

Exposure Pathway Assessment Report

TOC Site Number 01-169 - Everett Broadway

851 North Broadway, Everett, Washington

HydroCon Project Number 2014-01-169

Prepared for:

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October 22, 2014

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ACRONYMS AND ABBREVIATIONS

µg/L	micrograms per liter
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and total xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cleanup levels	MTCA Method A Cleanup Levels
cm/sec	centimeters per second
COCs	chemicals of concern
DCA	disproportionate cost analysis
DPE	dual phase extraction
DRPH	diesel-range petroleum hydrocarbons
Ecology	Washington State Department of Ecology
EDB	ethylene dibromide
EDC	ethylene dichloride
EGI	Engineering Geosciences Inc.
EPA	United States Environmental Protection Agency
EPI	Environmental Partners, Incorporated
ESA	environmental site assessment
FS	feasibility study
gpm	gallons per minute
GPR	ground-penetrating radar
GRPH	gasoline-range petroleum hydrocarbons
mg/kg	milligrams per kilogram
mg/L	milligrams per liter

mL/min	milliliters per minute
MTCA	Washington State Model Toxics Control Act
NWTPH	Northwest Total Petroleum Hydrocarbon
O&M	operation and maintenance
ORPH	oil-range petroleum hydrocarbons
PCS	petroleum-contaminated soil
the Property	712 and 714 Avenue D, Snohomish, Washington
RCW	Revised Code of Washington
RI	remedial investigation
ROW	right-of-way
SES	Sound Environmental Strategies
the Site	petroleum-contaminated soil and groundwater in the vicinity of the underground storage tanks and fuel-dispensing pump islands that formerly occupied the 712/714 Avenue D property
SVE	soil vapor extraction
UST	underground storage tank
VCP	Voluntary Cleanup Program
WAC	Washington Administrative Code

1. INTRODUCTION

HydroCon LLC. (HydroCon) has prepared this Exposure Pathway Assessment Report on behalf of TOC Holdings Co. for TOC Holdings Co. Facility No. 01-169, located at 851 North Broadway in Everett, Washington (the Property). The Property location is shown on Figure 1. The work described in this report was prepared for submittal to the Washington State Department of Ecology (Ecology). The scope of this work was developed in meetings between HydroCon and Ecology to develop further understanding of the Site hydrogeology and current site conditions.

1.1 Purpose

The specific objectives of this site investigation are summarized below:

- Evaluate the soil to groundwater pathway. This task included review of Ecology's Washington State Well Log Viewer database to locate water supply wells near the subject site to evaluate the depth to the regional aquifer and drilling a deep soil boring near the former USTs to evaluate the vertical extent of soil contamination.
- Calculate the MTCA Method B cleanup level for the site.
- Assess current shallow soil conditions (0 to 15 feet bgs) in selected areas of the site that have undergone remedial actions to evaluate the direct contact pathway.
- Evaluate the leachability of metals in slag by collecting soil samples below areas of known slag fill deposits.

1.2 Report Organization

This Site Summary and Status Report is organized into the following sections:

- **Section 2 - Background.** This section provides a description of the Property features and location; a summary of the current use of the Property and adjoining parcels; a summary of historical and future Property use; and a description of the Property's environmental, geologic, and hydrogeologic settings. This section also provides a summary of the subsurface investigations and interim remedial actions conducted at the Site, including a description of chemical of concern, media of concern, and exposure pathways.
- **Section 3 – Previous Investigations.** This section summarizes site investigations performed prior to 2014.
- **Section 4 - 2014 Site Investigation.** This section summarizes site work conducted by HydroCon in September 2014.

- **Section 5 - Implications for Exposure Pathways.** This section discusses what current conditions imply for the exposure pathways applicable to MTCA, specifically the soil to groundwater leaching pathway and the direct contact pathway.
- **Section 6 - Pathway to Site Closure.** This section provides recommendations for additional site work. 1
- **Section 7 - Limitations.** This section discusses the limitations of using this report.
- **Section 8 - References.** This section lists references cited in the document.

2. BACKGROUND

This section provides a summary of soil and groundwater conditions at the Site. Detailed descriptions of the Property features and location; current and historical land use practices on the Property and adjoining parcels, potential future Property uses, and a description of the environmental, geologic, and hydrogeologic settings at the Site and be found in the Remedial Investigation Report (SoundEarth 2013). This section also provides a summary of the subsurface investigations and interim remedial actions conducted at the Site, including a description of chemical of concern, media of concern, and exposure pathways.

2.1 PROPERTY LOCATION AND DESCRIPTION

The following subsections present the current land use practices on the Property and adjoining parcels.

2.1.1 Property

The Property consists of an irregularly shaped tax parcel (Snohomish County parcel number 29051700200700) that covers approximately 18,731 square feet (0.43 acres) of land. The Property is listed as 851 North Broadway, approximately 1.7 miles north of downtown Everett, Washington (Figure 1).

2.1.2 Everett Smelter Site

The Property is located less than 2,000 feet south of a smelter that operated between the years 1894 and 1912 (Figure 2). The smelter was initially built and operated by Puget Sound Reduction Company. In 1903, the smelter was purchased by ASARCO LLC, commonly known as ASARCO. Historical copper-smelting operations by ASARCO resulted in the generation and widespread distribution of slag in the area. Slag is a solidified remnant of a molten waste product that is produced during the smelting process, and it is commonly known to contain elevated concentrations of arsenic, lead, and other metals. Moreover, large quantities of this waste by-product were historically used locally as fill material during the late 1800s and early 1900s (e.g., for use as subbase aggregate beneath roadways).

The Everett Smelter Site cleanup area has been delineated by Ecology and encompasses an extensive area that includes the Property (which is located in the Uplands Cleanup Area shown on Figure 2). In 2009, Ecology received a settlement with ASARCO to continue cleanup efforts related to the operation of the smelter. Slag material that appears to have been deposited in association with the construction of the North Broadway right-of-way (ROW) has been encountered beneath the western portion of the Property.

2.2 REGIONAL HYDROGEOLOGY

The Property is located in the Snohomish County Ground Water Management Area (Snohomish County Surface Water Management Division 2002). The regional aquifers occur in recessional outwash, advance outwash, and undifferentiated sediments and are confined by Vashon till and pre-Vashon transitional beds. As discussed in Section 3.1, according to Ecology well logs, groundwater in the vicinity of the Property has been encountered at depths between 85 and 94 feet below ground surface (bgs).

2.3 PROPERTY GEOLOGY

The *Geologic Map of Washington State* (Schuster 2005) indicated that the Property is underlain by Vashon till, which generally consists of a dense heterogeneous mixture of silt, sand, gravel, cobbles, and boulders. The till is typically characterized by relatively low vertical hydraulic conductivity, which yields an increased potential for perched groundwater. Based on soil descriptions documented during the RI and prior work conducted at the Site, adequate data exist to characterize shallow soil at the Site into three geologic units, which are described below. The Site-specific geology is illustrated on the cross sections shown on Figures 2, 3, 4, and 5 of the RI (SoundEarth 2013). Copies of historical boring logs are provided in Appendix A of SoundEarth 2013.

The surface of the Site generally consists of pavement and underlying aggregate subbase, which extends approximately 1 foot bgs. Soil directly underlying the surface cover generally consists of medium dense to dense, fine to medium sand with variable amounts of gravel, coarse sand, and silt. In addition, variable amounts of slag up to 8 feet in thickness are present beneath the western portion of the Property and just beyond the Property boundary, near the North Broadway ROW. The shallow soil beneath the Site is interpreted to be non-native, anthropogenic fill. The fill unit ranges in thickness from approximately 7 feet bgs to at least the maximum depth explored of 22 feet bgs. Based on its composition and physical properties, soil within this unit has been generally classified as SM (silty sands, poorly graded sand-gravel-silt mixtures) in accordance with the Unified Soil Classification System (USCS).

An abrupt interface separates the relatively coarse fill materials from the underlying unit. This underlying unit predominately consists of very dense silt and clay, with variable amounts of fine sand. This unit represents the uppermost native formation and is interpreted to be Vashon till. The Vashon till is located approximately 15 to more than 30 feet bgs, exhibiting a downward dip toward the southwest consistent with surface topography. Based on its composition and physical properties, soil within this unit has been generally classified as ML (inorganic silts and very fine sands, silty or clayey fine sands) in accordance with the USCS. Investigation data and direct field observations indicate this unit yields little to no groundwater, and the Vashon till beneath the Property is characteristic of an aquiclude.

Underlying the Vashon till is a unit which generally consists of very dense, silty, fine to medium sand containing abundant coarse sand and gravel. This unit is interpreted to be Vashon advance outwash (i.e., Esperance Sand). In places, the transitional zone between the Vashon advance outwash and the overlying Vashon till is marked by thin layers or interbeds of sand, silt, and/or

clay. Based on the findings of investigations conducted at the Site, the depth of the Vashon advance outwash ranges from approximately 11 feet bgs to at least 30 feet bgs (the maximum depth explored). A review of well logs in the Site vicinity and available online from Ecology indicates the Vashon advance outwash extends to a minimum depth of 70 feet bgs (Ecology 2013). Based on its composition and physical properties, soil within this unit has been generally classified as SM in accordance with the USCS.

2.4 PROPERTY HYDROLOGY

Groundwater levels measured in the Site's 20 wells historically have ranged from 6.27 feet (observation well OW01) to 24.34 feet (monitoring well MW08) below the top of the monitoring well casings (SoundEarth 2013, Table 1). Ten of the Site wells have been dry during the course of monitoring, and these wells are generally located outside of the former UST remedial excavation area (wells MW02 through MW07, MW10, MW11, RW04, and RW05). Three other wells at the site used for groundwater monitoring rarely have water including RW02 (10 out of 32 monitoring events), RW08 (3 out of 12 monitoring events), and OW01 (12 out of 33 monitoring events).

Groundwater at the site generally occurs within the UST remedial excavation cavity. Groundwater elevation contours (presented in the Quarterly Groundwater Monitoring Reports) consistently indicate that the groundwater flow direction is radial due to mounding of groundwater within the permeable fill soil of the UST remedial excavation cavity. Outside of the UST remedial excavation area, groundwater levels (when present) have historically fluctuated drastically and are interpreted to be strongly controlled by the operation of the dual-phase extraction (DPE) remediation system.

The geologic contrast that generally exists below the Site places relatively coarse fill material over finer native deposits. The low permeability of the native material results in vertical retardation of the groundwater flow at the anthropogenic and native soil interface. Groundwater present above the fill-native interface is interpreted to be perched water.

2.5 GROUNDWATER USE

According to the Ecology Water Well Logs (Ecology 2013), there are no water production wells within a 1-mile radius of the Property. The Property is located within the City of Everett's water supply system. Water for the City of Everett originates from the Spada Reservoir, which is located 30 miles east of Everett. The Spada Reservoir is located in the Sultan Basin Watershed. Once treated at the Drinking Filtration Plant, 4-foot-diameter transmission lines transport the water downstream to Everett (City of Everett 2013b).

3. PREVIOUS INVESTIGATIONS

The following provides a summary of the methods and findings of prior subsurface investigations of the Site, including the discovery of soil and groundwater contamination. The locations of soil borings, monitoring wells, soil samples, and other Site features are shown on Figure 3. The soil and groundwater analytical results are summarized in Figures 6 through 8 and in Tables 1 through 4 of the RI (SoundEarth 2013). The remainder of this Remedial Investigation Report includes references to cleanup levels; unless otherwise specified, these refer to MTCA Method A Cleanup Levels for Unrestricted Land Use for soil and groundwater.

3.1 RELEASE DISCOVERY AND REMEDIAL EXCAVATION

A retail gasoline service station operated on the Property from 1959 to 2003. Historical records indicate that a 500-gallon waste oil underground storage tank, two 6,000-gallon gasoline underground storage tanks, an 8,000-gallon gasoline underground storage tank, a 12,000-gallon gasoline underground storage tank, two fuel-dispensing pump islands, and associated product delivery lines were previously located on the Property. The 500-gallon underground storage tank was removed from the Property in 1990, and the remaining underground storage tank systems were removed from the northwestern and west-central portions of the Property in 2003. Soil samples collected from the floor and sidewalls of the tank excavation contained concentrations of gasoline-range petroleum hydrocarbons, benzene, total xylenes, and/or naphthalene in excess of the applicable Washington State Model Toxics Control Act Method A cleanup levels. The petroleum-contaminated soil was excavated to the maximum extent feasible; logistical constraints and access issues (i.e., protection of site structures and the presence of the ROW) prohibited additional excavation to the north, south, and west.

3.2 SUBSURFACE INVESTIGATIONS 2004 THROUGH 2011

Six additional subsurface investigations were conducted at the Property between 2004 and 2011 to evaluate the vertical and lateral extent of petroleum hydrocarbon contamination. During the subsurface investigations, soil samples collected from borings advanced around the perimeter of the former tank excavation were found to contain concentrations of gasoline-range petroleum hydrocarbons (GRPH); benzene, toluene, ethylbenzene, and total xylenes (BTEX); and naphthalene in excess of the applicable Washington State Model Toxics Control Act Method A cleanup levels at depths between 4 and 27.5 feet bgs. Twenty-two of the soil borings were completed as monitoring, remediation, or observation wells. Groundwater samples collected during groundwater monitoring events since 2004 have contained concentrations of GRPH, diesel-range petroleum hydrocarbons (DRPH), oil-range petroleum hydrocarbons (ORPH), benzene, toluene, total xylenes, naphthalene, and/or methyl tertiary-butyl ether (MTBE) in excess of the applicable Washington State Model Toxics Control Act Method A cleanup levels.

3.3 HISTORIC DISTRIBUTION OF SOIL CONTAMINATION

The analytical data collected during the investigations conducted at the Site indicate that contaminant concentrations exceeding the MTCA Method A cleanup level are generally located beneath the central and northwestern portions of the Property in the vicinity of the UST excavation area and extend beneath a portion of the North Broadway ROW (Figure 4, Appendix A [SoundEarth 2013, Figure 7]). The western extent of PCS is bound by boring B29 (MW10); the eastern and southern extents of PCS are bound by borings B28 (MW09) and B30 (MW11), as well as by borings P01, P02, and P03; and the northern extent of PCS is bound by B23 through B26 (MW04 through MW07, respectively). The maximum vertical extent of PCS was detected in boring B31 (RW08) at 27.5 feet bgs.

3.4 HISTORIC DISTRIBUTION OF GROUNDWATER CONTAMINATION

Based on analytical data collected from May of 2006 to December of 2013, petroleum-related contaminants have been detected in groundwater samples collected from several monitoring wells located within and around the perimeter of the backfilled UST and dispenser island excavation areas. Shallow groundwater encountered beneath the Site consists of discontinuous saturated intervals within, or at the base of, the fill materials overlying finer-grained silt or silty sand deposits. Groundwater monitoring data indicates that some of these saturated water-bearing zones have transient characteristics as a result of seasonal precipitation and/or operation of the groundwater extraction system.

The extent of the petroleum-contaminated groundwater appears to be limited to the immediate vicinity of the former USTs and dispenser islands. Monitoring data collected during the investigations indicate that residual petroleum-related contamination is present in some of the unexcavated soil around the former USTs and dispenser islands, resulting in localized areas of petroleum-contaminated groundwater when saturated conditions occur. Monitoring wells located downgradient from the excavation source area and screened across intervals similar to those located within the excavation area have either not exhibited saturated conditions or, when groundwater is present, have not contained COC concentrations above the laboratory reporting limits or the applicable cleanup levels.

3.5 PRESENCE OF SLAG

Also present at the site are variable amounts of slag associated with the Everett Smelter Site up to 8 feet in thickness beneath the western portion of the Property and just beyond the Property boundary, near the North Broadway ROW (Figures 4-7, SoundEarth 2013). The slag is associated with the Everett Smelter formally located less than 2,000 feet north of the site. Testing of the slag (EPI 2006) resulted in detections of antimony, arsenic, copper, and lead at concentrations exceeding their applicable cleanup levels at boring B1 and B6. Soil underlying the slag was also tested at B1 and B6. Antimony, arsenic, copper, and lead concentrations were found in soil underlying the slag at B-1 (3.5 feet below the slag sample) at concentrations very similar to the overlying slag; however, a soil sample collected at B-6 (3 feet below the slag

sample) had metals concentrations at a depth lower than the overlying slag sample. Soil samples analyzed from two borings located in or near the excavation backfill (B-5 and B-6) did not have elevated metals or hydrocarbon concentrations; however, EPI (2006) does not state what the composition of the material (slag, excavation backfill, native soil) that was analyzed in these borings.

3.6 REMEDIATION ACTIVITIES

In May 2006, a dual-phase extraction (DPE) remediation system was installed on the Property. The DPE remediation system was designed to remove petroleum-contaminated groundwater and soil vapor from the UST system excavation area and vicinity. It was installed with use of the nine wells (remediation wells RW01 through RW07, and OW01 and OW02) that had been installed in March 2006.

An injection event was conducted on the Property in March 2009 in an effort to address the elevated concentrations of GRPH and BTEX detected in groundwater beneath the Site. Prior to injecting, SoundEarth obtained underground injection control (UIC) registration from Ecology. During the injection event, approximately 220 gallons of a solution containing sodium persulfate and hydrogen peroxide was injected into monitoring wells OW02 and RW06 with the use of a pump and/or via gravity feed.

In June 2012, an expanded DPE remediation system was installed on the Property which was designed to remove petroleum-contaminated groundwater and soil vapor from the UST system excavation area and vicinity. The system utilizes nine wells (MW08, OW02, RW02, RW03, RW04, RW08, RW09, RW10, and RW11).

3.7 CHEMICALS AND MEDIA OF CONCERN

As discussed in the section above, the former gasoline UST system and waste oil UST were identified as potential sources of release(s) beneath the Property, requiring the testing of several potential chemicals of concern (COCs) as identified on Table 830-1, Required Testing for Petroleum Releases, of WAC 173-340-900. HydroCon and others have analyzed soil and groundwater for petroleum hydrocarbons GRPH, DRPH, ORPH; volatile petroleum compounds, including BTEX; and fuel additives and blending compounds, including EDB, EDC, MTBE, and lead to satisfy the requirements for testing for a gasoline- or diesel-range release in association with the gasoline UST system. In addition, soil and/or groundwater were analyzed for carcinogenic PAHs, naphthalenes, PCBs, and halogenated VOCs to satisfy the requirements for testing for a heavy oil or waste oil release.

Based on the findings of the RI, PCBs, carcinogenic PAHs, EDB, EDC, and halogenated VOCs are not considered to be COCs for the Site because concentrations of these chemicals in soil and/or groundwater samples have remained below the applicable cleanup levels and/or laboratory reporting limits. Lead and arsenic were not considered to be COCs for the Site, as they are associated with the slag material associated with the ASARCO smelter site and not from a

release from the former gasoline station on the Property. The following primary COCs have been identified using the results of the RI:

- GRPH and BTEX constituents in soil, soil vapor, and groundwater.
- DRPH and ORPH in groundwater.
- Naphthalene in soil and groundwater.
- MTBE in groundwater.

The distribution of GRPH, DRPH, ORPH, BTEX, MTBE, and naphthalene in the affected media has been investigated sufficiently for definition of the Site under MTCA, identification of the media of concern for future cleanup action, and evaluation and recommendation of a cleanup alternative.

4. 2014 SITE INVESTIGATION

This section summarizes site work conducted by HydroCon in September 2014. As stated in Section 1.1, the purpose of the investigation was 1) to evaluate the soil to groundwater pathway and 2) to evaluate the leachability of metals in areas of PCS and 3) to gain further understanding of current site conditions.

4.1 REVIEW OF ECOLOGY WELL LOG DATABASE-REGIONAL GROUNDWATER

HydroCon reviewed well logs on Ecology's Washington State Well Log viewer database to locate water supply wells near the subject site. An approximate one mile search radius was performed. Some of the data on the well logs is incomplete (i.e., the address of the well, geologic information, etc.) or is illegible. Approximate locations of the wells are shown on Figure 5. Copies of the three well logs found with the search are provided in Appendix B. The following wells were identified:

- The city of Everett is the owner of a 10-inch diameter steel cased well that is 153 feet in depth. Water bearing sand and gravel is recorded at a depth of 92 feet below ground surface (bgs). The casing is perforated from 138 to 153 feet bgs. In August 2005 the static water level in the well was 92 feet.
- Pringle Electronics is the owner of a well located at 1021 N Broadway. The well is 90 feet deep; diameter and construction details are unknown. Water bearing sand and gravel was recorded at a depth of 85 to 90 feet bgs. On April 18, 2001, the static water level in the well was between 85 and 90 feet bgs.
- The city of Everett is the owner of an 8-inch diameter steel cased well that is 170 feet in depth. Water bearing sand and gravel is recorded at a depth of 108 to 190 feet below ground surface (bgs). The casing is perforated from 135 to 170 feet bgs. In April 7, 2005 the static water level in the well was 94.71 feet.

These wells indicate that the regional aquifer is present at a depth of 85 to 94 feet bgs in the area of the Site. This depth to the regional aquifer corresponds to an elevation of approximately 10 to 15 feet above mean sea level.

4.2 DEEP SOIL BORING

The degree of separation between PCS and the regional aquifer was evaluated with a deep borehole (B37) drilled using hollow-stem auger drilling and sampling techniques on August 22, 2014. This borehole was located 3 feet south of monitoring well MW12 in an area of the deepest PCS found at the site to date; 0.071 mg/kg benzene at 25 feet bgs (Table 1, Figure 3). Boring HC-1 was advanced to a depth of 60 feet with a conductor casing advanced to 30 feet to minimize the potential for cross-contamination. The objective is to demonstrate separation of

clean soil between the deepest PCS and the regional water table (at an estimated depth of 90 feet bgs).

The borehole was sampled with a split spoon sampler at 5-foot intervals and logged consistent with ASTM Standard D-2488-84 with emphasis on describing water-bearing intervals and field screening for the presence of PCS. The boring was backfilled with hydrated bentonite upon completion. The soil encountered during advancement of the soil boring was granular fill material from 1 to 14 feet bgs that is consistent with the excavation backfill activities on site. The fill was underlain by loose silt with fine sand which then graded into very dense silty sand with varying amounts of gravel to a depth of 50 feet bgs. The silty sand was then underlain by a fine to medium sand that continued to the total depth explored of 60 feet bgs. There was no evidence of groundwater observed in any of the samples collected or from observation of the drill cuttings during advancement of the soil boring. Soil borings are provided in Appendix C.

Headspace readings with a photoionization detector indicated the potential for PCS at depths of 35 to 45 feet bgs. The presence of PCS was verified upon receipt of analytical results showing concentrations of benzene above the Method A cleanup level of 0.03 mg/kg at depths ranging from 35 to 45 feet bgs (with benzene levels ranging from 0.11 to 0.27 mg/kg in this interval, see Table 1). Soils collected below 45 feet bgs did not contain petroleum hydrocarbons above the laboratory reporting limit.

Soil boring B37 demonstrates a separation of 15 feet between PCS and the maximum depth explored of 60 feet bgs as well as demonstrating that groundwater is not observed in the native soils to the maximum depth explored. As stated in the above section, regional groundwater is observed near the site at depths of 85 to 94 feet bgs.

4.3 SHALLOW SOIL BORINGS

Six shallow borings (HC-1 through HC-6, Figure 3) were advanced to with direct-push drilling and sampling techniques on August 28, 2014. The purpose of the borings were to evaluate the leachability of metals associated with slag and to evaluate the present condition of shallow soil (e.g., less than 15 feet) for the direct contact pathway. A copy of the laboratory report and chain-of-custody documentation is included in Appendix D. A discussion of each of the borings is provided below.

Boring HC-1 is located at historical Boring B-1 installed by EPI (2006) and is not in an area with PCS. Antimony, arsenic, copper, and lead concentrations were found in soil underlying the slag at B-1 (3.5 feet below the slag sample) at concentrations very similar to the overlying slag. Boring HC-1 was installed to further investigate the depth of high concentration metals in this area. Slag was encountered at 7 to 10 feet. As shown in Table 1, metals concentrations decreased substantially from the sample collected at 9 feet to the sample collected at 20 feet bgs. Groundwater was not encountered in the boring.

Boring HC-4 and HC-5 were located in areas of slag to evaluate the potential for metals leaching. Boring HC-4 was located near Boring P07 which had 770 mg/kg GRPH at a depth of 16 feet in 2009. GRPH and BTEX were not detected in HC-4 at the analyzed intervals of 10, 15, and 20 feet bgs. Slag was encountered in boring HC-4 from 7 to 13 feet bgs. The concentration of

metals substantially decreased with depth as seen from the results of the samples collected at 10 and 20 feet bgs. Boring HC-5 is located near EPI's boring B-6 which had high metals concentrations at a depth of 10 feet followed by low concentrations at 13 feet bgs. Slag was encountered at HC-5 at 10 feet bgs and the metals concentrations were consistent with those in B-6 with higher concentrations at 10 feet followed by lower concentrations with depth. Boring HC-5 had a GRPH concentration below the MTCA Method A Cleanup Level (CUL) at 10 feet bgs and no GRPH or BTEX detections above the laboratory's method reporting limit (MRL) at the deeper sample intervals. Groundwater was not encountered in either of the three borings.

Boring HC-2 is located near historical boring B27 which had a GRPH concentration of 520 mg/kg and Method A CUL exceedances of BTEX at 15 feet in 2010. GRPH and BTEX were not detected in the sample collected at 15 feet bgs. However, GRPH and total xylenes were detected at concentrations exceeding their respective MTCA Method A CULs in the sample collected from 18 feet bgs. Metals were not analyzed in boring HC-2. Groundwater was not encountered in the boring.

Boring HC-3 is located near historical boring P09 which had a GRPH concentration of 2,100 mg/kg as well as concentrations of ethylbenzene and total xylenes that exceeded their respective MTCA Method A CULs at 15 feet bgs in 2010. The sample collected at 15 feet bgs at HC-3 had a GRPH concentration of 20 mg/kg and total xylenes concentration of 22 mg/kg. Metals were not analyzed in boring HC-3. Groundwater was not encountered in the boring.

4.4 METHOD B SOIL CLEANUP LEVELS

For unrestricted land use, either Method A or Method B can be used to establish cleanup levels for direct contact with soil. To use Method B, soil must be analyzed using the VPH (Volatile Petroleum Hydrocarbons) and EPH (Extractable Petroleum Hydrocarbons) methods. Soil sample HC-2-18, which exhibited the highest GRPH concentrations collected for this 2014 site investigation, was selected and analyzed for VPH/EPH. The results of this analysis are shown on Table 2. As shown, this sample did not have a detectable concentration of benzene; however benzene has been detected soil historically and in this investigation. As a conservative estimate of the risk posed by benzene in soil at the site, the highest value of benzene in soil detected at the site (6.9 mg/kg from P09-15, Table 2, SES 2013) was substituted for calculating Method B soil cleanup levels.

The Method B soil cleanup levels were calculated with Ecology's MTCATPH11.1 Excel spreadsheet. The results of the calculations are provided in Appendix E. As noted above, the highest benzene result for the site was substituted. Also, if a fraction or component was not detected, it was assigned a concentration of zero, and if a fraction was reported by both the VPH and EPH methods, the maximum result was used. These results indicate that the Method B direct contacted cleanup level for total petroleum hydrocarbons for this site is 2,106 mg/kg.

Method B values for other site soil chemicals of concern were obtained directly from Ecology's Cleanup Levels and Risk Calculation (CLARC) tables using the lowest value of non-carcinogen and carcinogenic CULs and are summarized below:

Analyte	Soil Method B (mg/kg)
Benzene	18
Ethylbenzene	8,000
Naphthalene	1,600
Toluene	6,400
Xylenes	16,000
Total Petroleum Hydrocarbons	2,106

5. IMPLICATIONS FOR EXPOSURE PATHWAYS

The work described above was focused on gaining a better understanding of current site conditions and what these conditions imply for the exposure pathways applicable to MTCA, specifically the soil to groundwater leaching pathway and the direct contact pathway. These pathways are discussed in the following sections.

5.1 SOIL TO GROUNDWATER LEACHING PATHWAY

Water is present in site wells and is impacted by former site operations. Groundwater levels measured in the Site's 20 wells historically have ranged from 6.27 feet (Observation Well OW01) to 24.34 feet (Monitoring Well MW08) below the top of the monitoring well casings (Table 1, SES 2013). Thirteen of the Site wells have been dry during the course of monitoring, and these wells are generally located outside of the former UST system excavation area (wells MW02 through MW07, MW10, MW11, RW04, and RW05). The geologic contrast that generally exists below the Site places relatively coarse fill material over finer native deposits. The low permeability of the native material appears to result in vertical retardation of the groundwater flow at the anthropogenic and native soil interface. Groundwater present above the fill-native interface is interpreted to be perched water.

A search for nearby wells with Ecology's Washington State Well Log viewer database resulted in finding three wells with a one mile radius of the site. The depth to water in these wells was 85 to 94 feet below the Site.

Based on the results of recent and historical investigations, the extent of PCS is limited to a depth of about 45 feet at the site. Borings with clean samples (less than MTCA Method A CULs) beneath PCS detections include: B1 @ 18 feet, P07 @ 20 feet, P08 @ 20 feet, P09 @ 22 feet, P10 @ 20 feet, B22 @ 20 feet, B27 @ 17.5 feet, B31 @ 30 feet, B33 @ 22 feet, B36 @ 25 feet (Appendix A), and HC-1 @ 50 feet (Table 1). Boring locations where the depth of PCS is not constrained by deeper samples include: B03 @ 8 feet, B06 @ 14 feet, B07 @ 16 feet, P11 @ 20 feet, (Appendix A), and HC-2 @ 18 feet, and HC-3 @ 15 feet (Table 1). However, each of these borings is within 10-15 feet of a boring that does constrain the depth of PCS. Based on work conducted to date, the maximum depth of PCS is 45 feet bgs and more typically 20-25 feet bgs.

Metals testing for this and historical investigations show that metals concentrations are at or below background levels (Ecology 1993) at a depth of 20 feet or less.

Only one groundwater well, RW08 has exhibited concentrations above Method A CULs (CLARC does not have Method B values for TPH in groundwater) in the last 6 or more quarters. This well is usually dry, but of the water levels recorded, the depth to water is in excess of 15 ft.

Based on the discussion above, the potential for petroleum impacted soil and water beneath the site to impact the regional aquifer is very low.

5.2 DIRECT CONTACT PATHWAY

The direct contact pathway for soil is complete when soil concentrations are above CULs at depths of 15 feet or less. Two boring locations in this investigation indicate that remedial actions have been effective. Samples collected at 15 feet bgs at historical boring B27 and HC-2 show a reduction of GRPH from 520 mg/kg to non-detect. Samples collected at 15 feet bgs from historical boring P09 and HC-3 show a reduction of GRPH from 2,100 mg/kg to 620 mg/kg. Additional work will be required to identify and isolate areas with a complete direct contact pathway.

The calculations of the Method B TPH CUL indicate that a CUL of 2,106 mg/kg is appropriate for the site. A review of Table 1 and Appendix A shows that current and historical soil concentrations collected from depths of 15 or less above the CUL are limited to two samples, EX-23-6 and EX-24-5. These are no soil samples exceeding the Method B CULs for benzene, ethylbenzene, toluene, total xylenes, MTBE, or naphthalene. The area of soil contamination exceeding the MTCA Method B CULs is shown on Figure 6.

Only one groundwater well, RW08, has exhibited concentrations above Method A CULs (CLARC does not list Method B values for TPH in groundwater) in the last 6 or more quarters. This well is usually dry, but of the water levels recorded, the depth to water is in excess of 15 ft.

6. PATHWAY TO SITE CLOSURE

The previous section demonstrates that the potential for site conditions to impact the regional aquifer are very low and that soil and groundwater are in compliance with CULs, with the exception of two samples collected during the UST excavation activities. These samples were collected at depths of less than 15 feet. TOC Holdings Co. and HydroCon recommend that additional work at the site be limited to soil exploration and remediation in the vicinity of the two samples exceeding Method B CULs.

6.1 ADDITIONAL SITE CHARACTERIZATION

The scope and schedule for additional site characterization (if necessary) would be negotiated between TOC Holdings Co. and Ecology. This would include sampling soil in areas and depths where historic soil contamination exceeded the MTCA Method B cleanup level.

6.2 CLEANUP ACTION PLAN

HydroCon would prepare a Cleanup Action Plan (CAP) on behalf of TOC Holdings Co. for Ecology review that would propose additional soil sampling and monitoring to achieve remedial goals. The CAP would be prepared in accordance with Ecology guidance and include a declaration of the cleanup levels for the COCs and media of concern, the sampling approach, and the procedures for documenting when the cleanup levels have been achieved.

7. LIMITATIONS

The findings and conclusions documented in this report were prepared for the specific application to this project and were developed in a manner consistent with that level of care and skill normally exercised by members of the environmental science profession currently practicing under similar conditions in the area. A potential always remains for the presence of unknown, unidentified, or unforeseen subsurface contamination on portions of the property not sampled, such as under buildings. No warranty, expressed or implied, is made. This report is for the exclusive use of TOC Holdings Co. and its representatives.



CRAIG HULTGREN

A stylized handwritten signature in black ink, appearing to read "CH".

8. REFERENCES

City of Everett. Public Works Department – Drinking Water. Reviewed online at <<http://www.everettwa.org/default.aspx?ID=85>>. March 9, 2013.

Environmental Partners, Inc. (EPI). Phase II Environmental Site Assessment, Time Oil Co. Property No. 1-169, 851 Broadway, Everett, Washington 98201. December 18, 2006.

Schuster, J.E. Geologic Map of Washington State. Washington State Department of Natural Resources Geologic Map GM-53. Scale 1:500,000. 2005.

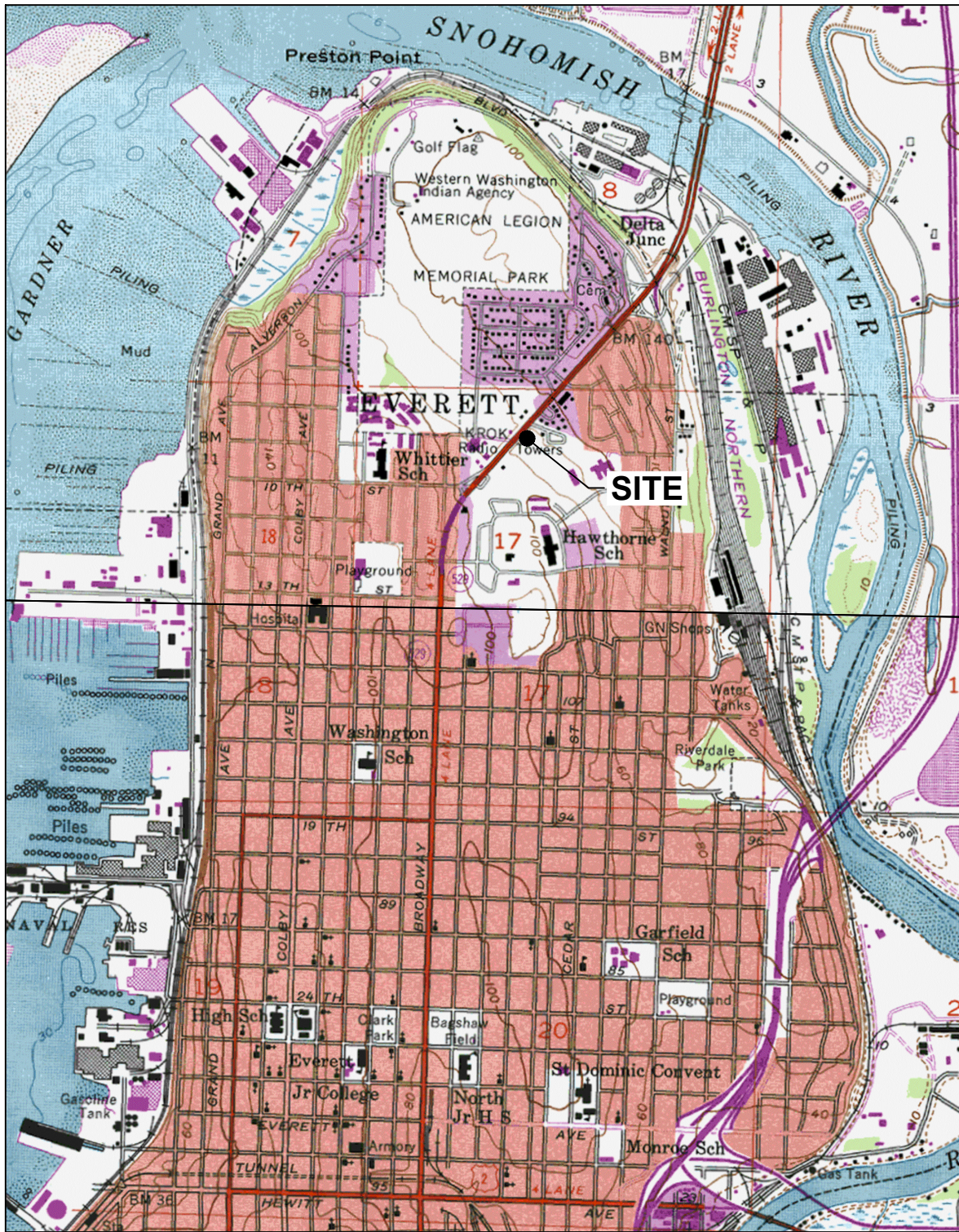
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Sound Environmental Strategies Corporation (SES). Subsurface Investigation, TOC Holdings Co. Facility 01-169, 851 Broadway, Everett, Washington. June 21, 2005.

SoundEarth Strategies, Inc. (SoundEearth). Remedial Investigation Report, TOC Holdings. Co. Facility 01-169, 851 Broadway, Everett, Washington. March 20, 2013.

Washington State Department of Ecology (Ecology). 1993. Natural Background Soil Metals Concentrations in Washington State. Publication #94-115. October 1994.

Washington State Well Log Viewer. <<http://apps.ecy.wa.gov/welllog/>>. Viewed February 11, 2013.

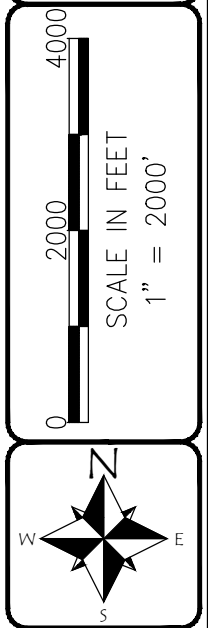


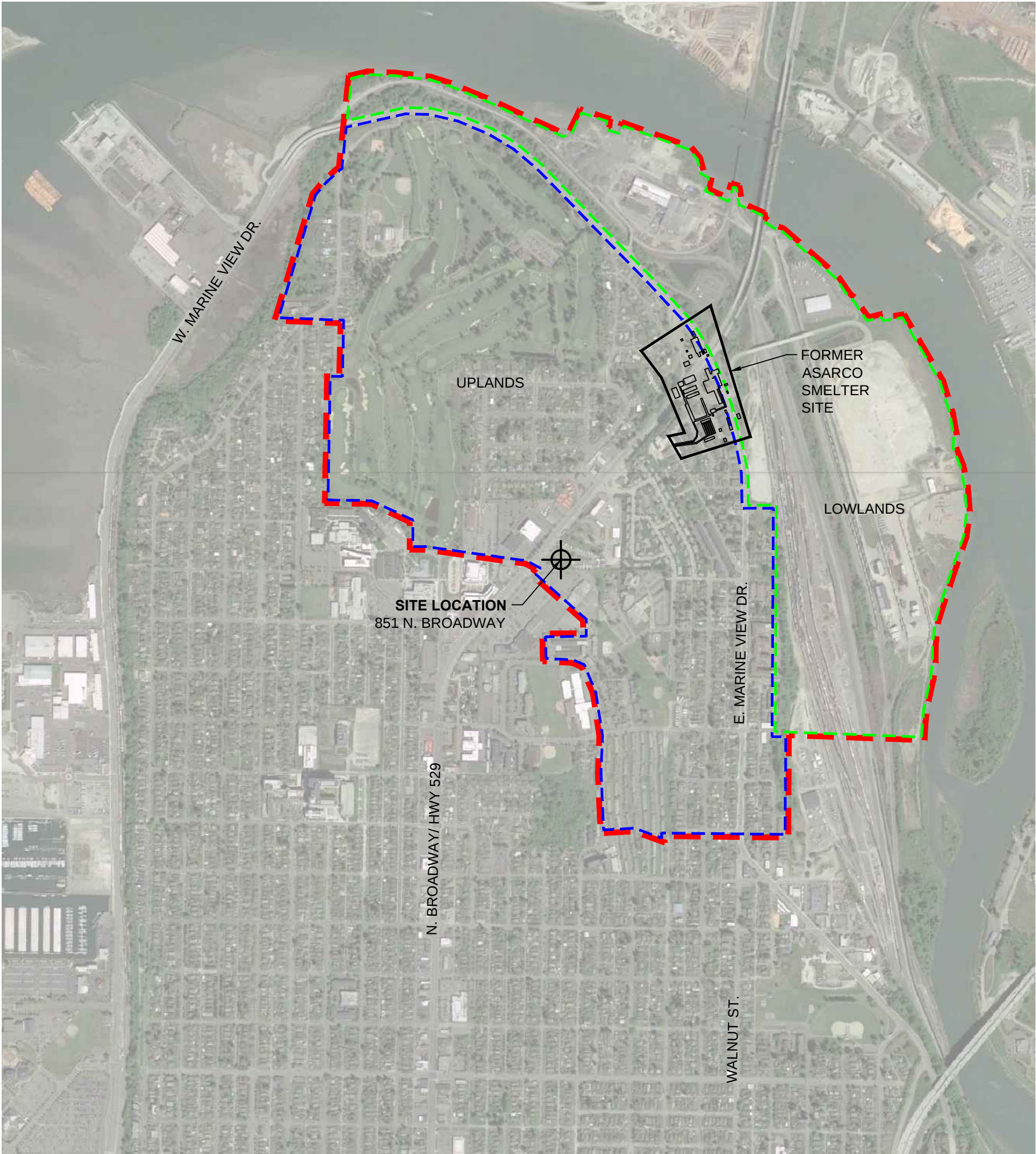
NOTE(S):
 USGS, MARYSVILLE QUADRANGLE
 WASHINGTON-SNOHOMISH CO.
 7.5 MINUTE SERIES (TOPOGRAPHIC)

FIGURE 1
 SITE LOCATION MAP

TOC HOLDINGS CO. FACILITY NO. 01-169
 851 N. BROADWAY
 EVERETT, WA.

DATE: 10-20-14
 DWN: JJT
 CHK: NV
 APPROVED: CH
 PRJ. MGR: CH
 PROJECT NO: 14-810





LEGEND

- Former Everett Smetler Site
- Everett Smelter Cleanup Site
- Uplands
- Lowlands



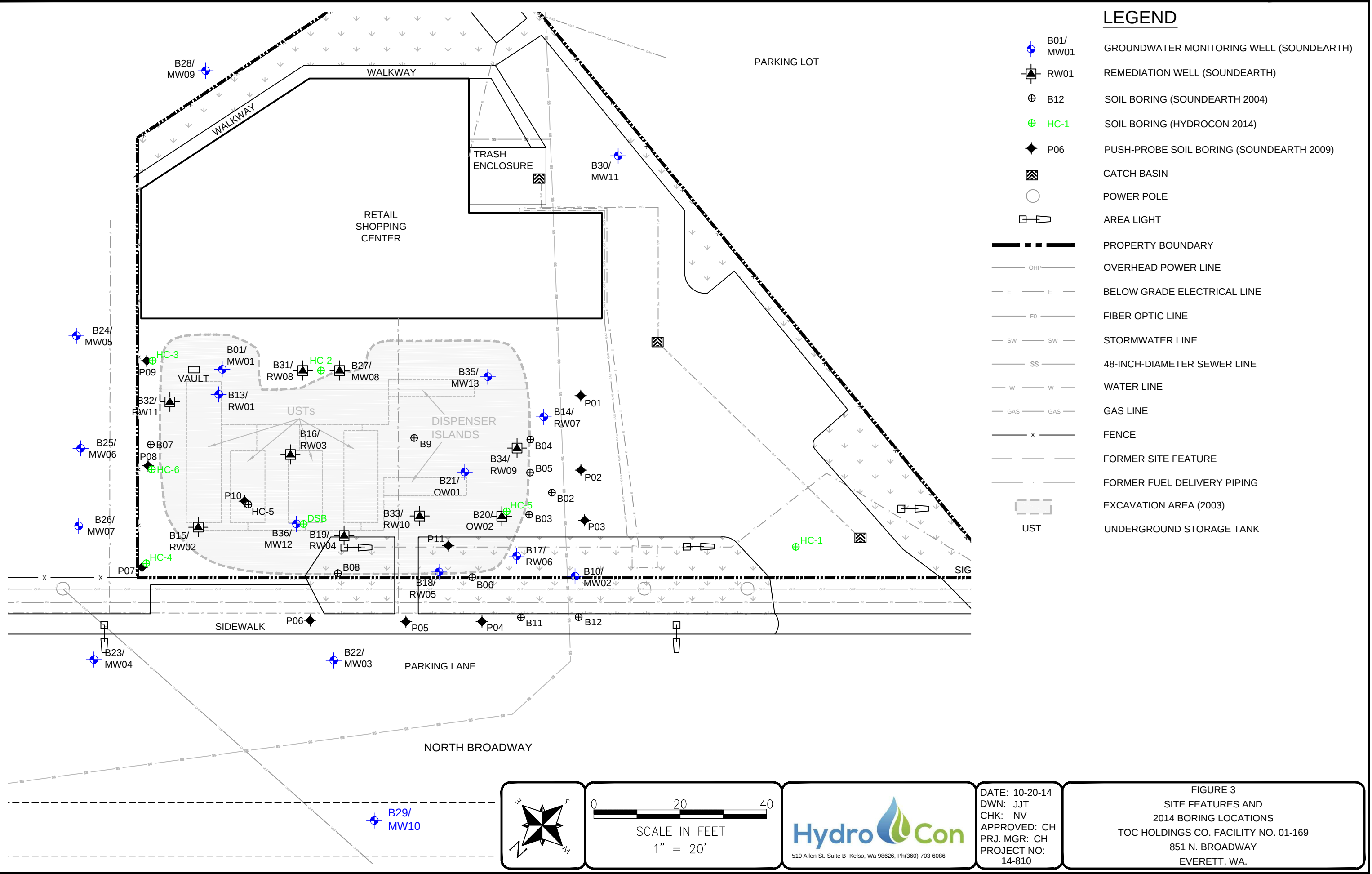
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1" = 1000'



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DWN: JJT
CHK: NV
APPROVED: CH
PRJ. MGR: CH
PROJECT NO:
14-810

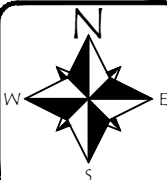
FIGURE 2
FORMER ASARCO SMELTER
CLEANUP AREA
TOC HOLDINGS CO. FACILITY NO. 01-069
EVERETT, WA.

D:\Client\Autocad\Hydrocon-Autocad\01-169_14-810 Everett 169\14-810\01-169_BM.dwg 2.17.2014





LEGEND
Well Locations



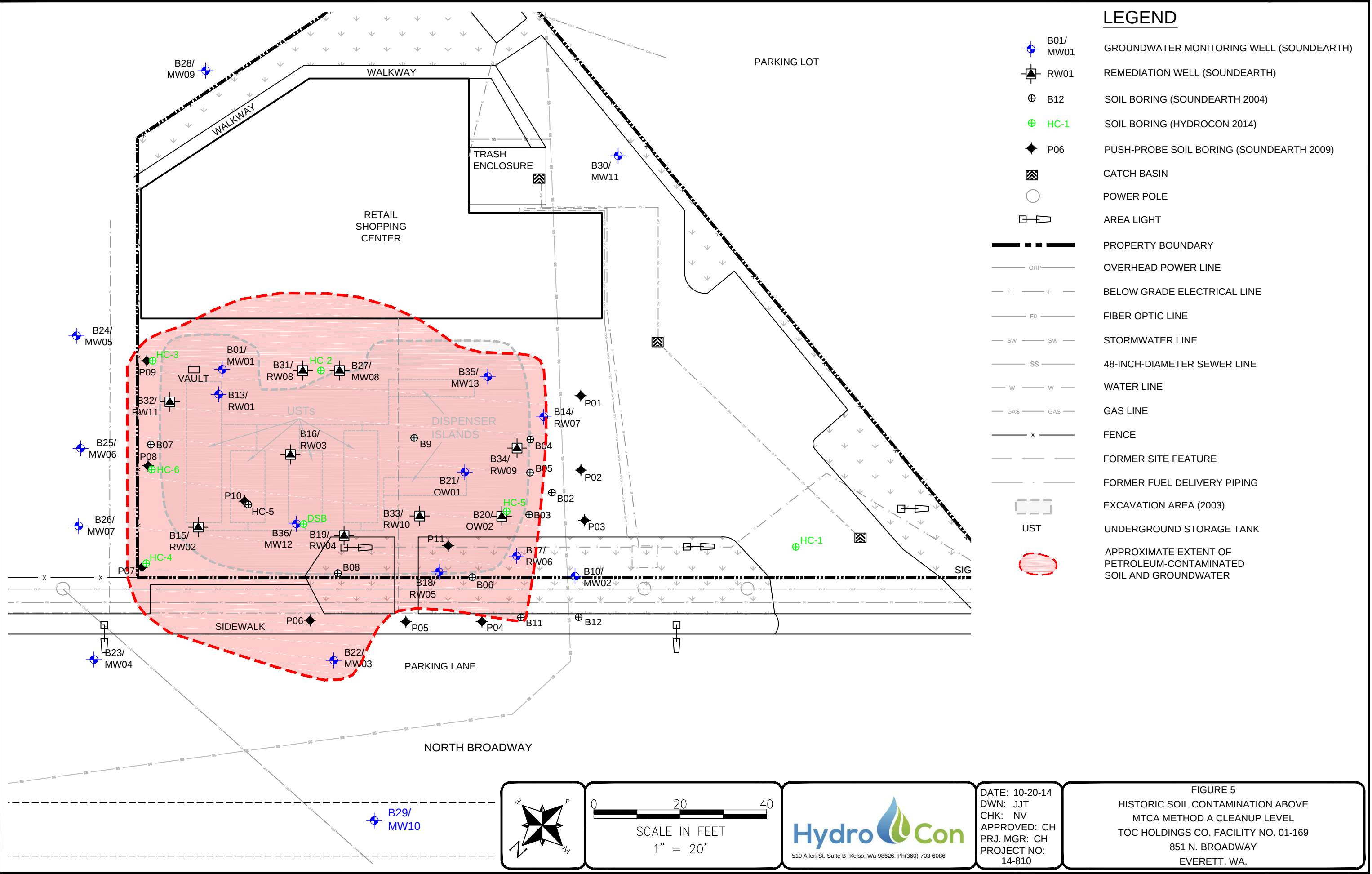
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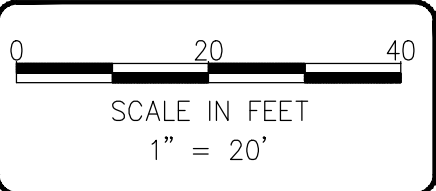
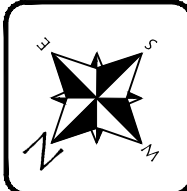
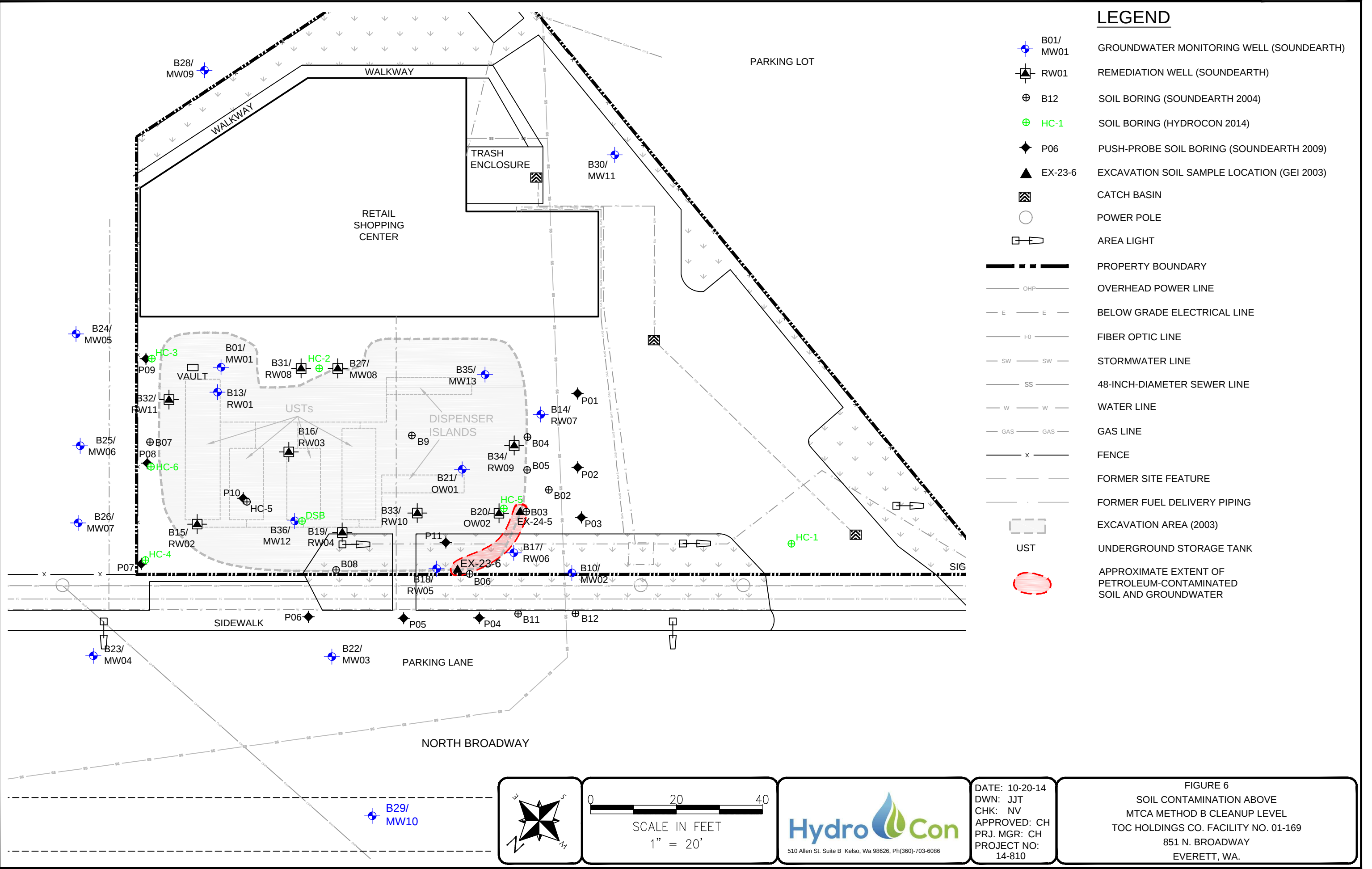
DATE: 10-20-14
DWN: JJT
CHK: NV
APPROVED: CH
PRJ. MGR: CH
PROJECT NO:
14-810

FIGURE 4
ECOLOGY WELL LOG
WELL LOCATIONS
TOC HOLDINGS CO. FACILITY NO. 01-069
EVERETT, WA.

D:\Client\Autocad\Hydrocon-Autocad\01-169_14-810 Everett 169\14-810\01-169_BM.dwg 2.17.2014



D:\Client\Autocad\Hydrocon-Autocad\01-169_14-810 Everett 169\14-810\01-169_BM.dwg 2.17.2014



DATE: 10-20-14
DWN: JJT
CHK: NV
APPROVED: CH
PRJ. MGR: CH
PROJECT NO:
14-810



Table 1
Soil Analytical Results
TOC Holdings Co. Facility No. 01-169
851 North Broadway
Everett, Washington

Sample ID	Sample Date	Analytical Results (mg/kg)								
		GRPH ⁽¹⁾	Benzene ⁽²⁾	Toluene ⁽²⁾	Ethylbenzene ⁽²⁾	Total Xylenes ⁽²⁾	Antimony ⁽⁵⁾	Arsenic ⁽⁵⁾	Copper ⁽⁵⁾	Lead ⁽⁵⁾
MTCA Method A Cleanup Level for Soil ⁽³⁾		30/100 ⁽⁴⁾	0.03	7	6	9	N/A	20	N/A	250
Hydrocon Soil Sampling 8-22-14										
B37-15	8/22/14	<2	<0.02	<0.02	<0.02	<0.06	-	-	-	-
B37-25	8/22/14	<2	<0.02	<0.02	<0.02	<0.06	-	-	-	-
B37-30	8/22/14	<2	<0.02	0.032	<0.02	0.088	-	-	-	-
B37-35	8/22/14	3.8	0.11	0.33	0.067	0.54	-	-	-	-
B37-40	8/22/14	3.6	0.27	0.25	0.1	0.41	-	-	-	-
B37-45	8/22/14	4.8	0.23	0.16	0.18	0.67	-	-	-	-
B37-50	8/22/14	<2	<0.02	<0.02	<0.02	<0.06	-	-	-	-
B37-60	8/22/14	<2	<0.02	<0.02	<0.02	<0.06	-	-	-	-
Hydrocon Soil Sampling 8-28-14										
HC-1-09	8/28/14	<2	<0.02	<0.02	<0.02	<0.06	86.4	144	1420	6980
HC-1-20	8/28/14	<2	<0.02	<0.02	<0.02	<0.06	<1	2.04	15.1	2.37
HC-2-15	8/28/14	<2	<0.02	<0.02	<0.02	<0.06	-	-	-	-
HC-2-18	8/28/14	4300	<0.4	3.5	<0.4	300	-	-	-	-
HC-3-15	8/28/14	620	<0.1	0.18	<0.1	22	-	-	-	-
HC-4-10	8/28/14	<2	<0.02	<0.02	<0.02	<0.06	1.73	24.6	30.6	125
HC-4-15	8/28/14	<2	<0.02	<0.02	<0.02	<0.06	-	-	-	-
HC-4-20	8/28/14	<2	<0.02	<0.02	<0.02	<0.06	<1	1.59	7.05	1.76
HC-5-10	8/28/14	27	<0.02	<0.02	<0.02	<0.06	1.32	52.8	20.4	108
HC-5-15	8/28/14	<2	<0.02	<0.02	<0.02	<0.06	-	-	-	-
HC-5-20	8/28/14	<2	<0.02	<0.02	<0.02	<0.06	<1	5.9	20.1	13.8
HC-6-15	8/28/14	<2	<0.02	<0.02	<0.02	<0.06	-	-	-	-

Red denotes concentration exceeds MTCA Method A cleanup level.

Bold debotes concentration exceeds the Method Reporting Level (MRL) or Method Deorting Level (MDL)

Samples analyzed by Friedman & Bruya, Inc., of Seattle, Washington.

¹Analyzed by Method NWTPH-Gx.

²Analyzed by U.S. Environmental Protection Agency Method 8260C or SW8021B.

³MTCA Method A Cleanup Levels, Table 740-1 of Section 900 of Chapter 173-340 of the Washington Administrative Code, revised November 2007.

⁴30 mg/kg when benzene is present and 100 mg/kg when benzene is not present.

⁽⁵⁾ Analyzed by U.S. Environmental Protection Agency 200.8

-- = not analyzed

< = not detected at a concentration exceeding the laboratory MRL or MDL

GRPH = gasoline-range petroleum hydrocarbons

mg/kg = milligrams per kilogram



Table 2
VPH/EPH Analytical Data Summary
TOC Holdings Co. Facility No. 01-169
851 North Broadway
Everett, Washington

Sample Date	
8/28/2014	
Sample ID	
HC-2-18	
Extractable Petroleum Hydrocarbons by NWEPH (mg/Kg)	
Aliphatic Hydrocarbon (C8-C10)	32.0
Aliphatic Hydrocarbon (C10-	22.1
Aliphatic Hydrocarbon (C12-	<5.38
Aliphatic Hydrocarbon (C16-	<5.38
Aliphatic Hydrocarbon (C21-	<5.38
Aromatic Hydrocarbon (C8-	7.02
Aromatic Hydrocarbon (C10-	15.4
Aromatic Hydrocarbon (C12-	6.38
Aromatic Hydrocarbon (C16-	8.68
Aromatic Hydrocarbon (C21-	763
Volatile Petroleum Hydrocarbons by NWVPH (mg/kg)	
Aliphatic Hydrocarbon (C5-C6)	<0.773
Aliphatic Hydrocarbon (C6-C8)	16.4 E
Aliphatic Hydrocarbon (C8-C10)	45.8
Aliphatic Hydrocarbon (C10-C12)	83.3
Aromatic Hydrocarbon (C8-C10)	73.3
Aromatic Hydrocarbon (C10-C12)	190
Aromatic Hydrocarbon (C12-C13)	11.4
Benzene	<1.93
Toluene	0.378
Ethylbenzene	0.547
m,p-Xylene	2.21
o-Xylene	2.81
Naphthalene	1.33
Methyl tert-butyl ether (MTBE)	<1.93

Bold debotes concentration exceeds the Method Reporting Level (MRL) or Method Deorting Level (MDL)

Samples analyzed by Fremont Analytical, of Seattle, Washington.

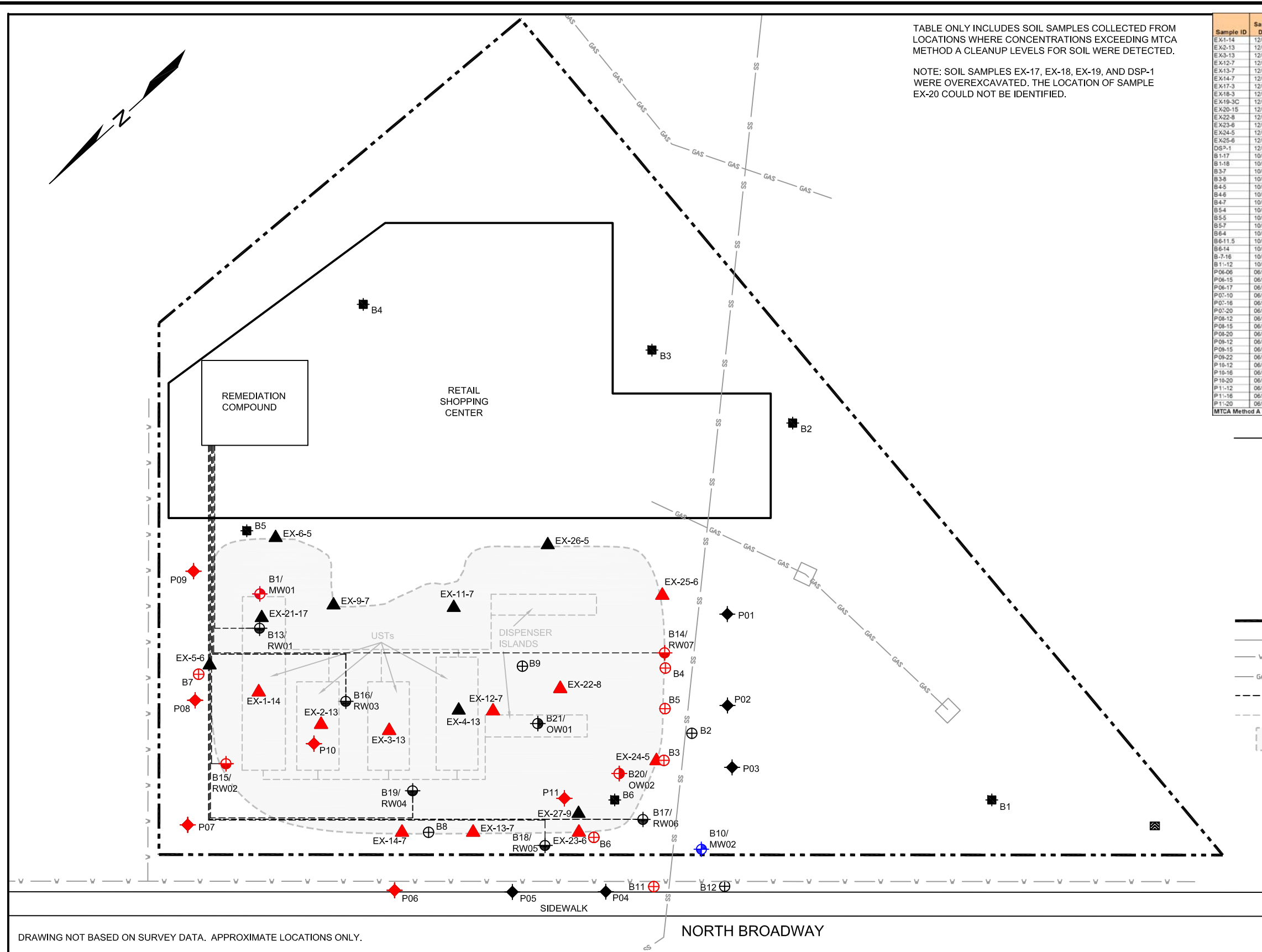
< = not detected at a concentration exceeding the laboratory MRL or MDL

mg/kg = milligrams per kilogram

E = Value above quantitation range

APPENDIX A

HISTORICAL SOIL RESULTS (SOUNDEARTH 2013, FIGURE 7)



APPENDIX B

WELL LOGS FROM ECOLOGY WELL LOG DATABASE

494783



GEOTECH SOIL BORING REPORT

Construction & Decommission

**Decommission
Notice of Intent****AE 22251
SE 48407**

Property Owner: City of Everett
Site Address: Intersection of 14th & Grand St., Everett, WA
Location: NW, SW, Sec 18, T29N, R5E
County: Snohomish County
Work/Decom Date: 6/12/2013
Date Completed: 6/14/2013

Consulting Firm: Geo Engineers
Drilling Company: Geologic Drill Exploration, Inc
Driller & License #: Aren Hansen 3123

Signature

A handwritten signature in black ink, appearing to be 'AH', is written over a horizontal line.

Construction:

Procedure: Hollow Stem Auger
Auger Size: 8"
Boring Depth: See below
Water Level: See below

Formation Description: Borings # B-1, 2, 3, 4

B-1	0 to 25'	Glacial Till
	25' to 85'	Sand
B-2	0 to 65'	Sand w/Silt interbeds H2O at 5'
B-3	0 to 15'	Silt Sand & Gravel
	15' to 45'	Glacial Till
	45' to 110'	Sand w/Silt interbeds
		H2O at 90'
B-4	0 to 75'	Sand
		H2O at 5'

Decommission

Backfilled with Bentonite

RECEIVED

SEP 09 2013

DEPT OF ECOLOGY
NWRO - WR



WATER WELL REPORT

Original & 1st copy - Ecology, 2nd copy - owner, 3rd copy - driller

Construction/Decommission ("x" in circle)

☒ Construction

☐ Decommission ORIGINAL CONSTRUCTION Notice

of Intent Number

188813

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

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

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

DIMENSIONS: Diameter of well 16 inches, drilled 200 ft.
 Depth of completed well 163 ft.

CONSTRUCTION DETAILS

Casing ☒ Welded 16" Diam. from 2 ft. to 140 ft.
 Installed: ☐ Liner installed " Diam. from " ft. to " ft.
☐ Threaded " Diam. from " ft. to " ft.

Perforations: ☐ Yes ☒ No

Type of perforator used

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

Screens: ☒ Yes ☐ No ☐ K-Pac Location

Manufacturer's Name Johnson

Type 304 stainless steel Model No.

Diam. 10" P.S. Slot Size 40 slot from 138 ft. to 153 ft.

Diam. " Slot Size " from " ft. to " ft.

Gravel/Filter packed: ☒ Yes ☐ No ☐ Size of gravel/sand 6X9

Materials placed from 163' ft. to 110' ft.

Surface Seal: ☒ Yes ☐ No To what depth? 21 ft

Materials used in seal High Solids Bentonite

Did any strata contain unusable water? ☐ Yes ☒ No

Type of water? Depth of strata

Method of sealing strata off

PUMP: Manufacturer's Name NA

Type: H.P.

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

Static level 9.2 ft. below top of well Date 8/24/05

Artesian pressure lbs. per square inch Date

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

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

Was a pump test made? ☒ Yes ☐ No If yes, by whom? Hokkaido/Johnson

Yield: 500 gal./min. with 36 ft. drawdown after 24 hrs.

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

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

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

Time	Water Level	Time	Water Level
4	96.1	48	96.1
8	96.7	60	95.9
20	96.4	90	95.65
		120	95.5
		160	95.3
		210	95.14

Date of test

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

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

Artesian flow g.p.m. Date

Temperature of water 50 Was a chemical analysis made? ☐ Yes ☒ No

CURRENT

Notice of Intent No. WEO 3956

Unique Ecology Well ID Tag No. AFT 328

Water Right Permit No. C2186A-C3358A

Property Owner Name City of Everett

Well Street Address 144 West Marine View Dr

City Everett County: Snohomish

Location SW 1/4- 1/4 SW 1/4 Sec. 8 Twn. 29N R15E WWM circle or one

Lat/Long: Lat Deg NA Lat Min/Sec NA

(s, t, r still REQUIRED) Long Deg NA Long Min/Sec NA

Tax Parcel No.

CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. Indicate all water encountered.

(USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
Top soil	0'	2'
Brown silt w/ gravel	2'	5'
Tan/gray Gravelly fill	5'	29'
Sandy silt bound Gravel	29'	48'
Tan in color		
Grey silty sand	48'	69'
Dark Grey sand fine med	69'	105'
Dark Grey sand med/	105'	147'
Coarse water bearing		
Dark Grey sand w/	147'	154'
some silt		
Grey sand med/fine	154'	200'
very silty		

RECEIVED

JAN 27 2006

DEPT OF ECOLOGY

RECEIVED

SEP 28 2005

DEPT OF ECOLOGY

Start Date 7/20 Completed Date 8/30/05

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

☒ Driller ☐ Engineer ☐ Trainee Name (Print) Bob Carper

Driller/Engineer/Trainee Signature Bob Carper

Driller or Trainee License No. 1239

If trainee, licensed driller's
 Signature and License no.

Drilling Company Hokkaido

Address PO Box 100

City, State, Zip Graham, WA, 98338

Contractor's

Registration No HOKKADT017MR Date 9/27/05

Ecology is an Equal Opportunity Employer. ECY 050-1-20 (Rev 4/01)

29-4E-17C

RECEIVED

154985

MAY 26 2004

RESOURCE PROTECTION WELL REPORT

START CARD NO. R040667

DEPARTMENT OF ECOLOGY
PROJECT NAME: Pringle Electronics

WELL IDENTIFICATION NO. 44 ALQ 411

DRILLING METHOD: Auger

DRILLER: Tom Adams

FIRM: Environmental Drilling

SIGNATURE: Thomas J. Adams

CONSULTING FIRM: Environmental Ass. Inc.

REPRESENTATIVE: Rob Roe

COUNTY: Sno

LOCATION: NE 1/4 NW 1/4 Sec 17 Twp 29N R 4E

STREET ADDRESS OF WELL: 1021 N Broadway Everett

WATER LEVEL ELEVATION:

GROUND SURFACE ELEVATION:

INSTALLED: 4-18-01

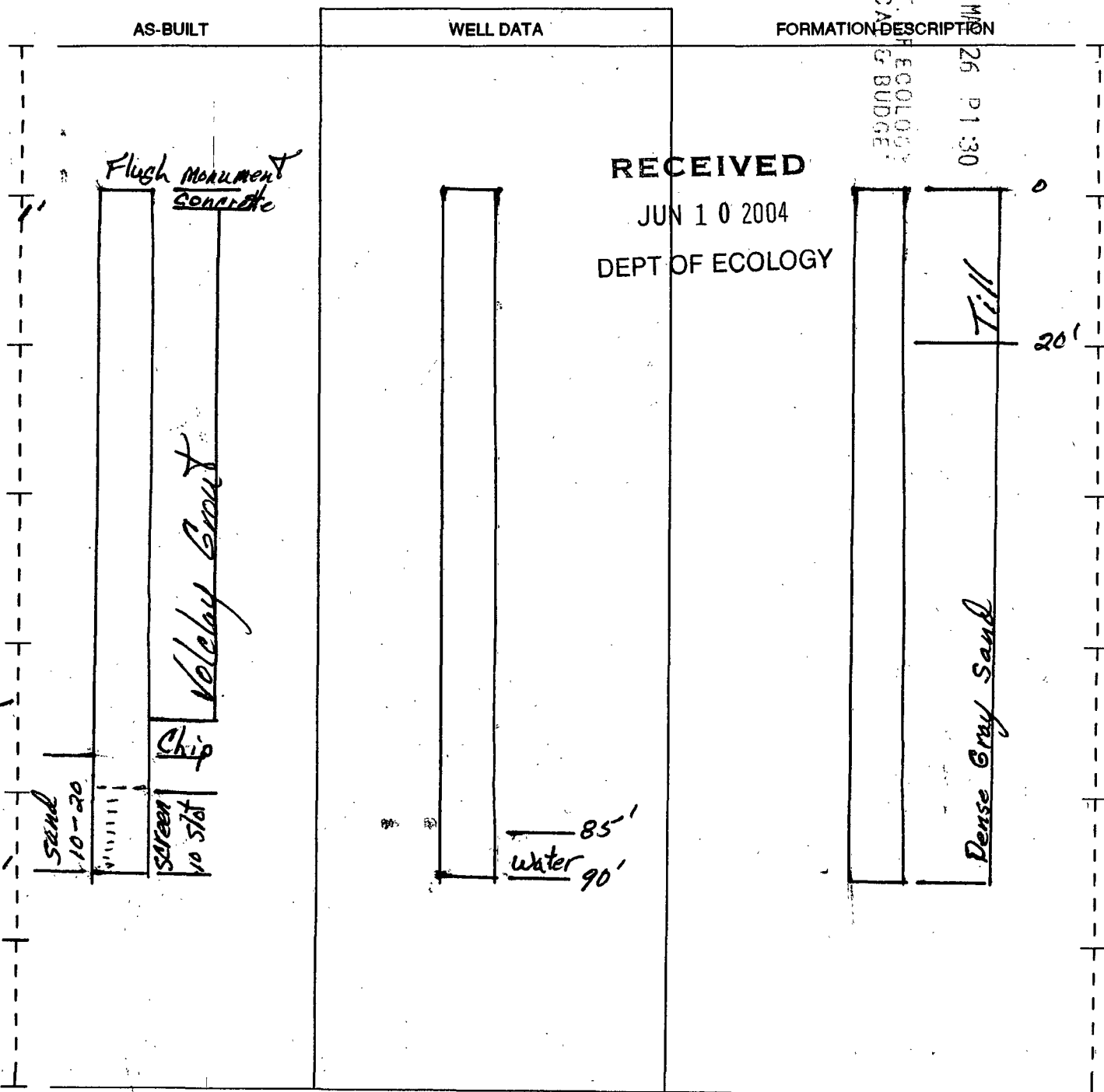
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FISCAL BUDGET
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JUN 10 2004

DEPT OF ECOLOGY



SCALE: 1" = 20'

PAGE 1 OF 1

APPENDIX C

BORING LOGS

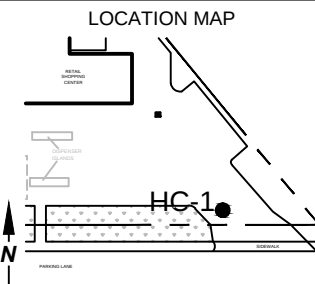


510 Allen Street
Kelso, WA 98626
Phone: 360-703-6086

WELL/BORING NUMBER

HC-1

PROJECT NAME: TOC Holdings Co.
PROJECT NUMBER: 01-069
PROJECT LOCATION: Everett, Wa.
LOGGED BY: RAH
REVIEWED BY: CH
DATE: 9-25-14



DESCRIPTION

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

DEPTH (FT.)

SYMBOL

Well Details

LAB SAMPLE ID

RECOVERY

PID

FIRST WATER

BLOW COUNTS

WELL CONSTRUCTION DETAILS

Asphalt

Silty Sand with Gravel (SM) Brown, 60% fine sand, 30% low plastic fines, 10% fine subround sand, loose, damp, no odor.

Slag - Black, fine to coarse gravel, vitric, dry.

Silt (ML) Brown, 60% low plastic fines, 40% fine sand, very dense, dry, no odor.

Sand with Silt and Gravel (SP) Brown, 90% fine sand, 5% low plastic fines, 5% fine subround gravel, very dense, dry, no odor.

Total Borehole Depth @ 20' bgs.

0

5

10

15

20

25

30

HC-1-09

HC-1-15

HC-1-20

0.2

0.2

0.1

0.1

0.2

0.2

0.1

✓

NA

NOTE:
Backfill Borehole with hydrated bentonite.

LEGEND:

□ FILTER PACK

■ BENTONITE

☒ CEMENT GROUT

☒ CUTTINGS/BACKFILL

DRILLING CONTRACTOR: ESN
DRILLING METHOD: Direct Push
BOREHOLE DIAMETER: 2-Inch
SAMPLING METHOD: Macro core
START CARD NUMBER:

CASING ELEVATION:
GROUND SURFACE ELEVATION:
COORDINATES (X & Y):
DATUM:
SURVEYING CONTRACTOR:



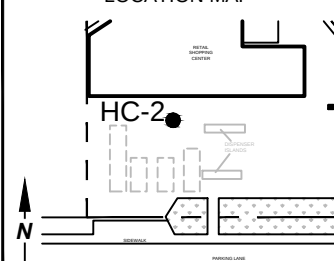
510 Allen Street
Kelso, WA 98626
Phone: 360-703-6086

WELL/BORING NUMBER

HC-2

PROJECT NAME: TOC Holdings Co.
PROJECT NUMBER: 01-069
PROJECT LOCATION: Everett, Wa.
LOGGED BY: RAH
REVIEWED BY: CH
DATE: 9-25-14

LOCATION MAP



DESCRIPTION

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

DEPTH
(FT.)

SYMBOL

Well Details

LAB
SAMPLE ID

RECOVERY

PID

FIRST
WATER

BLOW
COUNTS

WELL CONSTRUCTION DETAILS

Asphalt

Silty Sand with Gravel (SM) Brown, 65% fine sand, 30% low plastic fines, up to 5% fine gravel, loose, dry, no odor.

Slag - Black, fine to coarse gravel, vitric, dry.

Silty Sand with Gravel (SM) Gray, 70% fine sand, 25% low plastic fines, up to 5% fine gravel, very dense, dry, strong hydrocarbon odor.

Total Borehole Depth @ 20' bgs.

0

5

10

15

20

25

30

HC-2-5

HC-2-10

HC-2-15

HC-2-18

0.2

0.2

0.1

0.1

0.3

0.3

40.8

38.0

NA

NOTE:
Backfill Borehole with hydrated bentonite.

LEGEND:

FILTER PACK

BENTONITE

CEMENT GROUT

CUTTINGS/BACKFILL

DRILLING CONTRACTOR: ESN
DRILLING METHOD: Direct Push
BOREHOLE DIAMETER: 2-Inch
SAMPLING METHOD: Macro core
START CARD NUMBER:

CASING ELEVATION:
GROUND SURFACE ELEVATION:
COORDINATES (X & Y):
DATUM:
SURVEYING CONTRACTOR:



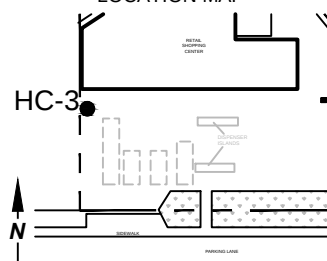
510 Allen Street
Kelso, WA 98626
Phone: 360-703-6086

WELL/BORING NUMBER

HC-3

PROJECT NAME: TOC Holdings Co.
PROJECT NUMBER: 01-069
PROJECT LOCATION: Everett, Wa.
LOGGED BY: RAH
REVIEWED BY: CH
DATE: 9-25-14

LOCATION MAP



DESCRIPTION

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

DEPTH
(FT.)

SYMBOL

Well Details

LAB
SAMPLE ID

RECOVERY

PID

FIRST
WATER

BLOW
COUNTS

WELL CONSTRUCTION DETAILS

Asphalt

Silty Sand with Gravel (SM) Gray, 70% fine sand, 25% low plastic fines, up to 5% fine gravel, loose, dry, no odor.

Silt with fine Sand (ML) Dark brown, 60% low plastic fines, 40% fine sand, very dense, dry, no odor.

Total Borehole Depth @ 15' bgs.

0

5

10

15

20

25

30

HC-3-5

HC-3-10

HC-3-15

0.2

0.2

0.2

0.2

0.2

0.5

0.8

NA

NOTE:
Backfill Borehole with hydrated bentonite.

LEGEND:

FILTER PACK

BENTONITE

CEMENT GROUT

CUTTINGS/BACKFILL

DRILLING CONTRACTOR: ESN
DRILLING METHOD: Direct Push
BOREHOLE DIAMETER: 2-Inch
SAMPLING METHOD: Macro core
START CARD NUMBER:

CASING ELEVATION:
GROUND SURFACE ELEVATION:
COORDINATES (X & Y):
DATUM:
SURVEYING CONTRACTOR:



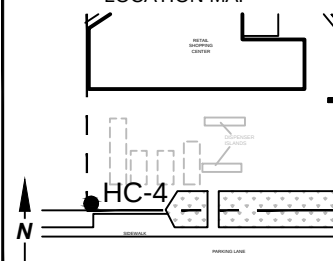
510 Allen Street
Kelso, WA 98626
Phone: 360-703-6086

WELL/BORING NUMBER

HC-4

PROJECT NAME: TOC Holdings Co.
PROJECT NUMBER: 01-069
PROJECT LOCATION: Everett, Wa.
LOGGED BY: RAH
REVIEWED BY: CH
DATE: 9-25-14

LOCATION MAP



DESCRIPTION

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

DEPTH
(FT.)

SYMBOL

Well Details

LAB
SAMPLE ID

RECOVERY

PID

FIRST
WATER

BLOW
COUNTS

WELL CONSTRUCTION DETAILS

Asphalt

Silty Sand with Gravel (SM) Brown, 65% fine sand, 25% low plastic fines, up to 5% fine gravel, loose, dry, no odor.

Sandy Silt (ML) Dark gray, 50% low plastic fines, 40% fine sand, 10% fine gravel, loose, dry, no odor.

Local slag fragments from 8' to 10' bgs.

Sand with Gravel (SP) Light brown, 80% fine sand, 10% low plastic fines, 10% fine gravel, very dense, dry, no odor.

Total Borehole Depth @ 20' bgs.

0

5

10

15

20

25

30

HC-4-5

HC-4-10

HC-4-15

HC-4-20

0.1

0.2

0.2

0.2

0.2

0.2

0.2

0.2

NA

NOTE:
Backfill Borehole with hydrated bentonite.

LEGEND:

FILTER PACK

BENTONITE

CEMENT GROUT

CUTTINGS/BACKFILL

DRILLING CONTRACTOR: ESN
DRILLING METHOD: Direct Push
BOREHOLE DIAMETER: 2-Inch
SAMPLING METHOD: Macro core
START CARD NUMBER:

CASING ELEVATION:
GROUND SURFACE ELEVATION:
COORDINATES (X & Y):
DATUM:
SURVEYING CONTRACTOR:



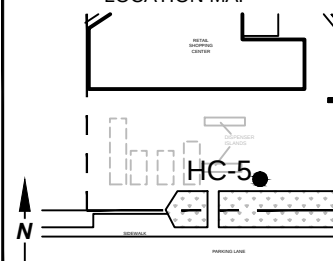
510 Allen Street
Kelso, WA 98626
Phone: 360-703-6086

WELL/BORING NUMBER

HC-5

PROJECT NAME: TOC Holdings Co.
PROJECT NUMBER: 01-069
PROJECT LOCATION: Everett, Wa.
LOGGED BY: RAH
REVIEWED BY: CH
DATE: 9-25-14

LOCATION MAP



DESCRIPTION

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

DEPTH
(FT.)

SYMBOL

Well Details

LAB
SAMPLE ID

RECOVERY

PID

FIRST
WATER

BLOW
COUNTS

WELL CONSTRUCTION DETAILS

Asphalt

Silty Sand with Gravel (SM) Gray, 70% fine sand, 25% low plastic fines, 5% fine gravel, loose, dry, slight hydrocarbon odor.

Slag - Black, fine to coarse gravel, vitric, dry.

Silt (ML) Brown, 60% low plastic fines, 40% fine sand, very dense, dry, no odor.

Total Borehole Depth @ 20' bgs.

0

5

10

15

20

25

30

HC-5-5

HC-5-10

HC-5-15

HC-5-20

0.3

0.5

0.5

0.8

0.2

0.2

0.1

0.1

NA

NOTE:
Backfill Borehole with hydrated bentonite.

LEGEND:

FILTER PACK

BENTONITE

CEMENT GROUT

CUTTINGS/BACKFILL

DRILLING CONTRACTOR: ESN
DRILLING METHOD: Direct Push
BOREHOLE DIAMETER: 2-Inch
SAMPLING METHOD: Macro core
START CARD NUMBER:

CASING ELEVATION:
GROUND SURFACE ELEVATION:
COORDINATES (X & Y):
DATUM:
SURVEYING CONTRACTOR:



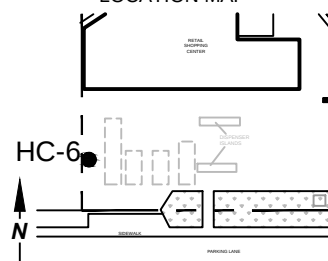
510 Allen Street
Kelso, WA 98626
Phone: 360-703-6086

WELL/BORING NUMBER

HC-6

PROJECT NAME: TOC Holdings Co.
PROJECT NUMBER: 01-069
PROJECT LOCATION: Everett, Wa.
LOGGED BY: RAH
REVIEWED BY: CH
DATE: 9-25-14

LOCATION MAP



DESCRIPTION

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

DEPTH
(FT.)

SYMBOL

Well Details

LAB
SAMPLE ID

RECOVERY

PID

FIRST
WATER

BLOW
COUNTS

WELL CONSTRUCTION DETAILS

Asphalt

Sand with Gravel and Silt (SP) Brown, 85% fine sand, 5% low plastic fines, 10% fine gravel, fine to medium sand, loose, dry, no odor.

Silt with Sand (ML) Light gray, 60% low plastic fines, 40% fine sand, very dense, damp, slight hydrocarbon odor.

Total Borehole Depth @ 15' bgs.

0

5

10

15

20

25

30

HC-6-5

HC-6-10

HC-6-15

0.1

0.1

1.8

NA

NOTE:
Backfill Borehole with hydrated bentonite.

LEGEND:

FILTER PACK

BENTONITE

CEMENT GROUT

CUTTINGS/BACKFILL

DRILLING CONTRACTOR: ESN
DRILLING METHOD: Direct Push
BOREHOLE DIAMETER: 2-Inch
SAMPLING METHOD: Macro core
START CARD NUMBER:

CASING ELEVATION:
GROUND SURFACE ELEVATION:
COORDINATES (X & Y):
DATUM:
SURVEYING CONTRACTOR:



510 Allen Street
Kelso, WA 98626
Phone: 360-703-6086

WELL/BORING NUMBER

B37

PROJECT NAME: TOC Holdings Co.
PROJECT NUMBER: 01-069

LOGGED BY: RAH

DATE: 8-22-14

LOCATION MAP

B37

DESCRIPTION

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

DEPTH
(FT.)

SYMBOL

Well Details

LAB
SAMPLE ID

RECOVERY

PID

FIRST
WATER

BLOW
COUNTS

WELL CONSTRUCTION DETAILS

Asphalt 4"

Type 17 Fill material

Sand with fine Silt (ML) Brown with gray streaks, 60% fine sand, 40% low plastic fines, dry, loose, slight hydrocarbon odor.

Silty fine Sand with Gravel (SM) Gray, 60% fine sand, 30% low plastic fines, 10% fine subround gravel, dry, dense, slight hydrocarbon odor.

0

5

10

15

20

25

30

100%

2.0

100%

5.4

66%

5.3

NOTE:

Set 10½" conductor casing at 30' bgs. Reduce hole size to 6¾" and continue drilling.

LEGEND:

-  FILTER PACK
-  BENTONITE
-  CEMENT GROUT
-  CUTTINGS/BACKFILL

DRILLING CONTRACTOR:

DRILLING METHOD:

BOREHOLE DIAMETER:

SAMPLING METHOD:

START CARD NUMBER:

CASING ELEVATION:

GROUND SURFACE ELEVATION:

COORDINATES (X & Y):

DATUM:

SURVEYING CONTRACTOR:



510 Allen Street
Kelso, WA 98626
Phone: 360-703-6086

WELL/BORING NUMBER

B37

PROJECT NAME: TOC Holdings Co.
PROJECT NUMBER: 01-069
PROJECT LOCATION: Everett, Wa.
LOGGED BY: RAH
REVIEWED BY: CH
DATE: 8-22-14



DESCRIPTION

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

Silty fine Sand with Gravel (SM) Gray, 60% fine sand, 30% low plastic fines, 10% fine subround gravel, dry, dense, slight hydrocarbon odor.

Slight increase fine sand content with depth.

Sand (SP) Brown, 90% fine to medium sand, 10% low plastic fines, dry, dense, no odor.

Total Borehole Depth @ 60' bgs

DEPTH
(FT.)

SYMBOL

Well Details

LAB
SAMPLE ID

RECOVERY

PID

FIRST
WATER

BLOW
COUNTS

WELL CONSTRUCTION DETAILS

35

40

45

50

55

60

65

33%

17.8

33%

13.5

66%

13.9

100%

0.6

66%

0.1

NOTE:
Backfill Borehole with hydrated bentonite.

LEGEND:

- ☐ FILTER PACK
- ☐ BENTONITE
- ☒ CEMENT GROUT
- ☒ CUTTINGS/BACKFILL

DRILLING CONTRACTOR: Cascade Drilling
DRILLING METHOD: Hollow Stem Auger
BOREHOLE DIAMETER: 10 1/2 - 6 1/4
SAMPLING METHOD: Split Spoon
START CARD NUMBER:

CASING ELEVATION:
GROUND SURFACE ELEVATION:
COORDINATES (X & Y):
DATUM:
SURVEYING CONTRACTOR:

APPENDIX D

LABORATORY REPORT WITH CHAIN-OF-CUSTODY DOCUMENTATION

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

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

August 29, 2014

Craig Hultgren, Project Manager
HydroCon
510 Allen St, Suite B
Kelso, WA 98626

Dear Mr. Hultgren:

Included are the results from the testing of material submitted on August 22, 2014 from the TOC_01-169, WORFDB8 F&BI 408374 project. There are 4 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

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

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures

c: Allison Greiner, Rob Honsberger
HDC0829R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on August 22, 2014 by Friedman & Bruya, Inc. from the HydroCon TOC_01-169, WORFDB8 F&BI 408374 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>HydroCon</u>
408374-01	B37-15
408374-02	B37-25
408374-03	B37-30
408374-04	B37-35
408374-05	B37-40
408374-06	B37-45
408374-07	B37-50
408374-08	B37-60

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 08/29/14

Date Received: 08/22/14

Project: TOC_01-169, WORFDB8 F&BI 408374

Date Extracted: 08/26/14

Date Analyzed: 08/26/14 and 08/27/14

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES AND TPH AS GASOLINE
USING METHODS 8021B AND NWTPH-Gx**

Results Reported on a Dry Weight Basis

Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Benzene</u>	<u>Toluene</u>	<u>Ethyl Benzene</u>	<u>Total Xylenes</u>	<u>Gasoline Range</u>	<u>Surrogate (% Recovery)</u> (Limit 50-150)
B37-15 408374-01	<0.02	<0.02	<0.02	<0.06	<2	96
B37-25 408374-02	<0.02	<0.02	<0.02	<0.06	<2	93
B37-30 408374-03	<0.02	0.032	<0.02	0.088	<2	95
B37-35 408374-04	0.11	0.33	0.067	0.54	3.8	96
B37-40 408374-05	0.27	0.25	0.10	0.41	3.6	95
B37-45 408374-06	0.23	0.16	0.18	0.67	4.8	96
B37-50 408374-07	<0.02	<0.02	<0.02	<0.06	<2	96
B37-60 408374-08	<0.02	<0.02	<0.02	<0.06	<2	95
Method Blank 04-1733 MB	<0.02	<0.02	<0.02	<0.06	<2	96

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 08/29/14

Date Received: 08/22/14

Project: TOC_01-169, WORFDB8 F&BI 408374

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES, AND TPH AS GASOLINE
USING METHOD 8021B AND NWTPH-Gx**

Laboratory Code: 408402-01 (Duplicate)

Analyte	Reporting Units	Sample Result (Wet Wt)	Duplicate Result (Wet Wt)	RPD (Limit 20)
Benzene	mg/kg (ppm)	<0.02	<0.02	nm
Toluene	mg/kg (ppm)	<0.02	<0.02	nm
Ethylbenzene	mg/kg (ppm)	<0.02	<0.02	nm
Xylenes	mg/kg (ppm)	<0.06	<0.06	nm
Gasoline	mg/kg (ppm)	<2	<2	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	mg/kg (ppm)	0.5	87	69-120
Toluene	mg/kg (ppm)	0.5	93	70-117
Ethylbenzene	mg/kg (ppm)	0.5	95	65-123
Xylenes	mg/kg (ppm)	1.5	94	66-120
Gasoline	mg/kg (ppm)	20	95	71-131

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Data Qualifiers & Definitions

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

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

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

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

cf - The sample was centrifuged prior to analysis.

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

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

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

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

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

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

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

ip - Recovery fell outside of control limits. Compounds in the sample matrix interfered with the quantitation of the analyte.

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

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

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

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

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

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

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

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

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

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

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

408374

SAMPLE CHAIN OF CUSTODY

MC 08/22/14 us2/c03

Send Report To Greg Hultgen

Company Hydro Con

Address 510 Allen St Ste 28

City, State, ZIP Wash WA 98076

Phone # 360-705-6074 Fax # 360-363-6086

SAMPLERS (signature) CLL

PROJECT NAME/NO. Tx 01-169

PO #

REMARKS

Page # 1 of 1

TURNAROUND TIME
☒ Standard (2 Weeks)
☐ RUSH

Revisions authorized by:

SAMPLE DISPOSAL
☐ Dispose after 30 days
☐ Return samples
☐ With call with instructions

ANALYSES REQUESTED

Sample ID	Lab ID	Date	Time	Sample Type	# of containers	TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by 8260	SVOCs by 8270	HFAs	Notes
B37-15	01 A-E	8-22-14	1000	S-1	5	☒	☒	☒				✓ per CL Hold
B37-25	02		1035		5	☒	☒	☒				Hold
B37-30	03		1055		5	☒	☒	☒				Hold
B37-35	04		1200		5	☒	☒	☒				Hold
B37-40	05		1205		5	☒	☒	☒				Hold
B37-45	06		1210		5	☒	☒	☒				Hold
B37-50	07		1225		5	☒	☒	☒				Hold
B37-60	08		1255		5	☒	☒	☒				Hold

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 265-8282
Fax (206) 283-5044
FORAMS\OGC\OGC.DOC

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
<u>[Signature]</u>	<u>Robert A. Hunsberger</u>	<u>Hydrocon</u>	<u>8-22-14</u>	<u>17:25</u>
<u>[Signature]</u>	<u>Don Schmitt</u>	<u>FBT</u>	<u>8-22-14</u>	<u>17:29</u>
Received by:				

Samples returned at 20°C

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

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

September 11, 2014

Craig Hultgren, Project Manager
HydroCon
510 Allen St, Suite B
Kelso, WA 98626

Dear Mr. Hultgren:

Included are the results from the testing of material submitted on August 28, 2014 from the TOC_01-169, WORFDB8 F&BI 408461 project. There are 13 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

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

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures

c: Allison Greiner, Rob Honsberger
HDC0911R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on August 28, 2014 by Friedman & Bruya, Inc. from the HydroCon TOC_01-169, WORFDB8 F&BI 408461 project. Samples were logged in under the laboratory ID's listed below.

<u>Laboratory ID</u>	<u>HydroCon</u>
408461 -01	HC-1-09
408461 -02	HC-1-15
408461 -03	HC-1-20
408461 -04	HC-2-05
408461 -05	HC-2-10
408461 -06	HC-2-15
408461 -07	HC-2-18
408461 -08	HC-3-05
408461 -09	HC-3-10
408461 -10	HC-3-15
408461 -11	HC-4-05
408461 -12	HC-4-10
408461 -13	HC-4-15
408461 -14	HC-4-20
408461 -15	HC-5-05
408461 -16	HC-5-10
408461 -17	HC-5-15
408461 -18	HC-5-20
408461 -19	HC-6-05
408461 -20	HC-6-10
408461 -21	HC-6-15

Sample HC-2-18 was sent to Fremont for EPH and VPH analyses. The report is enclosed.

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 09/11/14
 Date Received: 08/28/14
 Project: TOC_01-169, WORFDB8 F&BI 408461
 Date Extracted: 08/29/14
 Date Analyzed: 08/29/14

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
 FOR BENZENE, TOLUENE, ETHYLBENZENE,
 XYLENES AND TPH AS GASOLINE
 USING METHODS 8021B AND NWTPH-Gx**

Results Reported on a Dry Weight Basis

Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Benzene</u>	<u>Toluene</u>	<u>Ethyl Benzene</u>	<u>Total Xylenes</u>	<u>Gasoline Range</u>	<u>Surrogate (% Recovery)</u> (Limit 50-132)
HC-1-09 408461-01	<0.02	<0.02	<0.02	<0.06	<2	75
HC-1-20 408461-03	<0.02	<0.02	<0.02	<0.06	<2	74
HC-2-15 408461-06	<0.02	<0.02	<0.02	<0.06	<2	89
HC-2-18 408461-07 1/20	<0.4	3.5	<0.4	300	4,300	ip
HC-3-15 408461-10 1/5	<0.1	0.18	<0.1	22	620	113
HC-4-10 408461-12	<0.02	<0.02	<0.02	<0.06	<2	80
HC-4-15 408461-13	<0.02	<0.02	<0.02	<0.06	<2	80
HC-4-20 408461-14	<0.02	<0.02	<0.02	<0.06	<2	81
HC-5-10 408461-16	<0.02	<0.02	<0.02	<0.06	27	89
HC-5-15 408461-17	<0.02	<0.02	<0.02	<0.06	<2	88

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 09/11/14

Date Received: 08/28/14

Project: TOC_01-169, WORFDB8 F&BI 408461

Date Extracted: 08/29/14

Date Analyzed: 08/29/14

**RESULTS FROM THE ANALYSIS OF SOIL SAMPLES
FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES AND TPH AS GASOLINE
USING METHODS 8021B AND NWTPH-Gx**

Results Reported on a Dry Weight Basis

Results Reported as mg/kg (ppm)

<u>Sample ID</u> Laboratory ID	<u>Benzene</u>	<u>Toluene</u>	<u>Ethyl Benzene</u>	<u>Total Xylenes</u>	<u>Gasoline Range</u>	<u>Surrogate (% Recovery)</u> (Limit 50-132)
HC-5-20 408461-18	<0.02	<0.02	<0.02	<0.06	<2	80
HC-6-15 408461-21	<0.02	<0.02	<0.02	<0.06	<2	83
Method Blank 04-1735 MB	<0.02	<0.02	<0.02	<0.06	<2	89

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	HC-1-09	Client:	HydroCon
Date Received:	08/28/14	Project:	TOC_01-169, WORFDB8 F&BI 408461
Date Extracted:	09/02/14	Lab ID:	408461-01 x10
Date Analyzed:	09/03/14	Data File:	408461-01 x10.059
Matrix:	Soil	Instrument:	ICPMS1
Units:	mg/kg (ppm) Dry Weight	Operator:	AP

Internal Standard:	% Recovery:	Lower Limit:	Upper Limit:
Germanium	102	60	125
Indium	90	60	125
Holmium	90	60	125

Analyte:	Concentration mg/kg (ppm)
Copper	1,420
Arsenic	144
Antimony	86.4
Lead	6,980

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	HC-1-20	Client:	HydroCon
Date Received:	08/28/14	Project:	TOC_01-169, WORFDB8 F&BI 408461
Date Extracted:	09/02/14	Lab ID:	408461-03
Date Analyzed:	09/03/14	Data File:	408461-03.028
Matrix:	Soil	Instrument:	ICPMS1
Units:	mg/kg (ppm) Dry Weight	Operator:	AP

Internal Standard:	% Recovery:	Lower Limit:	Upper Limit:
Germanium	109	60	125
Indium	90	60	125
Holmium	94	60	125

Analyte:	Concentration mg/kg (ppm)
Copper	15.1
Arsenic	2.04
Antimony	<1
Lead	2.37

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	HC-4-10	Client:	HydroCon
Date Received:	08/28/14	Project:	TOC_01-169, WORFDB8 F&BI 408461
Date Extracted:	09/02/14	Lab ID:	408461-12
Date Analyzed:	09/03/14	Data File:	408461-12.034
Matrix:	Soil	Instrument:	ICPMS1
Units:	mg/kg (ppm) Dry Weight	Operator:	AP

Internal Standard:	% Recovery:	Lower Limit:	Upper Limit:
Germanium	103	60	125
Indium	80	60	125
Holmium	84	60	125

Analyte:	Concentration mg/kg (ppm)
Copper	30.6
Arsenic	24.6
Antimony	1.73
Lead	125

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	HC-4-20	Client:	HydroCon
Date Received:	08/28/14	Project:	TOC_01-169, WORFDB8 F&BI 408461
Date Extracted:	09/02/14	Lab ID:	408461-14
Date Analyzed:	09/03/14	Data File:	408461-14.035
Matrix:	Soil	Instrument:	ICPMS1
Units:	mg/kg (ppm) Dry Weight	Operator:	AP

Internal Standard:	% Recovery:	Lower Limit:	Upper Limit:
Germanium	100	60	125
Indium	82	60	125
Holmium	87	60	125

Analyte:	Concentration mg/kg (ppm)
Copper	7.05
Arsenic	1.59
Antimony	<1
Lead	1.76

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	HC-5-10	Client:	HydroCon
Date Received:	08/28/14	Project:	TOC_01-169, WORFDB8 F&BI 408461
Date Extracted:	09/02/14	Lab ID:	408461-16
Date Analyzed:	09/03/14	Data File:	408461-16.037
Matrix:	Soil	Instrument:	ICPMS1
Units:	mg/kg (ppm) Dry Weight	Operator:	AP

Internal Standard:	% Recovery:	Lower Limit:	Upper Limit:
Germanium	101	60	125
Indium	82	60	125
Holmium	85	60	125

Analyte:	Concentration mg/kg (ppm)
Copper	20.4
Arsenic	52.8
Antimony	1.32
Lead	108

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	HC-5-20	Client:	HydroCon
Date Received:	08/28/14	Project:	TOC_01-169, WORFDB8 F&BI 408461
Date Extracted:	09/02/14	Lab ID:	408461-18
Date Analyzed:	09/03/14	Data File:	408461-18.038
Matrix:	Soil	Instrument:	ICPMS1
Units:	mg/kg (ppm) Dry Weight	Operator:	AP

Internal Standard:	% Recovery:	Lower Limit:	Upper Limit:
Germanium	113	60	125
Indium	87	60	125
Holmium	93	60	125

Analyte:	Concentration mg/kg (ppm)
Copper	20.1
Arsenic	5.90
Antimony	<1
Lead	13.8

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

Client ID:	Method Blank	Client:	HydroCon
Date Received:	NA	Project:	TOC_01-169, WORFDB8 F&BI 408461
Date Extracted:	09/02/14	Lab ID:	I4-534 mb
Date Analyzed:	09/03/14	Data File:	I4-534 mb.026
Matrix:	Soil	Instrument:	ICPMS1
Units:	mg/kg (ppm) Dry Weight	Operator:	AP

Internal Standard:	% Recovery:	Lower Limit:	Upper Limit:
Germanium	96	60	125
Indium	90	60	125
Holmium	92	60	125

Analyte:	Concentration mg/kg (ppm)
Copper	<1
Arsenic	<1
Antimony	<1
Lead	<1

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 09/11/14

Date Received: 08/28/14

Project: TOC_01-169, WORFDB8 F&BI 408461

**QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES
FOR BENZENE, TOLUENE, ETHYLBENZENE,
XYLENES, AND TPH AS GASOLINE
USING EPA METHOD 8021B AND NWTPH-Gx**

Laboratory Code: 408439-01 (Duplicate)

Analyte	Reporting Units	Sample Result (Wet Wt)	Duplicate Result (Wet Wt)	RPD (Limit 20)
Benzene	mg/kg (ppm)	<0.02	<0.02	nm
Toluene	mg/kg (ppm)	<0.02	<0.02	nm
Ethylbenzene	mg/kg (ppm)	<0.02	<0.02	nm
Xylenes	mg/kg (ppm)	<0.06	<0.06	nm
Gasoline	mg/kg (ppm)	<2	<2	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	mg/kg (ppm)	0.5	83	66-121
Toluene	mg/kg (ppm)	0.5	85	72-128
Ethylbenzene	mg/kg (ppm)	0.5	85	69-132
Xylenes	mg/kg (ppm)	1.5	86	69-131
Gasoline	mg/kg (ppm)	20	95	61-153

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 09/11/14

Date Received: 08/28/14

Project: TOC_01-169, WORFDB8 F&BI 408461

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF SOIL SAMPLES
FOR TOTAL METALS USING EPA METHOD 200.8**

Laboratory Code: 408461-03 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Copper	mg/kg (ppm)	50	13.9	82 b	89 b	57-120	8 b
Arsenic	mg/kg (ppm)	10	1.88	102	102	70-118	0
Antimony	mg/kg (ppm)	20	<1	96	96	54-116	0
Lead	mg/kg (ppm)	50	2.18	102	105	59-148	3

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Copper	mg/kg (ppm)	50	99	82-119
Arsenic	mg/kg (ppm)	10	106	83-113
Antimony	mg/kg (ppm)	20	98	69-114
Lead	mg/kg (ppm)	50	104	80-120

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Data Qualifiers & Definitions

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

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

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

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

cf - The sample was centrifuged prior to analysis.

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

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

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

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

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

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

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

ip - Recovery fell outside of control limits. Compounds in the sample matrix interfered with the quantitation of the analyte.

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

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

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

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

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

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

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

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

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

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

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



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Friedman & Bruya
Michael Erdahl
3012 16th Ave. W.
Seattle, WA 98119

RE: 408461
Lab ID: 1409016

September 10, 2014

Attention Michael Erdahl:

Fremont Analytical, Inc. received 1 sample(s) on 9/2/2014 for the analyses presented in the following report.

Extractable Petroleum Hydrocarbons by NWEPH
Sample Moisture (Percent Moisture)
Volatile Petroleum Hydrocarbons by NWVPH

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Mike Ridgeway
President



Date: 09/10/2014

CLIENT: Friedman & Bruya
Project: 408461
Lab Order: 1409016

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1409016-001	HC-2-18	08/28/2014 10:00 AM	09/02/2014 1:47 PM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

CLIENT: Friedman & Bruya**Project:** 408461

I. SAMPLE RECEIPT:

Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:

Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:

Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.



Analytical Report

WO#: 1409016

Date Reported: 9/10/2014

Client: Friedman & Bruya

Collection Date: 8/28/2014 10:00:00 AM

Project: 408461

Lab ID: 1409016-001

Matrix: Soil

Client Sample ID: HC-2-18

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Extractable Petroleum Hydrocarbons by NWEPH

Batch ID: 8635

Analyst: EC

Aliphatic Hydrocarbon (C8-C10)	32.0	5.38		mg/Kg-dry	1	9/10/2014 3:05:00 AM
Aliphatic Hydrocarbon (C10-C12)	22.1	5.38		mg/Kg-dry	1	9/10/2014 3:05:00 AM
Aliphatic Hydrocarbon (C12-C16)	ND	5.38		mg/Kg-dry	1	9/10/2014 3:05:00 AM
Aliphatic Hydrocarbon (C16-C21)	ND	5.38		mg/Kg-dry	1	9/10/2014 3:05:00 AM
Aliphatic Hydrocarbon (C21-C34)	ND	5.38		mg/Kg-dry	1	9/10/2014 3:05:00 AM
Aromatic Hydrocarbon (C8-C10)	7.02	5.38		mg/Kg-dry	1	9/10/2014 8:08:00 AM
Aromatic Hydrocarbon (C10-C12)	15.4	5.38	*	mg/Kg-dry	1	9/10/2014 8:08:00 AM
Aromatic Hydrocarbon (C12-C16)	6.38	5.38		mg/Kg-dry	1	9/10/2014 8:08:00 AM
Aromatic Hydrocarbon (C16-C21)	8.68	5.38		mg/Kg-dry	1	9/10/2014 8:08:00 AM
Aromatic Hydrocarbon (C21-C34)	763	5.38		mg/Kg-dry	1	9/10/2014 8:08:00 AM
Surr: 1-Chlorooctadecane	83.5	65-140		%REC	1	9/10/2014 3:05:00 AM
Surr: o-Terphenyl	96.6	65-140		%REC	1	9/10/2014 8:08:00 AM

NOTES:

* - Flagged value is not within established control limits.

Volatile Petroleum Hydrocarbons by NWVPH

Batch ID: 8617

Analyst: EM

Aliphatic Hydrocarbon (C5-C6)	ND	0.773		mg/Kg-dry	1	9/8/2014 8:29:00 PM
Aliphatic Hydrocarbon (C6-C8)	16.4	0.773	E	mg/Kg-dry	1	9/8/2014 8:29:00 PM
Aliphatic Hydrocarbon (C8-C10)	45.8	15.5	D	mg/Kg-dry	20	9/8/2014 7:56:00 PM
Aliphatic Hydrocarbon (C10-C12)	83.3	15.5	D	mg/Kg-dry	20	9/8/2014 7:56:00 PM
Aromatic Hydrocarbon (C8-C10)	73.3	15.5	D	mg/Kg-dry	20	9/8/2014 7:56:00 PM
Aromatic Hydrocarbon (C10-C12)	190	15.5	D	mg/Kg-dry	20	9/8/2014 7:56:00 PM
Aromatic Hydrocarbon (C12-C13)	11.4	0.773		mg/Kg-dry	1	9/8/2014 8:29:00 PM
Benzene	ND	0.193		mg/Kg-dry	1	9/8/2014 8:29:00 PM
Toluene	0.378	0.193		mg/Kg-dry	1	9/8/2014 8:29:00 PM
Ethylbenzene	0.547	0.193		mg/Kg-dry	1	9/8/2014 8:29:00 PM
m,p-Xylene	2.21	0.193		mg/Kg-dry	1	9/8/2014 8:29:00 PM
o-Xylene	2.81	0.193		mg/Kg-dry	1	9/8/2014 8:29:00 PM
Naphthalene	1.33	0.193		mg/Kg-dry	1	9/8/2014 8:29:00 PM
Methyl tert-butyl ether (MTBE)	ND	0.193		mg/Kg-dry	1	9/8/2014 8:29:00 PM
Surr: 1,4-Difluorobenzene	82.6	65-140		%REC	1	9/8/2014 8:29:00 PM
Surr: Bromofluorobenzene	99.2	65-140		%REC	1	9/8/2014 8:29:00 PM

Qualifiers: B Analyte detected in the associated Method Blank
E Value above quantitation range
J Analyte detected below quantitation limits
RL Reporting Limit

D Dilution was required
H Holding times for preparation or analysis exceeded
ND Not detected at the Reporting Limit
S Spike recovery outside accepted recovery limits



Analytical Report

WO#: 1409016

Date Reported: 9/10/2014

Client: Friedman & Bruya

Collection Date: 8/28/2014 10:00:00 AM

Project: 408461

Lab ID: 1409016-001

Matrix: Soil

Client Sample ID: HC-2-18

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
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Sample Moisture (Percent Moisture)

Batch ID: R16535 Analyst: TK

Percent Moisture	13.4			wt%	1	9/3/2014 12:58:00 PM
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Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
RL	Reporting Limit

D	Dilution was required
H	Holding times for preparation or analysis exceeded
ND	Not detected at the Reporting Limit
S	Spike recovery outside accepted recovery limits



Date: 9/10/2014

Work Order: 1409016
CLIENT: Friedman & Bruya
Project: 408461

QC SUMMARY REPORT

Extractable Petroleum Hydrocarbons by NWEPH

Sample ID: 1408228-001ADUP	SampType: DUP	Units: mg/Kg-dry				Prep Date: 9/5/2014			RunNo: 16684		
Client ID: BATCH	Batch ID: 8635					Analysis Date: 9/10/2014			SeqNo: 335303		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C8-C10)	43.1	4.89						40.13	7.22	30	
Aliphatic Hydrocarbon (C10-C12)	217	4.89						208.0	4.35	30	
Aliphatic Hydrocarbon (C12-C16)	585	4.89						587.8	0.537	30	
Aliphatic Hydrocarbon (C16-C21)	294	4.89						288.6	1.86	30	
Aliphatic Hydrocarbon (C21-C34)	ND	4.89						0		30	
Surr: 1-Chlorooctadecane	3.04		3.911		77.6	65	140		0		

Sample ID: LCS-8635	SampType: LCS	Units: mg/Kg				Prep Date: 9/5/2014			RunNo: 16684		
Client ID: LCSS	Batch ID: 8635	Analysis Date: 9/10/2014						SeqNo: 335306			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C8-C10)	9.24	5.00	10.00	0	92.4	70	130				
Aliphatic Hydrocarbon (C10-C12)	4.81	5.00	5.000	0	96.3	70	130				
Aliphatic Hydrocarbon (C12-C16)	3.77	5.00	5.000	0	75.4	70	130				
Aliphatic Hydrocarbon (C16-C21)	4.62	5.00	5.000	0	92.5	70	130				
Aliphatic Hydrocarbon (C21-C34)	4.37	5.00	5.000	0	87.5	70	130				
Surr: 1-Chlorooctadecane	4.19		4.000		105	65	140				

Sample ID: MB-8635	SampType: MBLK	Units: mg/Kg				Prep Date: 9/5/2014			RunNo: 16684		
Client ID: MBLKS	Batch ID: 8635	Analysis Date: 9/10/2014						SeqNo: 335307			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C8-C10)	ND	5.00									
Aliphatic Hydrocarbon (C10-C12)	ND	5.00									
Aliphatic Hydrocarbon (C12-C16)	ND	5.00									
Aliphatic Hydrocarbon (C16-C21)	ND	5.00									
Aliphatic Hydrocarbon (C21-C34)	ND	5.00									
Surr: 1-Chlorooctadecane	3.87		4.000		96.7	65	140				

Qualifiers:	B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
	R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits



Date: 9/10/2014

Work Order: 1409016
CLIENT: Friedman & Bruya
Project: 408461

QC SUMMARY REPORT
Extractable Petroleum Hydrocarbons by NWEPH

Sample ID: MB-8635	SampType: MBLK	Units: mg/Kg			Prep Date: 9/5/2014			RunNo: 16684			
Client ID: MBLKS	Batch ID: 8635				Analysis Date: 9/10/2014			SeqNo: 335307			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sample ID: 1408228-001ADUP	SampType: DUP	Units: mg/Kg-dry				Prep Date: 9/5/2014				RunNo: 16684		
Client ID: BATCH	Batch ID: 8635					Analysis Date: 9/10/2014				SeqNo: 335311		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Aromatic Hydrocarbon (C8-C10)	5.73	4.89						0	200	30	
Aromatic Hydrocarbon (C10-C12)	43.1	4.89						0	200	30	*
Aromatic Hydrocarbon (C12-C16)	262	4.89						0	200	30	
Aromatic Hydrocarbon (C16-C21)	1,440	4.89						0	200	30	
Aromatic Hydrocarbon (C21-C34)	306	4.89						0	200	30	
Surr: o-Terphenyl	3.89		3.911		99.6	65	140		0		

NOTES:

* - Flagged value is not within established control limits.

Sample ID: LCS-8635		SampType: LCS		Units: mg/Kg		Prep Date: 9/5/2014			RunNo: 16684		
Client ID: LCSS		Batch ID: 8635					Analysis Date: 9/10/2014			SeqNo: 335314	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Aromatic Hydrocarbon (C8-C10)	4.55	5.00	5.000	0	91.0	70	130				
Aromatic Hydrocarbon (C10-C12)	3.19	5.00	5.000	0	63.8	70	130				S
Aromatic Hydrocarbon (C12-C16)	4.11	5.00	5.000	0	82.2	70	130				
Aromatic Hydrocarbon (C16-C21)	4.40	5.00	5.000	0	87.9	70	130				
Aromatic Hydrocarbon (C21-C34)	4.57	5.00	5.000	0	91.4	70	130				
Surr: o-Terphenyl	3.53		4.000		88.3	65	140				

NOTES:

S - Outlying QC recoveries were associated with this sample (EPH: Aromatic Hydrocarbon (C10-C12) - low bias). Samples may be qualified with an *.

Qualifiers:	B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
	R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits



Date: 9/10/2014

Work Order: 1409016
CLIENT: Friedman & Bruya
Project: 408461

QC SUMMARY REPORT
Extractable Petroleum Hydrocarbons by NWEPH

Sample ID: MB-8635	SampType: MBLK	Units: mg/Kg			Prep Date: 9/5/2014			RunNo: 16684			
Client ID: MBLKS	Batch ID: 8635				Analysis Date: 9/10/2014			SeqNo: 335315			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aromatic Hydrocarbon (C8-C10)	ND	5.00									
Aromatic Hydrocarbon (C10-C12)	ND	5.00									
Aromatic Hydrocarbon (C12-C16)	ND	5.00									
Aromatic Hydrocarbon (C16-C21)	ND	5.00									
Aromatic Hydrocarbon (C21-C34)	ND	5.00									
Surr: o-Terphenyl	3.04		4.000		75.9	65	140				

Qualifiers:	B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
	R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits



Date: 9/10/2014

Work Order: 1409016
CLIENT: Friedman & Bruya
Project: 408461

QC SUMMARY REPORT
Volatile Petroleum Hydrocarbons by NWVPH

Sample ID: 1409016-001BDUP	SampType: DUP	Units: mg/Kg-dry				Prep Date: 9/3/2014			RunNo: 16686		
Client ID: HC-2-18	Batch ID: 8617	Analysis Date: 9/8/2014							SeqNo: 335349		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C5-C6)	ND	0.773		0	0			0		25	
Aliphatic Hydrocarbon (C6-C8)	17.5	0.773		0	0			16.38	6.39	25	E
Aliphatic Hydrocarbon (C8-C10)	52.6	0.773		0	0			53.83	2.39	25	E
Aliphatic Hydrocarbon (C10-C12)	77.1	0.773		0	0			83.21	7.68	25	E
Aromatic Hydrocarbon (C8-C10)	66.4	0.773		0	0			70.12	5.45	25	E
Aromatic Hydrocarbon (C10-C12)	182	0.773		0	0			187.2	3.01	25	E
Aromatic Hydrocarbon (C12-C13)	10.7	0.773		0	0			11.42	6.51	25	
Benzene	ND	0.193		0	0			0		25	
Toluene	0.367	0.193		0	0			0.3785	3.15	25	
Ethylbenzene	0.493	0.193		0	0			0.5468	10.3	25	
m,p-Xylene	2.17	0.193		0	0			2.214	2.23	25	
o-Xylene	2.74	0.193		0	0			2.807	2.25	25	
Naphthalene	1.25	0.193		0	0			1.330	5.91	25	
Methyl tert-butyl ether (MTBE)	ND	0.193		0	0			0		25	
Surr: 1,4-Difluorobenzene	0.818		0.9660		84.7	65	140		0		
Surr: Bromofluorobenzene	1.06		0.9660		110	65	140		0		

Sample ID: 1409016-001BMS	SampType: MS	Units: mg/Kg-dry				Prep Date: 9/3/2014			RunNo: 16686		
Client ID: HC-2-18	Batch ID: 8617	Analysis Date: 9/8/2014							SeqNo: 335350		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aliphatic Hydrocarbon (C5-C6)	12.8	0.773	11.59	0	111	70	130				
Aliphatic Hydrocarbon (C6-C8)	19.6	0.773	3.864	16.38	84.4	70	130				E
Aliphatic Hydrocarbon (C8-C10)	53.6	0.773	3.864	53.83	-6.52	70	130				SE
Aliphatic Hydrocarbon (C10-C12)	72.4	0.773	3.864	83.21	-279	70	130				SE
Aromatic Hydrocarbon (C8-C10)	77.8	0.773	15.46	70.12	49.5	70	130				SE
Aromatic Hydrocarbon (C10-C12)	177	0.773	3.864	187.2	-254	70	130				SE
Aromatic Hydrocarbon (C12-C13)	16.1	0.773	3.864	11.42	121	70	130				

Qualifiers:

B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits



Date: 9/10/2014

Work Order: 1409016
CLIENT: Friedman & Bruya
Project: 408461

QC SUMMARY REPORT
Volatile Petroleum Hydrocarbons by NWVPH

Sample ID: 1409016-001BMS	SampType: MS	Units: mg/Kg-dry				Prep Date: 9/3/2014			RunNo: 16686		
Client ID: HC-2-18	Batch ID: 8617	Analysis Date: 9/8/2014						SeqNo: 335350			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Benzene	3.58	0.193	3.864	0	92.7	70	130				
Toluene	3.73	0.193	3.864	0.3785	86.8	70	130				
Ethylbenzene	4.34	0.193	3.864	0.5468	98.3	70	130				
m,p-Xylene	7.80	0.193	7.728	2.214	72.3	70	130				
o-Xylene	5.20	0.193	3.864	2.807	61.8	70	130				S
Naphthalene	4.09	0.193	3.864	1.330	71.5	70	130				
Methyl tert-butyl ether (MTBE)	3.36	0.193	3.864	0	87.0	70	130				
Surr: 1,4-Difluorobenzene	0.939		0.9660		97.2	65	140				
Surr: Bromofluorobenzene	1.13		0.9660		117	65	140				

NOTES:

S - Outlying spike recoveries were associated with this sample. The method is in control as indicated by the LCS.

Sample ID: LCS-8617		SampType: LCS			Units: mg/Kg		Prep Date: 9/3/2014			RunNo: 16686		
Client ID: LCSS		Batch ID: 8617			Analysis Date: 9/8/2014			SeqNo: 335353				
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Aliphatic Hydrocarbon (C5-C6)	30.9	2.00	30.00	0	103	70	130				
Aliphatic Hydrocarbon (C6-C8)	11.1	2.00	10.00	0	111	70	130				
Aliphatic Hydrocarbon (C8-C10)	9.06	2.00	10.00	0	90.6	70	130				
Aliphatic Hydrocarbon (C10-C12)	7.97	2.00	10.00	0	79.7	70	130				
Aromatic Hydrocarbon (C8-C10)	38.2	2.00	40.00	0	95.6	70	130				
Aromatic Hydrocarbon (C10-C12)	8.48	2.00	10.00	0	84.8	70	130				
Aromatic Hydrocarbon (C12-C13)	9.54	2.00	10.00	0	95.4	70	130				
Benzene	9.64	0.500	10.00	0	96.4	70	130				
Toluene	9.37	0.500	10.00	0	93.7	70	130				
Ethylbenzene	9.26	0.500	10.00	0	92.6	70	130				
m,p-Xylene	18.2	0.500	20.00	0	90.8	70	130				
o-Xylene	9.23	0.500	10.00	0	92.3	70	130				
Naphthalene	7.49	0.500	10.00	0	74.9	70	130				

Qualifiers:	B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
	R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits



Date: 9/10/2014

Work Order: 1409016
CLIENT: Friedman & Bruya
Project: 408461

QC SUMMARY REPORT
Volatile Petroleum Hydrocarbons by NWVPH

Sample ID: LCS-8617		SampType: LCS		Units: mg/Kg		Prep Date: 9/3/2014			RunNo: 16686		
Client ID: LCSS		Batch ID: 8617					Analysis Date: 9/8/2014			SeqNo: 335353	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Methyl tert-butyl ether (MTBE)	9.05	0.500	10.00	0	90.5	70	130				
Surr: 1,4-Difluorobenzene	2.18		2.500		87.0	65	140				
Surr: Bromofluorobenzene	2.34		2.500		93.5	65	140				

Sample ID: MB-8617	SampType: MBLK	Units: mg/Kg			Prep Date: 9/3/2014			RunNo: 16686			
Client ID: MBLKS	Batch ID: 8617				Analysis Date: 9/8/2014			SeqNo: 335354			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Aliphatic Hydrocarbon (C5-C6)	ND	2.00		0	0						
Aliphatic Hydrocarbon (C6-C8)	ND	2.00		0	0						
Aliphatic Hydrocarbon (C8-C10)	ND	2.00		0	0						
Aliphatic Hydrocarbon (C10-C12)	ND	2.00		0	0						
Aromatic Hydrocarbon (C8-C10)	ND	2.00		0	0						
Aromatic Hydrocarbon (C10-C12)	ND	2.00		0	0						
Aromatic Hydrocarbon (C12-C13)	ND	2.00		0	0						
Benzene	ND	0.500		0	0						
Toluene	ND	0.500		0	0						
Ethylbenzene	ND	0.500		0	0						
m,p-Xylene	ND	0.500		0	0						
o-Xylene	ND	0.500		0	0						
Naphthalene	ND	0.500		0	0						
Methyl tert-butyl ether (MTBE)	ND	0.500		0	0						
Surr: 1,4-Difluorobenzene	2.13		2.500		85.1	65	140				
Surr: Bromofluorobenzene	2.25		2.500		89.9	65	140				

Qualifiers:	B	Analyte detected in the associated Method Blank	D	Dilution was required	E	Value above quantitation range
	H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	ND	Not detected at the Reporting Limit
	R	RPD outside accepted recovery limits	RL	Reporting Limit	S	Spike recovery outside accepted recovery limits

Client Name: **FB**
 Logged by: **Erica Silva**

Work Order Number: **1409016**
 Date Received: **9/2/2014 1:47:00 PM**

Chain of Custody

1. Is Chain of Custody complete? Yes ☒ No ☐ Not Present ☐
 2. How was the sample delivered? FedEx

Log In

3. Coolers are present? Yes ☐ No ☒ NA ☐
No cooler present.
 4. Shipping container/cooler in good condition? Yes ☒ No ☐
 5. Custody seals intact on shipping container/cooler? Yes ☐ No ☐ Not Required ☒
 6. Was an attempt made to cool the samples? Yes ☒ No ☐ NA ☐
 7. Were all coolers received at a temperature of >0°C to 10.0°C? Yes ☐ No ☒ NA ☐
Please refer to item information.
 8. Sample(s) in proper container(s)? Yes ☒ No ☐
 9. Sufficient sample volume for indicated test(s)? Yes ☒ No ☐
 10. Are samples properly preserved? Yes ☒ No ☐
 11. Was preservative added to bottles? Yes ☐ No ☒ NA ☐
 12. Is the headspace in the VOA vials? Yes ☐ No ☐ NA ☒
 13. Did all samples containers arrive in good condition(unbroken)? Yes ☒ No ☐
 14. Does paperwork match bottle labels? Yes ☒ No ☐
 15. Are matrices correctly identified on Chain of Custody? Yes ☒ No ☐
 16. Is it clear what analyses were requested? Yes ☒ No ☐
 17. Were all holding times able to be met? Yes ☒ No ☐

Special Handling (if applicable)

18. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☒

Person Notified:		Date:	
By Whom:		Via:	☐ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:			
Client Instructions:			

19. Additional remarks:

Sample received with ice.

Item Information

Item #	Temp °C	Condition
Sample	13.1	

1409016

Phone # (206) 285-8282 Fax # (206) 283-5044

TURNAROUND TIME

☒ Standard (2 Weeks)

☐ RUSH _____

Rush charges authorized by: _____

SAMPLE DISPOSAL

☐ Dispose after 30 days

☐ Return samples

☐ Will call with instructions

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
	Michael Erdahl	Friedman & Bryna	9/2/14	13:00
Received by: 	Sophia N. Gage	Fremont Hospital	7/2/14	1349
Relinquished by:				
Received by:				

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

408461

SAMPLE CHAIN OF CUSTODY

ME 08/28/14

US3/873

Send Report To Craig HattenCompany HugobonAddress 510 Allen St Suite BCity, State, ZIP Eden wa 98626Phone # 360-703-6074 Fax # 360-703-6086SAMPLERS (signature) [Signature]PROJECT NAME/NO. Ice 01-1691

PO#

REMARKS

Page # 1 of 3

TURNAROUND TIME
☒ Standard (2 Weeks)
☐ RUSH
 Rush charges authorized by _____

SAMPLE DISPOSAL
☐ Dispose after 30 days
☐ Return samples
☐ Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of containers	ANALYSES REQUESTED							Notes
						TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by 8260	SVOCs by 8270	HFS	EPH/UPH	
HC-1-09	01	8-28-14	0850	Soil	5	X	X						
HC-1-15	02		0855										Hold
HC-1-20	03		0905			X	X					X	
HC-2-05	04		0935									X	Hold
HC-2-10	05		0940										Hold
HC-2-15	06		0945			X	X						
HC-2-16	07		1000			X	X						
HC-3-05	08		1025										Hold
HC-3-10	09		1030										Hold
HC-3-15	10		1035			X	X						

SIGNATURE

PRINT NAME

COMPANY

DATE

TIME

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029

Ph. (206) 285-8282

Fax (206) 283-5044

FORMS/COC/COC.DOC

Relinquished by: <u>[Signature]</u>	Robert A. Hunsberger	Hugobon	8-28-14	1500
Received by: <u>[Signature]</u>	HONG NGUYEN	EBI		
Relinquished by: <u>[Signature]</u>				
Received by: <u>[Signature]</u>				

Received by:

Samples received at:

5

°C

408461

SAMPLE CHAIN OF CUSTODY

ME 08/28/14

US3/053

Send Report To

Company

Address

City, State, ZIP

Phone #

Fax #

SAMPLERS (signature)

PROJECT NAME/NO.

Loc 01-1609

PO#

REMARKS

Page # 2 of 3

TURNAROUND TIME
Standard (2 Weeks)
☐ RUSH

Rush charges authorized by

SAMPLE DISPOSAL

- ☒ Dispose after 30 days
☐ Return samples
☐ Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of containers	ANALYSES REQUESTED						Notes
						TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by 8260	SVOCs by 8270	HFS	
HC-4-05	11	8-28-14	1100	Soil	5							Field
HC-4-10	12		1105			X	X					
HC-4-15	13		1115			X	X					
HC-4-20	14		1135			X	X					
HC-5-05	15		1155									Field
HC-5-10	16		1200			X	X					
HC-5-15	17		1205			X	X					
HC-5-20	18		1210			X	X					
HC-6-05	19		1255									Field
HC-6-10	20		1300									Field

SIGNATURE

PRINT NAME

COMPANY

DATE TIME

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029

Ph. (206) 285-8282

Fax (206) 283-5044

FORMS\COCCOC.DOC

Relinquished by:

Received by:

Relinquished by:

Received by:

Robert A. Hunsberger

Hydrosun

8-28-14

1510

HONG NGUYEN

FBI

✓

✓

Samples received at

5

°C

APPENDIX E

MTCA METHOD B CALCULATIONS

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

1. Enter Site Information

Date: 10/17/14

Site Name: TOC-01-169

Sample Name: HC-2-18

2. Enter Soil Concentration Measured

Chemical of Concern or Equivalent Carbon Group	Measured Soil Conc dry basis	Composition Ratio
	mg/kg	%
<u>Petroleum EC Fraction</u>		
AL_EC >5-6	0	0.00%
AL_EC >6-8	16.4	1.37%
AL_EC >8-10	45.8	3.82%
AL_EC >10-12	83.3	6.94%
AL_EC >12-16	0	0.00%
AL_EC >16-21	0	0.00%
AL_EC >21-34	0	0.00%
AR_EC >8-10	73.3	6.11%
AR_EC >10-12	190	15.84%
AR_EC >12-16	11.4	0.95%
AR_EC >16-21	8.68	0.72%
AR_EC >21-34	763	63.61%
Benzene	0.27	0.02%
Toluene	0.378	0.03%
Ethylbenzene	0.547	0.05%
Total Xylenes	5.02	0.42%
Naphthalene	1.33	0.11%
1-Methyl Naphthalene		0.00%
2-Methyl Naphthalene		0.00%
n-Hexane		0.00%
MTBE	0	0.00%
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	1199.425	100.00%

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 Concentration (if adjusted)

If you adjusted the target TPH ground water

concentration, enter adjusted value here: 500 ug/L

Notes for Data Entry

Set Default Hydrogeology

Clear All Soil Concentration Data Entry Cells

Restore All Soil Concentration Data cleared previously

REMARK:

The fractionation results for sample TOC-01-169 were adjusted by replacing the nondetected result for benzene with the maximum concentration of benzene detected on site (0.27 mg/kg in B37-40).

Interpretation of fractionation results:

- If a fraction or component was not detected, it was assigned a concentration of zero.
- If a fraction was reported by both the VPH and EPH methods, the maximum result was used.

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

Site Information

Date:	10/17/2014
Site Name:	TOC-01-169
Sample Name:	HC-2-18
Measured Soil TPH Concentration, mg/kg:	1,199.425

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	2,173	1.49E-08	5.52E-01	Pass
	Method C	30,363	1.99E-09	3.95E-02	Pass
Protection of Method B Ground Water Quality (Leaching)	Potable GW: Human Health Protection	62	3.03E-05	2.87E+00	Fail
	Target TPH GW Conc. @ 500 ug/L	258	NA	NA	Fail

Warning! Check to determine if a simplified or site-specific Terrestrial Ecological Evaluation may be required (Refer to WAC 173-340-7490 through ~7494).

Warning! Check Residual Saturation (WAC340-747(10)).

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	2,173.25	30,362.88
Most Stringent Criterion	HI =1	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	YES	2.17E+03	2.69E-08	1.00E+00	YES	3.04E+04	5.04E-08	1.00E+00
Total Risk=1E-5	NO	8.07E+05	1.00E-05	3.71E+02	NO	6.03E+06	1.00E-05	1.99E+02
Risk of Benzene= 1E-6	NO	8.07E+04	1.00E-06	3.71E+01	NA			
Risk of cPAHs mixture= 1E-6	NA	NA	NA	NA				
EDB	NA	NA	NA	NA				
EDC	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	HI=1
Protective Ground Water Concentration, ug/L	247.17
Protective Soil Concentration, mg/kg	62.12

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	YES	2.47E+02	3.01E-06	1.00E+00	6.21E+01
Total Risk = 1E-5	NO	4.84E+02	1.00E-05	1.94E+00	2.33E+02
Total Risk = 1E-6	YES	1.00E+02	1.00E-06	4.10E-01	2.01E+01
Risk of cPAHs mixture= 1E-5	NA	NA	NA	NA	NA
Benzene MCL = 5 ug/L	NO	3.91E+02	6.29E-06	1.56E+00	1.37E+02
MTBE = 20 ug/L	NA	NA	NA	NA	NA

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 @	
Target TPH GW Conc = 500 ug/L	5.00E+02	1.09E-05	2.00E+00	2.58E+02