

SAMPLE TYPE	BLOW COUNTS	PID (ppm)	SHEEN	First Water	LAB SAMPLE I.D.	DEPTH bgs (ft)	STRATA	SOIL TYPE	DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Composition, Density or Consistency, Moisture, Odor, Geological Interpretation)	WELL DETAIL	WELL CONSTRUCTION DETAIL
		0							(0-0.3) Asphalt.		Backfill borehole with hydrated bentonite and seal the surface with asphalt patch.
		0	NS						(0.3-1) Gravel (FILL), gray, predominantly fine subanguler gravel, some fine to coarse sand, moist, no odor.		
		54									
core		550	HS		B1-5	5		ML	(1-12) Silt (ML), brown, low plastic fines, variable amounts of fine subrounded gravel, trace fine sand, becoming greenish gray in color with gasoline like odor from ~4' bgs, moist but not wet.		
core		15	SS		B1-8				Note: Silt becoming brown from ~9' bgs with decrease in hydrocarbon odor.		
		5	SS			10					
		2									
		0	NS								
		12	NS			15					
		26						GP	(12-27) Sandy Gravel (GP), brown to gray, fine to medium subangular to subround gravel, varying amounts of fine to coarse sand, local faint hydrocarbon odor, moist but not wet.		
		4	NS			20					
core		25	NS		B1-23				Note: Unable to drill deeper than 27' bgs due to the presence of large gravels = refusal.		
		2	NS			25					
									Total Borehole Depth 27'		
						30					

DRILLING CONTRACTOR: Boart Longyear
DRILLING METHOD: Geoprobe
BOREHOLE DIAMETER: 2-Inch
SAMPLING EQUIPMENT: Geoprobe
DATE OF INSTALLATION: 11-12-07

PNG ENVIRONMENTAL, INC.
7130 SW Elmhurst Street
Tigard, Oregon 97223
TEL (503) 620-2387
FAX (503) 620-2977

LOCATION MAP



WELL/BORING NUMBER B-2

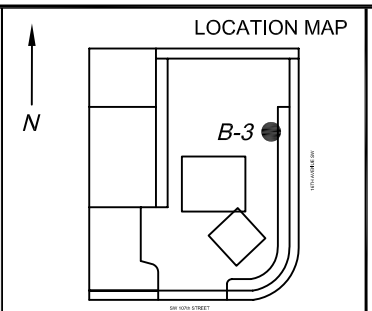
PROJECT NAME: Plaid Pantry #324
PROJECT NUMBER: 1133-01
LOCATION: Seattle, Washington
LOGGED BY: C. Hultgren
REVIEWED BY: C. Hultgren
DATE: 1-11-08

SAMPLE INFORMATION									STRATA	SOIL TYPE	DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Composition, Density or Consistency, Moisture, Odor, Geological Interpretation)	WELL DETAIL	WELL CONSTRUCTION DETAIL
SAMPLE TYPE	BLOW COUNTS	PID (ppm)	SHEEN	First Water	LAB SAMPLE I.D.	DEPTH bgs (ft)	SAMPLE LOCATION	SAMPLE INTERVAL	REC %					
		0									(0-0.3) Asphalt.		Backfill borehole with hydrated bentonite and seal the surface with asphalt patch.
			NS								(0.3-1) Gravel (FILL), gray, predominantly fine subanguler gravel, some fine to coarse sand, moist, no odor.		
		0											
		0	NS			5							
		0											
										ML	(1-14) Silt (ML), brown, low plastic fines, variable amounts of fine subrounded gravels, trace fine sand, becoming greenish gray from 6.5' bgs with faint hydrocarbon odor, moist but not wet.		
core		0	NS		B2-9								
		0				10							
		0											
		0	NS			15				GP	(14-15) Sand (SP), brown, predominantly fine to medium sand, local trace fine gravel, moist, no odor.		
											Total Borehole Depth 15'		
						20							
						25							
						30							

DRILLING CONTRACTOR: Boart Longyear
DRILLING METHOD: Geoprobe
BOREHOLE DIAMETER: 2-Inch
SAMPLING EQUIPMENT: Geoprobe
DATE OF INSTALLATION: 11-12-07

PNG ENVIRONMENTAL, INC.
7130 SW Elmhurst Street
Tigard, Oregon 97223
TEL (503) 620-2387
FAX (503) 620-2977

LOCATION MAP



WELL/BORING NUMBER: B-3

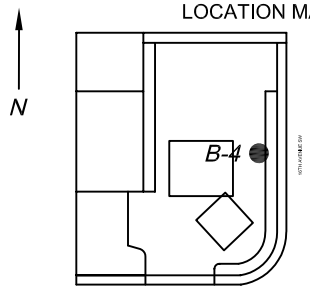
PROJECT NAME: Plaid Pantry #324
PROJECT NUMBER: 1133-01
LOCATION: Seattle, Washington
LOGGED BY: C. Hultgren
REVIEWED BY: C. Hultgren
DATE: 1-11-08

SAMPLE INFORMATION										STRATA	SOIL TYPE	DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Composition, Density or Consistency, Moisture, Odor, Geological Interpretation)	WELL DETAIL	WELL CONSTRUCTION DETAIL
SAMPLE TYPE	BLOW COUNTS	PID (ppm)	SHEEN	First Water	LAB SAMPLE I.D.	DEPTH bgs (ft)	SAMPLE LOCATION	SAMPLE INTERVAL	REC %					
												(0-0.3) Asphalt.		Backfill borehole with hydrated bentonite and seal the surface with asphalt patch.
												(0.3-1) Gravel (FILL), gray, predominantly fine subanguler gravel, some fine to coarse sand, moist, no odor.		
			NS			5					ML	(1-14.5) Silt (ML), brown, low plastic fines, variable amounts of fine subrounded gravels, trace fine sand, becoming greenish gray in color with gasoline like odor from ~5' to 10' bgs, odor decreasing with depth, moist but not wet.		
core			SS		B3-8									
			NS			10								
			NS			15								
			NS			20					GP	(14.5-29) Sandy Gravel (GP), brown to gray, fine to medium subangular to subround gravel, varying amounts of fine to coarse sand, local faint hydrocarbon odor, moist but not wet.		
			NS			25						Note: Unable to drill deeper than 29' bgs due to the presence of large gravels = refusal.		
			NS									Note: PID not operating.		
						30						Total Borehole Depth 29'		

DRILLING CONTRACTOR: Boart Longyear
DRILLING METHOD: Geoprobe
BOREHOLE DIAMETER: 2-Inch
SAMPLING EQUIPMENT: Geoprobe
DATE OF INSTALLATION: 11-12-07

PNG ENVIRONMENTAL, INC.
7130 SW Elmhurst Street
Tigard, Oregon 97223
TEL (503) 620-2387
FAX (503) 620-2977

LOCATION MAP



WELL/BORING NUMBER: B-4

PROJECT NAME: Plaid Pantry #324
PROJECT NUMBER: 1133-01
LOCATION: Seattle, Washington
LOGGED BY: C. Hultgren
REVIEWED BY: C. Hultgren
DATE: 1-11-08

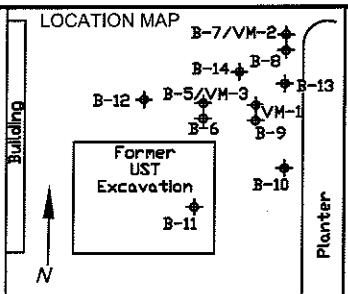
SAMPLE INFORMATION

SAMPLE TYPE	BLOW COUNTS	PID (ppm)	SHEEN	First Water	LAB SAMPLE I.D.	DEPTH bgs (ft)	SAMPLE LOCATION	SAMPLE INTERVAL	REC %	STRATA	SOIL TYPE	DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Composition, Density or Consistency, Moisture, Odor, Geological Interpretation)	WELL DETAIL	WELL CONSTRUCTION DETAIL
			NS									(0-0.3) Asphalt.		Backfill borehole with hydrated bentonite and seal the surface with asphalt patch.
												(0.3-1) Gravel (FILL), gray, predominantly fine subanguler gravel, some fine to coarse sand, moist, no odor.		
core			NS		B4-5	5					ML	(1-10) Silt (ML), brown, low plastic fines, variable amounts of fine subrounded gravels, trace fine sand, becoming greenish gray from 3.5' bgs with possible faint hydrocarbon odor, moist but not wet.		
core			NS		B4-8									
			NS			10						Total Borehole Depth 10'		
						15						Note: PID not operating.		
						20								
						25								
						30								

DRILLING CONTRACTOR: Boart Longyear
DRILLING METHOD: Geoprobe
BOREHOLE DIAMETER: 2-Inch
SAMPLING EQUIPMENT: Geoprobe
DATE OF INSTALLATION: 11-12-07

PNG ENVIRONMENTAL, INC.
6665 SW Hampton, Suite 101
Tigard, Oregon 97223
TEL (503) 620-2387
FAX (503) 620-2977

LOCATION MAP



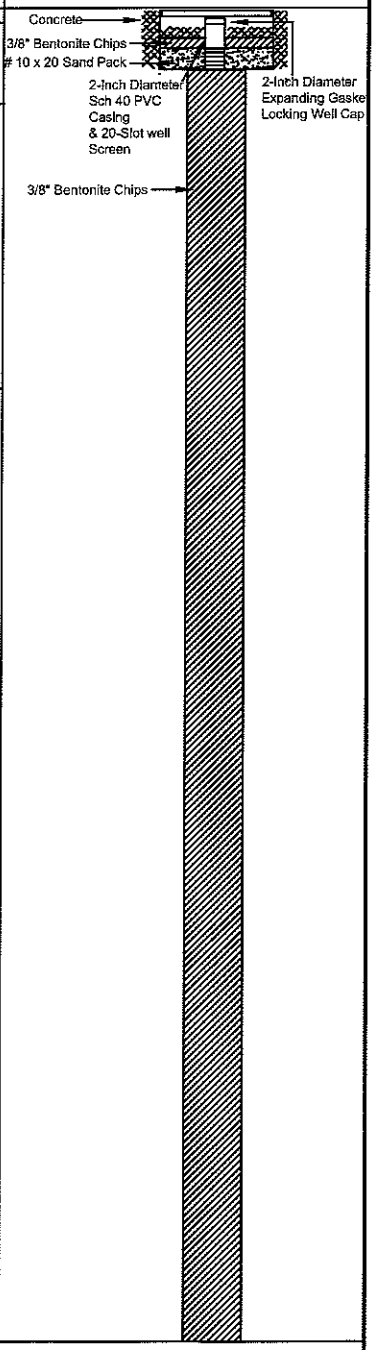
WELL/BORING NUMBER **B-5/VM-3**
Page 1 of 2

PROJECT NAME: Plaid # 324
PROJECT NUMBER: 1133
LOCATION: West Seattle, Washington
LOGGED BY: Dan Becraft
REVIEWED BY: Paul Ecker
DATE: 7/16/08

SAMPLE INFORMATION

SAMPLE TYPE	BLOW COUNTS	PID (ppm)	First Water	LAB SAMPLE I.D.	DEPTH bgs (ft)	STRATA	SOIL TYPE	DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Size, Density or Consistency, Moisture, Odor, Geological Interpretation)
								Asphalt
							GP	SANDY GRAVEL (GP), brown, subrounded to 2-inch diameter, fine and medium grained sand, occasional cobble, some fines, dry.
		452					SM	SILTY SAND (SM), gray, fine grained,dry, staining and hydrocarbon odor.
G		479		B-5@4'	5		SM-ML	Increasing silt content (SM-ML), moist.
G		159		B-5@7'				@ 7.5 ft: color change to brown.
		6.1			10		GP	SANDY GRAVEL (GP), brown, gravel subrounded to 2-inch diameter, fine-medium grained sand, dry.
		16						
G				B-5@12'				Between 12 and 15 ft: higher sand content (GP-SP).
		13.8			15			
		13						
G				B-5@17'			SP	SAND (SP), brown, medium grained, moist-damp.
		2.1			20		GP	As Above.
		9.2						Between 20 and 25 ft: high coarse grained sand content.
G				B-5@22'				
		2.8			25			Between 25 and 27 ft: high medium sand content .
		0.5						
G				B-5@28'				
		6.0			30			
		8.5						
G				B-5@34'	35			Between 34 and 36 ft: high medium sand content .

BOREHOLE/WELL CONSTRUCTION DETAIL



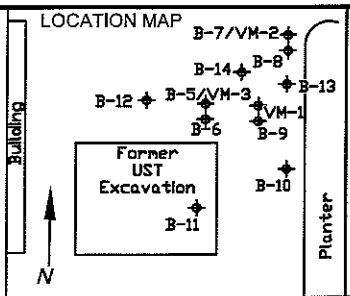
DRILLING CONTRACTOR: Boart-Longyear
DRILLING METHOD: Sonic
SAMPLING METHOD: Continuous Core
DRILLING START TIME: 2:45
DRILLING END TIME: 4:30

WELL I.D.: BAJ208

TIME	DATE	DTW

PNG ENVIRONMENTAL, INC.
6665 SW Hampton, Suite 101
Tigard, Oregon 97223
TEL (503) 620-2387
FAX (503) 620-2977

LOCATION MAP



WELL/BORING NUMBER **B-5/VM-3**

PROJECT NAME: Plaid # 324
PROJECT NUMBER: 1133
LOCATION: West Seattle, Washington
LOGGED BY: Dan Becraft
REVIEWED BY: Paul Ecker
DATE: 7/16/08

SAMPLE INFORMATION									STRATA	SOIL TYPE	DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Size, Density or Consistency, Moisture, Odor, Geological Interpretation)	BOREHOLE/WELL CONSTRUCTION DETAIL
SAMPLE TYPE	BLOW COUNTS	PID (ppm)		First Water	LAB SAMPLE I.D.	DEPTH bgs (ft)	SAMPLE LOCATION	SAMPLE INTERVAL / REC %				
		3.8								GP	SANDY GRAVEL (GP), continued	
											Between 37 ft and 40 ft:cemented sand clasts, friable, dry.	3/8" Bentonite Chips
G		3.8			B-5@39'							
						40					Total Boring Depth - 40'	
						45						
						50						
						55						
						60						
						65						
						70						

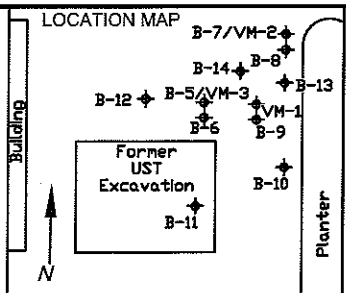
DRILLING CONTRACTOR: Boart-Longyear
DRILLING METHOD: Sonic
SAMPLING METHOD: Continuous Core
DRILLING START TIME: 2:45
DRILLING END TIME: 4:30

WELL I.D.: BAJ208

TIME	DATE	DTW

PNG ENVIRONMENTAL, INC.
6665 SW Hampton, Suite 101
Tigard, Oregon 97223
TEL (503) 620-2387
FAX (503) 620-2977

LOCATION MAP



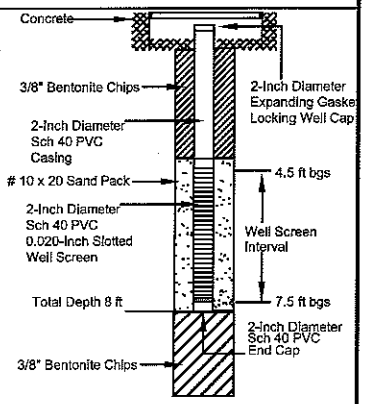
WELL/BORING NUMBER **B-6**
Page 1 of 1

PROJECT NAME: Plaid # 324
PROJECT NUMBER: 1133
LOCATION: West Seattle, Washington
LOGGED BY: Dan Becraft
REVIEWED BY: Paul Ecker
DATE: 7/17/08

SAMPLE INFORMATION

SAMPLE TYPE	BLOW COUNTS	PID (ppm)	First Water	LAB SAMPLE I.D.	DEPTH bgs (ft)	SAMPLE LOCATION	SAMPLE INTERVAL	REC %	STRATA	SOIL TYPE	DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Size, Density or Consistency, Moisture, Odor, Geological Interpretation)
											Asphalt
		193								GP	SANDY GRAVEL (GP), brown, subrounded to 2-inch diameter, fine and medium grained sand, occasional cobble, some fines, dry.
											SILTY SAND (SM) brown, medium grained, moist.
G		800		B-6@4'	5						Between 3ft and 5ft: gray staining/discoloration, hydrocarbon odor.
		505									
G		53		B-6@9'							
					10					GP	GRAVEL (GP)
											Total Boring Depth 10 ft
					15						
					20						
					25						
					30						
					35						

BOREHOLE/WELL CONSTRUCTION DETAIL



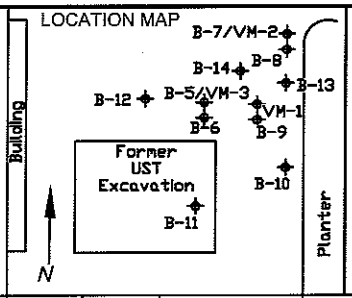
DRILLING CONTRACTOR: Boart-Longyear
DRILLING METHOD: Sonic
SAMPLING METHOD: Continuous Core
DRILLING START TIME: 11:10
DRILLING END TIME: 12:15

WELL I.D.: BAJ211

TIME	DATE	DTW

PNG ENVIRONMENTAL, INC.
6665 SW Hampton, Suite 101
Tigard, Oregon 97223
TEL (503) 620-2387
FAX (503) 620-2977

LOCATION MAP



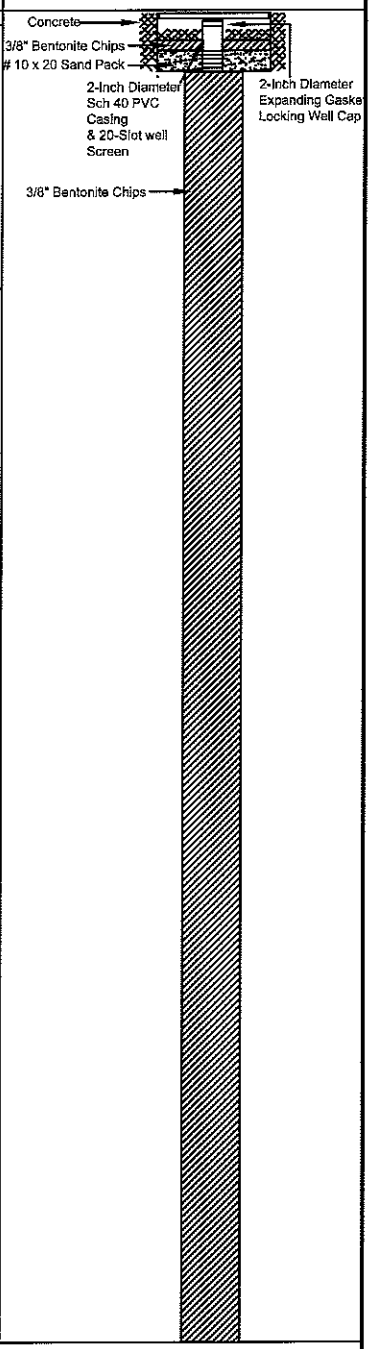
WELL/BORING NUMBER **B-7/VM-2**
Page 1 of 1

PROJECT NAME: Plaid # 324
PROJECT NUMBER: 1133
LOCATION: West Seattle, Washington
LOGGED BY: Dan Becraft
REVIEWED BY: Paul Ecker
DATE: 7/16/08

SAMPLE INFORMATION

SAMPLE TYPE	BLOW COUNTS	PID (ppm)	First Water	LAB SAMPLE I.D.	DEPTH bgs (ft)	SAMPLE LOCATION	SAMPLE INTERVAL	REC %	STRATA	SOIL TYPE	DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Size, Density or Consistency, Moisture, Odor, Geological Interpretation)
											Asphalt
										SM-ML	SILTY SAND-SANDY SILT (SM-ML), brown, fine to medium grained,occasional gravel, dry,
		5.3									@2.5 ft: moist.
G		5.6		B-7@4'	5						@5 ft: gray, hydrocarbon odor.
		427									Between 6 and 7 ft: staining
G				B-7@8'						ML-SM	Increasing silt content: (ML-SM).
		493									
G		33.7		B-7@11'	10						@11 ft: dry.
		4.5								SP	SAND (SP), brown, medium grained some coarse sand, moist.
		0.9			15					GP	SANDY GRAVEL (GP), brown, gravel subangular to subrounded to 3-inch diameter, fine-medium grained sand, occational cobble, moist.
G		0		B-7@19'							As Above.
G		8.1		B-7@21'	20						Between 20 and 25 ft: high coarse grained sand content.
		3.0									
G		12		B-7@26'	25						Between 25 and 27 ft: high medium sand content .
		3.4									
		2.5			30						
		3.9									
G				B-7@34'	35						Between 34 and 36 ft: high medium sand content .

BOREHOLE/WELL CONSTRUCTION DETAIL



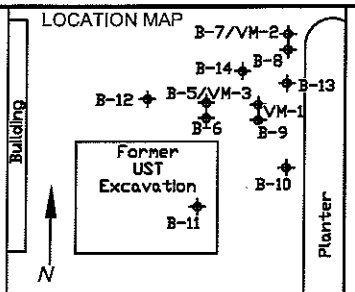
DRILLING CONTRACTOR: Boart-Longyear
DRILLING METHOD: Sonic
SAMPLING METHOD: Continuous Core
DRILLING START TIME: 11:20
DRILLING END TIME:1:00

WELL I.D.: BAJ207

TIME	DATE	DTW

PNG ENVIRONMENTAL, INC.
6665 SW Hampton, Suite 101
Tigard, Oregon 97223
TEL (503) 620-2387
FAX (503) 620-2977

LOCATION MAP



WELL/BORING NUMBER **B-7/VM-2**

PROJECT NAME: Plaid # 324
PROJECT NUMBER: 1133
LOCATION: West Seattle, Washington
LOGGED BY: Dan Becraft
REVIEWED BY: Paul Ecker
DATE: 7/16/08

SAMPLE INFORMATION								STRATA	SOIL TYPE	DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Size, Density or Consistency, Moisture, Odor, Geological Interpretation)	BOREHOLE/WELL CONSTRUCTION DETAIL
SAMPLE TYPE	BLOW COUNTS	PID (ppm)	First Water	LAB SAMPLE I.D.	DEPTH bgs (ft)	SAMPLE LOCATION / SAMPLE INTERVAL	REC %				
		3.9							GP	SANDY GRAVEL (GP), continued	3/8" Bentonite Chips
G		2.7		B-7@39'						@ 39 ft:cemented sand clasts, friable, dry.	
					40					Total Boring Depth - 40'	
					45						
					50						
					55						
					60						
					65						
					70						

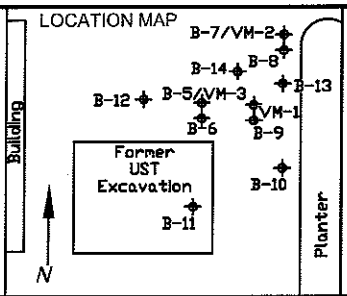
DRILLING CONTRACTOR: Boart-Longyear
DRILLING METHOD: Sonic
SAMPLING METHOD: Continuous Core
DRILLING START TIME: 11:20
DRILLING END TIME: 1:00

WELL I.D.: BAJ207

TIME	DATE	DTW

PNG ENVIRONMENTAL, INC.
6665 SW Hampton, Suite 101
Tigard, Oregon 97223
TEL (503) 620-2387
FAX (503) 620-2977

LOCATION MAP



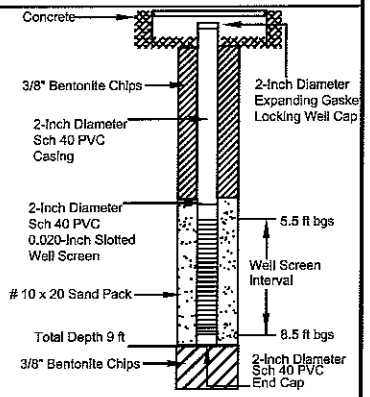
WELL/BORING NUMBER **B-8**
Page 1 of 1

PROJECT NAME: Plaid # 324
PROJECT NUMBER: 1133
LOCATION: West Seattle, Washington
LOGGED BY: Dan Becraft
REVIEWED BY: Paul Ecker
DATE: 7/17/08

SAMPLE INFORMATION

SAMPLE TYPE	BLOW COUNTS	PID (ppm)	First Water	LAB SAMPLE I.D.	DEPTH bgs (ft)	SAMPLE LOCATION	SAMPLE INTERVAL	REC %	STRATA	SOIL TYPE	DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Size, Density or Consistency, Moisture, Odor, Geological Interpretation)
											Asphalt
		4.5								GP	SANDY GRAVEL (GP), brown, subrounded to 2-inch diameter, fine and medium grained sand, occasional cobble, some fines, dry.
		4			5						SILTY SAND to SANDY SILT (SM-ML) brown, fine to medium grained, gravels subrounded to 1-inch diameter, moist.
G		369		B-8@6'							@ 6 ft: color change to gray, some staining, hydrocarbon odor.
		391									
G				B-8@9'	10						
											Total Boring Depth 10 ft
					15						
					20						
					25						
					30						
					35						

BOREHOLE/WELL CONSTRUCTION DETAIL



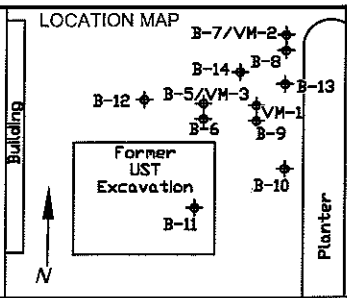
DRILLING CONTRACTOR: Boart-Longyear
DRILLING METHOD: Sonic
SAMPLING METHOD: Continuous Core
DRILLING START TIME: 2:00
DRILLING END TIME: 2:40

WELL I.D.: BAJ212

TIME	DATE	DTW

PNG ENVIRONMENTAL, INC.
6665 SW Hampton, Suite 101
Tigard, Oregon 97223
TEL (503) 620-2387
FAX (503) 620-2977

LOCATION MAP



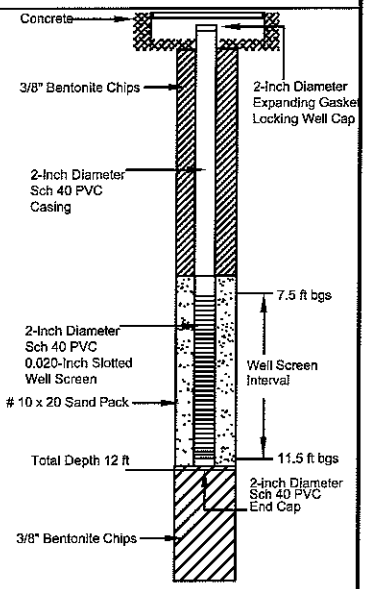
WELL/BORING NUMBER **B-9**
Page 1 of 1

PROJECT NAME: Plaid # 324
PROJECT NUMBER: 1133
LOCATION: West Seattle, Washington
LOGGED BY: Dan Becraft
REVIEWED BY: Paul Ecker
DATE: 7/17/08

SAMPLE INFORMATION

SAMPLE TYPE	BLOW COUNTS	PID (ppm)	First Water	LAB SAMPLE I.D.	DEPTH bgs (ft)	SAMPLE LOCATION	SAMPLE INTERVAL	REC %	STRATA	SOIL TYPE	DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Size, Density or Consistency, Moisture, Odor, Geological Interpretation)
											Asphalt
										GP	SANDY GRAVEL (GP), brown, subrounded to 2-inch diameter, fine and medium grained sand, occasional cobble, some fines, dry.
		351									SILTY SAND to SANDY SILT (SM-ML) brown, fine to medium grained, gravels subrounded to 1-inch diameter, moist.
		519									@ 4 ft: hydrocarbon odor.
G				B-9@5'	5						
		130									
G		650		B-9@10'	10						
		509									
G		85		B-9@12'							
G		3.5		B-9@14'	15						SAND (SP), brown, fine to medium grained, some gravel, no odor, dry.
											Total Boring Depth 15 ft
					20						
					25						
					30						
					35						

BOREHOLE/WELL CONSTRUCTION DETAIL



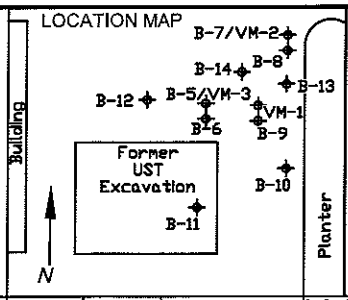
DRILLING CONTRACTOR: Boart-Longyear
DRILLING METHOD: Sonic
SAMPLING METHOD: Continuous Core
DRILLING START TIME: 5:00
DRILLING END TIME: 5:50

WELL I.D.: BAJ214

TIME	DATE	DTW

PNG ENVIRONMENTAL, INC.
6665 SW Hampton, Suite 101
Tigard, Oregon 97223
TEL (503) 620-2387
FAX (503) 620-2977

LOCATION MAP

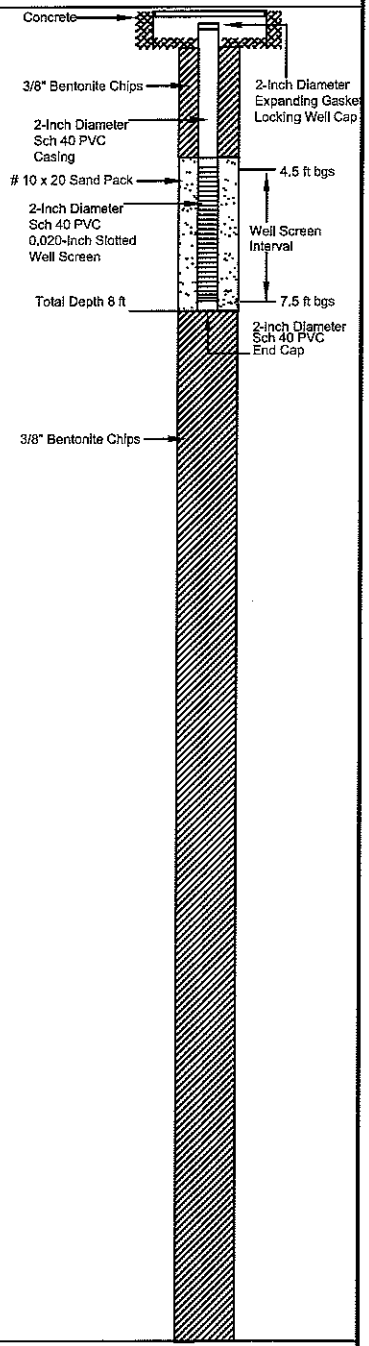


WELL/BORING NUMBER **B-10**
Page 1 of 2

PROJECT NAME: Plaid # 324
PROJECT NUMBER: 1133
LOCATION: West Seattle, Washington
LOGGED BY: Dan Becraft
REVIEWED BY: Paul Ecker
DATE: 7/15/08 - 7/16/08

SAMPLE TYPE	BLOW COUNTS	PID (ppm)	First Water	LAB SAMPLE I.D.	DEPTH bgs (ft)	STRATA	SOIL TYPE	DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Size, Density or Consistency, Moisture, Odor, Geological Interpretation)
								Asphalt
							ML-SM	SANDY SILT to SILTY SAND (ML-SM),gray, fine to fine, medium and coarse grained sand,occasional gravel, moist.
								@4 ft: color change to brown.
G				B-10@4'	5			
G				B-10@6'				
G				B-10@10'	10			As Above
G				B-10@14.5'	15			As Above.
							GP	GRAVEL (GP)
							SP	SAND (SP), brown, medium grained some coarse sand, moist.
G				B-10@19'	20		GP-GM	SANDY GRAVEL (GP), brown, gravel subangular to subrounded to 3-inch diameter, fine-medium grained sand, some silt, occasional cobble, moist. @20 ft: no fines, dry.
G								As Above.
				B-10@ 20'-30'	25			Casing bound up in boring, only 3 ft of core removed from between 20 ft and 30ft. Location of sample from within 10 ft interval is unknown. Stopped drilling for day, resumed drilling on July 16, 2008.
G				B-10@31'	30			As Above.
					35			

BOREHOLE/WELL CONSTRUCTION DETAIL



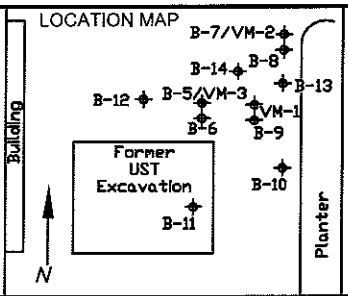
DRILLING CONTRACTOR: Boart-Longyear
DRILLING METHOD: Sonic
SAMPLING METHOD: Continuous Core
DRILLING START TIME: 9:20
DRILLING END TIME: 1:00

WELL I.D.: BAJ206

TIME	DATE	DTW

PNG ENVIRONMENTAL, INC.
6665 SW Hampton, Suite 101
Tigard, Oregon 97223
TEL (503) 620-2387
FAX (503) 620-2977

LOCATION MAP



WELL/BORING NUMBER **B-10**
Page 2 of 2

PROJECT NAME: Plaid # 324
PROJECT NUMBER: 1133
LOCATION: West Seattle, Washington
LOGGED BY: Dan Becraft
REVIEWED BY: Paul Ecker
DATE: 7/15/08 and 7/16/08

SAMPLE INFORMATION								STRATA	SOIL TYPE	DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Size, Density or Consistency, Moisture, Odor, Geological Interpretation)	BOREHOLE/WELL CONSTRUCTION DETAIL
SAMPLE TYPE	BLOW COUNTS	PID (ppm)	First Water	LAB SAMPLE I.D.	DEPTH bgs (ft)	SAMPLE LOCATION	SAMPLE INTERVAL REC %				
		3.8							GP	SANDY GRAVEL (GP), continued	3/8" Bentonite Chips
G		3.8		B-10@39.5	40					Between 38.5 ft and 40 ft:cemented sand clasts, friable, dry.	
										Total Boring Depth - 40'	
					45						
					50						
					55						
					60						
					65						
					70						

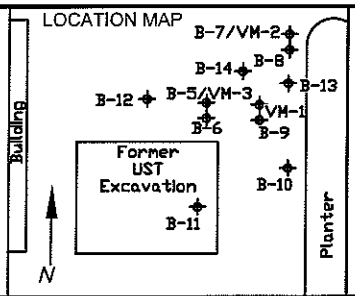
DRILLING CONTRACTOR: Boart-Longyear
DRILLING METHOD: Sonic
SAMPLING METHOD: Continuous Core
DRILLING START TIME: 2:45
DRILLING END TIME: 4:30

WELL I.D.: BAJ208

TIME	DATE	DTW

PNG ENVIRONMENTAL, INC.
6665 SW Hampton, Suite 101
Tigard, Oregon 97223
TEL (503) 620-2387
FAX (503) 620-2977

LOCATION MAP



WELL/BORING NUMBER **B-11**
Page 1 of 1

PROJECT NAME: Plaid # 324
PROJECT NUMBER: 1133
LOCATION: West Seattle, Washington
LOGGED BY: Dan Becraft
REVIEWED BY: Paul Ecker
DATE: 7/17/08

SAMPLE INFORMATION

SAMPLE TYPE	BLOW COUNTS	PID (ppm)	First Water	LAB SAMPLE I.D.	DEPTH bgs (ft)	SAMPLE LOCATION / SAMPLE INTERVAL / REC %	STRATA	SOIL TYPE
		0.2			5			GP
		0.4						
		0.6			10			
		0.8			15			
					20			
					25			
					30			
					35			

DESCRIPTION

(USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Size, Density or Consistency, Moisture, Odor, Geological Interpretation)

Asphalt

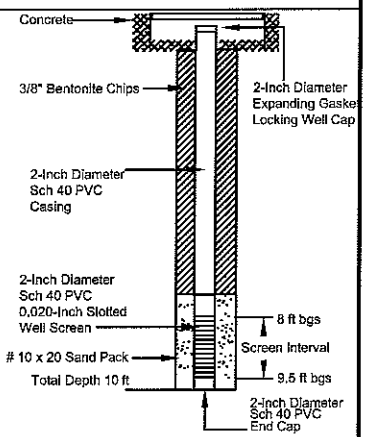
SANDY GRAVEL (GP), brown, subrounded to 2-inch diameter, fine and medium grained sand, occasional cobble, some fines, dry.

SAND (BACKFILL) (SP), brown, fine to medium grained, some gravel, no odor, dry.

@ 4 ft; hydrocarbon odor.

Total Boring Depth 10 ft

BOREHOLE/WELL CONSTRUCTION DETAIL



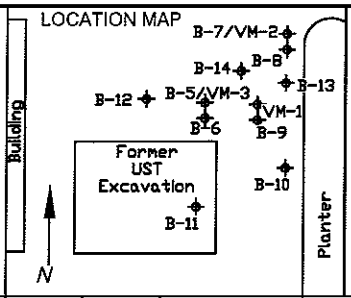
DRILLING CONTRACTOR: Boart-Longyear
DRILLING METHOD: Sonic
SAMPLING METHOD: Continuous Core
DRILLING START TIME: 9:30
DRILLING END TIME: 10:40

WELL I.D.: BAJ210

TIME	DATE	DTW

PNG ENVIRONMENTAL, INC.
6665 SW Hampton, Suite 101
Tigard, Oregon 97223
TEL (503) 620-2387
FAX (503) 620-2977

LOCATION MAP



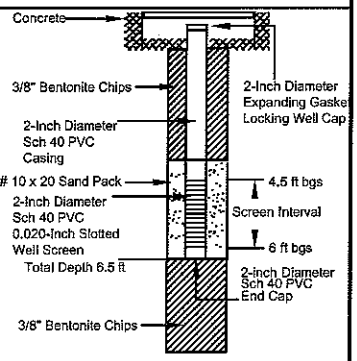
WELL/BORING NUMBER **B-12**
Page 1 of 1

PROJECT NAME: Plaid # 324
PROJECT NUMBER: 1133
LOCATION: West Seattle, Washington
LOGGED BY: Dan Becraft
REVIEWED BY: Paul Ecker
DATE: 7/17/08

SAMPLE INFORMATION

SAMPLE TYPE	BLOW COUNTS	PID (ppm)	First Water	LAB SAMPLE I.D.	DEPTH bgs (ft)	SAMPLE LOCATION	SAMPLE INTERVAL	REC %	STRATA	SOIL TYPE	DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Size, Density or Consistency, Moisture, Odor, Geological Interpretation)
											Asphalt
										GP	SANDY GRAVEL (GP), brown, subrounded to 2-inch diameter, fine and medium grained sand, occasional cobble, some fines, dry.
		11.9									
G		775		B-12@4'	5					SM	SILTY SAND to SANDY SILT (SM-ML), gray, fine to medium grained, gravel subangular to subrounded to 1-inch diameter, hydrocarbon odor, discoloration, moist.
		10.1								GP	SANDY GRAVEL (GP), As Above
										SM	SILTY SAND (SM), As Above
G				B-12@8'						GP	SANDY GRAVEL (GP), As Above
		9.5			10						Total Boring Depth 9 ft
					15						
					20						
					25						
					30						
					35						

BOREHOLE/WELL CONSTRUCTION DETAIL



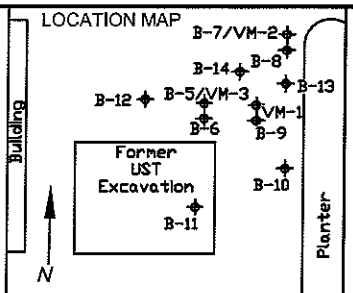
DRILLING CONTRACTOR: Boart-Longyear
DRILLING METHOD: Sonic
SAMPLING METHOD: Continuous Core
DRILLING START TIME: 8:40
DRILLING END TIME: 9:20

WELL I.D.: BAJ209

TIME	DATE	DTW

PNG ENVIRONMENTAL, INC.
6665 SW Hampton, Suite 101
Tigard, Oregon 97223
TEL (503) 620-2387
FAX (503) 620-2977

LOCATION MAP



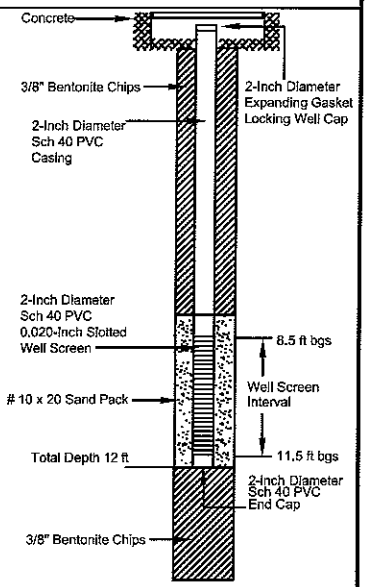
WELL/BORING NUMBER **B-13**
Page 1 of 1

PROJECT NAME: Plaid # 324
PROJECT NUMBER: 1133
LOCATION: West Seattle, Washington
LOGGED BY: Dan Becraft
REVIEWED BY: Paul Ecker
DATE: 7/17/08

SAMPLE INFORMATION

SAMPLE TYPE	BLOW COUNTS	PID (ppm)	First Water	LAB SAMPLE I.D.	DEPTH bgs (ft)	STRATA	SOIL TYPE	DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Size, Density or Consistency, Moisture, Odor, Geological Interpretation)
								Asphalt
		21					GP	SANDY GRAVEL (GP), brown, subrounded to 2-inch diameter, fine and medium grained sand, occasional cobble, some fines, dry.
		148					SM	SILTY SAND to SANDY SILT (SM-ML), gray, medium grained, some gravel, moist.
		503						
G				B-13@5'	5			@ 4ft: discoloration, hydrocarbon odor.
		540						Between 5 ft and 7.5 ft: high gravel content.
		359						
								As Above.
		559						
		209			10			
		679						As Above.
G		22		B-13@12'				
		12.5						
		3.5						
					15			SAND(SP), brown, medium grained, no ODS, moist.
								Total Boring Depth 15 ft
					20			
					25			
					30			
					35			

BOREHOLE/WELL CONSTRUCTION DETAIL



DRILLING CONTRACTOR: Boart-Longyear
DRILLING METHOD: Sonic
SAMPLING METHOD: Continuous Core
DRILLING START TIME: 3:05
DRILLING END TIME: 4:30

WELL I.D.: BAJ213

TIME	DATE	DTW

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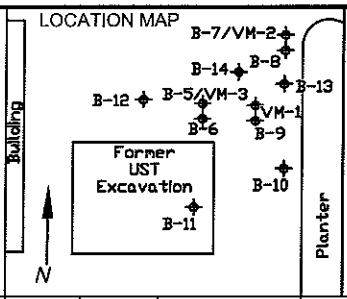
LOCATION MAP



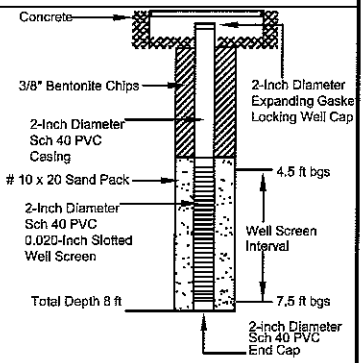
WELL/BORING NUMBER **B-14**
Page 1 of 1

PROJECT NAME: Plaid # 324
PROJECT NUMBER: 1133
LOCATION: West Seattle, Washington
LOGGED BY: Dan Becraft
REVIEWED BY: Paul Ecker
DATE: 7/18/08

SAMPLE INFORMATION

SAMPLE TYPE	BLOW COUNTS	PID (ppm)	First Water	LAB SAMPLE I.D.	DEPTH bgs (ft)	SAMPLE LOCATION	SAMPLE INTERVAL	REC %	STRATA	SOIL TYPE	DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Size, Density or Consistency, Moisture, Odor, Geological Interpretation)
											Asphalt
		193								GP	SANDY GRAVEL (GP), brown, subrounded to 2-inch diameter, fine and medium grained sand, occasional cobble, some fines, dry.
		645			5						SILTY SAND (SM) brown, medium grained, moist. Between 3ft and 5ft: gray staining/discoloration, hydrocarbon odor.
		315									
					10						Total Boring Depth 8 ft
					15						
					20						
					25						
					30						
					35						

BOREHOLE/WELL CONSTRUCTION DETAIL



DRILLING CONTRACTOR: Boart-Longyear
DRILLING METHOD: Sonic
SAMPLING METHOD: Continuous Core
DRILLING START TIME: 8:00
DRILLING END TIME: 8:30

WELL I.D.: BAJ215

TIME	DATE	DTW

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SEE SITE MAP FOR BORING LOCATIONS

N

WELL/BORING NUMBER B-15

PROJECT NAME: Plaid Pantry #324
PROJECT NUMBER: 1133-01
LOCATION: Seattle, WA.
LOGGED BY: JRG
REVIEWED BY: JRG
DATE: 4-27-09

SAMPLE TYPE	BLOW COUNTS	PID (ppm)	First Water	LAB SAMPLE I.D.	DEPTH bgs (ft)	SAMPLE INTERVAL	REC %	STRATA	SOIL TYPE	DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Composition, Density or Consistency, Moisture, Odor, Geological Interpretation)
										(0-0.4) Asphalt.
		0							GP	Sandy Gravel. Brown, dry, no odor. (Fill)
				B15@4'					ML	Sandy Silt with Gravel. Brown, fine sand, subangular gravel up to 1" dia., soft, non-plastic, moist, no odor.
		8.0			5					3 to 5': Gravel to 1/2" dia., mild petro odor, red mottled appearance.
										6 to 7': No mottling or odor, stiff.
				B15@8'						8': Gray petro staining, strong odor, no sheen.
		18								9 to 14': Color returns to brown, no odor or staining, stiff, occasional gray lense.
		0			10					
				B15@12'						
		0								
		0							SP	Poorly Graded Sand with Gravel. Brown, medium to coarse sand with pea size subrounded to round gravel, moist, no odor.
					15					End of Boring @ 15'.
										Note: 3/8" Bentonite chips backfill and EZ Street Asphalt hole patch for surface repair.
					20					
					25					
					30					

BOREHOLE/WELL CONSTRUCTION DETAIL

DRILLING CONTRACTOR: Cascade Drilling
DRILLING METHOD: Direct Push "Geoprobe"
SAMPLING METHOD: Continuous
DRILLING START TIME: 4-22-09
DRILLING END TIME:

COORDINATES:
SURFACE ELEVATION:
CASING ELEVATION:
SITE DATUM:

TIME	DATE	DTW
	4-22-09	

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SEE SITE MAP FOR BORING LOCATIONS

N

WELL/BORING NUMBER B-16

PROJECT NAME: Plaid Pantry #324
PROJECT NUMBER: 1133-01
LOCATION: Seattle, WA.
LOGGED BY: JRG
REVIEWED BY: JRG
DATE: 4-27-09

SAMPLE INFORMATION								STRATA	SOIL TYPE	DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Composition, Density or Consistency, Moisture, Odor, Geological Interpretation)	BOREHOLE/WELL CONSTRUCTION DETAIL
SAMPLE TYPE	BLOW COUNTS	PID (ppm)	First Water	LAB SAMPLE I.D.	DEPTH bgs (ft)	SAMPLE INTERVAL	REC %				
										(0-0.4) Asphalt.	
									GP	Sandy Gravel. Brown, dry, no odor. (Fill)	
				B16@4'	5				SM	Silty Sand with Gravel. Brown, fine to medium sand with silt, gravel subangular up to 1" dia., dry, no odor.	
				B16@8'					ML	Sandy Silt with Gravel. Gray, fine sand with subrounded gravel up to 1" dia., moist, petro odor, no sheen, stiff.	
				B16@12'	10				SM	Silty Sand with Gravel. Fine to medium sand with some silt and subrounded gravel up to 1" dia., moist, no odor.	
					15					End of Boring @ 12'. Note: 3/8" Bentonite chips backfill and EZ Street Asphalt hole patch for surface repair.	
					20						
					25						
					30						

DRILLING CONTRACTOR: Cascade Drilling
DRILLING METHOD: Direct Push "Geoprobe"
SAMPLING METHOD: Continuous
DRILLING START TIME: 4-22-09
DRILLING END TIME:

COORDINATES:
SURFACE ELEVATION:
CASING ELEVATION:
SITE DATUM:

TIME	DATE	DTW
	4-22-09	

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SEE SITE MAP FOR BORING LOCATIONS

N

WELL/BORING NUMBER B-17

PROJECT NAME: Plaid Pantry #324
PROJECT NUMBER: 1133-01
LOCATION: Seattle, WA.
LOGGED BY: JRG
REVIEWED BY: JRG
DATE: 4-27-09

SAMPLE INFORMATION

SAMPLE TYPE	BLOW COUNTS	PID (ppm)	First Water	LAB SAMPLE I.D.	DEPTH bgs (ft)	SAMPLE INTERVAL	REC %	STRATA	SOIL TYPE	DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Composition, Density or Consistency, Moisture, Odor, Geological Interpretation)
										(0-0.4) Asphalt.
									GP	Sandy Gravel. Brown, dry, no odor. (Fill)
				B17@4'					SM	Silty Sand with Gravel. Brown, fine to medium sand with silt and some gravel, gravel subrounded up to 1" dia., dry, no odor.
					5					Sandy Silt with Gravel. Gray, fine sand with subrounded gravel up to 1" dia.
				B17@7'					ML	6.5': Black organic layer, no odor, 2" thick, stiff, dry.
										7 to 8': Strong petro odor and staining.
				B17@10'					SM	Silty Sand with Gravel. Brown, fine to medium sand with silt and some gravel, gravel subrounded up to 1" dia., dry, no odor.
					10				ML	Sandy Silt with Gravel. Gray, fine sand with subrounded gravel up to 1" dia., strong petro odor.
				B17@13'					SW	Well Graded Sand with Gravel. Brown, medium to coarse sand with trace fines and some subrounded 1/2" dia. gravel, dry, no odor.
									SP	Poorly Graded Sand. Brown, fine to medium sand with trace fines, dry, no odor.
					15					End of Boring @ 15'.
										Note: 3/8" Bentonite chips backfill and EZ Street Asphalt hole patch for surface repair.
					20					
					25					
					30					

BOREHOLE/WELL CONSTRUCTION DETAIL

DRILLING CONTRACTOR: Cascade Drilling
DRILLING METHOD: Direct Push "Geoprobe"
SAMPLING METHOD: Continuous
DRILLING START TIME: 4-22-09
DRILLING END TIME:

COORDINATES:
SURFACE ELEVATION:
CASING ELEVATION:
SITE DATUM:

TIME	DATE	DTW
	4-22-09	

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SEE SITE MAP FOR BORING LOCATIONS

N

WELL/BORING NUMBER B-18

PROJECT NAME: Plaid Pantry #324
PROJECT NUMBER: 1133-01
LOCATION: Seattle, WA.
LOGGED BY: JRG
REVIEWED BY: JRG
DATE: 4-27-09

SAMPLE INFORMATION								STRATA	SOIL TYPE	DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Composition, Density or Consistency, Moisture, Odor, Geological Interpretation)	BOREHOLE/WELL CONSTRUCTION DETAIL
SAMPLE TYPE	BLOW COUNTS	PID (ppm)	First Water	LAB SAMPLE I.D.	DEPTH bgs (ft)	SAMPLE INTERVAL	REC %				
									GP	(0-0.4) Asphalt. Sandy Gravel. Brown, dry, no odor. (Fill)	
				B18@4'	5				SM	Silty Sand with Gravel to Sandy Silt with Gravel. Brown, fine to medium sand, subrounded gravel up to 1" dia., stiff, no odor. 4 to 6': Petro odor, gray staining, no sheen, very stiff. 6 to 9.5': Brown, some iron mottling, no odor.	
				B18@8'							
				B18@12'	10				SP	Poorly Graded Sand with Gravel. Brown, fine to coarse sand with subrounded gravel up to 1/2" dia., dry, no odor.	
					15					End of Boring @ 12'. Note: 3/8" Bentonite chips backfill and EZ Street Asphalt hole patch for surface repair.	
					20						
					25						
					30						

DRILLING CONTRACTOR: Cascade Drilling
DRILLING METHOD: Direct Push "Geoprobe"
SAMPLING METHOD: Continuous
DRILLING START TIME: 4-22-09
DRILLING END TIME:

COORDINATES:
SURFACE ELEVATION:
CASING ELEVATION:
SITE DATUM:

TIME	DATE	DTW
	4-22-09	

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SEE SITE MAP FOR BORING LOCATIONS

N

WELL/BORING NUMBER B-19

PROJECT NAME: Plaid Pantry #324
PROJECT NUMBER: 1133-01
LOCATION: Seattle, WA.
LOGGED BY: JRG
REVIEWED BY: JRG
DATE: 4-27-09

SAMPLE INFORMATION								STRATA	SOIL TYPE	DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Composition, Density or Consistency, Moisture, Odor, Geological Interpretation)	BOREHOLE/WELL CONSTRUCTION DETAIL
SAMPLE TYPE	BLOW COUNTS	PID (ppm)	First Water	LAB SAMPLE I.D.	DEPTH bgs (ft)	SAMPLE INTERVAL	REC %				
										(0-0.4) Asphalt.	
									GP	Sandy Gravel. Brown, dry, no odor. (Fill)	
				B19@4'	5				SM/ ML	Silty Sand with Gravel to Sandy Silt with Gravel. Brown, fine to medium sand, subround gravel up to 1" dia., firm, dry, no odor. 4 to 8': Grayish-brown, stiff, no odor. 7 to 8': Some red iron mottling.	
				B19@8'						8 to 12': No mottling, very homogenous looking core.	
				B19@12'	10					End of Boring @ 12'. Note: 3/8" Bentonite chips backfill and EZ Street Asphalt hole patch for surface repair.	
					15						
					20						
					25						
					30						

DRILLING CONTRACTOR: Cascade Drilling
DRILLING METHOD: Direct Push "Geoprobe"
SAMPLING METHOD: Continuous
DRILLING START TIME: 4-22-09
DRILLING END TIME:

COORDINATES:
SURFACE ELEVATION:
CASING ELEVATION:
SITE DATUM:

TIME	DATE	DTW
	4-22-09	

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SEE SITE MAP FOR BORING LOCATIONS

N

WELL/BORING NUMBER B-20

PROJECT NAME: Plaid Pantry #324
PROJECT NUMBER: 1133-01
LOCATION: Seattle, WA.
LOGGED BY: JRG
REVIEWED BY: JRG
DATE: 4-27-09

SAMPLE TYPE	BLOW COUNTS	PID (ppm)	First Water	LAB SAMPLE I.D.	DEPTH bgs (ft)	SAMPLE INTERVAL	REC %	STRATA	SOIL TYPE	DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Composition, Density or Consistency, Moisture, Odor, Geological Interpretation)
										(0-0.4) Asphalt.
		0							GP	Sandy Gravel. Brown, dry, no odor. (Fill)
									ML	Sandy Silt with Gravel. Brown, fine sand, gravel subrounded up to 1" dia., dry to moist, no odor.
		0		B20@4'					SP	Poorly Graded Sand. Brown, fine to medium sand with pea size gravel, moist, no odor.
		0		B20@6'	5				ML	Sandy Silt with Gravel. Brown, fine sand, gravel subrounded up to 1" dia., moist, stiff, no odor.
		27								6.5 to 6.7': Very thin lense of gray staining, petro odor.
		0								
		0		B20@10'	10					10 to 12': Very stiff.
		0								
										End of Boring @ 12'.
					15					Note: 3/8" Bentonite chips backfill and EZ Street Asphalt hole patch for surface repair.
					20					
					25					
					30					

BOREHOLE/WELL CONSTRUCTION DETAIL

DRILLING CONTRACTOR: Cascade Drilling
DRILLING METHOD: Direct Push "Geoprobe"
SAMPLING METHOD: Continuous
DRILLING START TIME: 4-22-09
DRILLING END TIME:

COORDINATES:
SURFACE ELEVATION:
CASING ELEVATION:
SITE DATUM:

TIME	DATE	DTW
	4-22-09	

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SEE SITE MAP FOR BORING LOCATIONS

N

WELL/BORING NUMBER B-21

PROJECT NAME: Plaid Pantry #324
PROJECT NUMBER: 1133-01
LOCATION: Seattle, WA.
LOGGED BY: JRG
REVIEWED BY: JRG
DATE: 4-27-09

SAMPLE INFORMATION								STRATA	SOIL TYPE	DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Composition, Density or Consistency, Moisture, Odor, Geological Interpretation)	BOREHOLE/WELL CONSTRUCTION DETAIL
SAMPLE TYPE	BLOW COUNTS	PID (ppm)	First Water	LAB SAMPLE I.D.	DEPTH bgs (ft)	SAMPLE INTERVAL	REC %				
									GP	(0-0.4) Asphalt. Sandy Gravel. Brown, dry, no odor. (Fill)	
				B21@4'	5				SM	Silty Sand with Gravel. Brown, fine to medium sand with some silt and some 1" dia. subrounded gravel, dry, no odor. 4 to 8': Poor recovery (10%), no sample.	
				B21@9'	10				SP	Poorly Graded Sand with Gravel. Brown, medium to coarse sand, gravel subangular up to 1", dry, no odor.	
									SM	Silty Sand with Gravel. Brown, fine to medium sand with some silt and some pea size gravel, dry, no odor.	
					15				SP	Poorly Graded Sand. Brown, fine to medium sand, trace pea size gravel, dry, no odor.	
					20					End of Boring @ 15'. Note: 3/8" Bentonite chips backfill and EZ Street Asphalt hole patch for surface repair.	
					25						
					30						

DRILLING CONTRACTOR: Cascade Drilling
DRILLING METHOD: Direct Push "Geoprobe"
SAMPLING METHOD: Continuous
DRILLING START TIME: 4-22-09
DRILLING END TIME:

COORDINATES:
SURFACE ELEVATION:
CASING ELEVATION:
SITE DATUM:

TIME	DATE	DTW
	4-22-09	

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SEE SITE MAP FOR BORING LOCATIONS

N

WELL/BORING NUMBER B-22

PROJECT NAME: Plaid Pantry #324
PROJECT NUMBER: 1133-01
LOCATION: Seattle, WA.
LOGGED BY: JRG
REVIEWED BY: JRG
DATE: 4-27-09

SAMPLE INFORMATION								STRATA	SOIL TYPE	DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Composition, Density or Consistency, Moisture, Odor, Geological Interpretation)	BOREHOLE/WELL CONSTRUCTION DETAIL
SAMPLE TYPE	BLOW COUNTS	PID (ppm)	First Water	LAB SAMPLE I.D.	DEPTH bgs (ft)	SAMPLE INTERVAL	REC %				
										(0-0.4) Asphalt.	
									GP	Sandy Gravel. Brown, dry, no odor. (Fill)	
				B22@4'					SM/ ML	Silty Sand with Gravel to Sandy Silt with Gravel. Brown, fine to medium sand, gravel subangular up to 1", dry, no odor.	
					5					5.5 to 7': Gray, petro odor, no sheen.	
				B22@7'					SP	Poorly Graded Sand. Brown, fine to medium sand, few small gravels, dry, no odor.	
										End of Boring @ 8'.	
					10					Note: 3/8" Bentonite chips backfill and EZ Street Asphalt hole patch for surface repair.	
					15						
					20						
					25						
					30						

DRILLING CONTRACTOR: Cascade Drilling
DRILLING METHOD: Direct Push "Geoprobe"
SAMPLING METHOD: Continuous
DRILLING START TIME: 4-22-09
DRILLING END TIME:

COORDINATES:
SURFACE ELEVATION:
CASING ELEVATION:
SITE DATUM:

TIME	DATE	DTW
	4-22-09	

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SEE SITE MAP FOR BORING LOCATIONS

N

WELL/BORING NUMBER B-23

PROJECT NAME: Plaid Pantry #324
PROJECT NUMBER: 1133-01
LOCATION: Seattle, WA.
LOGGED BY: JRG
REVIEWED BY: JRG
DATE: 4-27-09

SAMPLE INFORMATION								STRATA	SOIL TYPE	DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Composition, Density or Consistency, Moisture, Odor, Geological Interpretation)	BOREHOLE/WELL CONSTRUCTION DETAIL
SAMPLE TYPE	BLOW COUNTS	PID (ppm)	First Water	LAB SAMPLE I.D.	DEPTH bgs (ft)	SAMPLE INTERVAL	REC %				
										(0-0.4) Asphalt.	
									GP	Sandy Gravel. Brown, dry, no odor. (Fill)	
									SM/ ML	Silty Sand with Gravel to Sandy Silt with Gravel. Brown, fine to medium sand, gravel subrounded up to 1", dry, soft, no odor.	
				B23@5'	5						
				B23@10'	10					10 to 12': Stiff, 1/2" dia. gravel.	
										End of Boring @ 12'.	
					15					Note: 3/8" Bentonite chips backfill and EZ Street Asphalt hole patch for surface repair.	
					20						
					25						
					30						

DRILLING CONTRACTOR: Cascade Drilling
DRILLING METHOD: Direct Push "Geoprobe"
SAMPLING METHOD: Continuous
DRILLING START TIME: 4-22-09
DRILLING END TIME:

COORDINATES:
SURFACE ELEVATION:
CASING ELEVATION:
SITE DATUM:

TIME	DATE	DTW
	4-22-09	

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LOCATION MAP

N

● MW-1

WELL/BORING NUMBER: B24

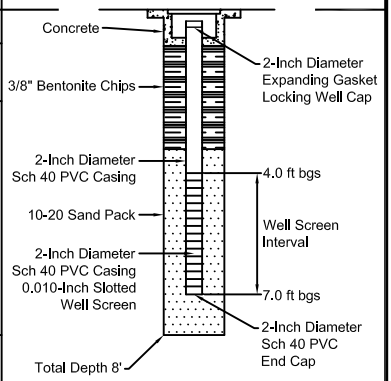
PROJECT NAME: Plaid Pantry 324
PROJECT NUMBER: 1133-01
LOCATION: Seattle, WA
LOGGED BY: J. Greifer
REVIEWED BY: Paul Ecker
DATE: 11-10-09

SAMPLE INFORMATION

SAMPLE TYPE	Blow Counts	PID (ppm)	REC %	First Water	LAB SAMPLE I.D.	DEPTH bgs (ft)	SAMPLE INTERVAL
		0.9					
		1.6			B24-4	5	
		242					
		519			B24-8		
						10	
						15	
						20	
						25	
						30	

STRATA	SOIL TYPE	DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Composition, Density or Consistency, Moisture, Odor, Geological Interpretation)
		(0-0.3) Asphalt.
	GW	Gravel (GW) Light brown, subangular, dense, dry, no odor.
	ML	Silt (ML) Yellow orange, trace gravel, very stiff, damp to moist, no odor. 4' - 8': Silt with trace gravels, Gx gray, Gx odor, very stiff, dry.
		Total Depth 8'
		DOE Tag # BAJ 259

BOREHOLE/WELL CONSTRUCTION DETAIL



DRILLING CONTRACTOR: ---
DRILLING METHOD: Geoprobe
SAMPLING METHOD: Continuous
START DATE: ---
END DATE: ---

COORDINATES: ---
SURFACE ELEVATION: ---
CASING ELEVATION: ---
SITE DATUM: ---

TIME	DATE	DTW

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LOCATION MAP

N

● MW-1

WELL/BORING NUMBER: B25

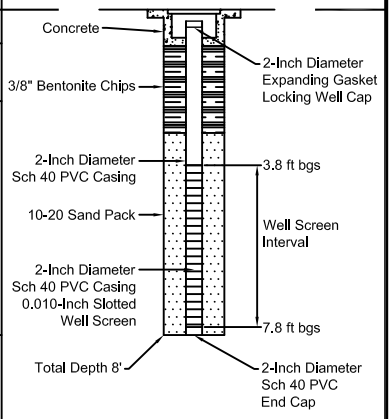
PROJECT NAME: Plaid Pantry 324
PROJECT NUMBER: 1133-01
LOCATION: Seattle, WA
LOGGED BY: J. Greifer
REVIEWED BY: Paul Ecker
DATE: 11-10-09

SAMPLE INFORMATION

SAMPLE TYPE	Blow Counts	PID (ppm)	REC %	First Water	LAB SAMPLE I.D.	DEPTH bgs (ft)	SAMPLE INTERVAL
	9						
	11	32.4			B25-4		
	13					5	
	11						
	27						
	32	26.5			B25-8		
						10	
						15	
						20	
						25	
						30	

STRATA	SOIL TYPE	DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Composition, Density or Consistency, Moisture, Odor, Geological Interpretation)
		(0-0.3) Asphalt.
	GW	Gravel (GW) Light brown, subangular, dense, dry, no odor.
	ML	Silt (ML) Yellow orange, trace gravel, very stiff, damp to moist, no odor.
		7.5' - 8': Color to light brown.
		Total Depth 8'
		DOE Tag # BBP 266

BOREHOLE/WELL CONSTRUCTION DETAIL



DRILLING CONTRACTOR: ---
DRILLING METHOD: Geoprobe
SAMPLING METHOD: Continuous
START DATE: ---
END DATE: ---

COORDINATES: ---
SURFACE ELEVATION: ---
CASING ELEVATION: ---
SITE DATUM: ---

TIME	DATE	DTW

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LOCATION MAP

N

● MW-1

WELL/BORING NUMBER: B26

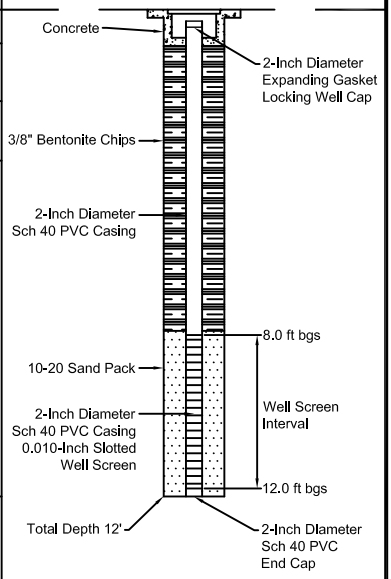
PROJECT NAME: Plaid Pantry 324
PROJECT NUMBER: 1133-01
LOCATION: Seattle, WA
LOGGED BY: J. Greifer
REVIEWED BY: Paul Ecker
DATE: 11-10-09

SAMPLE INFORMATION

SAMPLE TYPE	Blow Counts	PID (ppm)	REC %	First Water	LAB SAMPLE I.D.	DEPTH bgs (ft)	SAMPLE INTERVAL
		72.6			B26-4	5	
		271			B26-8	10	
		1,018			B26-12	15	
						20	
						25	
						30	

STRATA	SOIL TYPE	DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Composition, Density or Consistency, Moisture, Odor, Geological Interpretation)
		(0-0.3) Asphalt.
	GW	Gravel (GW) Light brown, subangular, dense, dry, no odor.
	SP	Sand (SP) Light brown, medium density, medium grained, dry, no odor.
	ML	Silt (ML) Gray, trace gravel, very stiff, dry, no odor.
		Total Depth 12'
		DOE Tag # BBP 264

BOREHOLE/WELL CONSTRUCTION DETAIL



DRILLING CONTRACTOR: ---
DRILLING METHOD: Geoprobe
SAMPLING METHOD: Continuous
START DATE: ---
END DATE: ---

COORDINATES: ---
SURFACE ELEVATION: ---
CASING ELEVATION: ---
SITE DATUM: ---

TIME	DATE	DTW

PNG ENVIRONMENTAL, INC.
6665 SW Hampton St., Suite 101
Tigard, Oregon 97223
TEL (503) 620-2387
FAX (503) 620-2977

LOCATION MAP

N

● MW-1

WELL/BORING NUMBER: B27

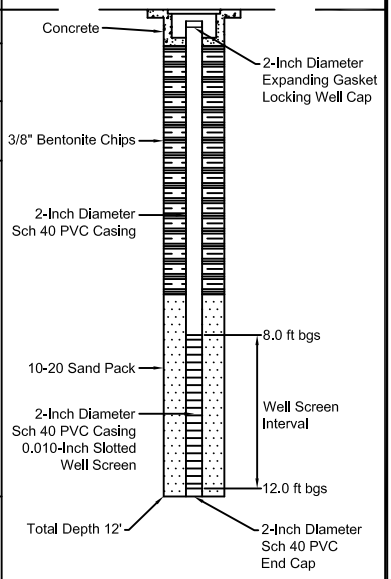
PROJECT NAME: Plaid Pantry 324
PROJECT NUMBER: 1133-01
LOCATION: Seattle, WA
LOGGED BY: J. Greifer
REVIEWED BY: Paul Ecker
DATE: 11-10-09

SAMPLE INFORMATION

SAMPLE TYPE	Blow Counts	PID (ppm)	REC %	First Water	LAB SAMPLE I.D.	DEPTH bgs (ft)	SAMPLE INTERVAL
		1,628			B27-4	5	
		2,011			B27-8	10	
		49.1			B27-12		
						15	
						20	
						25	
						30	

STRATA	SOIL TYPE	DESCRIPTION (USCS Classification, Depth Interval, Color, Grain Size, Plasticity, Shapes, Mineral Composition, Density or Consistency, Moisture, Odor, Geological Interpretation)
		(0-0.3) Asphalt.
	GW	Gravel (GW) Light brown, subangular, dense, dry, no odor.
	SP	Sand (SP) Light brown, medium density, medium grained, dry, no odor.
	ML	Silt (ML) Gray, trace gravel, very stiff, dry, no odor.
		Total Depth 12'
		DOE Tag # BBP 265

BOREHOLE/WELL CONSTRUCTION DETAIL



DRILLING CONTRACTOR: ---
DRILLING METHOD: Geoprobe
SAMPLING METHOD: Continuous
START DATE: ---
END DATE: ---

COORDINATES: ---
SURFACE ELEVATION: ---
CASING ELEVATION: ---
SITE DATUM: ---

TIME	DATE	DTW

APPENDIX C: BORING B-28

CLIENT: PNG environmental, Inc.	EARTH ENGINEERS, INC. PROJECT NO.: 11-026
PROJECT: Plaid Pantry #324, Seattle, WA	EQUIPMENT: Geoprobe 7822DT with 8" HSA and Safety Hammer
LOCATION: See Appendix B	APPROXIMATE ELEVATION: 383.5 feet
DATE DRILLED: May 18, 2011	LOGGED BY: Ken Andrieu, R.G. (Oregon)

DEPTH (ft)	SAMPLE NO.	SAMPLE	SOIL DESCRIPTION	BLOWS PER 6 INCHES	% PASSING #200 SIEVE	LIQUID LIMIT	PLASTIC LIMIT	MOISTURE CONTENT (%)	POCKET PEN. (t.s.f.)	REMARKS
	SPT-1		**ASPHALT -** 4 inches thick	24						
			FILL - brown silty gravel, moist, medium dense (4 inches)	9						
			FILL - brown, moist, medium dense, fine- to coarse-grained silty sand with subround gravel.	10				7		
	SPT-2			15						
			SANDY SILT with GRAVEL - grayish brown, moist, hard, sandy silt with trace fine-grained, subround gravel.	19				8		
				15					2.25	
	SPT-3		**SILTY SAND with GRAVEL** - red-streaked, grayish brown, moist, medium dense, fine- to coarse-grained silty sand with subround gravel.	8						
				8	35			11		
				6						
5			**SANDY SILT with GRAVEL** - gray, moist, very stiff to hard, sandy silt with trace fine-grained, subround gravel and cobble.	4						
	SPT-4			7				12	2	
				12						
				7						
	SPT-5			16				11	2.5	
				18						Auger grinding from 7 to 8 feet.
				10						
	SPT-6			16				11	3	
				19						
				9						
10	SPT-7			17	54			11	3.5	
				16						
				10						
	SPT-8			12				7		
				13						
			Becomes brown at 12 feet.	10						
	SPT-9			20				8	4	
				30						
				21						
	SPT-10		**SILTY SAND with GRAVEL** - brown, moist, dense, fine- to coarse-grained sand with silt and subround gravel.	20	15			11		
15				20						
			Boring terminated at depth of 15 feet. Groundwater was not observed at the time of drilling. Boring backfilled with bentonite chips upon completion on 5/18/2011. Elevation estimated using site survey data provided by PNG while on site.							
20										
25										
30										

EARTH ENGINEERS, Inc.

APPENDIX C: BORING B-29

CLIENT: PNG Environmental, Inc.	EARTH ENGINEERS, INC. PROJECT NO.: 11-026
PROJECT: Plaid Pantry #324, Seattle, WA	EQUIPMENT: Geoprobe 7822DT with 8" HSA and Safety Hammer
LOCATION: See Appendix B	APPROXIMATE ELEVATION: 383 feet
DATE DRILLED: May 18, 2011	LOGGED BY: Ken Andrieu, R.G. (Oregon)

DEPTH (ft)	SAMPLE NO.	SAMPLE	SOIL DESCRIPTION	BLOWS PER 6 INCHES	% PASSING #200 SIEVE	LIQUID LIMIT	PLASTIC LIMIT	MOISTURE CONTENT (%)	POCKET PEN. (t.s.f.)	REMARKS
			ASPHALT - 4 inches thick							
			FILL - brown silty gravel, moist (4 inches)							
			FILL - brown, moist, fine- to coarse-grained silty sand with subround gravel.							
	SPT-1	■	**SANDY SILT with GRAVEL** - gray, moist, very stiff, sandy silt with trace fine-grained, subround gravel.	7 8 9				7 8 11	3	
5			**SILTY SAND with GRAVEL** - red-streaked, brown, moist, medium dense, fine- to coarse-grained silty sand with subround gravel.							
	SPT-2	■	No red-streaking at 5 feet.	4 7 9				15		
										Auger grinding from 7.3 to 9 feet.
	SPT-3	■	**SANDY SILT with GRAVEL** - gray, moist, very stiff to hard, sandy silt with trace fine-grained, subround gravel and cobble.	15 23 27				8		
10										
	SPT-4	■		7 13 12				13	4	
	SPT-5	■		7 20 21				11	4.5+	
15			**SILTY SAND with GRAVEL** - gray and brown, moist, dense, fine- to coarse-grained sand with silt and subround gravel.							
	SPT-6	■		6 19 19				7		
			Boring terminated at depth of 16.5 feet. Groundwater was not observed at the time of drilling. Boring backfilled with bentonite chips upon completion on 5/18/2011. Elevation estimated using site survey data provided by PNG while on site.							
20										
25										
30										

EARTH ENGINEERS, Inc.

DEPTH (ft bgs)	GRAPHIC LOG	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	VOLATILE READING (ppmV)	GROUNDWATER	GW SCREENED INTERVAL	FIELD TESTING	SAMPLE NUMBER / TESTING AND LABORATORY DATA
0			Asphalt (8 inches).						
			SANDY GRAVEL: dense, brown, sandy GRAVEL with silt. (Fill)						
		ML	SANDY SILT: medium stiff, mottled light brown and reddish brown, fine sandy SILT with disseminated fine gravel.		2.4				ROW-1/3 NWTPH-Gx, BTEX
5		SM	SILTY SAND: dense, brown, silty fine SAND with some fine to coarse rounded gravel.		0.8				ROW-1/6 Hold
					132				ROW-1/9 NWTPH-Gx, BTEX
			Moderate hydrocarbon-like odor.						
10		ML	SILT: hard, brown SILT with trace clay, with scattered gravel, non-plastic. Slight hydrocarbon-like odor.		160				ROW-1/10 NWTPH-Gx, BTEX
			Slight hydrocarbon-like odor.		50				
		GW	GRAVEL: dense, gray GRAVEL with fine to medium sand.		12				ROW-1/15 NWTPH-Gx, BTEX
15			End of boring at 15 feet bgs due to refusal.						
20									
25									
30									

BORING METHOD: Air-knife/Direct Push

BOREHOLE DIAMETER: 1.75 (in)

DRILL RIG: AMS 9630

CONTRACTOR: ESN

LOGGED BY/REVIEWED BY: JF/LF

ELEVATION REFERENCE: NA

GROUND SURFACE ELEVATION: NA

START CARD/TAG ID: NA

DRILLING DATES: 8/22/2012 - 8/22/2012

NOTES:
Air-knifed from 0 to 10 feet bgs. Attempted to hand auger but reached refusal at 10 feet bgs.

Plaid Pantry #324
10645 16th Avenue SW
Seattle, WA 98146

E-1133-01

EES Environmental Consulting, Inc.
240 N Broadway, Suite 115
Portland, Oregon 97227
Tel (503) 847-2740

LOG OF BORING ROW-1

DEPTH (ft bgs)	GRAPHIC LOG	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	VOLATILE READING (ppmV)	GROUNDWATER	GW SCREENED INTERVAL	FIELD TESTING	SAMPLE NUMBER / TESTING AND LABORATORY DATA
0			Asphalt (8 inches).						
			SANDY GRAVEL: dense, brown, sandy GRAVEL with silt. (Fill)						
		ML	SILT: medium stiff, mottled brown and reddish brown, moist SILT with some fine sand.		4.0				ROW-2/3 NWTPH-Gx, BTEX
5		SM	SILTY SAND: medium dense, brown, silty fine SAND with disseminated fine gravel. No odor.		4.7				ROW-2/6 Hold
			Dense gravel layer at 7.5 to 8 feet bgs.						
		ML	SILT: medium stiff to stiff, brown, moist SILT with trace clay, fine sand, disseminated gravel. Gray at 9 to 10 feet bgs.		18				ROW-2/8 Hold
10			Gray at 10 feet bgs. Moderate petroleum hydrocarbon odor.		52				ROW-2/10 NWTPH-Gx, BTEX
		SP	SAND: medium dense, brown, medium SAND. No odor.		8.5				
		ML	SANDY SILT: medium stiff, brown, sandy SILT.						
		GW	GRAVEL: dense, gray, moist, fine to coarse rounded to subrounded GRAVEL with sand.						
15			Silty sand layer at 16 to 17 feet bgs.		11				ROW-2/16 NWTPH-Gx, BTEX
					12				ROW-2/18 NWTPH-Gx, BTEX
			End of boring at 18 feet bgs due to refusal.						
20									
25									
30									

BORING METHOD: Air-knife/Direct Push

BOREHOLE DIAMETER: 1.75 (in)

DRILL RIG: AMS 9630

CONTRACTOR: ESN

LOGGED BY/REVIEWED BY: JF/LF

ELEVATION REFERENCE: NA

GROUND SURFACE ELEVATION: NA

START CARD/TAG ID: NA

DRILLING DATES: 8/22/2012 - 8/22/2012

NOTES:
Air-knifed from 0 to 7.5 feet bgs due to refusal in rock.

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LOG OF BORING ROW-2

DEPTH (ft bgs)	GRAPHIC LOG	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	VOLATILE READING (ppmV)	GROUNDWATER	GW SCREENED INTERVAL	FIELD TESTING	SAMPLE NUMBER / TESTING AND LABORATORY DATA
0			Asphalt (8 inches).						
			SANDY GRAVEL: dense, brown, sandy GRAVEL with silt. (Fill)						
		SM	SILTY SAND: medium dense, brown and reddish brown, silty fine to medium SAND with trace coarse to fine rounded gravel.		7.5				ROW-3/3 NWTPH-Gx, BTEX
5		ML	SANDY SILT: medium stiff, brown, moist, sandy SILT, scattered gravel inclusions, non-plastic.		0.0				
			Color changes to gray. Moderate hydrocarbon-like odor.		9.4				ROW-3/9 NWTPH-Gx, BTEX
10			Becomes stiff.		94				ROW-3/12 NWTPH-Gx, BTEX
		GW	GRAVEL: dense, fine to coarse rounded to subrounded GRAVEL with some sand (20-30%). No odor.		6.4				
15			Sand content increases to sandy (40%) at 16 to 17 feet bgs.		9.4				
					6.2				ROW-3/18 NWTPH-Gx, BTEX
			End of boring at 18 feet bgs due to refusal.						
20									
25									
30									

BORING METHOD: Air-knife/Direct Push

BOREHOLE DIAMETER: 1.75 (in)

DRILL RIG: AMS 9630

CONTRACTOR: ESN

LOGGED BY/REVIEWED BY: JF/LF

ELEVATION REFERENCE: NA

GROUND SURFACE ELEVATION: NA

START CARD/TAG ID: NA

DRILLING DATES: 8/22/2012 - 8/22/2012

NOTES:
Air-knifed from 0 to 3.5 feet bgs due to refusal. Hand augered to refusal at 4 feet bgs.

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LOG OF BORING ROW-3

DEPTH (ft bgs)	USCS SYMBOL	SOIL DESCRIPTION	VOLATILE READING (ppmV)	SAMPLE NUMBER / TESTING AND LABORATORY DATA
0		Asphalt (8 inches).		
		SANDY GRAVEL: dense, brown, sandy GRAVEL with silt. (Fill)		
	SM	SILTY SAND: medium dense, brown and yellowish brown, moist, silty SAND with some fine to coarse rounded gravel. No odor.	3.3	ROW-4/3 NWTPH-Gx, BTEX
5		Becomes gravelly at 6 feet bgs.		
	GM	SILTY GRAVEL: dense, brown and yellowish brown, moist, silty fine to coarse rounded to subrounded GRAVEL with some fine to medium sand.	3.7	
	ML	SANDY SILT: stiff, brown, moist, sandy SILT with some fine rounded gravel.	13	
10		Color changes to gray. Zone (< 1 foot thick) with moderate petroleum hydrocarbon odor.	403	ROW-4/10 NWTPH-Gx, BTEX
	SM	SILTY SAND: medium dense, light brown, silty SAND with trace fine rounded gravel. No odor.	7.0	ROW-4/11 NWTPH-Gx, BTEX
			4.3	
	GP	SANDY GRAVEL: dense, light brown, moist, sandy fine rounded to subrounded GRAVEL.	4.5	ROW-4/15 NWTPH-Gx, BTEX
15			5.8	
			4.5	ROW-4/18 Hold
		End of boring at 18 feet bgs due to refusal.		
20				
25				
30				

BORING METHOD: Air-knife/Direct Push

BOREHOLE DIAMETER: 1.75 (in)

ELEVATION REFERENCE: NA

DRILL RIG: AMS 9630

GROUND SURFACE ELEVATION: NA

CONTRACTOR: ESN

START CARD/TAG ID: NA

LOGGED BY/REVIEWED BY: JF/LF

DRILLING DATES: 8/23/2012 - 8/23/2012

NOTES:
Air-knifed from 0 to 7 feet bgs due to refusal. Hand augered to refusal at 7 feet bgs.

Plaid Pantry #324
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LOG OF BORING ROW-4

DEPTH (ft bgs)	GRAPHIC LOG	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	VOLATILE READING (ppmV)	GROUNDWATER	GW SCREENED INTERVAL	FIELD TESTING	SAMPLE NUMBER / TESTING AND LABORATORY DATA
0			Asphalt (8 inches).						
			SANDY GRAVEL: dense, brown, sandy GRAVEL with silt. (Fill)						
		SM	SILTY SAND: medium dense, brown, silty fine to medium SAND with trace coarse to fine rounded gravel.		4.5				ROW-5/3 NWTPH-Gx, BTEX
5			Becomes gravelly; rock in sampler at 6 feet bgs. Very hard hand augering. Poor recovery.		3.6 3.0				
10		ML	SANDY SILT: stiff to very stiff, brown, sandy SILT with scattered fine gravel inclusions.		5.1				ROW-5/10 NWTPH-Gx, BTEX
			Becomes hard.		5.0				
15		GP	SANDY GRAVEL: dense, brown, moist, sandy fine rounded to subrounded GRAVEL. No odor.		1.0 5.8				ROW-5/15 NWTPH-Gx, BTEX
			End of boring at 18 feet bgs due to refusal.		4.0				ROW-5/18 Hold
20									
25									
30									

BORING METHOD: Air-knife/Direct Push

BOREHOLE DIAMETER: 1.75 (in)

DRILL RIG: AMS 9630

CONTRACTOR: ESN

LOGGED BY/REVIEWED BY: JF/LF

ELEVATION REFERENCE: NA

GROUND SURFACE ELEVATION: NA

START CARD/TAG ID: NA

DRILLING DATES: 8/23/2012 - 8/23/2012

NOTES:
Air-knifed from 0 to 5 feet bgs due to refusal. Hand augered to refusal at 6.5 feet bgs.

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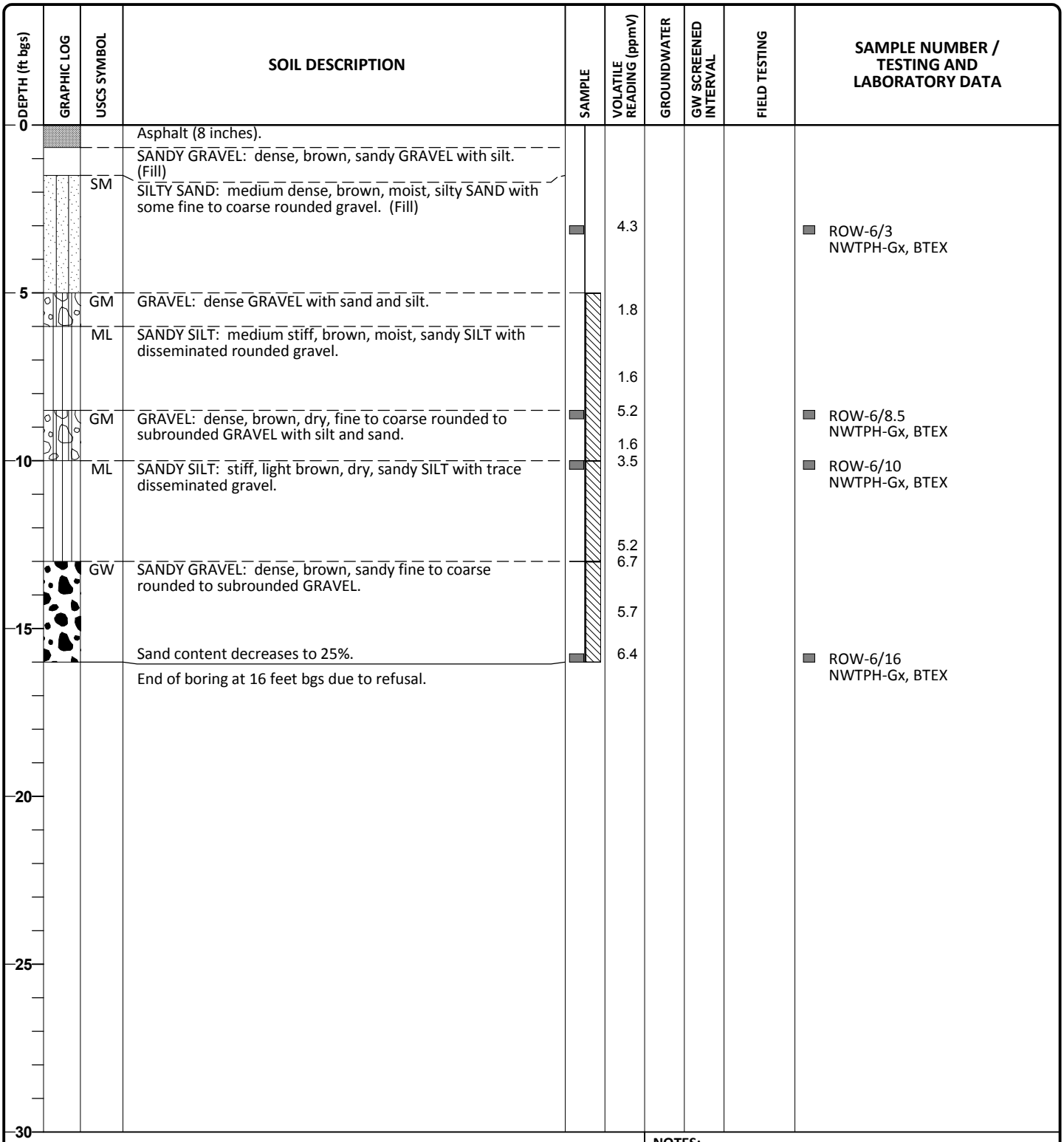
LOG OF BORING
ROW-5



BORING METHOD: Air-knife/Direct Push

BOREHOLE DIAMETER: 1.75 (in)

ELEVATION REFERENCE: NA

DRILL RIG: AMS 9630

GROUND SURFACE ELEVATION: NA

CONTRACTOR: ESN

START CARD/TAG ID: NA

LOGGED BY/REVIEWED BY: JF/LF

DRILLING DATES: 8/23/2012 - 8/23/2012

NOTES:
Air-knifed from 0 to 5 feet bgs due to refusal. Unable to hand auger more than 3 inches beyond 5 feet bgs.

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LOG OF BORING ROW-6

DEPTH (ft bgs)	GRAPHIC LOG	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	VOLATILE READING (ppmV)	GROUNDWATER	GW SCREENED INTERVAL	FIELD TESTING	SAMPLE NUMBER / TESTING AND LABORATORY DATA
0			Two layers of concrete (each 8 inches thick).						
			SANDY GRAVEL: dense, dark brown, moist, sandy GRAVEL with some silt. (Fill) No odor.		3.0				ROW-7/3 NWTPH-Gx, BTEX
5		SM	SILTY SAND: medium dense, brown and yellowish brown, moist, silty SAND with some fine gravel.						
		ML	SANDY SILT: medium stiff, brown, moist, sandy SILT with disseminated rounded gravel.		3.7				ROW-7/6 Hold
					4.2				ROW-7/8 NWTPH-Gx, BTEX
		GM	SILTY GRAVEL: dense, brown, moist, silty fine to coarse rounded GRAVEL with some sand.						
10		ML	SILT: stiff to very stiff, brown SILT with some clay and disseminated gravel and cobbles.		6.4				ROW-7/10 NWTPH-Gx, BTEX
					3.3				ROW-7/14 NWTPH-Gx, BTEX
15			End of boring at 14 feet bgs due to refusal.						
20									
25									
30									

BORING METHOD: Air-knife/Direct Push

BOREHOLE DIAMETER: 1.75 (in)

DRILL RIG: AMS 9630

CONTRACTOR: ESN

LOGGED BY/REVIEWED BY: JF/LF

ELEVATION REFERENCE: NA

GROUND SURFACE ELEVATION: NA

START CARD/TAG ID: NA

DRILLING DATES: 8/24/2012 - 8/24/2012

NOTES:
Air-knifed from 0 to 6 feet bgs due to refusal. Hand augered to refusal at 7 feet bgs.

Plaid Pantry #324
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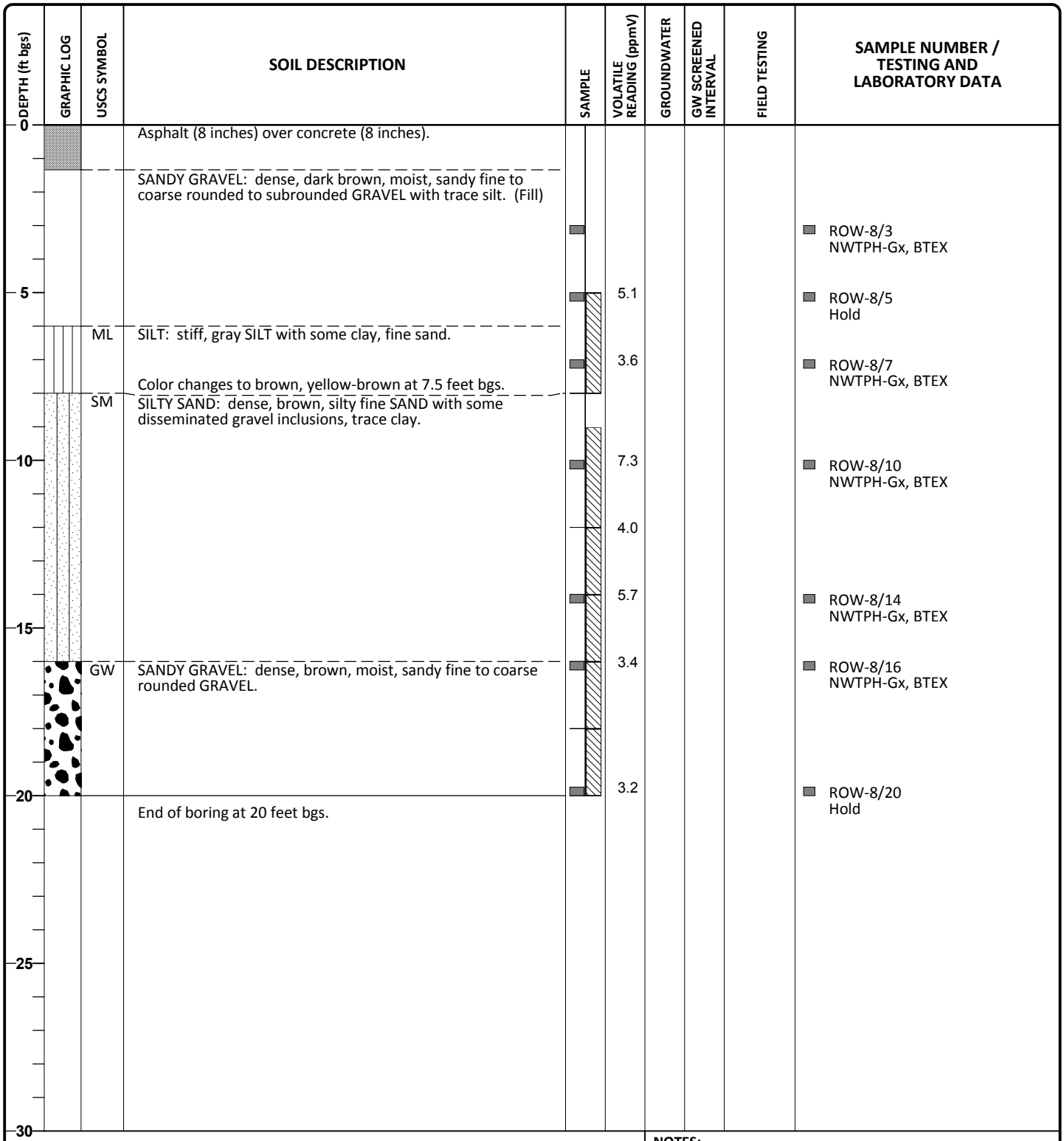
LOG OF BORING ROW-7



BORING METHOD: Air-knife/Direct Push

BOREHOLE DIAMETER: 1.75 (in)

ELEVATION REFERENCE: NA

DRILL RIG: AMS 9630

GROUND SURFACE ELEVATION: NA

CONTRACTOR: ESN

START CARD/TAG ID: NA

LOGGED BY/REVIEWED BY: JF/LF

DRILLING DATES: 8/24/2012 - 8/24/2012

NOTES:
Air-knifed from 0 to 4.5 feet bgs due to refusal on very large cobble. Hand augered to refusal at 5 feet bgs.

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LOG OF BORING
ROW-8

DEPTH (ft bgs)	GRAPHIC LOG	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	VOLATILE READING (ppmV)	GROUNDWATER	GW SCREENED INTERVAL	FIELD TESTING	SAMPLE NUMBER / TESTING AND LABORATORY DATA
0			Asphalt (8 inches) over concrete (8 inches).						
			SANDY GRAVEL: dense, dark brown, sandy fine rounded to subrounded GRAVEL. (Fill)		2.6				ROW-9/3 NWTPH-Gx, BTEX
5		ML	CLAYEY SILT: stiff, brown, clayey SILT with trace disseminated fine rounded gravel.		3.4				ROW-9/7 NWTPH-Gx, BTEX
			Gray from 7 to 7.5 feet bgs.		5.2				
			Trace clay, some fine sand.						
10					2.4				ROW-9/10 NWTPH-Gx, BTEX
			Very stiff to hard.						
			Sand content decreases.		2.4				
			Dark brown, sandy with trace clay.						
15		GW	SANDY GRAVEL: dense, brown, moist, sandy fine to coarse rounded to subrounded GRAVEL. No odor.		3.6				ROW-9/15 NWTPH-Gx, BTEX
					4.1				
					1.7				ROW-9/19 Hold
20			End of boring at 19 feet bgs.						
25									
30									

BORING METHOD: Air-knife/Direct Push

BOREHOLE DIAMETER: 1.75 (in)

DRILL RIG: AMS 9630

CONTRACTOR: ESN

LOGGED BY/REVIEWED BY: JF/LF

ELEVATION REFERENCE: NA

GROUND SURFACE ELEVATION: NA

START CARD/TAG ID: NA

DRILLING DATES: 8/24/2012 - 8/24/2012

NOTES:
Air-knifed from 0 to 5 feet bgs due to refusal. Hand augered to 7 feet bgs.

Plaid Pantry #324
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Seattle, WA 98146

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LOG OF BORING ROW-9

DEPTH (ft bgs)	GRAPHIC LOG	USCS SYMBOL	SOIL DESCRIPTION	SAMPLE	VOLATILE READING (ppmV)	GROUNDWATER	GW SCREENED INTERVAL	FIELD TESTING	SAMPLE NUMBER / TESTING AND LABORATORY DATA
0			Asphalt (8 inches) over concrete (8 inches).						
		ML	SILT: stiff, brown SILT with disseminated gravel.		1.0				ROW-10/3 NWTPH-Gx, BTEX
5			Becomes gravelly.						
		ML	SANDY SILT: medium stiff, brown, moist, sandy SILT.		3.0				
			Becomes gray. No odor.		1.9				
			Becomes stiff, brown, disseminated rounded gravel. Fine sand content increases slightly.		1.6				ROW-10/8 NWTPH-Gx, BTEX
10			Very stiff. Sand content decreases to some fine sand (20-30%).		0.8				ROW-10/10 NWTPH-Gx, BTEX
					3.8				
		GW	SANDY GRAVEL: dense, brown, moist, sandy fine to coarse rounded to subrounded GRAVEL, little to no fines. No odor.		4.2				ROW-10/13 Hold
15			End of boring at 15 feet bgs.		6.5				ROW-10/15 NWTPH-Gx, BTEX
20									
25									
30									

BORING METHOD: Air-knife/Direct Push

BOREHOLE DIAMETER: 1.75 (in)

DRILL RIG: AMS 9630

CONTRACTOR: ESN

LOGGED BY/REVIEWED BY: JF/LF

ELEVATION REFERENCE: NA

GROUND SURFACE ELEVATION: NA

START CARD/TAG ID: NA

DRILLING DATES: 8/24/2012 - 8/25/2012

NOTES:
Air-knifed from 0 to 5 feet bgs due to refusal. Hand augered to refusal at 6 feet bgs.

Plaid Pantry #324
10645 16th Avenue SW
Seattle, WA 98146

E-1133-01

EES Environmental Consulting, Inc.
240 N Broadway, Suite 115
Portland, Oregon 97227
Tel (503) 847-2740

LOG OF BORING
ROW-10

EES Environmental Consulting Inc.
240 N. Broadway #203
Portland, OR 97227
Telephone: 503.847.2740

BORING NO. **B-32/CS-1**
PROJECT **Plaid #324**
LOCATION **Seattle, WA**
PROJECT NO. **1133-01**
LOGGED BY **CJR**

START CARD
COORDINATES
SURFACE ELEVATION
WELL ID
DATUM

DEPTH FEET	LAB SAMPLE ID	SAMPLE TYPE	PID (ppmV)	SHEEN	RECOVERY %	STRATA	DESCRIPTION	CONSTRUCTION DETAIL/ COMMENTS	ELEVATION FEET
							Asphalt (AC).		
							Gray silty GRAVEL (GP), moist.		
			1.8	NS	80		Brown sandy SILT with gravel (ML); moist.		
5	B-32/CS-1 (5-5.5)	Grab	2.0	NS					
							Becomes gray, obvious petroleum odor.		
	B-32/CS-1 (7-7.5)	Grab	733	NS	100				
	B-32/CS-1 (9-9.5)	Grab	76.6	NS					
10									
	B-32/CS-1 (11-11.5)	Grab	24.2	NS					
			16.9	NS	90				
							Becomes brown; no petroleum odor.		
			7.1	NS			Brown SAND with gravel (SP); moist.		
15							Boring complete at 15 feet bgs.		

DRILLING CONTRACTOR **Pacific Soil and Water**
DRILLING METHOD **Direct-Push**
DRILLING EQUIPMENT **GeoProbe 6600**
DRILLING STARTED **7/11/13** ENDED **7/11/13**

REMARKS

See key sheet for symbols and abbreviations used above.

EES Environmental Consulting Inc.
240 N. Broadway #203
Portland, OR 97227
Telephone: 503.847.2740

BORING NO. **B-33/CS-2**
PROJECT **Plaid #324**
LOCATION **Seattle, WA**
PROJECT NO. **1133-01**
LOGGED BY **CJR**

START CARD
COORDINATES
SURFACE ELEVATION
WELL ID
DATUM

SAMPLE INFORMATION						STRATA	DESCRIPTION	CONSTRUCTION DETAIL/ COMMENTS	ELEVATION FEET
DEPTH FEET	LAB SAMPLE ID	SAMPLE TYPE	PID (ppmV)	SHEEN	RECOVERY %				
							Asphalt (AC).		
							Grayish brown silty GRAVEL (GP), some sand; moist.		
			0.8	NS	80		Brown sandy SILT with gravel (ML); moist.		
5	B-33/CS-2 (5-5.5)	Grab	0.9	NS			Becomes gray, obvious petroleum odor.		
	B-33/CS-2 (7-7.5)	Grab	895	NS	90				
	B-33/CS-2 (9-9.5)	Grab	1360	NS					
10	B-33/CS-2 (11-11.5)	Grab	61.7	NS					
			21.0	NS	100		Becomes brown; no petroleum odor.		
			16.9	NS					
15							Boring complete at 15 feet bgs.		

DRILLING CONTRACTOR **Pacific Soil and Water**
DRILLING METHOD **Direct-Push**
DRILLING EQUIPMENT **GeoProbe 6600**
DRILLING STARTED **7/11/13** ENDED **7/11/13**

REMARKS

See key sheet for symbols and abbreviations used above.

EES Environmental Consulting Inc.
240 N. Broadway #203
Portland, OR 97227
Telephone: 503.847.2740

BORING NO. **B-34/CS-3**
PROJECT **Plaid #324**
LOCATION **Seattle, WA**
PROJECT NO. **1133-01**
LOGGED BY **CJR**

START CARD
COORDINATES
SURFACE ELEVATION
WELL ID
DATUM

DEPTH FEET	LAB SAMPLE ID	SAMPLE TYPE	PID (ppmV)	SHEEN	RECOVERY %	STRATA	DESCRIPTION	CONSTRUCTION DETAIL/ COMMENTS	ELEVATION FEET
							Asphalt (AC).		
							Grayish brown silty GRAVEL (GP), some sand; moist.		
			1.0	NS	90		Brown sandy SILT with gravel (ML); moist.		
			957	NS					
			420	NS					
5	B-34/CS-3 (5-5.5)	Grab	810	NS			Becomes gray, obvious petroleum odor.		
	B-34/CS-3 (7-7.5)	Grab	1471	NS	90				
	B-34/CS-3 (9-9.5)	Grab	49.4	NS					
10	B-34/CS-3 (11-11.5)	Grab	1124	NS					
			94.6	NS	100				
			16.9	NS			Becomes brown; no petroleum odor.		
15			8.5	NS	100		Brown SAND (SP) with gravel, sand is medium; moist.		
			1.0	NS					
20							Boring complete at 20 feet bgs.		

DRILLING CONTRACTOR **Pacific Soil and Water**
DRILLING METHOD **Direct-Push**
DRILLING EQUIPMENT **GeoProbe 6600**
DRILLING STARTED **7/11/13** ENDED **7/11/13**

REMARKS

See key sheet for symbols and abbreviations used above.

EES Environmental Consulting Inc.
240 N. Broadway #203
Portland, OR 97227
Telephone: 503.847.2740

BORING NO. **B-35/CS-4** PAGE **1** OF **1**
PROJECT **Plaid #324**
LOCATION **Seattle, WA**
PROJECT NO. **1133-01**
LOGGED BY **CJR**

START CARD
COORDINATES
SURFACE ELEVATION
WELL ID
DATUM

DEPTH FEET	LAB SAMPLE ID	SAMPLE TYPE	PID (ppmV)	SHEEN	RECOVERY %	STRATA	DESCRIPTION	CONSTRUCTION DETAIL/ COMMENTS	ELEVATION FEET
							Asphalt (AC).		
			0.5	NS			Brown SAND (SP); moist.		
							Gray silty gravel (GP), moist.		
					90		Brown sandy silt (ML) with gravel; moist.		
			96.5	NS			Slight petroleum odor.		
							Becomes gray, obvious petroleum odor.		
5	B-35/CS-4 (5-5.5)	Grab	2068	NS					
	B-35/CS-4 (7-7.5)	Grab	1816	NS	90				
	B-35/CS-4 (9-9.5)	Grab	111	NS					
10	B-35/CS-4 (11-11.5)	Grab	50.1	NS					
					90				
			48.5	NS			Becomes brown; slight petroleum odor.		
15			1.0	NS			Brown sand (SP) with gravel, sand is medium; moist.		
					100				
							Boring completed at 16.5 feet bgs.		

DRILLING CONTRACTOR **Pacific Soil and Water**
DRILLING METHOD **Direct-Push**
DRILLING EQUIPMENT **GeoProbe 6600**
DRILLING STARTED **7/11/13** ENDED **7/11/13**

REMARKS

See key sheet for symbols and abbreviations used above.

EES LOG WITH WELL & SHEEN - LOG A EWNN03.GDT - 7/24/13 10:55 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\PLAID 324 BORING LOGS 071213.GPJ

EES Environmental Consulting Inc.
240 N. Broadway #203
Portland, OR 97227
Telephone: 503.847.2740

BORING NO. **B-37/B-37A**
PROJECT **Plaid #324**
LOCATION **Seattle, WA**
PROJECT NO. **1133-01**
LOGGED BY **RR**

START CARD
COORDINATES
SURFACE ELEVATION
WELL ID
DATUM

SAMPLE INFORMATION						STRATA	DESCRIPTION	CONSTRUCTION DETAIL/ COMMENTS	ELEVATION FEET
DEPTH FEET	LAB SAMPLE ID	SAMPLE TYPE	PID (ppmV)	SHEEN	RECOVERY %				
							ASPHALT (AC).		
			19	No			Grayish brown SILTY GRAVEL (GP); moist.		
					100		Brown SANDY SILT (ML) with gravel; moist. Becomes gray.		
5	B-37: 4.5-5	Grab	2380	No			Obvious petroleum odor between 4.5 and 10 feet bgs.		
			179.5	No	100				
10			40.4	No					
			296	No					
					100		Brown SAND (SP) with gravel, sand is medium; moist.		
			11.5	No					
15							Brown SANDY GRAVEL (GP) with occasional cobbles; moist.		
			11.6	No	100				
			10.9	No					
20			26.2	No					
	B-37A: 23-23.5	Grab	24.7	No	100				

DRILLING CONTRACTOR **Holt Services, Inc.**
DRILLING METHOD **Sonic**
DRILLING EQUIPMENT **TSI 150 CC**
DRILLING STARTED **3/5/14** ENDED **3/5/14**

REMARKS **PID malfunction due to high ambient moisture, PID readings provided for qualitative purposes only.**

See key sheet for symbols and abbreviations used above.

EES Environmental Consulting Inc.
240 N. Broadway #203
Portland, OR 97227
Telephone: 503.847.2740

BORING NO. **B-37/B-37A**
PROJECT **Plaid #324**
LOCATION **Seattle, WA**
PROJECT NO. **1133-01**
LOGGED BY **RR**

START CARD
COORDINATES
SURFACE ELEVATION
WELL ID
DATUM

SAMPLE INFORMATION						STRATA	DESCRIPTION	CONSTRUCTION DETAIL/ COMMENTS	ELEVATION FEET
DEPTH FEET	LAB SAMPLE ID	SAMPLE TYPE	PID (ppmV)	SHEEN	RECOVERY %				
			22.0	No			Brown SANDY GRAVEL (GP) with occasional cobbles; moist. *(continued)*		
			23.5	No	100				
			19.0	No					
30			10.9	No					
					100				
35			16.4	No					
					100				
			12.2	No					
40			12.0	No			Brown SAND with gravel (SP); moist.		
					100				
45			12.3	No					
					100				
			11.2	No					
50							Boring completed at 50 feet bgs. Borehole backfilled with hydrated bentonite and sealed at the surface with concrete.		

EES Environmental Consulting Inc.
240 N. Broadway #203
Portland, OR 97227
Telephone: 503.847.2740

BORING NO. **B-38**
PROJECT **Plaid #324**
LOCATION **Seattle, WA**
PROJECT NO. **1133-01**
LOGGED BY **RR**

START CARD
COORDINATES
SURFACE ELEVATION
WELL ID
DATUM

SAMPLE INFORMATION						STRATA	DESCRIPTION	CONSTRUCTION DETAIL/ COMMENTS	ELEVATION FEET
DEPTH FEET	LAB SAMPLE ID	SAMPLE TYPE	PID (ppmV)	SHEEN	RECOVERY %				
				No			ASPHALT (AC).		
				No			Grayish brown SILTY GRAVEL (GP); moist.		
				No	100		Brown SANDY SILT (ML) with gravel; moist. Becomes gray.		
5	B-38: 4.5-5	Grab		No					
				No					
					100				
				No					
10				No					
				No	100		Brown SAND (SP) with gravel, sand is medium; moist.		
				No					
15							Boring completed at 15 feet bgs. No obvious petroleum odor observed. Borehole backfilled with hydrated bentonite and sealed at the surface with concrete.		

DRILLING CONTRACTOR **Holt Services, Inc.**
DRILLING METHOD **Sonic**
DRILLING EQUIPMENT **TSI 150 CC**
DRILLING STARTED **3/5/14** ENDED **3/5/14**

REMARKS **PID malfunction during sampling due to high ambient moisture.**

See key sheet for symbols and abbreviations used above.

EES Environmental Consulting Inc.
240 N. Broadway #203
Portland, OR 97227
Telephone: 503.847.2740

BORING NO. **B-39**
PROJECT **Plaid #324**
LOCATION **Seattle, WA**
PROJECT NO. **1133-01**
LOGGED BY **RR**

START CARD
COORDINATES
SURFACE ELEVATION
WELL ID
DATUM

SAMPLE INFORMATION						STRATA	DESCRIPTION	CONSTRUCTION DETAIL/ COMMENTS	ELEVATION FEET
DEPTH FEET	LAB SAMPLE ID	SAMPLE TYPE	PID (ppmV)	SHEEN	RECOVERY %				
							ASPHALT (AC).		
				No			Grayish brown SILTY GRAVEL (GP); moist.		
					100		Brown SANDY SILT (ML) with gravel; moist.		
				No					
5				Slight			Becomes gray.		
	B-39: 7-7.5	Grab		Heavy	100		Obvious petroleum odor between 5 and 8 feet bgs.		
10				No					
				No					
					100		Brown SAND (SP) with gravel, sand is medium; moist.		
				No					
15							Boring completed at 15 feet bgs. Borehole backfilled with hydrated bentonite and sealed at the surface with concrete.		

DRILLING CONTRACTOR **Holt Services, Inc.**
DRILLING METHOD **Sonic**
DRILLING EQUIPMENT **TSI 150 CC**
DRILLING STARTED **3/5/14** ENDED **3/5/14**

REMARKS **PID malfunction during sampling due to high ambient moisture.**

See key sheet for symbols and abbreviations used above.

EES Environmental Consulting Inc.
240 N. Broadway #203
Portland, OR 97227
Telephone: 503.847.2740

BORING NO. **B-40**
PROJECT **Plaid #324**
LOCATION **Seattle, WA**
PROJECT NO. **1133-01**
LOGGED BY **RR**

START CARD
COORDINATES
SURFACE ELEVATION
WELL ID
DATUM

SAMPLE INFORMATION						STRATA	DESCRIPTION	CONSTRUCTION DETAIL/ COMMENTS	ELEVATION FEET
DEPTH FEET	LAB SAMPLE ID	SAMPLE TYPE	PID (ppmV)	SHEEN	RECOVERY %				
							ASPHALT (AC).		
				No			Grayish brown SILTY GRAVEL (GP); moist.		
					100		Brown SANDY SILT (ML) with gravel; moist.		
							Becomes gray. Obvious petroleum odor between 4.5 and 8 feet bgs.		
5				Slight					
				Slight					
	B-40: 8-8.5	Grab		Heavy	100				
10				No					
					100				
							Brown SAND (SP) with gravel, sand is medium; moist.		
				No					
15							Boring completed at 15 feet bgs. Borehole backfilled with hydrated bentonite and sealed at the surface with concrete.		

DRILLING CONTRACTOR **Holt Services, Inc.**
DRILLING METHOD **Sonic**
DRILLING EQUIPMENT **TSI 150 CC**
DRILLING STARTED **3/5/14** ENDED **3/5/14**

REMARKS **PID malfunction during sampling due to high ambient moisture.**

See key sheet for symbols and abbreviations used above.

EES LOG WITH WELL & SHEEN - LOG A EWNN03.GDT - 3/14/14 15:54 - C:\USERS\PUBLIC\DOCUMENTS\BENTLEY\GINT\PROJECTS\PLAID 324 BORING LOGS 031314.GPJ

EES Environmental Consulting Inc.
240 N. Broadway #203
Portland, OR 97227
Telephone: 503.847.2740

BORING NO. **B-41**
PROJECT **Plaid #324**
LOCATION **Seattle, WA**
PROJECT NO. **1133-01**
LOGGED BY **RR**

START CARD
COORDINATES
SURFACE ELEVATION
WELL ID
DATUM

SAMPLE INFORMATION						STRATA	DESCRIPTION	CONSTRUCTION DETAIL/ COMMENTS	ELEVATION FEET
DEPTH FEET	LAB SAMPLE ID	SAMPLE TYPE	PID (ppmV)	SHEEN	RECOVERY %				
							ASPHALT (AC).		
				No			Grayish brown SILTY GRAVEL (GP); moist.		
				No	100		Brown SANDY SILT (ML) with gravel; moist.		
5				No			Becomes gray.		
	B-41: 8-8.5	Grab		Heavy	100		Obvious petroleum odor at 8 feet bgs.		
10				No					
				No	100		Brown SAND (SP) with gravel, sand is medium; moist.		
				No					
15							Boring completed at 15 feet bgs. Borehole backfilled with hydrated bentonite and sealed at the surface with concrete.		

DRILLING CONTRACTOR **Holt Services, Inc.**
DRILLING METHOD **Sonic**
DRILLING EQUIPMENT **TSI 150 CC**
DRILLING STARTED **3/5/14** ENDED **3/5/14**

REMARKS **PID malfunction during sampling due to high ambient moisture.**

See key sheet for symbols and abbreviations used above.

Appendix D1

ATTACHMENT F-A

Total Petroleum Hydrocarbon Calculations - Direct Contact

Former Plaid Pantry #324

White Center/King County, Washington

	B-37	B-39	B-40	B-41
ALIPHATICS				
>5-6	134	26.2	332	98.3
>6-8	256	64.4	392	10.2
>8-10	19.5	60.8	15.2	23.1
>10-12	830	73.4	118	156
>12-16	142	19.7	15.2	43.3
>16-21	33	5.74	2.77	9.82
>21-34	2.65	2.775	2.77	2.72
AROMATICS				
>8-10	193.9	77.5	440.6	247.1
>10-12	536.8	137.95	363.2	489.2
>12-13		54.4	127	284
>12-16	22.8	11.8	11.3	9.37
>16-21	27.6	7.66	7	7.47
>21-34	2.65	2.775	2.77	2.72
Benzene	4.82	0.556	10.6	2.92
Toluene	29.6	9.64	133	70.7
Ethylbenzene	28	14.3	40.3	60.5
Xylenes	205.1	71.2	92.1	360.4
Naphthalene	26.2	6.05	14.8	21.8
1-methyl				
2-methyl				
n-hexane				
MTBE	13	0.231	16.5	8.96
EDB				
EDC				
BaPAnthracene				
B(b)fluoranthene				
B(k)fluoranthene				
BaP				
Chrysene				
Dibenzo (a,h)				
Indeno (1,2,3				
Most stringent direct contact soil concentration	2649.87	2921.79	3661.47	2915.36
	HI=1	HI= 1	ECR=1E-06	HI = 1
units are mg/Kg	ECR = 3E-07	1.00E-07	0.88	

2918.595	median concentration

A2. 1B Worksheet for Calculating Soil Cleanup Levels for Protection of Human Health: (Soil Direct Contact Pathway)

Method B: Unrestricted Land Use (WAC 173-340-740)

Date: 4/18/2014
Site Name: Plaid Pantry #324
Sample Name: B-37

Chemical of Concern or EC group	Current Condition				Adjusted Condition			
	Measured Soil Conc @dry basis	HQ	RISK	Pass or Fail?	Soil Conc being tested	HQ	RISK	Pass or Fail?
	mg/kg	unitless	unitless		mg/kg	unitless	unitless	
Petroleum EC Fraction								
AL_EC >5-6	134	1.07E-03			1.42E+02	1.13E-03		
AL_EC >6-8	256	2.04E-03			2.71E+02	2.15E-03		
AL_EC >8-10	19.5	8.80E-03			2.06E+01	9.29E-03		
AL_EC >10-12	830	3.74E-01			8.77E+02	3.96E-01		
AL_EC >12-16	142	8.52E-02			1.50E+02	9.00E-02		
AL_EC >16-21	33	2.97E-04			3.49E+01	3.14E-04		
AL_EC >21-34	2.65	2.39E-05			2.80E+00	2.52E-05		
AR_EC >8-10	193.9	2.62E-02			2.05E+02	2.77E-02		
AR_EC >10-12	536.8	3.63E-01			5.67E+02	3.84E-01		
AR_EC >12-16	22.8	8.21E-03			2.41E+01	8.67E-03		
AR_EC >16-21	27.6	1.66E-02			2.92E+01	1.75E-02		
AR_EC >21-34	2.65	1.19E-03			2.80E+00	1.26E-03		
Benzene	4.82	1.51E-02	2.65E-07		5.09E+00	1.59E-02	2.80E-07	
Toluene	29.6	4.93E-03			3.13E+01	5.21E-03		
Ethylbenzene	28	3.75E-03			2.96E+01	3.96E-03		
Total Xylenes	205.1	1.38E-02			2.17E+02	1.45E-02		
Naphthalene	26.2	2.16E-02			2.77E+01	2.29E-02		
1-Methyl Naphthalene	0				0.00E+00	0.00E+00		
2-Methyl Naphthalene	0				0.00E+00	0.00E+00		
n-Hexane	0				0.00E+00	0.00E+00		
MTBE	13				1.37E+01			
Ethylene Dibromide (EDB)	0		0.00E+00		0.00E+00	0.00E+00	0.00E+00	
1,2 Dichloroethane (EDC)	0		0.00E+00		0.00E+00	0.00E+00	0.00E+00	
Benzo(a)anthracene	0		0.00E+00	*For*	0.00E+00		0.00E+00	*For*
Benzo(b)fluoranthene	0		0.00E+00	*all*	0.00E+00		0.00E+00	*all*
Benzo(k)fluoranthene	0		0.00E+00	*cPAHs*	0.00E+00		0.00E+00	*cPAHs*
Benzo(a)pyrene	0		0.00E+00		0.00E+00		0.00E+00	
Chrysene	0		0.00E+00		0.00E+00		0.00E+00	
Dibenz(a,h)anthracene	0		0.00E+00	Σ Risk=	0.00E+00		0.00E+00	Σ Risk=
Indeno(1,2,3-cd)pyrene	0		0.00E+00	0.00E+00	0.00E+00		0.00E+00	0.00E+00
Sum	**2507.62**	9.46E-01	2.65E-07		2.65E+03	1.00E+00	2.80E-07	

TEST CURRENT CONDITION

Measured TPH Soil Conc, mg/kg= 2507.620
HI= 9.463E-01
RISK= 2.654E-07
Pass or Fail? Pass
Check Residual Saturation (WAC340-747(10))

CALCULATE PROTECTIVE CONDITION

This tool allows the user to calculate protective TPH soil concentration based on various soil quality criteria. The Workbook uses the same composition ratio as for the measured data.

Calculate Protective TPH Soil Conc

Selected Criterion: @HI=1
Most Stringent? YES
Protctive TPH Soil Conc, mg/kg = 2649.87
HI = 1.00E+00
RISK = 2.80E-07

TEST ADJUSTED CONDITION

This tool allows the user to test whether a particular TPH soil concentration is protective of human health. The Workbook uses the same composition ratio as for the measured data.

Test Adjusted TPH Soil

Tested TPH Soil Conc, mg/kg =
HI =
RISK =
Pass or Fail?

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 04/18/14
Site Name: Plaid Pantry #324
Sample Name: B-37

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	134	5.34%
AL_EC >6-8	256	10.21%
AL_EC >8-10	19.5	0.78%
AL_EC >10-12	830	33.10%
AL_EC >12-16	142	5.66%
AL_EC >16-21	33	1.32%
AL_EC >21-34	2.65	0.11%
AR_EC >8-10	193.9	7.73%
AR_EC >10-12	536.8	21.41%
AR_EC >12-16	22.8	0.91%
AR_EC >16-21	27.6	1.10%
AR_EC >21-34	2.65	0.11%
Benzene	4.82	0.19%
Toluene	29.6	1.18%
Ethylbenzene	28	1.12%
Total Xylenes	205.1	8.18%
Naphthalene	26.2	1.04%
1-Methyl Naphthalene		0.00%
2-Methyl Naphthalene		0.00%
n-Hexane		0.00%
MTBE	13	0.52%
Ethylene Dibromide (EDB)		0.00%
1,2 Dichloroethane (EDC)		0.00%
Benzo(a)anthracene		0.00%
Benzo(b)fluoranthene		0.00%
Benzo(k)fluoranthene		0.00%
Benzo(a)pyrene		0.00%
Chrysene		0.00%
Dibenz(a,h)anthracene		0.00%
Indeno(1,2,3-cd)pyrene		0.00%
Sum	2507.62	100.00%

Notes for Data Entry | Set Default Hydrogeology
Clear All Soil Concentration Data Entry Cells
Restore All Soil Concentration Data cleared

REMARK:
Enter site-specific information here.....

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.43	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.13	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.001	Unitless
Dilution Factor:	20	Unitless

4. Target TPH Ground Water Concentation (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here: ug/L

A2. 1B Worksheet for Calculating Soil Cleanup Levels for Protection of Human Health: (Soil Direct Contact Pathway)
Method B: Unrestricted Land Use (WAC 173-340-740)

Date: 4/18/2014
Site Name: Plaid Pantry #324
Sample Name: B-38

Chemical of Concern or EC group	Current Condition				Adjusted Condition			
	Measured Soil Conc @dry basis	HQ	RISK	Pass or Fail?	Soil Conc being tested	HQ	RISK	Pass or Fail?
	mg/kg	unitless	unitless		mg/kg	unitless	unitless	
Petroleum EC Fraction								
AL_EC >5-6	1.12	8.91E-06			7.25E+01	5.77E-04		
AL_EC >6-8	1.12	8.91E-06			7.25E+01	5.77E-04		
AL_EC >8-10	1.12	5.05E-04			7.25E+01	3.27E-02		
AL_EC >10-12	1.12	5.05E-04			7.25E+01	3.27E-02		
AL_EC >12-16	2.705	1.62E-03			1.75E+02	1.05E-01		
AL_EC >16-21	2.705	2.43E-05			1.75E+02	1.58E-03		
AL_EC >21-34	2.705	2.43E-05			1.75E+02	1.58E-03		
AR_EC >8-10	0.559	7.56E-05			3.62E+01	4.90E-03		
AR_EC >10-12	0.8395	5.68E-04			5.44E+01	3.68E-02		
AR_EC >12-16	2.705	9.74E-04			1.75E+02	6.30E-02		
AR_EC >16-21	2.705	1.62E-03			1.75E+02	1.05E-01		
AR_EC >21-34	2.705	1.22E-03			1.75E+02	7.88E-02		
Benzene	0.2805	8.78E-04	1.54E-08		1.82E+01	5.68E-02	1.00E-06	
Toluene	0.2805	4.67E-05			1.82E+01	3.02E-03		
Ethylbenzene	0.2805	3.76E-05			1.82E+01	2.43E-03		
Total Xylenes	0.2805	1.88E-05			1.82E+01	1.22E-03		
Naphthalene	0.2805	2.32E-04			1.82E+01	1.50E-02		
1-Methyl Naphthalene	0				0.00E+00	0.00E+00		
2-Methyl Naphthalene	0				0.00E+00	0.00E+00		
n-Hexane	0				0.00E+00	0.00E+00		
MTBE	0.2805				1.82E+01			
Ethylene Dibromide (EDB)	0		0.00E+00		0.00E+00	0.00E+00	0.00E+00	
1,2 Dichloroethane (EDC)	0		0.00E+00		0.00E+00	0.00E+00	0.00E+00	
Benzo(a)anthracene	0		0.00E+00	*For*	0.00E+00		0.00E+00	*For*
Benzo(b)fluoranthene	0		0.00E+00	*all*	0.00E+00		0.00E+00	*all*
Benzo(k)fluoranthene	0		0.00E+00	*cPAHs*	0.00E+00		0.00E+00	*cPAHs*
Benzo(a)pyrene	0		0.00E+00		0.00E+00		0.00E+00	
Chrysene	0		0.00E+00		0.00E+00		0.00E+00	
Dibenz(a,h)anthracene	0		0.00E+00	Σ Risk=	0.00E+00		0.00E+00	Σ Risk=
Indeno(1,2,3-cd)pyrene	0		0.00E+00	0.00E+00	0.00E+00		0.00E+00	0.00E+00
Sum	**23.7915**	8.37E-03	1.54E-08		1.54E+03	5.42E-01	1.00E-06	

TEST CURRENT CONDITION

Measured TPH Soil Conc, mg/kg= 23.792
HI= 8.370E-03
RISK= 1.545E-08
Pass or Fail? Pass

CALCULATE PROTECTIVE CONDITION

This tool allows the user to calculate protective TPH soil concentration based on various soil quality criteria. The Workbook uses the same composition ratio as for the measured data.

Calculate Protective TPH Soil Conc

Selected Criterion: @Benzene Risk=1E-6
Most Stringent? YES
Protctive TPH Soil Conc, mg/kg = 1540.37
HI = 5.42E-01
RISK = 1.00E-06

TEST ADJUSTED CONDITION

This tool allows the user to test whether a particular TPH soil concentration is protective of human health. The Workbook uses the same composition ratio as for the measured data.

Test Adjusted TPH Soil

Tested TPH Soil Conc, mg/kg =
HI =
RISK =
Pass or Fail?

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 04/18/14
Site Name: Plaid Pantry #324
Sample Name: B-38

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	1.12	4.71%
AL_EC >6-8	1.12	4.71%
AL_EC >8-10	1.12	4.71%
AL_EC >10-12	1.12	4.71%
AL_EC >12-16	2.705	11.37%
AL_EC >16-21	2.705	11.37%
AL_EC >21-34	2.705	11.37%
AR_EC >8-10	0.559	2.35%
AR_EC >10-12	0.8395	3.53%
AR_EC >12-16	2.705	11.37%
AR_EC >16-21	2.705	11.37%
AR_EC >21-34	2.705	11.37%
Benzene	0.2805	1.18%
Toluene	0.2805	1.18%
Ethylbenzene	0.2805	1.18%
Total Xylenes	0.2805	1.18%
Naphthalene	0.2805	1.18%
1-Methyl Naphthalene		0.00%
2-Methyl Naphthalene		0.00%
n-Hexane		0.00%
MTBE	0.2805	1.18%
Ethylene Dibromide (EDB)		0.00%
1,2 Dichloroethane (EDC)		0.00%
Benzo(a)anthracene		0.00%
Benzo(b)fluoranthene		0.00%
Benzo(k)fluoranthene		0.00%
Benzo(a)pyrene		0.00%
Chrysene		0.00%
Dibenz(a,h)anthracene		0.00%
Indeno(1,2,3-cd)pyrene		0.00%
Sum	23.7915	100.00%

Notes for Data Entry | Set Default Hydrogeology
Clear All Soil Concentration Data Entry Cells
Restore All Soil Concentration Data cleared

REMARK:
Enter site-specific information here.....

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.43	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.13	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.001	Unitless
Dilution Factor:	20	Unitless

4. Target TPH Ground Water Concentation (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here: ug/L

A2 Soil Cleanup Levels: Calculation and Summary of Results. Refer to WAC 173-340-720, 740, 745, 747, 750

Site Information

Date: 4/18/2014
Site Name: Plaid Pantry #324
Sample Name: B-38
Measured Soil TPH Concentration, mg/kg: **23.792**

1. Summary of Calculation Results

Exposure Pathway	Method/Goal	Protective Soil TPH Conc, mg/kg	With Measured Soil Conc		Does Measured Soil Conc Pass or Fail?
			RISK @	HI @	
Protection of Soil Direct Contact: Human Health	Method B	1,540	1.54E-08	8.37E-03	Pass
	Method C	39,675	2.07E-09	6.00E-04	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protectior	2	6.21E-05	1.86E+00	Fail
	NA	NA	NA	NA	NA

2. Results for Protection of Soil Direct Contact Pathway: Human Health

	Method B: Unrestricted Land Use	Method C: Industrial Land Use
Protective Soil Concentration, TPH mg/kg	**1,540.37**	**39,674.88**
Most Stringent Criterion	**Risk of Benzene= 1E-6**	**HI =1**

Soil Criteria	Protective Soil Concentration @Method B				Protective Soil Concentration @Method C			
	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @	Most Stringent?	TPH Conc, mg/kg	RISK @	HI @
HI =1	*NO*	2.84E+03	1.85E-06	1.00E+00	YES	3.97E+04	3.45E-06	1.00E+00
Total Risk=1E-5	*NO*	1.54E+04	1.00E-05	5.42E+00	*NO*	1.15E+05	1.00E-05	2.90E+00
Risk of Benzene= 1E-6	YES	1.54E+03	1.00E-06	5.42E-01				
Risk of cPAHs mixture= 1E-6	NA	NA	NA	NA				
EDB	NA	NA	NA	NA				
EDC	NA	NA	NA	NA				

NA

3. Results for Protection of Ground Water Quality (Leaching Pathway)

3.1. Protection of Potable Ground Water Quality (Method B): Human Health Protection

Most Stringent Criterion	**Benzene MCL = 5 ug/L**
Protective Ground Water Concentration, ug/L	**31.74**
Protective Soil Concentration, mg/kg	**2.39**

Ground Water Criteria	Protective Potable Ground Water Concentration @Method B				Protective Soil Conc, mg/kg
	Most Stringent?	TPH Conc, ug/L	RISK @	HI @	
HI=1	*NO*	1.62E+02	3.30E-05	1.00E+00	1.26E+01
Total Risk = 1E-5	*NO*	5.04E+01	1.00E-05	3.05E-01	3.80E+00
Total Risk = 1E-6	YES	4.81E+00	1.00E-06	3.01E-02	3.83E-01
Risk of cPAHs mixture= 1E-5	NA	NA	NA	NA	NA
Benzene MCL = 5 ug/L	YES	3.17E+01	6.29E-06	1.92E-01	2.39E+00
MTBE = 20 ug/L	*NO*	9.42E+01	1.89E-05	5.76E-01	7.21E+00

3.2 Protection of Ground Water Quality for TPH Ground Water Concentration previously adjusted and entered

Ground Water Criteria	Protective Ground Water Concentration			Protective Soil Conc, mg/kg
	TPH Conc, ug/L	Risk @	HI @	
NA	NA	NA	NA	**NA**

A2. 1B Worksheet for Calculating Soil Cleanup Levels for Protection of Human Health: (Soil Direct Contact Pathway)

Method B: Unrestricted Land Use (WAC 173-340-740)

Date: 4/18/2014
Site Name: Plaid Pantry #324
Sample Name: B-39

Chemical of Concern or EC group	Current Condition				Adjusted Condition			
	Measured Soil Conc @dry basis	HQ	RISK	Pass or Fail?	Soil Conc being tested	HQ	RISK	Pass or Fail?
	mg/kg	unitless	unitless		mg/kg	unitless	unitless	
Petroleum EC Fraction								
AL_EC >5-6	26.2	2.09E-04			1.21E+02	9.59E-04		
AL_EC >6-8	64.4	5.13E-04			2.96E+02	2.36E-03		
AL_EC >8-10	60.8	2.74E-02			2.80E+02	1.26E-01		
AL_EC >10-12	73.4	3.31E-02			3.38E+02	1.52E-01		
AL_EC >12-16	19.7	1.18E-02			9.06E+01	5.44E-02		
AL_EC >16-21	5.74	5.17E-05			2.64E+01	2.38E-04		
AL_EC >21-34	2.775	2.50E-05			1.28E+01	1.15E-04		
AR_EC >8-10	77.5	1.05E-02			3.56E+02	4.82E-02		
AR_EC >10-12	137.95	9.33E-02			6.34E+02	4.29E-01		
AR_EC >12-16	54.4	1.96E-02			2.50E+02	9.01E-02		
AR_EC >16-21	7.66	4.60E-03			3.52E+01	2.11E-02		
AR_EC >21-34	2.775	1.25E-03			1.28E+01	5.74E-03		
Benzene	0.5556	1.74E-03	3.06E-08		2.56E+00	7.99E-03	1.41E-07	
Toluene	9.64	1.61E-03			4.43E+01	7.38E-03		
Ethylbenzene	14.3	1.92E-03			6.58E+01	8.81E-03		
Total Xylenes	71.2	4.78E-03			3.27E+02	2.20E-02		
Naphthalene	6.05	5.00E-03			2.78E+01	2.30E-02		
1-Methyl Naphthalene	0				0.00E+00	0.00E+00		
2-Methyl Naphthalene	0				0.00E+00	0.00E+00		
n-Hexane	0				0.00E+00	0.00E+00		
MTBE	0.231				1.06E+00			
Ethylene Dibromide (EDB)	0		0.00E+00		0.00E+00	0.00E+00	0.00E+00	
1,2 Dichloroethane (EDC)	0		0.00E+00		0.00E+00	0.00E+00	0.00E+00	
Benzo(a)anthracene	0		0.00E+00	*For*	0.00E+00		0.00E+00	*For*
Benzo(b)fluoranthene	0		0.00E+00	*all*	0.00E+00		0.00E+00	*all*
Benzo(k)fluoranthene	0		0.00E+00	*cPAHs*	0.00E+00		0.00E+00	*cPAHs*
Benzo(a)pyrene	0		0.00E+00		0.00E+00		0.00E+00	
Chrysene	0		0.00E+00		0.00E+00		0.00E+00	
Dibenz(a,h)anthracene	0		0.00E+00	Σ Risk=	0.00E+00		0.00E+00	Σ Risk=
Indeno(1,2,3-cd)pyrene	0		0.00E+00	0.00E+00	0.00E+00		0.00E+00	0.00E+00
Sum	**635.2766**	2.17E-01	3.06E-08		2.92E+03	1.00E+00	1.41E-07	

TEST CURRENT CONDITION

Measured TPH Soil Conc, mg/kg= 635.277
HI= 2.174E-01
RISK= 3.059E-08
Pass or Fail? Pass

CALCULATE PROTECTIVE CONDITION

This tool allows the user to calculate protective TPH soil concentration based on various soil quality criteria. The Workbook uses the same composition ratio as for the measured data.

Calculate Protective TPH Soil Conc

Selected Criterion: @HI=1
Most Stringent? YES
Protctive TPH Soil Conc, mg/kg = 2921.79
HI = 1.00E+00
RISK = 1.41E-07

TEST ADJUSTED CONDITION

This tool allows the user to test whether a particular TPH soil concentration is protective of human health. The Workbook uses the same composition ratio as for the measured data.

Test Adjusted TPH Soil

Tested TPH Soil Conc, mg/kg = 2921.79
HI = 1.00E+00
RISK = 1.41E-07
Pass or Fail? Pass
Check Residual Saturation (WAC340-747(10))

A2. 1B Worksheet for Calculating Soil Cleanup Levels for Protection of Human Health: (Soil Direct Contact Pathway)
Method B: Unrestricted Land Use (WAC 173-340-740)

Date: 4/18/2014
Site Name: Plaid Pantry #324
Sample Name: B-39

Chemical of Concern or EC group	Current Condition				Adjusted Condition			
	Measured Soil Conc @dry basis	HQ	RISK	Pass or Fail?	Soil Conc being tested	HQ	RISK	Pass or Fail?
	mg/kg	unitless	unitless		mg/kg	unitless	unitless	
Petroleum EC Fraction								
AL_EC >5-6	26.2	2.09E-04			1.21E+02	9.59E-04		
AL_EC >6-8	64.4	5.13E-04			2.96E+02	2.36E-03		
AL_EC >8-10	60.8	2.74E-02			2.80E+02	1.26E-01		
AL_EC >10-12	73.4	3.31E-02			3.38E+02	1.52E-01		
AL_EC >12-16	19.7	1.18E-02			9.06E+01	5.44E-02		
AL_EC >16-21	5.74	5.17E-05			2.64E+01	2.38E-04		
AL_EC >21-34	2.775	2.50E-05			1.28E+01	1.15E-04		
AR_EC >8-10	77.5	1.05E-02			3.56E+02	4.82E-02		
AR_EC >10-12	137.95	9.33E-02			6.34E+02	4.29E-01		
AR_EC >12-16	54.4	1.96E-02			2.50E+02	9.01E-02		
AR_EC >16-21	7.66	4.60E-03			3.52E+01	2.11E-02		
AR_EC >21-34	2.775	1.25E-03			1.28E+01	5.74E-03		
Benzene	0.5556	1.74E-03	3.06E-08		2.56E+00	7.99E-03	1.41E-07	
Toluene	9.64	1.61E-03			4.43E+01	7.38E-03		
Ethylbenzene	14.3	1.92E-03			6.58E+01	8.81E-03		
Total Xylenes	71.2	4.78E-03			3.27E+02	2.20E-02		
Naphthalene	6.05	5.00E-03			2.78E+01	2.30E-02		
1-Methyl Naphthalene	0				0.00E+00	0.00E+00		
2-Methyl Naphthalene	0				0.00E+00	0.00E+00		
n-Hexane	0				0.00E+00	0.00E+00		
MTBE	0.231				1.06E+00			
Ethylene Dibromide (EDB)	0		0.00E+00		0.00E+00	0.00E+00	0.00E+00	
1,2 Dichloroethane (EDC)	0		0.00E+00		0.00E+00	0.00E+00	0.00E+00	
Benzo(a)anthracene	0		0.00E+00	*For*	0.00E+00		0.00E+00	*For*
Benzo(b)fluoranthene	0		0.00E+00	*all*	0.00E+00		0.00E+00	*all*
Benzo(k)fluoranthene	0		0.00E+00	*cPAHs*	0.00E+00		0.00E+00	*cPAHs*
Benzo(a)pyrene	0		0.00E+00		0.00E+00		0.00E+00	
Chrysene	0		0.00E+00		0.00E+00		0.00E+00	
Dibenz(a,h)anthracene	0		0.00E+00	Σ Risk=	0.00E+00		0.00E+00	Σ Risk=
Indeno(1,2,3-cd)pyrene	0		0.00E+00	0.00E+00	0.00E+00		0.00E+00	0.00E+00
Sum	**635.2766**	2.17E-01	3.06E-08		2.92E+03	1.00E+00	1.41E-07	

TEST CURRENT CONDITION

Measured TPH Soil Conc, mg/kg= 635.277
HI= 2.174E-01
RISK= 3.059E-08
Pass or Fail? Pass

CALCULATE PROTECTIVE CONDITION

This tool allows the user to calculate protective TPH soil concentration based on various soil quality criteria. The Workbook uses the same composition ratio as for the measured data.

Calculate Protective TPH Soil Conc

Selected Criterion: @HI=1
Most Stringent? YES
Protctive TPH Soil Conc, mg/kg = 2921.79
HI = 1.00E+00
RISK = 1.41E-07

TEST ADJUSTED CONDITION

This tool allows the user to test whether a particular TPH soil concentration is protective of human health. The Workbook uses the same composition ratio as for the measured data.

Test Adjusted TPH Soil

Tested TPH Soil Conc, mg/kg =
HI =
RISK =
Pass or Fail?

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 04/18/14
Site Name: Plaid Pantry #324
Sample Name: B-39

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	26.2	4.12%
AL_EC >6-8	64.4	10.14%
AL_EC >8-10	60.8	9.57%
AL_EC >10-12	73.4	11.55%
AL_EC >12-16	19.7	3.10%
AL_EC >16-21	5.74	0.90%
AL_EC >21-34	2.775	0.44%
AR_EC >8-10	77.5	12.20%
AR_EC >10-12	137.95	21.71%
AR_EC >12-16	54.4	8.56%
AR_EC >16-21	7.66	1.21%
AR_EC >21-34	2.775	0.44%
Benzene	0.5556	0.09%
Toluene	9.64	1.52%
Ethylbenzene	14.3	2.25%
Total Xylenes	71.2	11.21%
Naphthalene	6.05	0.95%
1-Methyl Naphthalene		0.00%
2-Methyl Naphthalene		0.00%
n-Hexane		0.00%
MTBE	0.231	0.04%
Ethylene Dibromide (EDB)		0.00%
1,2 Dichloroethane (EDC)		0.00%
Benzo(a)anthracene		0.00%
Benzo(b)fluoranthene		0.00%
Benzo(k)fluoranthene		0.00%
Benzo(a)pyrene		0.00%
Chrysene		0.00%
Dibenz(a,h)anthracene		0.00%
Indeno(1,2,3-cd)pyrene		0.00%
Sum	635.2766	100.00%

Notes for Data Entry | Set Default Hydrogeology
Clear All Soil Concentration Data Entry Cells
Restore All Soil Concentration Data cleared

REMARK:
Enter site-specific information here.....

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.43	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.13	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.001	Unitless
Dilution Factor:	20	Unitless

4. Target TPH Ground Water Concentation (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here: ug/L

A2. 1B Worksheet for Calculating Soil Cleanup Levels for Protection of Human Health: (Soil Direct Contact Pathway)
Method B: Unrestricted Land Use (WAC 173-340-740)

Date: 4/18/2014
Site Name: Plaid Pantry #324
Sample Name: B-40

Chemical of Concern or EC group	Current Condition				Adjusted Condition			
	Measured Soil Conc @dry basis	HQ	RISK	Pass or Fail?	Soil Conc being tested	HQ	RISK	Pass or Fail?
	mg/kg	unitless	unitless		mg/kg	unitless	unitless	
Petroleum EC Fraction								
AL_EC >5-6	332	2.64E-03			5.69E+02	4.53E-03		
AL_EC >6-8	392	3.12E-03			6.72E+02	5.35E-03		
AL_EC >8-10	15.2	6.86E-03			2.60E+01	1.17E-02		
AL_EC >10-12	118	5.32E-02			2.02E+02	9.12E-02		
AL_EC >12-16	15.2	9.12E-03			2.60E+01	1.56E-02		
AL_EC >16-21	2.77	2.49E-05			4.75E+00	4.27E-05		
AL_EC >21-34	2.77	2.49E-05			4.75E+00	4.27E-05		
AR_EC >8-10	440.6	5.96E-02			7.55E+02	1.02E-01		
AR_EC >10-12	363.2	2.46E-01			6.22E+02	4.21E-01		
AR_EC >12-16	127	4.57E-02			2.18E+02	7.83E-02		
AR_EC >16-21	7	4.20E-03			1.20E+01	7.20E-03		
AR_EC >21-34	2.77	1.25E-03			4.75E+00	2.14E-03		
Benzene	10.6	3.32E-02	5.84E-07		1.82E+01	5.68E-02	1.00E-06	
Toluene	133	2.22E-02			2.28E+02	3.80E-02		
Ethylbenzene	40.3	5.40E-03			6.90E+01	9.25E-03		
Total Xylenes	92.1	6.18E-03			1.58E+02	1.06E-02		
Naphthalene	14.8	1.22E-02			2.54E+01	2.09E-02		
1-Methyl Naphthalene	0				0.00E+00	0.00E+00		
2-Methyl Naphthalene	0				0.00E+00	0.00E+00		
n-Hexane	0				0.00E+00	0.00E+00		
MTBE	16.5				2.83E+01			
Ethylene Dibromide (EDB)	0		0.00E+00		0.00E+00	0.00E+00	0.00E+00	
1,2 Dichloroethane (EDC)	0		0.00E+00		0.00E+00	0.00E+00	0.00E+00	
Benzo(a)anthracene	0		0.00E+00	*For*	0.00E+00		0.00E+00	*For*
Benzo(b)fluoranthene	0		0.00E+00	*all*	0.00E+00		0.00E+00	*all*
Benzo(k)fluoranthene	0		0.00E+00	*cPAHs*	0.00E+00		0.00E+00	*cPAHs*
Benzo(a)pyrene	0		0.00E+00		0.00E+00		0.00E+00	
Chrysene	0		0.00E+00		0.00E+00		0.00E+00	
Dibenz(a,h)anthracene	0		0.00E+00	Σ Risk=	0.00E+00		0.00E+00	Σ Risk=
Indeno(1,2,3-cd)pyrene	0		0.00E+00	0.00E+00	0.00E+00		0.00E+00	0.00E+00
Sum	**2125.81**	5.11E-01	5.84E-07		3.64E+03	8.75E-01	1.00E-06	

TEST CURRENT CONDITION

Measured TPH Soil Conc, mg/kg= 2125.810
HI= 5.106E-01
RISK= 5.837E-07
Pass or Fail? Pass
Check Residual Saturation (WAC340-747(10))

CALCULATE PROTECTIVE CONDITION

This tool allows the user to calculate protective TPH soil concentration based on various soil quality criteria. The Workbook uses the same composition ratio as for the measured data.

Calculate Protective TPH Soil Conc

Selected Criterion: @Benzene Risk=1E-6
Most Stringent? YES
Protctive TPH Soil Conc, mg/kg = 3642.11
HI = 8.75E-01
RISK = 1.00E-06

TEST ADJUSTED CONDITION

This tool allows the user to test whether a particular TPH soil concentration is protective of human health. The Workbook uses the same composition ratio as for the measured data.

Test Adjusted TPH Soil

Tested TPH Soil Conc, mg/kg = 3642.11
HI = 8.75E-01
RISK = 1.00E-06
Pass or Fail? Pass
Check Residual Saturation (WAC340-747(10))

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 04/18/14
Site Name: Plaid Pantry #324
Sample Name: B-40

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	332	15.62%
AL_EC >6-8	392	18.44%
AL_EC >8-10	15.2	0.72%
AL_EC >10-12	118	5.55%
AL_EC >12-16	15.2	0.72%
AL_EC >16-21	2.77	0.13%
AL_EC >21-34	2.77	0.13%
AR_EC >8-10	440.6	20.73%
AR_EC >10-12	363.2	17.09%
AR_EC >12-16	127	5.97%
AR_EC >16-21	7	0.33%
AR_EC >21-34	2.77	0.13%
Benzene	10.6	0.50%
Toluene	133	6.26%
Ethylbenzene	40.3	1.90%
Total Xylenes	92.1	4.33%
Naphthalene	14.8	0.70%
1-Methyl Naphthalene		0.00%
2-Methyl Naphthalene		0.00%
n-Hexane		0.00%
MTBE	16.5	0.78%
Ethylene Dibromide (EDB)		0.00%
1,2 Dichloroethane (EDC)		0.00%
Benzo(a)anthracene		0.00%
Benzo(b)fluoranthene		0.00%
Benzo(k)fluoranthene		0.00%
Benzo(a)pyrene		0.00%
Chrysene		0.00%
Dibenz(a,h)anthracene		0.00%
Indeno(1,2,3-cd)pyrene		0.00%
Sum	2125.81	100.00%

Notes for Data Entry | Set Default Hydrogeology
Clear All Soil Concentration Data Entry Cells
Restore All Soil Concentration Data cleared

REMARK:
Enter site-specific information here.....

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.43	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.13	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.001	Unitless
Dilution Factor:	20	Unitless

4. Target TPH Ground Water Concentation (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here: ug/L

A2. 1B Worksheet for Calculating Soil Cleanup Levels for Protection of Human Health: (Soil Direct Contact Pathway)
Method B: Unrestricted Land Use (WAC 173-340-740)

Date: 4/18/2014
Site Name: Plaid Pantry #324
Sample Name: B-41

Chemical of Concern or EC group	Current Condition				Adjusted Condition			
	Measured Soil Conc @dry basis	HQ	RISK	Pass or Fail?	Soil Conc being tested	HQ	RISK	Pass or Fail?
	mg/kg	unitless	unitless		mg/kg	unitless	unitless	
Petroleum EC Fraction								
AL_EC >5-6	98.3	7.82E-04			1.51E+02	1.20E-03		
AL_EC >6-8	10.2	8.12E-05			1.57E+01	1.25E-04		
AL_EC >8-10	23.1	1.04E-02			3.55E+01	1.60E-02		
AL_EC >10-12	156	7.04E-02			2.40E+02	1.08E-01		
AL_EC >12-16	43.3	2.60E-02			6.65E+01	3.99E-02		
AL_EC >16-21	9.82	8.84E-05			1.51E+01	1.36E-04		
AL_EC >21-34	2.72	2.45E-05			4.18E+00	3.76E-05		
AR_EC >8-10	247.1	3.34E-02			3.79E+02	5.13E-02		
AR_EC >10-12	489.2	3.31E-01			7.51E+02	5.08E-01		
AR_EC >12-16	284	1.02E-01			4.36E+02	1.57E-01		
AR_EC >16-21	7.47	4.48E-03			1.15E+01	6.88E-03		
AR_EC >21-34	2.72	1.22E-03			4.18E+00	1.88E-03		
Benzene	2.92	9.14E-03	1.61E-07		4.48E+00	1.40E-02	2.47E-07	
Toluene	70.7	1.18E-02			1.09E+02	1.81E-02		
Ethylbenzene	60.5	8.11E-03			9.29E+01	1.24E-02		
Total Xylenes	360.4	2.42E-02			5.53E+02	3.71E-02		
Naphthalene	21.8	1.80E-02			3.35E+01	2.76E-02		
1-Methyl Naphthalene	0				0.00E+00	0.00E+00		
2-Methyl Naphthalene	0				0.00E+00	0.00E+00		
n-Hexane	0				0.00E+00	0.00E+00		
MTBE	8.96				1.38E+01			
Ethylene Dibromide (EDB)	0		0.00E+00		0.00E+00	0.00E+00	0.00E+00	
1,2 Dichloroethane (EDC)	0		0.00E+00		0.00E+00	0.00E+00	0.00E+00	
Benzo(a)anthracene	0		0.00E+00	*For*	0.00E+00		0.00E+00	*For*
Benzo(b)fluoranthene	0		0.00E+00	*all*	0.00E+00		0.00E+00	*all*
Benzo(k)fluoranthene	0		0.00E+00	*cPAHs*	0.00E+00		0.00E+00	*cPAHs*
Benzo(a)pyrene	0		0.00E+00		0.00E+00		0.00E+00	
Chrysene	0		0.00E+00		0.00E+00		0.00E+00	
Dibenz(a,h)anthracene	0		0.00E+00	Σ Risk=	0.00E+00		0.00E+00	Σ Risk=
Indeno(1,2,3-cd)pyrene	0		0.00E+00	0.00E+00	0.00E+00		0.00E+00	0.00E+00
Sum	**1899.21**	6.51E-01	1.61E-07		2.92E+03	1.00E+00	2.47E-07	

TEST CURRENT CONDITION

Measured TPH Soil Conc, mg/kg= 1899.210
HI= 6.513E-01
RISK= 1.608E-07
Pass or Fail? Pass
Check Residual Saturation (WAC340-747(10))

CALCULATE PROTECTIVE CONDITION

This tool allows the user to calculate protective TPH soil concentration based on various soil quality criteria. The Workbook uses the same composition ratio as for the measured data.

Calculate Protective TPH Soil Conc

Selected Criterion: @HI=1
Most Stringent? YES
Protctive TPH Soil Conc, mg/kg = 2916.07
HI = 1.00E+00
RISK = 2.47E-07

TEST ADJUSTED CONDITION

This tool allows the user to test whether a particular TPH soil concentration is protective of human health. The Workbook uses the same composition ratio as for the measured data.

Test Adjusted TPH Soil

Tested TPH Soil Conc, mg/kg = 2916.07
HI = 1.00E+00
RISK = 2.47E-07
Pass or Fail? Pass
Check Residual Saturation (WAC340-747(10))

A1 Soil Cleanup Levels: Worksheet for Soil Data Entry: Refer to WAC 173-340-720, 740,745, 747, 750

1. Enter Site Information

Date: 04/18/14
Site Name: Plaid Pantry #324
Sample Name: B-41

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis mg/kg	Composition Ratio %
Petroleum EC Fraction		
AL_EC >5-6	98.3	5.18%
AL_EC >6-8	10.2	0.54%
AL_EC >8-10	23.1	1.22%
AL_EC >10-12	156	8.21%
AL_EC >12-16	43.3	2.28%
AL_EC >16-21	9.82	0.52%
AL_EC >21-34	2.72	0.14%
AR_EC >8-10	247.1	13.01%
AR_EC >10-12	489.2	25.76%
AR_EC >12-16	284	14.95%
AR_EC >16-21	7.47	0.39%
AR_EC >21-34	2.72	0.14%
Benzene	2.92	0.15%
Toluene	70.7	3.72%
Ethylbenzene	60.5	3.19%
Total Xylenes	360.4	18.98%
Naphthalene	21.8	1.15%
1-Methyl Naphthalene		0.00%
2-Methyl Naphthalene		0.00%
n-Hexane		0.00%
MTBE	8.96	0.47%
Ethylene Dibromide (EDB)		0.00%
1,2 Dichloroethane (EDC)		0.00%
Benzo(a)anthracene		0.00%
Benzo(b)fluoranthene		0.00%
Benzo(k)fluoranthene		0.00%
Benzo(a)pyrene		0.00%
Chrysene		0.00%
Dibenz(a,h)anthracene		0.00%
Indeno(1,2,3-cd)pyrene		0.00%
Sum	1899.21	100.00%

Notes for Data Entry | Set Default Hydrogeology
Clear All Soil Concentration Data Entry Cells
Restore All Soil Concentration Data cleared

REMARK:
Enter site-specific information here.....

3. Enter Site-Specific Hydrogeological Data

Total soil porosity:	0.43	Unitless
Volumetric water content:	0.3	Unitless
Volumetric air content:	0.13	Unitless
Soil bulk density measured:	1.5	kg/L
Fraction Organic Carbon:	0.001	Unitless
Dilution Factor:	20	Unitless

4. Target TPH Ground Water Concentation (if adjusted)

If you adjusted the target TPH ground water concentration, enter adjusted value here: ug/L

ATTACHMENT A

ProUCL Statistics

ROW Surface and Subsurface Soils

Former Plaid Pantry #324

White Center, King County, Washington

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	4/21/2014 8:34:21 AM
From File	WorkSheet_a.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

TPHG

General Statistics

Total Number of Observations	35	Number of Distinct Observations	7
Number of Detects	6	Number of Non-Detects	29
Number of Distinct Detects	6	Number of Distinct Non-Detects	1
Minimum Detect	35	Minimum Non-Detect	10
Maximum Detect	780	Maximum Non-Detect	10
Variance Detects	72471	Percent Non-Detects	82.86%
Mean Detects	273.7	SD Detects	269.2
Median Detects	230	CV Detects	0.984
Skewness Detects	1.645	Kurtosis Detects	3.19
Mean of Logged Detects	5.164	SD of Logged Detects	1.115

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.834	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.294	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.362	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	55.2	Standard Error of Mean	26.33
SD	142.2	95% KM (BCA) UCL	99.2
95% KM (t) UCL	99.73	95% KM (Percentile Bootstrap) UCL	98.49
95% KM (z) UCL	98.52	95% KM Bootstrap t UCL	124.4
90% KM Chebyshev UCL	134.2	95% KM Chebyshev UCL	170
97.5% KM Chebyshev UCL	219.7	99% KM Chebyshev UCL	317.2

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.245	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.711	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.177	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.339	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.256	k star (bias corrected MLE)	0.739
Theta hat (MLE)	217.9	Theta star (bias corrected MLE)	370.3
nu hat (MLE)	15.07	nu star (bias corrected)	8.869
MLE Mean (bias corrected)	273.7	MLE Sd (bias corrected)	318.3

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.151	nu hat (KM)	10.54
Approximate Chi Square Value (10.54, α)	4.285	Adjusted Chi Square Value (10.54, β)	4.097
95% Gamma Approximate KM-UCL (use when n>=50)	135.8	95% Gamma Adjusted KM-UCL (use when n<50)	142.1

ATTACHMENT A

ProUCL Statistics

ROW Surface and Subsurface Soils

Former Plaid Pantry #324

White Center, King County, Washington

UCL Statistics for Data Sets with Non-Detects

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	46.92
Maximum	780	Median	0.01
SD	147	CV	3.133
k hat (MLE)	0.117	k star (bias corrected MLE)	0.126
Theta hat (MLE)	399.9	Theta star (bias corrected MLE)	371.4
nu hat (MLE)	8.214	nu star (bias corrected)	8.843
MLE Mean (bias corrected)	46.92	MLE Sd (bias corrected)	132
		Adjusted Level of Significance (β)	0.0425
Approximate Chi Square Value (8.84, α)	3.232	Adjusted Chi Square Value (8.84, β)	3.073
95% Gamma Approximate UCL (use when n>=50)	128.4	95% Gamma Adjusted UCL (use when n<50)	135

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.958	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.215	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.362	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	50.51	Mean in Log Scale	0.751
SD in Original Scale	146	SD in Log Scale	2.926
95% t UCL (assumes normality of ROS data)	92.23	95% Percentile Bootstrap UCL	95.49
95% BCA Bootstrap UCL	117.1	95% Bootstrap t UCL	159.8
95% H-UCL (Log ROS)	2285		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	2.793	95% H-UCL (KM -Log)	54.06
KM SD (logged)	1.158	95% Critical H Value (KM-Log)	2.654
KM Standard Error of Mean (logged)	0.214		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	51.06	Mean in Log Scale	2.219
SD in Original Scale	145.6	SD in Log Scale	1.425
95% t UCL (Assumes normality)	92.68	95% H-Stat UCL	53.11

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	99.73	95% KM (Percentile Bootstrap) UCL	98.49

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Data Sets with Non-Detects

Ethylbenzene

General Statistics

Total Number of Observations	35	Number of Distinct Observations	4
Number of Detects	2	Number of Non-Detects	33
Number of Distinct Detects	2	Number of Distinct Non-Detects	2
Minimum Detect	0.24	Minimum Non-Detect	0.025
Maximum Detect	1.6	Maximum Non-Detect	0.05
Variance Detects	0.925	Percent Non-Detects	94.29%
Mean Detects	0.92	SD Detects	0.962
Median Detects	0.92	CV Detects	1.045
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-0.479	SD of Logged Detects	1.341

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only
Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.0761	Standard Error of Mean	0.0631
SD	0.264	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.183	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.18	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.265	95% KM Chebyshev UCL	0.351
97.5% KM Chebyshev UCL	0.47	99% KM Chebyshev UCL	0.704

Gamma GOF Tests on Detected Observations Only
Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	1.409	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.653	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	5.635	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.0833	nu hat (KM)	5.833
		Adjusted Level of Significance (β)	0.0425
Approximate Chi Square Value (5.83, α)	1.555	Adjusted Chi Square Value (5.83, β)	1.453
95% Gamma Approximate KM-UCL (use when n>=50)	0.286	95% Gamma Adjusted KM-UCL (use when n<50)	0.306

Gamma (KM) may not be used when k hat (KM) is < 0.1

Lognormal GOF Test on Detected Observations Only
Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.0533	Mean in Log Scale	-12 55
SD in Original Scale	0.272	SD in Log Scale	5.784
95% t UCL (assumes normality of ROS data)	0.131	95% Percentile Bootstrap UCL	0.139
95% BCA Bootstrap UCL	0.229	95% Bootstrap t UCL	5.197
95% H-UCL (Log ROS)	1685765		

ATTACHMENT A

ProUCL Statistics

ROW Surface and Subsurface Soils

Former Plaid Pantry #324

White Center, King County, Washington

UCL Statistics for Data Sets with Non-Detects

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0658	Mean in Log Scale	-4.08
SD in Original Scale	0.27	SD in Log Scale	0.955
95% t UCL (Assumes normality)	0.143	95% H-Stat UCL	0.0395

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (BCA) UCL N/A

Warning: One or more Recommended UCL(s) not available!

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Data Sets with Non-Detects

Xylene

General Statistics

Total Number of Observations	35	Number of Distinct Observations	3
Number of Detects	2	Number of Non-Detects	33
Number of Distinct Detects	2	Number of Distinct Non-Detects	1
Minimum Detect	0.28	Minimum Non-Detect	0.15
Maximum Detect	3.9	Maximum Non-Detect	0.15
Variance Detects	6.552	Percent Non-Detects	94.29%
Mean Detects	2.09	SD Detects	2.56
Median Detects	2.09	CV Detects	1.225
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	0.044	SD of Logged Detects	1.862

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only
Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.261	Standard Error of Mean	0.149
SD	0.624	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.513	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.506	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.709	95% KM Chebyshev UCL	0.912
97.5% KM Chebyshev UCL	1.193	99% KM Chebyshev UCL	1.746

Gamma GOF Tests on Detected Observations Only
Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	0.85	k star (bias corrected MLE)	N/A
Theta hat (MLE)	2.46	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	3.398	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.174	nu hat (KM)	12.21
		Adjusted Level of Significance (β)	0.0425
Approximate Chi Square Value (12.21, α)	5.368	Adjusted Chi Square Value (12.21, β)	5.154
95% Gamma Approximate KM-UCL (use when n>=50)	0.594	95% Gamma Adjusted KM-UCL (use when n<50)	0.618

Lognormal GOF Test on Detected Observations Only
Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.12	Mean in Log Scale	-16.75
SD in Original Scale	0.659	SD in Log Scale	8.272
95% t UCL (assumes normality of ROS data)	0.308	95% Percentile Bootstrap UCL	0.342
95% BCA Bootstrap UCL	0.462	95% Bootstrap t UCL	55.7
95% H-UCL (Log ROS)	3.546E+16		

ATTACHMENT A

ProUCL Statistics

ROW Surface and Subsurface Soils

Former Plaid Pantry #324

White Center, King County, Washington

UCL Statistics for Data Sets with Non-Detects

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.19	Mean in Log Scale	-2.44
SD in Original Scale	0.646	SD in Log Scale	0.698
95% t UCL (Assumes normality)	0.375	95% H-Stat UCL	0.143

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

97.5% KM (Chebyshev) UCL	1.193

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

ATTACHMENT A
ProUCL Statistics
Surface and Subsurface Soils
Former Plaid Pantry #324
White Center/King County, Washington

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	4/21/2014 8:22:41 AM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

TPHG

General Statistics

Total Number of Observations	92	Number of Distinct Observations	52
Number of Detects	55	Number of Non-Detects	37
Number of Distinct Detects	50	Number of Distinct Non-Detects	3
Minimum Detect	2	Minimum Non-Detect	1.25
Maximum Detect	5970	Maximum Non-Detect	2
Variance Detects	2087788	Percent Non-Detects	40.22%
Mean Detects	924.4	SD Detects	1445
Median Detects	120	CV Detects	1.563
Skewness Detects	2.039	Kurtosis Detects	4.125
Mean of Logged Detects	4.926	SD of Logged Detects	2.418

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.687	**Normal GOF Test on Detected Observations Only**	
5% Shapiro Wilk P Value	1.243E-14	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.268	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.119	Detected Data Not Normal at 5% Significance Level	

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	553.1	Standard Error of Mean	125.8
SD	1196	95% KM (BCA) UCL	773
95% KM (t) UCL	762.2	95% KM (Percentile Bootstrap) UCL	763.6
95% KM (z) UCL	760.1	95% KM Bootstrap t UCL	811.1
90% KM Chebyshev UCL	930.6	95% KM Chebyshev UCL	1102
97.5% KM Chebyshev UCL	1339	99% KM Chebyshev UCL	1805

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.585	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.85	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.16	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.129	Detected Data Not Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.353	k star (bias corrected MLE)	0.346
Theta hat (MLE)	2620	Theta star (bias corrected MLE)	2674
nu hat (MLE)	38.81	nu star (bias corrected)	38.03
MLE Mean (bias corrected)	924.4	MLE Sd (bias corrected)	1572

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.214	nu hat (KM)	39.36
Approximate Chi Square Value (39.36, α)	25.99	Adjusted Chi Square Value (39.36, β)	25.81
95% Gamma Approximate KM-UCL (use when n>=50)	837.7	95% Gamma Adjusted KM-UCL (use when n<50)	843.4

ATTACHMENT A
ProUCL Statistics
Surface and Subsurface Soils
Former Plaid Pantry #324
White Center/King County, Washington

UCL Statistics for Data Sets with Non-Detects

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	552.6
Maximum	5970	Median	11
SD	1203	CV	2.176
k hat (MLE)	0.148	k star (bias corrected MLE)	0.15
Theta hat (MLE)	3746	Theta star (bias corrected MLE)	3685
nu hat (MLE)	27.15	nu star (bias corrected)	27.59
MLE Mean (bias corrected)	552.6	MLE Sd (bias corrected)	1427
		Adjusted Level of Significance (β)	0.0474
Approximate Chi Square Value (27.59, α)	16.61	Adjusted Chi Square Value (27.59, β)	16.48
95% Gamma Approximate UCL (use when n>=50)	918	95% Gamma Adjusted UCL (use when n<50)	925.5

Lognormal GOF Test on Detected Observations Only

Lilliefors Test Statistic	0.151	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.119	Detected Data Not Lognormal at 5% Significance Level	

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	553.1	Mean in Log Scale	2.562
SD in Original Scale	1203	SD in Log Scale	3.642
95% t UCL (assumes normality of ROS data)	761.4	95% Percentile Bootstrap UCL	751.4
95% BCA Bootstrap UCL	804	95% Bootstrap t UCL	835
95% H-UCL (Log ROS)	84032		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	553	Mean in Log Scale	2.936
SD in Original Scale	1203	SD in Log Scale	3.069
95% t UCL (Assumes normality)	761.4	95% H-Stat UCL	9884

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

97.5% KM (Chebyshev) UCL	1339

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

ATTACHMENT A
ProUCL Statistics
Surface and Subsurface Soils
Former Plaid Pantry #324
White Center/King County, Washington

UCL Statistics for Data Sets with Non-Detects

Benzene

General Statistics

Total Number of Observations	92	Number of Distinct Observations	38
Number of Detects	38	Number of Non-Detects	54
Number of Distinct Detects	35	Number of Distinct Non-Detects	6
Minimum Detect	0.014	Minimum Non-Detect	0.00351
Maximum Detect	11	Maximum Non-Detect	0.8
Variance Detects	8.439	Percent Non-Detects	58.7%
Mean Detects	2.085	SD Detects	2.905
Median Detects	0.83	CV Detects	1.393
Skewness Detects	1.847	Kurtosis Detects	2.503
Mean of Logged Detects	-0 296	SD of Logged Detects	1.683

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.697	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.938	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.29	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.144	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.866	Standard Error of Mean	0.223
SD	2.107	95% KM (BCA) UCL	1.251
95% KM (t) UCL	1.236	95% KM (Percentile Bootstrap) UCL	1.247
95% KM (z) UCL	1.232	95% KM Bootstrap t UCL	1.368
90% KM Chebyshev UCL	1.534	95% KM Chebyshev UCL	1.837
97.5% KM Chebyshev UCL	2.257	99% KM Chebyshev UCL	3.081

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.678	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.803	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.131	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.15	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.6	k star (bias corrected MLE)	0.57
Theta hat (MLE)	3.477	Theta star (bias corrected MLE)	3.659
nu hat (MLE)	45.56	nu star (bias corrected)	43.3
MLE Mean (bias corrected)	2.085	MLE Sd (bias corrected)	2.762

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.169	nu hat (KM)	31.1
Approximate Chi Square Value (31.10, α)	19.36	Adjusted Chi Square Value (31.10, β)	19.21
95% Gamma Approximate KM-UCL (use when n>=50)	1.392	95% Gamma Adjusted KM-UCL (use when n<50)	1.402

ATTACHMENT A
ProUCL Statistics
Surface and Subsurface Soils
Former Plaid Pantry #324
White Center/King County, Washington

UCL Statistics for Data Sets with Non-Detects

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.867
Maximum	11	Median	0.01
SD	2.118	CV	2.443
k hat (MLE)	0.263	k star (bias corrected MLE)	0.261
Theta hat (MLE)	3.301	Theta star (bias corrected MLE)	3.317
nu hat (MLE)	48.33	nu star (bias corrected)	48.09
MLE Mean (bias corrected)	0.867	MLE Sd (bias corrected)	1.696
		Adjusted Level of Significance (β)	0.0474
Approximate Chi Square Value (48.09, α)	33.17	Adjusted Chi Square Value (48.09, β)	32.97
95% Gamma Approximate UCL (use when n>=50)	1.257	95% Gamma Adjusted UCL (use when n<50)	1.264

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.953	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.938	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.119	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.144	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.874	Mean in Log Scale	-2.923
SD in Original Scale	2.116	SD in Log Scale	2.764
95% t UCL (assumes normality of ROS data)	1.24	95% Percentile Bootstrap UCL	1.273
95% BCA Bootstrap UCL	1.345	95% Bootstrap t UCL	1.385
95% H-UCL (Log ROS)	8.775		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-3.152	95% H-UCL (KM -Log)	5.17
KM SD (logged)	2.68	95% Critical H Value (KM-Log)	4.29
KM Standard Error of Mean (logged)	0.357		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.873	Mean in Log Scale	-2.676
SD in Original Scale	2.116	SD in Log Scale	2.331
95% t UCL (Assumes normality)	1.24	95% H-Stat UCL	2.652

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	1.236	95% GROS Approximate Gamma UCL	1.257
95% Approximate Gamma KM-UCL	1.392		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Data Sets with Non-Detects

Ethylbenzene

General Statistics

Total Number of Observations	92	Number of Distinct Observations	45
Number of Detects	48	Number of Non-Detects	44
Number of Distinct Detects	40	Number of Distinct Non-Detects	5
Minimum Detect	0.059	Minimum Non-Detect	0.00625
Maximum Detect	122	Maximum Non-Detect	0.05
Variance Detects	746.6	Percent Non-Detects	47.83%
Mean Detects	17.63	SD Detects	27.32
Median Detects	2	CV Detects	1.55
Skewness Detects	2.22	Kurtosis Detects	5.405
Mean of Logged Detects	0.983	SD of Logged Detects	2.419

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.691	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.947	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.26	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.128	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	9.203	Standard Error of Mean	2.257
SD	21.42	95% KM (BCA) UCL	12.97
95% KM (t) UCL	12.95	95% KM (Percentile Bootstrap) UCL	13.32
95% KM (z) UCL	12.92	95% KM Bootstrap t UCL	14.45
90% KM Chebyshev UCL	15.97	95% KM Chebyshev UCL	19.04
97.5% KM Chebyshev UCL	23.3	99% KM Chebyshev UCL	31.66

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.768	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.849	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.205	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.138	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.355	k star (bias corrected MLE)	0.347
Theta hat (MLE)	49.61	Theta star (bias corrected MLE)	50.8
nu hat (MLE)	34.12	nu star (bias corrected)	33.32
MLE Mean (bias corrected)	17.63	MLE Sd (bias corrected)	29.93

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.185	nu hat (KM)	33.96
Approximate Chi Square Value (33.96, α)	21.63	Adjusted Chi Square Value (33.96, β)	21.47
95% Gamma Approximate KM-UCL (use when n>=50)	14.45	95% Gamma Adjusted KM-UCL (use when n<50)	14.55

ATTACHMENT A
ProUCL Statistics
Surface and Subsurface Soils
Former Plaid Pantry #324
White Center/King County, Washington

UCL Statistics for Data Sets with Non-Detects

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	9.205
Maximum	122	Median	0.06
SD	21.54	CV	2.34
k hat (MLE)	0.19	k star (bias corrected MLE)	0.191
Theta hat (MLE)	48.5	Theta star (bias corrected MLE)	48.23
nu hat (MLE)	34.92	nu star (bias corrected)	35.11
MLE Mean (bias corrected)	9.205	MLE Sd (bias corrected)	21.07
		Adjusted Level of Significance (β)	0.0474
Approximate Chi Square Value (35.11, α)	22.56	Adjusted Chi Square Value (35.11, β)	22.4
95% Gamma Approximate UCL (use when n>=50)	14.33	95% Gamma Adjusted UCL (use when n<50)	14.43

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.893	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.947	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.17	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.128	Detected Data Not Lognormal at 5% Significance Level

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	9.209	Mean in Log Scale	-1.939
SD in Original Scale	21.54	SD in Log Scale	3.785
95% t UCL (assumes normality of ROS data)	12.94	95% Percentile Bootstrap UCL	13.07
95% BCA Bootstrap UCL	13.8	95% Bootstrap t UCL	14.22
95% H-UCL (Log ROS)	1873		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	9.209	Mean in Log Scale	-1.472
SD in Original Scale	21.54	SD in Log Scale	3.135
95% t UCL (Assumes normality)	12.94	95% H-Stat UCL	157

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

97.5% KM (Chebyshev) UCL	23.3

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

ATTACHMENT A
ProUCL Statistics
Surface and Subsurface Soils
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White Center/King County, Washington

UCL Statistics for Data Sets with Non-Detects

Toluene

General Statistics

Total Number of Observations	92	Number of Distinct Observations	45
Number of Detects	47	Number of Non-Detects	45
Number of Distinct Detects	41	Number of Distinct Non-Detects	4
Minimum Detect	0.03	Minimum Non-Detect	0.0125
Maximum Detect	170	Maximum Non-Detect	0.05
Variance Detects	2070	Percent Non-Detects	48.91%
Mean Detects	28.74	SD Detects	45.5
Median Detects	4.2	CV Detects	1.583
Skewness Detects	1.86	Kurtosis Detects	2.625
Mean of Logged Detects	1.516	SD of Logged Detects	2.357

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.677	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.946	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.265	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.129	Detected Data Not Normal at 5% Significance Level	

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	14.69	Standard Error of Mean	3.713
SD	35.23	95% KM (BCA) UCL	21.48
95% KM (t) UCL	20.86	95% KM (Percentile Bootstrap) UCL	20.94
95% KM (z) UCL	20.79	95% KM Bootstrap t UCL	23.28
90% KM Chebyshev UCL	25.83	95% KM Chebyshev UCL	30.87
97.5% KM Chebyshev UCL	37.87	99% KM Chebyshev UCL	51.63

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.184	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.847	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.165	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.139	Detected Data Not Gamma Distributed at 5% Significance Level	

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.363	k star (bias corrected MLE)	0.354
Theta hat (MLE)	79.17	Theta star (bias corrected MLE)	81.18
nu hat (MLE)	34.12	nu star (bias corrected)	33.27
MLE Mean (bias corrected)	28.74	MLE Sd (bias corrected)	48.3

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.174	nu hat (KM)	31.97
Approximate Chi Square Value (31.97, α)	20.05	Adjusted Chi Square Value (31.97, β)	19.9
95% Gamma Approximate KM-UCL (use when n>=50)	23.42	95% Gamma Adjusted KM-UCL (use when n<50)	23.6

ATTACHMENT A
ProUCL Statistics
Surface and Subsurface Soils
Former Plaid Pantry #324
White Center/King County, Washington

UCL Statistics for Data Sets with Non-Detects

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	14.69
Maximum	170	Median	0.0475
SD	35.43	CV	2.412
k hat (MLE)	0.18	k star (bias corrected MLE)	0.181
Theta hat (MLE)	81.74	Theta star (bias corrected MLE)	81.12
nu hat (MLE)	33.06	nu star (bias corrected)	33.31
MLE Mean (bias corrected)	14.69	MLE Sd (bias corrected)	34.51
		Adjusted Level of Significance (β)	0.0474
Approximate Chi Square Value (33.31, α)	21.11	Adjusted Chi Square Value (33.31, β)	20.96
95% Gamma Approximate UCL (use when n>=50)	23.17	95% Gamma Adjusted UCL (use when n<50)	23.34

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.944	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.946	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.109	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.129	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Approximate Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	14.7	Mean in Log Scale	-1.452
SD in Original Scale	35.42	SD in Log Scale	3.759
95% t UCL (assumes normality of ROS data)	20.83	95% Percentile Bootstrap UCL	21.14
95% BCA Bootstrap UCL	22.75	95% Bootstrap t UCL	22.68
95% H-UCL (Log ROS)	2674		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-1 354	95% H-UCL (KM -Log)	492.9
KM SD (logged)	3.376	95% Critical H Value (KM-Log)	5.247
KM Standard Error of Mean (logged)	0.356		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	14.69	Mean in Log Scale	-1.207
SD in Original Scale	35.42	SD in Log Scale	3.279
95% t UCL (Assumes normality)	20.83	95% H-Stat UCL	374.9

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

97.5% KM (Chebyshev) UCL	37.87

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Data Sets with Non-Detects

Xylene

General Statistics

Total Number of Observations	92	Number of Distinct Observations	49
Number of Detects	49	Number of Non-Detects	43
Number of Distinct Detects	45	Number of Distinct Non-Detects	4
Minimum Detect	0.1	Minimum Non-Detect	0.0188
Maximum Detect	623	Maximum Non-Detect	0.15
Variance Detects	21843	Percent Non-Detects	46.74%
Mean Detects	102.5	SD Detects	147.8
Median Detects	11	CV Detects	1.442
Skewness Detects	1.838	Kurtosis Detects	3.618
Mean of Logged Detects	2.571	SD of Logged Detects	2.622

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.726	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.947	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.272	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.127	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	54.6	Standard Error of Mean	12.47
SD	118.4	95% KM (BCA) UCL	76.53
95% KM (t) UCL	75.32	95% KM (Percentile Bootstrap) UCL	75.43
95% KM (z) UCL	75.11	95% KM Bootstrap t UCL	81.63
90% KM Chebyshev UCL	92	95% KM Chebyshev UCL	108.9
97.5% KM Chebyshev UCL	132.5	99% KM Chebyshev UCL	178.7

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	2.221	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.855	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.224	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.137	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.33	k star (bias corrected MLE)	0.323
Theta hat (MLE)	310.8	Theta star (bias corrected MLE)	317.1
nu hat (MLE)	32.32	nu star (bias corrected)	31.67
MLE Mean (bias corrected)	102.5	MLE Sd (bias corrected)	180.3

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.213	nu hat (KM)	39.15
Approximate Chi Square Value (39.15, α)	25.82	Adjusted Chi Square Value (39.15, β)	25.65
95% Gamma Approximate KM-UCL (use when n>=50)	82.79	95% Gamma Adjusted KM-UCL (use when n<50)	83.35

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UCL Statistics for Data Sets with Non-Detects

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	54.59
Maximum	623	Median	0.302
SD	119	CV	2.18
k hat (MLE)	0.159	k star (bias corrected MLE)	0.161
Theta hat (MLE)	342.8	Theta star (bias corrected MLE)	338.4
nu hat (MLE)	29.31	nu star (bias corrected)	29.68
MLE Mean (bias corrected)	54.59	MLE Sd (bias corrected)	135.9
		Adjusted Level of Significance (β)	0.0474
Approximate Chi Square Value (29.68, α)	18.25	Adjusted Chi Square Value (29.68, β)	18.1
95% Gamma Approximate UCL (use when n>=50)	88.82	95% Gamma Adjusted UCL (use when n<50)	89.52

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.887	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.947	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.205	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.127	Detected Data Not Lognormal at 5% Significance Level

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	54.62	Mean in Log Scale	-0.459
SD in Original Scale	119	SD in Log Scale	4.036
95% t UCL (assumes normality of ROS data)	75.24	95% Percentile Bootstrap UCL	75.65
95% BCA Bootstrap UCL	78.52	95% Bootstrap t UCL	80.84
95% H-UCL (Log ROS)	29738		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	54.61	Mean in Log Scale	-0.0442
SD in Original Scale	119	SD in Log Scale	3.413
95% t UCL (Assumes normality)	75.23	95% H-Stat UCL	2158

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

97.5% KM (Chebyshev) UCL	132.5

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Data Sets with Non-Detects

Naphthalene

General Statistics

Total Number of Observations	36	Number of Distinct Observations	12
Number of Detects	11	Number of Non-Detects	25
Number of Distinct Detects	10	Number of Distinct Non-Detects	2
Minimum Detect	0.057	Minimum Non-Detect	0.05
Maximum Detect	22	Maximum Non-Detect	5
Variance Detects	51.99	Percent Non-Detects	69.44%
Mean Detects	5.608	SD Detects	7.211
Median Detects	1	CV Detects	1.286
Skewness Detects	1.308	Kurtosis Detects	1.285
Mean of Logged Detects	0.187	SD of Logged Detects	2.26

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.798	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.85	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.284	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.267	Detected Data Not Normal at 5% Significance Level	

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	1.75	Standard Error of Mean	0.801
SD	4.582	95% KM (BCA) UCL	3.332
95% KM (t) UCL	3.103	95% KM (Percentile Bootstrap) UCL	3.13
95% KM (z) UCL	3.067	95% KM Bootstrap t UCL	4.227
90% KM Chebyshev UCL	4.152	95% KM Chebyshev UCL	5.241
97.5% KM Chebyshev UCL	6.751	99% KM Chebyshev UCL	9.719

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.609	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.796	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.223	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.272	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.424	k star (bias corrected MLE)	0.369
Theta hat (MLE)	13.22	Theta star (bias corrected MLE)	15.2
nu hat (MLE)	9.33	nu star (bias corrected)	8.119
MLE Mean (bias corrected)	5.608	MLE Sd (bias corrected)	9.231

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.146	nu hat (KM)	10.5
Approximate Chi Square Value (10.50, α)	4.256	Adjusted Chi Square Value (10.50, β)	4.076
95% Gamma Approximate KM-UCL (use when n>=50)	4.316	95% Gamma Adjusted KM-UCL (use when n<50)	4.506

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UCL Statistics for Data Sets with Non-Detects

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	1.72
Maximum	22	Median	0.01
SD	4.658	CV	2.707
k hat (MLE)	0.2	k star (bias corrected MLE)	0.202
Theta hat (MLE)	8.61	Theta star (bias corrected MLE)	8.53
nu hat (MLE)	14.39	nu star (bias corrected)	14.52
MLE Mean (bias corrected)	1.72	MLE Sd (bias corrected)	3.831
		Adjusted Level of Significance (β)	0.0428
Approximate Chi Square Value (14.52, α)	6.93	Adjusted Chi Square Value (14.52, β)	6.692
95% Gamma Approximate UCL (use when n>=50)	3.605	95% Gamma Adjusted UCL (use when n<50)	3.733

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.88	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.85	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.22	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.267	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	1.718	Mean in Log Scale	-4.92
SD in Original Scale	4.658	SD in Log Scale	4.363
95% t UCL (assumes normality of ROS data)	3.03	95% Percentile Bootstrap UCL	3.131
95% BCA Bootstrap UCL	3.602	95% Bootstrap t UCL	4.22
95% H-UCL (Log ROS)	23298		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-2.016	95% H-UCL (KM -Log)	2.467
KM SD (logged)	1.889	95% Critical H Value (KM-Log)	3.554
KM Standard Error of Mean (logged)	0.331		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.8	Mean in Log Scale	-2.377
SD in Original Scale	4.646	SD in Log Scale	2.239
95% t UCL (Assumes normality)	3.108	95% H-Stat UCL	5.316

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	3.103	95% GROS Adjusted Gamma UCL	3.733
95% Adjusted Gamma KM-UCL	4.506		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
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UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	4/21/2014 7:21:47 AM
From File	WorkSheet.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

TPHG

General Statistics

Total Number of Observations	21	Number of Distinct Observations	11
Number of Detects	12	Number of Non-Detects	9
Number of Distinct Detects	11	Number of Distinct Non-Detects	1
Minimum Detect	2	Minimum Non-Detect	2
Maximum Detect	2120	Maximum Non-Detect	2
Variance Detects	549253	Percent Non-Detects	42.86%
Mean Detects	541.3	SD Detects	741.1
Median Detects	102	CV Detects	1.369
Skewness Detects	1.185	Kurtosis Detects	0.0974
Mean of Logged Detects	4.47	SD of Logged Detects	2.543

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.762	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.859	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.289	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.256	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	310.1	Standard Error of Mean	136.5
SD	599.1	95% KM (BCA) UCL	558.5
95% KM (t) UCL	545.6	95% KM (Percentile Bootstrap) UCL	540
95% KM (z) UCL	534.7	95% KM Bootstrap t UCL	674.5
90% KM Chebyshev UCL	719.8	95% KM Chebyshev UCL	905.3
97.5% KM Chebyshev UCL	1163	99% KM Chebyshev UCL	1669

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.449	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.811	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.169	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.263	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.366	k star (bias corrected MLE)	0.33
Theta hat (MLE)	1479	Theta star (bias corrected MLE)	1640
nu hat (MLE)	8.784	nu star (bias corrected)	7.921
MLE Mean (bias corrected)	541.3	MLE Sd (bias corrected)	942.1

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.268	nu hat (KM)	11.26
Approximate Chi Square Value (11.26, α)	4.741	Adjusted Chi Square Value (11.26, β)	4.419
95% Gamma Approximate KM-UCL (use when n>=50)	736.3	95% Gamma Adjusted KM-UCL (use when n<50)	789.9

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UCL Statistics for Data Sets with Non-Detects

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	309.3
Maximum	2120	Median	2
SD	614.3	CV	1.986
k hat (MLE)	0.149	k star (bias corrected MLE)	0.16
Theta hat (MLE)	2072	Theta star (bias corrected MLE)	1937
nu hat (MLE)	6.268	nu star (bias corrected)	6.706
MLE Mean (bias corrected)	309.3	MLE Sd (bias corrected)	774
		Adjusted Level of Significance (β)	0.0383
Approximate Chi Square Value (6.71, α)	2.011	Adjusted Chi Square Value (6.71, β)	1.82
95% Gamma Approximate UCL (use when n>=50)	1032	95% Gamma Adjusted UCL (use when n<50)	1140

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.916	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.164	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.256	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	309.4	Mean in Log Scale	1.594
SD in Original Scale	614.3	SD in Log Scale	4.106
95% t UCL (assumes normality of ROS data)	540.6	95% Percentile Bootstrap UCL	553.6
95% BCA Bootstrap UCL	576.9	95% Bootstrap t UCL	701.8
95% H-UCL (Log ROS)	32584257		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	2.851	95% H-UCL (KM -Log)	11615
KM SD (logged)	2.623	95% Critical H Value (KM-Log)	5.231
KM Standard Error of Mean (logged)	0.598		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	309.7	Mean in Log Scale	2.554
SD in Original Scale	614.1	SD in Log Scale	2.949
95% t UCL (Assumes normality)	540.8	95% H-Stat UCL	45946

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (BCA) UCL	558.5	95% GROS Adjusted Gamma UCL	1140
95% Adjusted Gamma KM-UCL	789.9		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

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UCL Statistics for Data Sets with Non-Detects

Benzene

General Statistics

Total Number of Observations	21	Number of Distinct Observations	9
Number of Detects	7	Number of Non-Detects	14
Number of Distinct Detects	6	Number of Distinct Non-Detects	3
Minimum Detect	0.06	Minimum Non-Detect	0.02
Maximum Detect	1.6	Maximum Non-Detect	0.8
Variance Detects	0.412	Percent Non-Detects	66.67%
Mean Detects	0.694	SD Detects	0.642
Median Detects	0.34	CV Detects	0.924
Skewness Detects	0.684	Kurtosis Detects	-1.639
Mean of Logged Detects	-0.866	SD of Logged Detects	1.193

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.838	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.281	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.335	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.247	Standard Error of Mean	0.11
SD	0.467	95% KM (BCA) UCL	0.421
95% KM (t) UCL	0.437	95% KM (Percentile Bootstrap) UCL	0.427
95% KM (z) UCL	0.428	95% KM Bootstrap t UCL	0.578
90% KM Chebyshev UCL	0.578	95% KM Chebyshev UCL	0.727
97.5% KM Chebyshev UCL	0.935	99% KM Chebyshev UCL	1.344

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.372	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.726	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.208	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.319	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.136	k star (bias corrected MLE)	0.744
Theta hat (MLE)	0.611	Theta star (bias corrected MLE)	0.933
nu hat (MLE)	15.9	nu star (bias corrected)	10.42
MLE Mean (bias corrected)	0.694	MLE Sd (bias corrected)	0.805

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.279	nu hat (KM)	11.74
Approximate Chi Square Value (11.74, α)	5.054	Adjusted Chi Square Value (11.74, β)	4.72
95% Gamma Approximate KM-UCL (use when n>=50)	0.573	95% Gamma Adjusted KM-UCL (use when n<50)	0.614

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UCL Statistics for Data Sets with Non-Detects

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.238
Maximum	1.6	Median	0.01
SD	0.482	CV	2.026
k hat (MLE)	0.35	k star (bias corrected MLE)	0.331
Theta hat (MLE)	0.681	Theta star (bias corrected MLE)	0.718
nu hat (MLE)	14.68	nu star (bias corrected)	13.92
MLE Mean (bias corrected)	0.238	MLE Sd (bias corrected)	0.414
		Adjusted Level of Significance (β)	0.0383
Approximate Chi Square Value (13.92, α)	6.516	Adjusted Chi Square Value (13.92, β)	6.13
95% Gamma Approximate UCL (use when n>=50)	0.509	95% Gamma Adjusted UCL (use when n<50)	0.541

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.921	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.167	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.335	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.244	Mean in Log Scale	-3.281
SD in Original Scale	0.48	SD in Log Scale	2.109
95% t UCL (assumes normality of ROS data)	0.425	95% Percentile Bootstrap UCL	0.428
95% BCA Bootstrap UCL	0.476	95% Bootstrap t UCL	0.638
95% H-UCL (Log ROS)	2.679		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-2.872	95% H-UCL (KM -Log)	0.653
KM SD (logged)	1.574	95% Critical H Value (KM-Log)	3.43
KM Standard Error of Mean (logged)	0.375		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.259	Mean in Log Scale	-3.029
SD in Original Scale	0.48	SD in Log Scale	1.859
95% t UCL (Assumes normality)	0.439	95% H-Stat UCL	1.38

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.437	95% KM (Percentile Bootstrap) UCL	0.427

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Data Sets with Non-Detects

Ethylbenzene

General Statistics

Total Number of Observations	21	Number of Distinct Observations	9
Number of Detects	8	Number of Non-Detects	13
Number of Distinct Detects	7	Number of Distinct Non-Detects	2
Minimum Detect	0.17	Minimum Non-Detect	0.02
Maximum Detect	20	Maximum Non-Detect	0.05
Variance Detects	69.22	Percent Non-Detects	61.9%
Mean Detects	8.156	SD Detects	8.32
Median Detects	7	CV Detects	1.02
Skewness Detects	0.364	Kurtosis Detects	-1.911
Mean of Logged Detects	1.045	SD of Logged Detects	1.925

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.835	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.27	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.313	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	3.12	Standard Error of Mean	1.451
SD	6.22	95% KM (BCA) UCL	5.564
95% KM (t) UCL	5.622	95% KM (Percentile Bootstrap) UCL	5.544
95% KM (z) UCL	5.506	95% KM Bootstrap t UCL	6.31
90% KM Chebyshev UCL	7.472	95% KM Chebyshev UCL	9.444
97.5% KM Chebyshev UCL	12.18	99% KM Chebyshev UCL	17.56

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.548	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.756	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.272	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.307	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.588	k star (bias corrected MLE)	0.451
Theta hat (MLE)	13.86	Theta star (bias corrected MLE)	18.08
nu hat (MLE)	9.412	nu star (bias corrected)	7.216
MLE Mean (bias corrected)	8.156	MLE Sd (bias corrected)	12.15

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.252	nu hat (KM)	10.57
Approximate Chi Square Value (10.57, α)	4.298	Adjusted Chi Square Value (10.57, β)	3.995
95% Gamma Approximate KM-UCL (use when n>=50)	7.668	95% Gamma Adjusted KM-UCL (use when n<50)	8.251

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UCL Statistics for Data Sets with Non-Detects

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	3.113
Maximum	20	Median	0.01
SD	6.376	CV	2.048
k hat (MLE)	0.204	k star (bias corrected MLE)	0.207
Theta hat (MLE)	15.23	Theta star (bias corrected MLE)	15.04
nu hat (MLE)	8.585	nu star (bias corrected)	8.692
MLE Mean (bias corrected)	3.113	MLE Sd (bias corrected)	6.844
		Adjusted Level of Significance (β)	0.0383
Approximate Chi Square Value (8.69, α)	3.142	Adjusted Chi Square Value (8.69, β)	2.89
95% Gamma Approximate UCL (use when n>=50)	8.613	95% Gamma Adjusted UCL (use when n<50)	9.363

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.867	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.273	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.313	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	3.123	Mean in Log Scale	-2.637
SD in Original Scale	6.371	SD in Log Scale	3.532
95% t UCL (assumes normality of ROS data)	5.521	95% Percentile Bootstrap UCL	5.367
95% BCA Bootstrap UCL	6.116	95% Bootstrap t UCL	6.504
95% H-UCL (Log ROS)	8326		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-2.023	95% H-UCL (KM -Log)	101.8
KM SD (logged)	2.651	95% Critical H Value (KM-Log)	5.282
KM Standard Error of Mean (logged)	0.619		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	3.119	Mean in Log Scale	-2.104
SD in Original Scale	6.373	SD in Log Scale	2.799
95% t UCL (Assumes normality)	5.518	95% H-Stat UCL	196.9

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	5.622	95% KM (Percentile Bootstrap) UCL	5.544

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Data Sets with Non-Detects

Toluene

General Statistics

Total Number of Observations	21	Number of Distinct Observations	11
Number of Detects	9	Number of Non-Detects	12
Number of Distinct Detects	9	Number of Distinct Non-Detects	2
Minimum Detect	0.15	Minimum Non-Detect	0.02
Maximum Detect	65	Maximum Non-Detect	0.05
Variance Detects	460.7	Percent Non-Detects	57.14%
Mean Detects	12.16	SD Detects	21.46
Median Detects	0.85	CV Detects	1.765
Skewness Detects	2.286	Kurtosis Detects	5.417
Mean of Logged Detects	0.692	SD of Logged Detects	2.235

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.65	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.829	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.311	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.295	Detected Data Not Normal at 5% Significance Level	

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	5.222	Standard Error of Mean	3.367
SD	14.55	95% KM (BCA) UCL	11.3
95% KM (t) UCL	11.03	95% KM (Percentile Bootstrap) UCL	10.72
95% KM (z) UCL	10.76	95% KM Bootstrap t UCL	25.42
90% KM Chebyshev UCL	15.32	95% KM Chebyshev UCL	19.9
97.5% KM Chebyshev UCL	26.25	99% KM Chebyshev UCL	38.72

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.541	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.795	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.266	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.299	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.369	k star (bias corrected MLE)	0.32
Theta hat (MLE)	32.93	Theta star (bias corrected MLE)	37.97
nu hat (MLE)	6.645	nu star (bias corrected)	5.763
MLE Mean (bias corrected)	12.16	MLE Sd (bias corrected)	21.49

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.129	nu hat (KM)	5.413
Approximate Chi Square Value (5.41, α)	1.347	Adjusted Chi Square Value (5.41, β)	1.2
95% Gamma Approximate KM-UCL (use when n>=50)	20.98	95% Gamma Adjusted KM-UCL (use when n<50)	23.56

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UCL Statistics for Data Sets with Non-Detects

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	5.216
Maximum	65	Median	0.01
SD	14.91	CV	2.858
k hat (MLE)	0.187	k star (bias corrected MLE)	0.192
Theta hat (MLE)	27.96	Theta star (bias corrected MLE)	27.21
nu hat (MLE)	7.837	nu star (bias corrected)	8.051
MLE Mean (bias corrected)	5.216	MLE Sd (bias corrected)	11.91
		Adjusted Level of Significance (β)	0.0383
Approximate Chi Square Value (8.05, α)	2.764	Adjusted Chi Square Value (8.05, β)	2.531
95% Gamma Approximate UCL (use when n>=50)	15.19	95% Gamma Adjusted UCL (use when n<50)	16.59

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.914	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.829	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.204	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.295	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	5.215	Mean in Log Scale	-3.316
SD in Original Scale	14.91	SD in Log Scale	4.181
95% t UCL (assumes normality of ROS data)	10.83	95% Percentile Bootstrap UCL	10.98
95% BCA Bootstrap UCL	14.55	95% Bootstrap t UCL	25.6
95% H-UCL (Log ROS)	424812		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-1 939	95% H-UCL (KM -Log)	117.6
KM SD (logged)	2.664	95% Critical H Value (KM-Log)	5.303
KM Standard Error of Mean (logged)	0.616		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	5.222	Mean in Log Scale	-1.986
SD in Original Scale	14.91	SD in Log Scale	2.785
95% t UCL (Assumes normality)	10.83	95% H-Stat UCL	206.7

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	11.03	95% GROS Adjusted Gamma UCL	16.59
95% Adjusted Gamma KM-UCL	23.56		

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Data Sets with Non-Detects

Xylene

General Statistics

Total Number of Observations	21	Number of Distinct Observations	11
Number of Detects	9	Number of Non-Detects	12
Number of Distinct Detects	9	Number of Distinct Non-Detects	2
Minimum Detect	0.92	Minimum Non-Detect	0.06
Maximum Detect	250	Maximum Non-Detect	0.15
Variance Detects	8118	Percent Non-Detects	57.14%
Mean Detects	72.91	SD Detects	90.1
Median Detects	16	CV Detects	1.236
Skewness Detects	1.046	Kurtosis Detects	0.124
Mean of Logged Detects	2.882	SD of Logged Detects	2.155

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.815	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.829	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.292	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.295	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	31.28	Standard Error of Mean	15.34
SD	66.27	95% KM (BCA) UCL	55.97
95% KM (t) UCL	57.74	95% KM (Percentile Bootstrap) UCL	57.56
95% KM (z) UCL	56.51	95% KM Bootstrap t UCL	75.74
90% KM Chebyshev UCL	77.3	95% KM Chebyshev UCL	98.15
97.5% KM Chebyshev UCL	127.1	99% KM Chebyshev UCL	183.9

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.549	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.778	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.242	**Kolmogrov-Smirnoff GOF**	
5% K-S Critical Value	0.296	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.458	k star (bias corrected MLE)	0.379
Theta hat (MLE)	159.3	Theta star (bias corrected MLE)	192.3
nu hat (MLE)	8.237	nu star (bias corrected)	6.825
MLE Mean (bias corrected)	72.91	MLE Sd (bias corrected)	118.4

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.223	nu hat (KM)	9.358
Approximate Chi Square Value (9.36, α)	3.545	Adjusted Chi Square Value (9 36, β)	3.274
95% Gamma Approximate KM-UCL (use when n>=50)	82.59	95% Gamma Adjusted KM-UCL (use when n<50)	89.42

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UCL Statistics for Data Sets with Non-Detects

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	31.25
Maximum	250	Median	0.01
SD	67.92	CV	2.173
k hat (MLE)	0.158	k star (bias corrected MLE)	0.167
Theta hat (MLE)	198.2	Theta star (bias corrected MLE)	187.3
nu hat (MLE)	6.623	nu star (bias corrected)	7.01
MLE Mean (bias corrected)	31.25	MLE Sd (bias corrected)	76.5
		Adjusted Level of Significance (β)	0.0383
Approximate Chi Square Value (7.01, α)	2.176	Adjusted Chi Square Value (7.01, β)	1.975
95% Gamma Approximate UCL (use when n>=50)	100.7	95% Gamma Adjusted UCL (use when n<50)	110.9

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.887	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.829	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.232	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.295	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	31.31	Mean in Log Scale	-0.816
SD in Original Scale	67.9	SD in Log Scale	3.877
95% t UCL (assumes normality of ROS data)	56.86	95% Percentile Bootstrap UCL	57.33
95% BCA Bootstrap UCL	63.32	95% Bootstrap t UCL	76.01
95% H-UCL (Log ROS)	543974		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-0 373	95% H-UCL (KM -Log)	6291
KM SD (logged)	3.117	95% Critical H Value (KM-Log)	6.117
KM Standard Error of Mean (logged)	0.721		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	31.28	Mean in Log Scale	-0.42
SD in Original Scale	67.91	SD in Log Scale	3.249
95% t UCL (Assumes normality)	56.84	95% H-Stat UCL	13022

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	57.74	95% KM (Percentile Bootstrap) UCL	57.56

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

Recommendations are based upon data size, data distribution, and skewness.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

UCL Statistics for Data Sets with Non-Detects

Naphthalene

General Statistics

Total Number of Observations	10	Number of Distinct Observations	4
Number of Detects	3	Number of Non-Detects	7
Number of Distinct Detects	3	Number of Distinct Non-Detects	1
Minimum Detect	0.092	Minimum Non-Detect	0.05
Maximum Detect	6.2	Maximum Non-Detect	0.05
Variance Detects	12.43	Percent Non-Detects	70%
Mean Detects	2.129	SD Detects	3.526
Median Detects	0.095	CV Detects	1.656
Skewness Detects	1.732	Kurtosis Detects	N/A
Mean of Logged Detects	-0 972	SD of Logged Detects	2.422

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.75	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.767	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.385	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.512	Detected Data appear Normal at 5% Significance Level

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.674	Standard Error of Mean	0.713
SD	1.842	95% KM (BCA) UCL	N/A
95% KM (t) UCL	1.982	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	1.847	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	2.814	95% KM Chebyshev UCL	3.784
97.5% KM Chebyshev UCL	5.129	99% KM Chebyshev UCL	7.773

Gamma GOF Tests on Detected Observations Only
Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	0.384	k star (bias corrected MLE)	N/A
Theta hat (MLE)	5.551	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	2.301	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.134	nu hat (KM)	2.675
		Adjusted Level of Significance (β)	0.0267
Approximate Chi Square Value (2.67, α)	0.283	Adjusted Chi Square Value (2.67, β)	0.194
95% Gamma Approximate KM-UCL (use when n>=50)	6.368	95% Gamma Adjusted KM-UCL (use when n<50)	9.297

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.756	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.767	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.383	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.512	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Approximate Lognormal at 5% Significance Level

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UCL Statistics for Data Sets with Non-Detects

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.639	Mean in Log Scale	-7.844
SD in Original Scale	1.954	SD in Log Scale	5.741
95% t UCL (assumes normality of ROS data)	1.772	95% Percentile Bootstrap UCL	1.87
95% BCA Bootstrap UCL	2.499	95% Bootstrap t UCL	43.05
95% H-UCL (Log ROS)	1.108E+16		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-2 389	95% H-UCL (KM -Log)	1.726
KM SD (logged)	1.426	95% Critical H Value (KM-Log)	4.035
KM Standard Error of Mean (logged)	0.552		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.656	Mean in Log Scale	-2.874
SD in Original Scale	1.948	SD in Log Scale	1.74
95% t UCL (Assumes normality)	1.785	95% H-Stat UCL	4.076

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Detected Data appear Approximate Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	1.982	95% KM (Percentile Bootstrap) UCL	N/A

Warning: One or more Recommended UCL(s) not available!

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Appendix D2

Technical Assessment Services, Inc.

MEMORANDUM

To: Paul Ecker
EES Environmental Consulting, Inc.

From: Regina Skarzinskas

Date: 5 February 2018

Re: Plaid Pantry #324 Seattle, WA MTCA Modified B Calculations and Screening for Indoor Air

This memo describes the calculation of MTCA Modified B CULs for indoor air and soil gas at the Plaid Pantry #324 site and risk characterization for the occupational worker.

MTCA Modified B CUL

Potential human health impacts associated with exposure to COPCs at the site were evaluated by estimating the potential for both non-carcinogenic and carcinogenic health effects using site-specific MTCA Modified B CULs. The following sections describe the equations and inputs used to calculate these values.

Non-Carcinogens

Non-carcinogenic hazard is estimated as the ratio of the average daily dose (ADD) of the non-carcinogenic chemical through a specific exposure route to the chronic reference dose (RfD) for that exposure route. Under MTCA, Risk Based CULs (RBCs) are calculated for each media, receptor, and selected exposure pathway. Therefore, the HQ is calculated as follows:

$$HQ = \frac{EPC}{MTCA\ CUL}$$

Where:

HQ = Hazard Quotient (unitless)
EPC = Exposure Point Concentration (mg/Kg for soil; ug/m^3 for soil gas)
MTCA CUL = Risk-based Concentration (e.g. MTCA Method B or MTCA Modified Method B CUL)

A Hazard Quotient is calculated for each non-carcinogenic COI. Hazard Quotients greater than 1.0 indicate a potential for adverse health effects because the intake exceeds the allowable risk- based concentration. The sum of all individual chemical-specific Hazard Quotients is termed the Hazard Index (HI) and is calculated under each exposure pathway and for each receptor. Thus, an HI less than 1.0 is not anticipated to produce unacceptable human health effects.

7870 SW Bristol Court
Beaverton, OR 97007
Voice (503) 970-9538
Fax (503) 641-8622

Carcinogens

Carcinogenic risk is presented as the potential for exposure to produce an increased risk of developing cancer. The excess lifetime carcinogenic risk is the incremental increase in the probability of developing cancer compared to a background probability of developing cancer with no exposure to Site-related contaminants. The potential for cancer is evaluated in terms of excess cancer risk (ECR). The EPA accepts a risk range of one in ten thousand (1E-04) to one in one million (1E-06); however, Ecology considers an ECR greater than one in one million (1E-06) to be unacceptable for all receptors except occupational/industrial workers. In that case, an ECR greater than one in one hundred thousand (1E-05) is considered to be unacceptable. An ECR of 1E-06 is defined as an increase of one additional case of cancer (above background) in one million people who are exposed to a carcinogen.

MTCA Modified Method B CUL values are calculated for each media, receptor, and selected exposure pathway to represent a concentration at or below which no unacceptable ECR is anticipated. ECRs are calculated as follows:

$$ECR = \frac{EPC * 0.000001}{MTCA\ CUL}$$

Where:

ECR = Excess Cancer Risk (unitless)
EPC = Exposure Point Concentration (mg/Kg for soil; ug/^{m3} for soil gas)
MTCA CUL = Risk-based Concentration (e.g. MTCA Method B or MTCA Modified Method B CUL)

Calculating MTCA Modified Method B for Indoor Air

The primary pathway of concern at this Site was identified as the indirect pathway of vapor intrusion from soil into indoor air. MTCA Method B exposure factors, modified with site-specific exposure parameters, were used to calculate MTCA Modified Method B CULs for this indirect exposure pathway. Default MTCA B values as well as the site-specific modifications are presented in the Exposure Factors Table (Table 1).

MTCA Modified Method B CULs for the current and future occupational worker, the retail customer, and the restaurant diner were calculated using the following equations:

MTCA Modified Method B soil gas cleanup numbers were calculated by first calculating an Air CUL. The Air CUL was calculated as follows:

[MTCA Equation 750-1] (non-carcinogens)

$$MTCA\ Modified\ B\ Air\ CUL = \frac{RfDi * ABW * UCF * HQ * AT}{BR * AB * EF * ED}$$

Where,

RfDi = Inhalation Reference Dose as defined in WAC 173-340-708) (mg/kg-day)
ABW = Average Body Weight (kg)
UCF = Unit conversion rate (mg/kg)
BR = Breathing Rate (mg^3/day)
AB1 = Gastrointestinal Absorption Fraction (unitless)

EF = Exposure Frequency (unitless)
HQ = Hazard Quotient (unitless)
AT = Averaging Time (years)
ED = Exposure Duration (years)

[MTCA Equation 750-2] (carcinogens)

$$MTCA\ Modified\ B\ Air\ CUL = \frac{RISK * ABW * AT * UCF}{CPFi * BR * AB * EF * ED}$$

Where,

RISK = Acceptable Risk Level (E-6)
ABW = Average Body Weight (kg)
UCF = Unit conversion rate (mg/kg)
BR = Breathing rate (m^3/day)
CPFi = Inhalation Cancer Potency Factor as defined in WAC 173-340-708(8) (kg-day/mg)
AB1 = Gastrointestinal Absorption Fraction (unitless)
EF = Exposure Frequency (unitless)
HQ = Hazard Quotient (unitless)
AT = Averaging Time (years)
ED = Exposure Duration (years)

In accordance with MTCA guidance, the air cleanup level was then divided by 0.03 to determine a soil gas screening value.

The MTCA Modified Method B CULs are provided in Table 2.

Risk Characterization

Exposure point concentrations calculated for each of the COIs were screened against the most conservative MTCA Modified Method B CUL. The screening results are provided in Table 3.

Vapor intrusion from soil into indoor air was identified as a potential pathway of concern for this Site. The occupational worker represents the most conservative CULs for the Plaid 324 site for this pathway of exposure. Therefore, the risk characterization consisted of screening the MTCA Modified B CULs for the occupational receptor for soil gas against the EPCs for the identified Site COIs (Benzene, Toluene, Ethylbenzene and Xylenes. Naphthalene in soil gas was eliminated as a COI). The results are summarized in Table 3 and here as follows:

- Soil gas EPCs were calculated using all soil gas data collected on the Property (seven locations including “worst case” samples collected from zones of greatest contaminant concentrations) as well as a sub-set of three soil gas samples (SG-1, SG-2, and SG-7) collected nearest the existing Property building.
  - When the EPCs for the entire seven-sample soil gas data set (SG-1 through SG-7) were screened against MTCA Modified Method B CULs, both the ECRs and the HIs for these receptors exceeded the regulatory standards. For the occupational worker the ECR was calculated to be 2E-03 and the HI 1E+1, with all constituents exceeding their respective CULs. This scenario represents potential vapor intrusion risks for a building covering the entire Property, including all “developable areas” and does not represent current Property or building conditions.

- One of the seven soil gas samples (SG-3) was collected on the northern portion of the Property, immediately adjacent to known soil gasoline contamination and approximately 10 feet south of a neighboring commercial building (currently used as an automotive repair shop). Soil gas concentrations at SG-3 for gasoline and benzene exceed modified Method B screening levels and are addressed as part of the assessment of future developable portions of the Site (above). However, risk characterization was not conducted specifically for that adjacent off-Property building since similar gasoline-related chemicals are likely to be routinely used by workers at that auto repair facility, which should exempt that facility from Ecology's vapor intrusion assessment guidance (see off-Property receptor discussion below).

- In order to represent what is likely to be current Property building conditions, three of the seven soil gas samples (SG-1, SG-2, and SG-7) were collected adjacent to the existing commercial/retail building. Among these three samples, the maximum vapor concentration detected was screened against the MTCA Modified Method B CULs. Using the soil gas data closest to the existing Property building, no unacceptable health risks are identified for vapor intrusion with regard to occupational workers which represent the most conservative CULs. Under current building conditions, the ECR of 2E-07 and the HI of 1E-05 did not exceed the regulatory standard of ECR ≤ 1E-06 and HI =1.

Therefore, since the occupational receptor represented the most conservative CUL for indoor air and soil gas, no unacceptable cancer or noncancer health effects are expected for the occupational worker or any of the potential future receptors exposed to indoor air under current site conditions.

References

Ecology, 2007. *Workbook Tools for Calculating Soil and Groundwater Cleanup Levels.* State of Washington Department of Ecology, Toxics Cleanup Program. Revised 2007.

Ecology, 2009. *Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action*. State of Washington Department of Ecology, Toxics Cleanup Program. October 2009. Revised February 2016.

Table 1
Exposure Assumptions MTCA Modified Method B
Former Plaid Pantry #324
White Center/King County, Washington

Parameter	Definition	Default Method B[a]	Modified Method B	Units	Comments	Receptors
RfDi	Inhalation Reference Dose	Chemical-Specific	Chemical-Specific	mg/kg-day		occupational worker, trenchworker, retail customer, restaurant diner, highway maintenance worker, construction worker
CPFi	Inhalation Cancer Potency Factor	Chemical-Specific	Chemical-Specific	kg-day/mg		occupational worker, trenchworker, retail customer, restaurant diner, highway maintenance worker, construction worker
ABW	Average Body Weight (nc)	16	16	kg		retail customer
			70			occupational worker, trenchworker, highway maintenance worker, construction worker, restaurant diner
ABW	Average Body Weight (c)	16	16 70	kg		retail customer occupational worker, trenchworker, highway maintenance worker, construction worker, restaurant diner
AT	Averaging Time (nc)	6	AT=ED	yrs		occupational worker, retail customer, restaurant diner (ingestion only), trenchworker, construction worker, highway maintenance worker (ingestion and dermal)
AT	Averaging Time (c)	75	75	yrs		occupational worker, trenchworker, retail customer, restaurant diner, highway maintenance worker, construction worker
UFC2	Unit Conversion Factor	1,000	1,000	ug/mg		occupational worker, trenchworker, retail customer, restaurant diner, highway maintenance worker, construction worker
BR	Breathing Rate	10	10	m^3/day		retail customer, restaurant diner
			20			occupational worker
			7			maintenance worker, trenchworker, construction worker
ED[1]	Exposure Duration	6	11	years	urban residential (DEQ)	retail customer, restaurant diner
			25			occupational worker
			1			highway maintenance worker, construction worker, trenchworker
ED[1]	Exposure Duration (c)	30	11	years	urban residential (DEQ)	retail customer, restaurant diner
			25			occupational worker
			1			trenchworker, highway maintenance worker , construction worker
ED[2]	Exposure Duration (nc/c)	365	52	days/year	4 days/wk * 13 weeks/yr	retail customer, restaurant diner
			250			occupational worker, construction worker
			9			highway maintenance worker, trenchworker
ED[3]	Exposure Duration (nc/c)		0.25	hours/day		retail customer
			1			restaurant diner
			8			occupational worker, highway maintenance worker, trenchworker, construction worker
EF	Exposure Frequency	1	1	unitless	ingestion	occupational worker, trenchworker, retail customer, restaurant diner, highway maintenance worker, construction worker
HQ	Hazard Quotient	1	1	unitless		occupational worker, trenchworker, retail customer, restaurant diner, highway maintenance worker, construction worker
RISK	Acceptable Cancer Risk Level	1.E-06	1.00E-06	unitless		occupational worker, trenchworker, retail customer, restaurant diner, highway maintenance worker, construction worker

Notes:

[a] Default MTCA B used for residental exposures

ED^1 = Exposure duration (years)

ED^2 = Exposure duration (days/year)

ED^3 = Exposure duration (hours/day)

mg/kg = milligram per kilogram

m^3/day = Cubic meters per day

c = Carcinogen

nc = Non-carginogen

Shaded cells indicate parameters that differ from the MTCA Method B defaults.

Table 2
MTCA Modified Method B Cleanup Values
Former Plaid Pantry #324
White Center/King County, Washington

COPC	CASN	c/nc	CPFo	IUR	CPFi	RfC	RfDi	Occupational Worker		Retail Customer		Restaurant Diner		**MTCA B DEFAULT**	
								Vapor Intrusion Pathway		Vapor Intrusion Pathway		Vapor Intrusion Pathway		Vapor Intrusion Pathway	
								Indoor Air CUL[1] (ug/m^3)	Soil Gas CUL[2] (ug/m^3)	Indoor Air CUL (ug/m^3)	Soil Gas CUL (ug/m^3)	Indoor Air CUL (ug/m^3)	Soil Gas CUL (ug/m^3)	Indoor Air CUL (ug/m^3)	Soil Gas CUL (ug/m^3)
Benzene	71-43-2	c	5.5E-02	7.8E-06	2.7E-02		8.6E-03	1.7E+00	5.6E+01	1.3E+03	4.5E+04	1.5E+02	4.9E+03	3.7E-01	3.7E+00
Ethylbenzene	100-41-4	c	1.1E-02	2.5E-06	8.8E-03		2.9E-01	5.3E+00	1.8E+02	4.2E+03	1.4E+05	4.6E+02	1.5E+04	1.1E+00	1.1E+01
Xylenes	95-47-6	nc					2.9E-02	4.4E+02	1.5E+04	3.1E+05	1.0E+07	1.7E+04	5.7E+05	2.3E+01	2.3E+02
Toluene	108-88-3	nc				5.0E+00	1.4E+00	2.2E+04	7.3E+05	1.5E+07	5.1E+08	8.4E+05	2.8E+07	1.1E+03	1.1E+04

Notes:

COPC = Chemical of Potential Concern

CASN = Chemical Abstract Service (Registration) Number

CPFo = Oral Cancer Potency Factor (kg-day/mg)

IUR = inhalation unit risk $(ug/m^3)^{-1}$

CPF = Inhalation Cancer Potency Factor $(mg/kg\text{-}day)^{-1}$

RfC = Inhalation Reference Concentration (ug/m^3)

RfDi = Inhalation Reference Dose (mg/kg-day)

ug/m^3 = Micrograms per cubic meter

[1]MTCA A Industrial Land Use

[1]Indoor Air CUL calculated using Equations 750-1(non-carcinogens) or 750-2 (carcinogens) defined by MTCA

[2] Soil Gas CUL = (Indoor Air CUL/0.03)

Table 3
Screening of Occupational EPCs Against CULs for Soil Gas
Former Plaid Pantry #324
White Center/King County, Washington

Constitutent	EPC	Most Conservative MTCA Modified B CUL	Receptor	Pathway	EPC> CUL	Potential Risk	
						ECR	HI
SOIL GAS - Soil Gas Data Near Building (SG-1, SG-2, SG-7)							
Benzene	8.9E+00	5.6E+01	Occupational Worker	vapor intrusion	no	2E-07	
Toluene	9.1E+00	7.3E+05	Occupational Worker	vapor intrusion	no		0.00001
SOIL GAS - All Soil Gas Data (ug/m^3)							
Benzene	1.0E+05	5.6E+01	Occupational Worker	vapor intrusion	yes	**2E-03**	
Toluene	4.8E+05	7.3E+05	Occupational Worker	vapor intrusion	yes		**0.66**
Ethylbenzene	4.3E+04	1.8E+02	Occupational Worker	vapor intrusion	yes	**2E-04**	
Total Xylenes	2.0E+05	1.5E+04	Occupational Worker	vapor intrusion	yes		**13.55**
					TOTAL FOR ALL DATA	**2E-03**	**14.21**

Notes:

EPC = Exposure Point Concentration

CUL = Cleanup Level

ECR = Excess Cancer Risk

HI = Hazard Index

Shaded cells indicate EPC was greater than the CUL.

Bold values indicate value exceeded regulatory standards.

Appendix E

Technical Assessment Services, Inc.

MEMORANDUM

To: Paul Ecker
EES Environmental Consulting, Inc.

From: Regina Skarzinskas

Date: 28 August 2017

Re: Calculation of 95UCL for Plaid Pantry #324 White Center/King County, Washington

A statistical average concentration (95 UCL) was calculated for the TPH-G data from the Plaid Pantry #324 site. All TPH-G data less than 15 ft bgs were included in the data analysis. (Attachment 1)

The data set consisted of 132 samples. Of these, 71 samples were not detected. Reporting limits ranged from 2.0 mg/kg to 580 mg/kg (1 sample, B7@8). As a conservative first run, all data was considered to be detected at the reporting limit. The data was analyzed using the MTCAstats program. The results indicated that the distribution was neither normal nor lognormal. The recommendation was made to use the maximum concentration. (Attachment 2)

The dataset consists of 53% nondetects, a majority of which were not detected @ 2.0 mg/kg (35/71 samples). Two out of 132 samples (1.5%) including B35/CS-4 (5-5.5 ft) and B-39 (7-7.5 ft) exceeded the clean-up level by 202%, slightly exceeding Ecology's 200% limitation criteria. Therefore, the maximum concentration detected does not accurately represent the arithmetic or the statistical average concentration across the site.

EPA's ProUCL statistical program version 5.1 was used to calculate the 95 UCL for TPH-G at this site. Conservatively, the assumption was made that all samples represented detections therefore all nondetects were entered at their respective reporting limits. The results of the calculation are presented in Attachment 3.

The 95% Chebyshev (Mean, Sd) UCL of 792.2 mg/Kg was recommended as the most appropriate 95UCL concentration across the site. As more than half of the data were not detected, this 95UCL represents a very conservative statistical average concentration across the Plaid Pantry #324 site.

7870 SW Bristol Court
Beaverton, OR 97007
Voice (503) 970-9538

ATTACHMENT 1

Gasoline Analytical Results used to Calculate 95UCL

Plaid Pantry #324

White Center / King County, Washington

Sample ID	Sample Depth (feet bgs)	Gasoline	
		mg/Kg	ProUCL code
S-4	8	2.0	0
S-5	8	2.0	0
S-6	8	2.0	0
S-7	8	2.0	0
S-8	8	2.0	0
S-9	8	2.0	0
S-10	4	310	1
B1-5	5	1,400	1
B1-8	8	11	1
B2-9	9	2.0	0
B3-8	8	390	1
B4-5	5	2.0	1
B4-8	8	2.0	0
B-5@4	4	1,300	1
B-5@7	7	2.0	0
B-5@12	12	2.0	0
B-6@4	4	1,500	1
B-6@9	4	2.0	0
B-7@4	4	2.0	0
B-7@8	8	580	0
B-7@11	11	2.0	0
B-8@6	6	1,200	1
B-8@9	9	18	1
B-9@5	5	950	1
B-9@10	10	2,100	1
B-9@12	12	2.0	0
B-10@4	4	8	1
B-10@6	6	6	1
B-10@10	10	76	1
B-10@14.5	14.5	19	1
B-12@4	4	150	1
B-12@8	8	2.0	0
B-13@5	5	140	1
B-13@12	12	3.0	1
B-15/4	4	2.0	0
B-15/8	8	2.0	0
B-15/12	12	2.0	0
B-16/4	4	2.0	0
B-16/8	8	120	1
B-16/11	11	2.0	0
B-17/4	4	2.0	0
B-17/7	7	46	1
B-17/10	10	90	1
B-17/13	13	2.0	0
B-18/4	4	54	1
B-18/8	8	2.0	0
B-18/12	12	2.0	0
B-19/4	4	2.0	0

ATTACHMENT 1

Gasoline Analytical Results used to Calculate 95UCL

Plaid Pantry #324

White Center / King County, Washington

Sample ID	Sample Depth (feet bgs)	Gasoline	
		mg/Kg	ProUCL code
B-19/8	8	2.0	0
B-19/12	12	2.0	0
B-20/4	4	2.0	0
B-20/6	6	93	1
B-20/10	10	2.0	0
B-21/4	4	2.0	0
B-21/9	9	2.0	0
B-22/4	4	2.0	0
B-22/7	7	93	1
B-23/5	5	2.0	0
B-23/10	10	2.0	0
B-24/4	4	2.0	1
B-24/8	8	990	1
B-25/4	4	2.0	1
B-25/8	8	2.0	0
B-26/4	4	27	1
B-26/8	8	130	1
B-26/12	12	17	1
B-27/4	4	1,000	1
B-27/8	8	12	1
B-27/12	12	5.0	1
B-28/8	8	1,420	1
B-28/13	13	14	1
B-29/8	8	1,420	1
ROW-1/3	3	10	0
ROW-1/9	9	67	1
ROW-1/10	10	780	1
ROW-1/15	15	10	0
ROW-2/3	3	10	0
ROW-2/3 (duplicate)	3	10	0
ROW-2/10	10	200	1
ROW-3/3	3	10	0
ROW-3/9	9	35	1
ROW-3/12	12	300	1
ROW-4/3	3	10	0
ROW-4/10	10	260	1
ROW-4/11	11	10	0
ROW-4/15	15	10	0
ROW-5/3	3	10	0
ROW-5/10	10	10	0
ROW-5/15	15	10	0
ROW-5/15 (duplicate)	15	10	0
ROW-6/3	3	10	0
ROW-6/8.5	8.5	10	0
ROW-6/10	10	10	0
ROW-7/3	3	10	0
ROW-7/8	8	10	0
ROW-7/10	10	10	0

ATTACHMENT 1

Gasoline Analytical Results used to Calculate 95UCL

Plaid Pantry #324

White Center / King County, Washington

Sample ID	Sample Depth (feet bgs)	Gasoline	
		mg/Kg	ProUCL code
ROW-7/14	14	10	0
ROW-8/3	3	10	0
ROW-8/7	7	10	0
ROW-8/10	10	10	0
ROW-8/14	14	10	0
ROW-8/14 (duplicate)	14	10	0
ROW-9/3	3	10	0
ROW-9/7	7	10	0
ROW-9/10	10	10	0
ROW-9/15	15	10	0
ROW-10/3	3	10	0
ROW-10/8	8	10	0
ROW-10/10	10	10	0
ROW-10/15	15	10	0
ROW-10/15 (duplicate)	15	10	0
B-32/CS-1 (5-5.5)	5-5.5	5.9	0
B-32/CS-1 (7-7.5)	7-7.5	**4,210**	1
B-32/CS-1 (9-9.5)	9-9.5	11	1
B-32/CS-1 (11-11.5)	11-11.5	10	1
B-33/CS-2 (5-5.5)	5-5.5	5.0	0
B-33/CS-2 (7-7.5)	7-7.5	1,700	1
B-33/CS-2 (9-9.5)	9-9.5	42	1
B-33/CS-2 (11-11.5)	11-11.5	23	1
B-34/CS-3 (5-5.5)	5-5.5	2,660	1
B-34/CS-3 (7-7.5)	7-7.5	2,900	1
B-34/CS-3 (9-9.5)	9-9.5	13	1
B-34/CS-3 (11-11.5)	11-11.5	36	1
B-35/CS-4 (5-5.5)	5-5.5	**5,960**	1
B-35/CS-4 (7-7.5)	7-7.5	**3,700**	1
B-35/CS-4 (9-9.5)	9-9.5	29	1
B-35/CS-4 (11-11.5)	11-11.5	327	1
B-37 (4.5-5)	4-4.5	2,120	1
B-38 (4.5-5)	4.5-5	22	1
B-39 (7-7.5)	7-7.5	**5,970**	1
B-40 (8-8.5)	8-8.5	2,520	1
B-41 (8-8.5)	8-8.5	2,910	1
MTCA Method B Soil Cleanup Levels[a]		2,919	

Notes:

Gasoline analyzed by Method NWTPH-Gx

[a] Site-Specific MTCA Method B Soil Cleanup Level calculated using MTCA TPH Calculator

mg/Kg = Milligrams per kilogram (parts per million)

bgs = Below ground surface

0= Not detected at method reporting limit shown

1= detected

Values in **bold** indicate the concentration exceeds applicable cleanup criteria.

ATTACHMENT 2

TPH-G MTCAstats

Plaid Pantry #324

White Center / King County, Washington

Number of samples		Uncensored values	
Uncensored	132	Mean	400.87
Censored		Lognormal mean	399.52
Detection limit or PQL		Std. devn.	1031.35
Method detection limit		Median	10
TOTAL	132	Min.	2
		Max.	5970

Lognormal distribution?	Normal distribution?
r-squared is:	r-squared is:

Recommendations:

Reject lognormal distribution.

Y value is -5.0713. This lies outside the tabled values of 1.3798 and -2.488

Reject normal distribution.

Y value is -43.6664. This lies outside the tabled values of 1.3798 and -2.488

ATTACHMENT 3
UCL Statistics for Uncensored Full Data Sets
Plaid Pantry #324
White Center / King County, Washington

TPHG

General Statistics

Total Number of Observations	132	Number of Distinct Observations	58
		Number of Missing Observations	0
Minimum	2	Mean	400.9
Maximum	5970	Median	10
SD	1031	Std. Error of Mean	89.77
Coefficient of Variation	2.573	Skewness	3 538

Normal GOF Test

Shapiro Wilk Test Statistic	0.458	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk P Value	0	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.384	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0775	Data Not Normal at 5% Significance Level	

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	549.6	95% Adjusted-CLT UCL (Chen-1995)	578.1
		95% Modified-t UCL (Johnson-1978)	554.2

Gamma GOF Test

A-D Test Statistic	14.85	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.895	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.287	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.0893	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.246	k star (bias corrected MLE)	0 245
Theta hat (MLE)	1632	Theta star (bias corrected MLE)	1635
nu hat (MLE)	64.86	nu star (bias corrected)	64.72
MLE Mean (bias corrected)	400.9	MLE Sd (bias corrected)	809.6
		Approximate Chi Square Value (0.05)	47.21
Adjusted Level of Significance	0.0482	Adjusted Chi Square Value	47.05

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	549.5	95% Adjusted Gamma UCL (use when n<50)	551.5

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.825	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.22	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.0775	Data Not Lognormal at 5% Significance Level	

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.693	Mean of logged Data	3.094
Maximum of Logged Data	8.695	SD of logged Data	2.406

Assuming Lognormal Distribution

95% H-UCL	881.4	90% Chebyshev (MVUE) UCL	776.9
95% Chebyshev (MVUE) UCL	961.9	97.5% Chebyshev (MVUE) UCL	1219
99% Chebyshev (MVUE) UCL	1723		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

95% CLT UCL	548.5	95% Jackknife UCL	549.6
95% Standard Bootstrap UCL	550	95% Bootstrap-t UCL	600.5
95% Hall's Bootstrap UCL	591.8	95% Percentile Bootstrap UCL	557.6
95% BCA Bootstrap UCL	585.4		
90% Chebyshev(Mean, Sd) UCL	670.2	95% Chebyshev(Mean, Sd) UCL	792.2
97.5% Chebyshev(Mean, Sd) UCL	961.5	99% Chebyshev(Mean, Sd) UCL	1294

Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL 792.2

Appendix F

DEPARTMENT OF ECOLOGY
State of Washington

Voluntary Cleanup Program

Washington State Department of Ecology
Toxics Cleanup Program

TERRESTRIAL ECOLOGICAL EVALUATION FORM

Under the Model Toxics Control Act (MTCA), a terrestrial ecological evaluation is necessary if hazardous substances are released into the soils at a Site. In the event of such a release, you must take one of the following three actions as part of your investigation and cleanup of the Site:

1. Document an exclusion from further evaluation using the criteria in WAC 173-340-7491.
2. Conduct a simplified evaluation as set forth in WAC 173-340-7492.
3. Conduct a site-specific evaluation as set forth in WAC 173-340-7493.

When requesting a written opinion under the Voluntary Cleanup Program (VCP), you must complete this form and submit it to the Department of Ecology (Ecology). The form documents the type and results of your evaluation.

Completion of this form is not sufficient to document your evaluation. You still need to document your analysis and the basis for your conclusion in your cleanup plan or report.

If you have questions about how to conduct a terrestrial ecological evaluation, please contact the Ecology site manager assigned to your Site. For additional guidance, please refer to www.ecy.wa.gov/programs/tcp/policies/terrestrial/TEEHome.htm.

Step 1: IDENTIFY HAZARDOUS WASTE SITE

Please identify below the hazardous waste site for which you are documenting an evaluation.

Facility/Site Name: FORMER PLAID PANTRY STORE #324	
Facility/Site Address: 10645 16th AVE. SW, WHITE CENTER, WA	
Facility/Site No: 1811426	VCP Project No.: NW2585

Step 2: IDENTIFY EVALUATOR

Please identify below the person who conducted the evaluation and their contact information.

Name: CHRIS RHEA		Title: PROJECT MANAGER
Organization: EES ENVIRONMENTAL CONSULTING, INC.		
Mailing address: 240 N BROADWAY, SUITE #203		
City: PORTLAND	State: OR	Zip code: 97227
Phone: 971-302-7234	Fax: —	E-mail: CHRIS@EES-ENV.COM

Step 3: DOCUMENT EVALUATION TYPE AND RESULTS

A. Exclusion from further evaluation.

1. Does the Site qualify for an exclusion from further evaluation?

☒ Yes *If you answered **"YES,"** then answer **Question 2.***

☐ No or Unknown *If you answered **"NO" or "UKNOWN,"** then skip to **Step 3B** of this form.*

2. What is the basis for the exclusion? *Check all that apply. Then skip to **Step 4** of this form.*

Point of Compliance: WAC 173-340-7491(1)(a)

☐ All soil contamination is, or will be,* at least 15 feet below the surface.

☐ All soil contamination is, or will be,* at least 6 feet below the surface (or alternative depth if approved by Ecology), and institutional controls are used to manage remaining contamination.

Barriers to Exposure: WAC 173-340-7491(1)(b)

☐ All contaminated soil, is or will be,* covered by physical barriers (such as buildings or paved roads) that prevent exposure to plants and wildlife, and institutional controls are used to manage remaining contamination.

Undeveloped Land: WAC 173-340-7491(1)(c)

☐ There is less than 0.25 acres of contiguous# undeveloped± land on or within 500 feet of any area of the Site and any of the following chemicals is present: chlorinated dioxins or furans, PCB mixtures, DDT, DDE, DDD, aldrin, chlordane, dieldrin, endosulfan, endrin, heptachlor, heptachlor epoxide, benzene hexachloride, toxaphene, hexachlorobenzene, pentachlorophenol, or pentachlorobenzene.

☒ For sites not containing any of the chemicals mentioned above, there is less than 1.5 acres of contiguous# undeveloped± land on or within 500 feet of any area of the Site.

Background Concentrations: WAC 173-340-7491(1)(d)

☐ Concentrations of hazardous substances in soil do not exceed natural background levels as described in WAC 173-340-200 and 173-340-709.

* An exclusion based on future land use must have a completion date for future development that is acceptable to Ecology.

± "Undeveloped land" is land that is not covered by building, roads, paved areas, or other barriers that would prevent wildlife from feeding on plants, earthworms, insects, or other food in or on the soil.

"Contiguous" undeveloped land is an area of undeveloped land that is not divided into smaller areas of highways, extensive paving, or similar structures that are likely to reduce the potential use of the overall area by wildlife.

B. Simplified evaluation. NOT APPLICABLE

1. Does the Site qualify for a simplified evaluation?

☐ Yes *If you answered **"YES,"** then answer **Question 2** below.*

☐ No or Unknown *If you answered **"NO"** or **"UNKNOWN,"** then skip to **Step 3C** of this form.*

2. Did you conduct a simplified evaluation?

☐ Yes *If you answered **"YES,"** then answer **Question 3** below.*

☐ No *If you answered **"NO,"** then skip to **Step 3C** of this form.*

3. Was further evaluation necessary?

☐ Yes *If you answered **"YES,"** then answer **Question 4** below.*

☐ No *If you answered **"NO,"** then answer **Question 5** below.*

4. If further evaluation was necessary, what did you do?

☐ Used the concentrations listed in Table 749-2 as cleanup levels. *If so, then skip to **Step 4** of this form.*

☐ Conducted a site-specific evaluation. *If so, then skip to **Step 3C** of this form.*

5. If no further evaluation was necessary, what was the reason? *Check all that apply. Then skip to **Step 4** of this form.*

Exposure Analysis: WAC 173-340-7492(2)(a)

☐ Area of soil contamination at the Site is not more than 350 square feet.

☐ Current or planned land use makes wildlife exposure unlikely. Used Table 749-1.

Pathway Analysis: WAC 173-340-7492(2)(b)

☐ No potential exposure pathways from soil contamination to ecological receptors.

Contaminant Analysis: WAC 173-340-7492(2)(c)

☐ No contaminant listed in Table 749-2 is, or will be, present in the upper 15 feet at concentrations that exceed the values listed in Table 749-2.

☐ No contaminant listed in Table 749-2 is, or will be, present in the upper 6 feet (or alternative depth if approved by Ecology) at concentrations that exceed the values listed in Table 749-2, and institutional controls are used to manage remaining contamination.

☐ No contaminant listed in Table 749-2 is, or will be, present in the upper 15 feet at concentrations likely to be toxic or have the potential to bioaccumulate as determined using Ecology-approved bioassays.

☐ No contaminant listed in Table 749-2 is, or will be, present in the upper 6 feet (or alternative depth if approved by Ecology) at concentrations likely to be toxic or have the potential to bioaccumulate as determined using Ecology-approved bioassays, and institutional controls are used to manage remaining contamination.

C. Site-specific evaluation. A site-specific evaluation process consists of two parts: (1) formulating the problem, and (2) selecting the methods for addressing the identified problem. Both steps require consultation with and approval by Ecology. *See* WAC 173-340-7493(1)(c). N/A

1. Was there a problem? *See* WAC 173-340-7493(2).

☐ Yes *If you answered **"YES,"** then answer **Question 2** below.*

☐ No *If you answered **"NO,"** then identify the reason here and then skip to **Question 5** below:*

- ☐ No issues were identified during the problem formulation step.
- ☐ While issues were identified, those issues were addressed by the cleanup actions for protecting human health.

2. What did you do to resolve the problem? *See* WAC 173-340-7493(3).

☐ Used the concentrations listed in Table 749-3 as cleanup levels. *If so, then skip to **Question 5** below.*

☐ Used one or more of the methods listed in WAC 173-340-7493(3) to evaluate and address the identified problem. *If so, then answer **Questions 3 and 4** below.*

3. If you conducted further site-specific evaluations, what methods did you use? *Check all that apply. See* WAC 173-340-7493(3).

- ☐ Literature surveys.
- ☐ Soil bioassays.
- ☐ Wildlife exposure model.
- ☐ Biomarkers.
- ☐ Site-specific field studies.
- ☐ Weight of evidence.
- ☐ Other methods approved by Ecology. If so, please specify:

4. What was the result of those evaluations?

- ☐ Confirmed there was no problem.
- ☐ Confirmed there was a problem and established site-specific cleanup levels.

5. Have you already obtained Ecology's approval of both your problem formulation and problem resolution steps?

☐ Yes If so, please identify the Ecology staff who approved those steps:

☐ No