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November 16, 2018

Adam Harris
Washington State Department of Ecology
Southwest Regional Office Toxics Cleanup Program
PO Box 47775
Olympia, Washington 98504-7775

SUBJECT **Remedial Investigation Report**
Fife RV Center
3410 Pacific Highway East
Fife, Washington 98424

VCP Coordinator,

At the request of Chris LaVerdiere, Aerotech Environmental Consulting, Inc. ("Aerotech") has prepared the enclosed *Remedial Investigation* which summarizes environmental investigation activities to date. As described in the enclosed report, Aerotech plans to use this report to facilitate access with adjacent parcels and requests an opinion from the Washington State Department of Ecology regarding the investigations completed to characterize the historical release according to the substantive requirements of the MTCA.

Aerotech and Mr. Chris LaVerdiere, appreciate your assistance in the matter. Please do not hesitate to contact me or Nick Gerkin at 206-257-4211 with any questions regarding the Site.

Sincerely,

Justin Foslien
Licensed Geologist WA #2504
Email: justin@dirtydirt.us

ENCLOSURE
Aerotech 's *Remedial Investigation*, dated November 9, 2018

REMEDIAL INVESTIGATION

Performed at:
Fife RV Center
3410 Pacific Highway East
Fife, Washington 98424

AEROTECH
Environmental Consulting Inc.

November 9, 2018

Anchorage Seattle Portland

Cost-effective environmental solutions
for the western United States and Alaska

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REMEDIAL INVESTIGATION

Performed at:
Fife RV Center
3410 Pacific Highway East
Fife, Washington 98424

November 9, 2018

Performed by:

AEROTECH Environmental Consulting Inc.
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Seattle, Washington 98168
Fax (206) 402-3872
(866) 800-4030
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Remedial Investigation Report

Report Version: Revision 1

Site Name:	Fife RV Center
Site Address:	3410 Pacific Highway East Fife, Washington 98404
Alternate Location Info:	Pierce County, Washington Parcel Number: 0320111067

Ecology Facility Site ID No.:	7907
Cleanup Site No.:	13173
Voluntary Cleanup Program Project No.:	SW1565

Prepared By:
Justin Foslien
Aerotech Environmental Technology Inc.
13925 Interurban Ave South Suite 210
Seattle, Washington 98168

Prepared For:
Chris LaVerdiere
3410 Pacific Highway East
Fife, Washington 98404

Signature:

Date: 11/16/18

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ACRONYMS AND ABBREVIATIONS

AMSL	Above Mean Sea Level
Aerotech	Aerotech Environmental Consulting, Inc
AESI	Associated Earth Sciences, Inc
BTEX	Benzene, Toluene, Ethylbenzene and Xylenes
bgs	below ground surface
cPAHs	Carcinogenic Polycyclic Aromatic Hydrocarbons
COC	Contaminant/Chemical of Concern
CSCSL	Confirmed and Suspected Contaminated Sites List
CSID	Cleanup Site Identification number
CSM	Conceptual Site Model
CUL	Clean-up Levels
DOT	Department of Transportation
Ecology	Washington State Department of Ecology
FSID	Facility Site Identification Number
HVOCs	Halogenated Volatile Organic Compounds
Langseth	Langseth Environmental Services, Inc
MTCA	Model Toxics Control Act
PID	Photoionization Detector
PCBs	Polychlorinated Biphenyls
PVC	Polyvinyl Chloride
RI	Remedial Investigation
TEE	Terrestrial Ecological Evaluation
TPH	Total Petroleum Hydrocarbon
TPHg	Total Petroleum Hydrocarbon – Gasoline Range
TPHd	Total Petroleum Hydrocarbon – Diesel Range
TPHo	Total Petroleum Hydrocarbon – Heavy Oil Range
UST	Underground Storage Tank
VCP	Voluntary Cleanup Program
WAC	Washington State Administrative Code

EXECUTIVE SUMMARY

The subject Property consists of one irregularly-shaped 3.76-acre Parcel of commercial land located on the south side of Pacific Highway East in Fife, Washington. One approximately 10,763 square foot, 2-story structure, occupied by *Fife RV Center,* is situated near the southeastern corner of the Property. Asphalt parking areas surround the structure on all sides and are utilized to display RVs. A 0.77-acre gravel parking lot utilized to store RVs, and the subject of this investigation, is situated on the west side of the Property.

Adjoining to the south is a drainage ditch that appear to discharge to the east, followed by Interstate 5. The neighboring Parcel to the east includes approximately 5.24 acres, currently leased by the Fife RV Center for use as additional storage. The Puyallup River approaches the Site within 3,000 feet to the southwest, and the Blair Waterway and Commencement Bay are located over 4,000 feet to the north.

Formerly included within the same Parcel, and now adjoining to the north, is a Tahoma Express Gas Station and a Jack in the Box restaurant followed by Pacific Highway East and an *Econolodge.* The Tahoma Express Gas Station was listed on Ecology's Site Cleanup List as Site No. 5015. Petroleum hydrocarbons were documented at the Tahoma site prior to remediation, at concentrations above the State Cleanup Levels in soil and groundwater. Ecology issued a No Further Action determination for that site in 1993.

From the mid 1960's to the late l980's a *Gasamet Gasoline Station* occupied the western portion of the western gravel paved lot on the Subject Property and the southern portion of the Jack in the Box Property. Fuel dispenser islands were located south and east of the eastern terminus of the current restaurant drive-thru, with Underground Storage Tank Basins situated both to the east and west, and a building farther south. A triangular-shaped wooded water retention area (Bio-Swale) is located at the west side of the Site. In 2014, *Associated Earth Sciences,* Inc. conducted a *Supplemental Phase II Environmental Site Assessment* at the subject Property. Petroleum hydrocarbons were detected at concentrations above the Model Toxic Control Act ("MTCA") Method A Clean-up Levels (CULs) in soil and groundwater samples in the vicinity of the former *Gasamet* pump islands and UST Basins. Based on these results, Mr. Chris LaVerdiere, requested *Langseth Environmental* ("Langseth") *and Aerotech Environmental Consulting, Inc.* ("Aerotech") initiate site remedial excavation and environmental consulting services to address petroleum impacted soils.

In 2014, *Associated Earth Sciences,* Inc. conducted a *Supplemental Phase II Environmental Site Assessment* at the subject Property. Petroleum hydrocarbons were detected at concentrations above the MTCA Method A CULs in soil and groundwater samples in the vicinity of the former *Gasamet* pump islands and UST Basins. Based on these results, Mr. Chris LaVerdiere, requested *Langseth Environmental* ("Langseth") *and Aerotech Environmental Consulting, Inc.* ("Aerotech") initiate site remedial excavation and environmental consulting services to address petroleum impacted soils.

1,685.24 tons of petroleum impacted soil were removed in late 2016. The first six groundwater monitoring wells were installed immediately thereafter, followed by monitoring wells (MW7, MW8, and MW9) in July of 2017.

Soil and Groundwater:

Analytical data collected during the July 2018 site assessment indicate that groundwater and soil contain concentrations above MTCA Method A CULs exist along the northern Fife RV Center property shared with Jack in the Box. Soil borings B6-B9 advanced along the fenced property line indicated the extent of soil and groundwater impacted by petroleum related hydrocarbons extends into the Jack in the Box parcel immediately to the north.

A soil sample collected from soil boring B3 at the southwestern property boundary also contained concentrations of TPHg and benzene above MTCA Method A CULs. Groundwater samples collected from monitoring well MW12 have also contained concentrations of benzene above MTCA Method A CULs. Additional investigation in necessary to define the Site toward the WSDOT right of way associated with the Interstate 5 Off-Ramp.

1. INTRODUCTION

The purpose of this Remedial Investigation ("RI") is to characterize the nature and extent of contamination at the Site. Aerotech Environmental Technology, Inc ("Aerotech") was retained by Mr. Chris LaVerdiere of Fife RV Center to summarize the work completed at the Site and obtain an opinion from the VCP regarding the substantive requirements of the MTCA.

Under MTCA, 173-340-200 Washington Administrative Code ("WAC") the Site is defined by the nature and extent of contamination associated with one or more releases of hazardous substances prior to any cleanup of the contamination. Aerotech has completed several investigations to define the Site based on previous release of petroleum hydrocarbons; however, the data indicates petroleum related compounds exist beyond the parcel boundaries. Furthermore, it appears more than one source may be contributing to the existing plume with soil and groundwater from an adjacent property parcel, as historically the parcel was subdivided from a larger parcel when the release occurred. It is Aerotech's intent to utilize the information summarized in this report to facilitate access on adjacent properties to ultimately define the nature and extent of the Site.

1.1. GENERAL SITE INFORMATION

Site Name:	Fife RV Center
Site Address:	3410 Pacific Highway East Fife, Washington 98424
Facility Site Identification number (FSID):	35644949
Cleanup Site Identification number (CSID):	8853
Voluntary Cleanup Program (VCP):	SW1565
Project Consultant:	Aerotech Environmental Consulting, Inc.
Project Consultant Contact Information:	Nick Gerkin 13925 Interurban Avenue South, Suite No. 210 Seattle, Washington 98168 (206) 482-2287 nick@dirtydirt.us
Property Owner:	Chris LaVerdiere 3410 Pacific Highway East Fife, Washington 98424 (253) 284-6608 chrisl@fifervcenter.com

1.2. SITE LOCATION/DEFINITION

The subject Property (3410 Pacific Highway East; Parcel # 0320111067) is comprised of one irregularly-shaped 3.76-acre Parcel, located on the south side of Pacific Highway East in Fife, Washington (Figures 1 & 2). One building, occupied by Fife RV Center, is situated on the southeastern comer of the Property. It is an approximately 10,763 square foot, 2-story structure with the main entrance to the north. An approximately 1,000 square foot, one-story structure is situated northeast of the main building along the eastern property boundary. Asphalt parking areas surround the structure on

all sides and are utilized for the storage and showing of the RV inventory. On the west side of the parcel lies an approximately 0.77-acre vacant gravel parking lot, used to store recreational vehicle ("RV") inventory.

The Property is situated between Blair Waterway (leading to Commencement Bay), which is approximately 4,000 feet to the north and the Puyallup River, which is located 3,000 feet to the southwest and flows to the northwest into Commencement Bay.

The MTCA site (Site) is defined by the extent of release to soil as petroleum related hydrocarbons associated with the former *Gasamet Gasoline Station* previously located on the *Fife RV Center* and *Jack in the Box* parcels. The entire extent of the MTCA Site Boundary is unknown currently. The boundary at least extends to the parcel boundary on the west along the I-5 off ramp and to the north, where based on existing soil data extends north into the parcel currently occupied by *Jack in the Box*.

1.2.1. SURROUNDING AREA DESCRIPTION:

Surrounding areas include a drainage area to the south with Interstate 5 adjoining beyond (Figure 3). The neighboring Parcel to the east (3520 Pacific Highway East; Parcel # 0320111049) includes approximately 5.24 acres which is leased by *Fife RV Center* for use as additional storage. Formerly included with this Parcel before being subdivided in 2004, situated along Pacific Highway East to the north, is a Travelodge (3518 Pacific Highway East; Parcel # 0320024106). This Parcel is listed on Washington State Department of Ecology ("Ecology") Voluntary Cleanup Program List as Site No. SW0601 and is known as *Homotel*. It has been confirmed to contain petroleum products and metals at concentrations above the State Cleanup Levels in soil and in groundwater.

Pacific Highway East, followed by an *Econolodge*, are adjoining the subject Property to the north (Figure 3). Formerly included within the same Parcel as the subject Property is a *Tahoma Express Gas Station* (3408 Pacific Highway East; Parcel # 0320024105) and a *Jack in the Box* (3402 Pacific Highway East; Parcel # 0320024104) adjoin to the west (north of excavation area) followed by the Port of Tacoma Road. The *Tahoma Express Gas Station* was listed on Ecology's Site Cleanup List as Site No. 5015. The Ecology Database lists the site as formerly having petroleum hydrocarbons at concentrations above the State Cleanup Levels in soil and groundwater. The site received a No Further Action determination from Ecology in 1993. A drainage area is located off-Property to the southwest with Interstate 5 beyond.

1.2.2. PHYSIOGRAPHIC SETTING/TOPOGRAPHY

The precise Property location is N 47° 14' 34.44" / W 122° 22' 58.80" as determined by Delorme mapping data. The Site elevation is approximately 9 to 12 feet above mean sea level ("AMSL"). As observed during Site visits and confirmed on the USGS topographic map, the subject Property is relatively flat (Figure 4). As is commonly the case in low-lying areas near sea level, many roads and properties appear to be elevated several feet above the original grade. Evidence of the original grade may be seen in the decrease in elevation evident north of Pacific Highway East, north of the subject Property. A ditch is located a few tens of feet south of the Property adjoining to the south. A second ditch is located east of the property adjoining to the east. The field west of the subject Property slopes markedly to the level of the ditch to the south. Pacific Avenue East is elevated approximately two feet above the Site.

Slopes in the vicinity of the Site descend to the southwest towards the Puyallup River. The elevation of the parcel north of Pacific Highway East (*Econolodge*) is approximately that of the subject Parcel, 11 feet above mean sea level ("MSL"), however, Pacific Highway East itself is approximately 4 feet above that. The topography slopes steadily in a southerly direction from Pacific highway East towards the subject Parcel until the local topographic low, 4 feet above MSL at the drainage area southwest of the Site.

The regional topography within the Commencement Bay tidal flats is that of the nearly planar surface generated by the placement of artificial fill material in the later decades of the nineteenth century and the early years of the twentieth century. Elevations on ridges over one mile to the south increase to more than 200 feet AMSL, at the northernmost margins of the south Tacoma upland area.

1.3. SITE HISTORY

The subject Property was originally developed prior to 1940 for agricultural use on deltaic and alluvial plains near the margins of the Commencement Bay. A private residence and a barn or garage structure were present on the property to the south, property once a part of a larger parcel of land including the Site. A *Gasamet Gasoline Station* and store were constructed in 1964 and appear to have been located on both the current *Fife RV Center* and *Jack in the Box* properties. The gasoline station operated until 1987 and then was demolished and replaced in 1987 and 1988 by the existing structures, leased by Unocal and Sac's Deli, then Shell, Chevron and now the *Tahoma Express Gas Station*.

Four 8,000-gallon underground fuel storage tanks were reportedly removed from the former *Gasamet Gasoline Station* property to the south, and two 12,000-gallon underground fuel storage tanks were installed beneath a concrete pad west of the new fuel pump islands on the *Tahoma Express Gas Station*. Petroleum impacted soil was discovered in 1990, after which the service station was closed for two years while Unocal performed investigations and remediation of both soil and groundwater. Two existing tanks were removed, clean soil closure samples were collected, and two double walled steel-clad fiberglass replacement tanks were installed. In a letter issued by the State of Washington Department of Ecology, dated August 16, 1993, cleanup was characterized as complete; the letter states that no further action is required with regard to Unocal's participation in the state Independent Remedial Action Program, and that this opinion applied solely to the documented release associated with the tank system operated by Unocal between 1987 and 1990. The service station was reopened as a Shell branded gasoline retail facility in 1994, and Chevron in 1996.

The historical petroleum hydrocarbon release of focus in this RI, is associated with a Gasamet gasoline station occupied the western portion of the western gravel paved lot from the mid 1960's to the late 1980's on the *Fife RV Center* and *Jack in the Box* properties. Fuel dispenser islands were located south and southeast of the eastern terminus of the current restaurant drive-thru, with Underground Storage Tank Basins situated both to the east and west, and a building farther south. A triangular-shaped wooded water retention area (“Bio-Swale”) is located to the west. Test pit exploration conducted in 2000 indicated strong petroleum odor in soil both south and southeast of the current *Jack in the Box* restaurant location, the bio-swale area, and the adjoining gravel lot.

1.4. PREVIOUS SITE ASSESSMENT

In October 2013, Associated Earth Sciences, Inc. (“AESI”) conducted a Phase I Environmental Site Assessment at the subject Property, now called Fife RV Center, located at 3410 Pacific Highway East in Fife, Washington. Within the Phase I, they state that a *Gasamet Gasoline Station* operated at the northwest corner of the Property from the 1960s through the 1980s, and that the Property was listed on the Washington State Department of Ecology (“Ecology”) CSCSL list for a petroleum release and arsenic release in the groundwater. Arsenic was determined not to be a contaminant of concern. A separate, remediated release was discovered at the northeast adjoining Chevron fueling station (which received a No Further Action designation from Ecology in 1993) (AESI, 2014).

In December 2013, AESI observed a geophysical survey consisting of electromagnetism and ground-penetrating radar. No abandoned underground storage tanks (“USTs”) or former UST basins were discovered from the survey.

The following day, AESI observed the advancement of ten direct push borings: nine to a depth of 10 feet bgs, with EB6 to 15 feet bgs. Soil samples were collected at every borehole, and analyzed for TPHg, TPHd, TPHo, and BTEX. The samples were passed through a silica-gel column prior to analyses of TPHd and TPHo. Select samples from EB4 through EB6 (near the former pump islands) were additionally analyzed for total lead. Concentrations of TPHg and BTEX were detected above MTCA Method A screening levels in EB4 at 5 feet bgs. Concentrations of TPHg, benzene, ethylbenzene, and total xylenes were detected above screening levels in EB5. Concentrations of benzene, toluene, and ethylbenzene were detected above screening levels in EB6. No other analytes were detected above the MTCA Method A screening levels (AESI, 2014).

One groundwater grab sample was collected from the screened interval at the base of each of the ten

temporary borings: nine at a depth of 10 feet bgs, while EB6 was at a depth of 15 feet bgs. All samples were analyzed for TPHg and BTEX. EB3W through EB7W, as well as EB10W, were additionally analyzed for TPHd and TPHo after passing through a silica-gel column prior to analyses. EB5W through EB7W were also analyzed volatile organic compounds by EPA Method 8260C. Concentrations of TPHg and benzene were detected above screening levels in EB4W though EB7W (i.e. within and immediately southeast of the fueling area.) Concentrations of TPHd were detected above screening levels in EB4W and EB6W, for which AESI states, "The sample chromatographic pattern does not resemble the fuel standard used for quantitation." Concentrations of ethylbenzene was detected above Cleanup Levels in EB4W and EB6W, while total xylenes were detected above Cleanup Levels in EB4W and EB5W. Naphthalene was detected above Cleanup Levels in EB6W. Methylene chloride was detected above screening level in EB5W, however AESI attributed this to laboratory contamination. Aerotech can confirm that the lab results from Friedman & Bruya, Inc. provided within the report, indicate a separate analysis of EPA Method 8260C for this sample does not detect methylene chloride above detection limits. Concentrations of 1,3,5-trimethylbenzene were detected above MTCA Method B Non-carcinogen Standard Values in EB5W. No Method A or Method B Carcinogen values are set for this compound. No other analytes were detected above the MTCA Method A screening levels. Further information may be found in AESI's *Supplemental Phase II Environmental Assessment*, *Freddie's Casino* dated January 24, 2014.

After the interim excavation activity where 1685.24 tons of impacted soil were removed, Aerotech installed six 2-inch PVC Groundwater Monitoring Wells, north, west and southwest of the former Gasamet pump island and UST areas. Two wells, MW-1 and MW-2, were installed to the north of the excavated area, and three wells, MW-4, MW-5, and MW-6, were installed south and west of the excavated area. Well screens were placed between 4 and 15 feet bgs, in order to accommodate potential water level fluctuations related to daily tides and Puyallup River water level variations, as well as local recharge. One well, MW-3, was installed at a "hot spot" near the center of the excavated area (Aerotech, 2016b).

Total Petroleum Hydrocarbons - Gasoline were detected above MTCA Method A screening levels for soil at MW-2, MW-4, and MW-5, at concentrations between 34 and 250 mg/kg (benzene at 0.061 to 0.530 mg/kg), and at MW-3 at 13,000 mg/kg (benzene at 9.3 mg/kg) Further information may be found in Aerotech's *Groundwater Monitoring Well Installation Report*, *Fife RV Center* dated November 17, 2016.

On July 14, 2017, Aerotech installed three 1-inch PVC Groundwater Monitoring Wells south and east of the former Gasamet Pump island and UST areas. Two wells, MW-7 and MW-8, were installed in the cross-gradient groundwater flow direction to the south, and one well, MW9, was installed in the upgradient groundwater flow direction to the east. Screens were placed from 4 to 14 feet bgs (Aerotech, 2017d).

Four soil samples collected during well installation operations were analyzed. Lead, gasoline, diesel, and oil constituents were not detected. One additional borehole (B-1) was advanced in the unexcavated water main hot zone northwest of MW-3 in order to document additional MCTA Table 830-1 parameters; PCBs, cPAHs, and fuel additives were not detected or were below screening levels, while methylene chloride and trichloroethylene (TCE) exceedances were documented in soil at B-1. Further information may be found in Aerotech's *Groundwater Monitoring Well Installation Report*, *Fife RV Center* dated August 17, 2017.

On February 23, 2018, BoreTec Drilling, Inc., along with Aerotech Environmental Consulting, Inc. installed three 2-inch diameter PVC Groundwater Monitoring Wells west and southwest of the former Gasamet-related station features. Two wells, MW11 and MW12, were installed on the southside of the Bio-Swale pond, downgradient groundwater flow direction to the west and southwest. The other well, MW10, was installed downgradient groundwater flow direction from groundwater monitoring well MW2. Groundwater Monitoring Wells MW10 and MW12 were screened from 4 to 14 feet bgs. MW11 was screened from 2 to 9 feet bgs. Wells were developed by surge block and pump method on February 28, 2018 (Aerotech, 2018).

Nine soil samples collected during well installation operations were analyzed. petroleum constituents,

lead, PCBs and VOCs were not detected above the MTCA Method A screening levels except for MW12(7), which contained gasoline concentrations above. Further information may be found in Aerotech's *Downgradient Groundwater Monitoring Well Installation Report, Fife RV Center* dated April 27, 2018.

1.5. SITE USE

1.5.1. CURRENT PROPERTY USES AND FACILITIES

The Property consists of a RV Storage lot which is unpaved with compacted gravel and (Figure 3). The western portions of the Parcel are paved with asphalt and include the Fife RV Center office building.

1.5.2. PROPOSED OR POTENTIAL FUTURE SITE USES

Planned use for the Property is to continue as parking and storage for Fife RV Center. There are no Plans for redevelopment currently. The parcel is zoned as regional commercial use (Figure 5).

1.5.3. REGULATORY STATUS

Aerotech entered the Site as "Fife RV Center" into the VCP under Ecology in January 2017. Adam Harris of the Southwest Regional Office Toxics Cleanup Program has been assigned as the Ecology Project Manager.

The latest opinion letter dated May 31, 2017 issued from Ecology determined additional remedial actions are necessary to clean up contamination at the Site.

1.5.4. TRANSPORTATION/ROADS

The Property is located south of the Pacific Highway East and north of Interstate 5. Access is obtained through an easement between Jack In The Box and Tahoma Express Gas Station as well as the entrance to Fife RV Center at 3410 Pacific Highway East. Port of Tacoma Road is the north south arterial and interchanges with Interstate 5. Interstate 5 that connects Canada to Mexico lies immediately to the south (Figure 3).

1.5.5. UTILITIES AND WATER SUPPLY

During the interim excavation activity, the layout of the subsurface utilities were identified and mapped (Figure 6). A storm sewer is located on the south-central portion of the Property and trends east west draining toward the west and the Bio-Swale Pond. A buried electric line crosses the parcel forming a polygon surrounding the former *Gasamet Gasoline Station* features. A main utility corridor with gas, electrical and storm sewer lines trends southeast to northwest along the northeast section of the parcel. A fire hydrant is connected to a northwest-southeast rending water line that bisects the middle of the parcel.

The City of Tacoma supplies potable water within the city limits. The City of Tacoma reports its water source as the upper eastern sections of the Green River watershed along the western flanks of the Cascade Mountains; the city also maintains groundwater production wells within the same area, in the vicinity of the Eagle Gorge Reservoir and the Howard Hanson Dam, some twenty miles east of the subject Property. A municipal well field, utilized during high demand periods, is located near Interstate 5 in south Tacoma, over three miles west of the subject Property.

1.6. POTENTIAL SOURCES OF HYDROCARBONS

The potential sources of hydrocarbons include the former USTs located in the center of the Property and the former fuel conveyance system including the fuel dispensers (Figure 6)

Facilities associated with the *Gasamet Gasoline Station* that operated from until 1964-1987 included at least three pump islands and four 8,000-gallon USTs. All former UST contents remain unknown.

Tank Type & Volume	Content	Date Installed	Date Decommissioned
8,000-gallon UST	Unknown	1964	1987
8,000-gallon UST	Unknown	1964	1987
8,000-gallon UST	Unknown	1964	1987
8,000-gallon UST	Unknown	1964	1987

2. FIELD INVESTIGATIONS

2.1. PREVIOUS ENVIRONMENTAL INVESTIGATIONS

A total of 12 groundwater monitoring wells have been completed on-Property to date. Monitoring of the groundwater wells has occurred quarterly since 2016 (Aerotech 2016c; 2017a; 2017b; 2017c; 2017e; 2017f; 2017g).

A total of 5 investigations have been completed at the Fife RV Center Property are summarized in the following reports:

- Associated Earth Sciences. August 16, 2014. *Supplemental Phase II Site Assessment,*
- Aerotech. November 1, 2016. *Site Remedial Excavation Report.*
- Aerotech. November 17, 2016. *Groundwater Monitoring Well Installation Report.*
- Aerotech. August 16, 2017. *Groundwater Monitoring Well Installation Report.*
- Aerotech. April 27, 2018. *Downgradient Well Installation Report.*

A chronological summary of work completed at Fife RV Center during the investigations listed above can be found in Appendix B. These data include investigations completed on the Fife RV Parcel only. A summary of historical soil analytical data and historical groundwater analytical data can be found in Tables 1 and 2, respectively. All historical boring logs are included in Appendix C. Boring logs for work completed in Aerotech's July 2018 site assessment are included in Appendix D. Laboratory analytical reports for soil and groundwater samples collected during the July 2018 site assessment are included in Appendix E. All currently existing wells and soil boring locations are shown on Figure 7. Other pertinent investigations completed in the immediate vicinity of the Fife RV Center property are also summarized in Appendix B and differentiated by parcel. All activities completed by Aerotech were in accordance with Aerotech Field Protocols (Appendix F) and selected photos from the investigation may be found in Appendix G.

2.2. ENVIRONMENTAL INVESTIGTION SUMMARY

A total 31 soil borings have been advanced at the Site (MW-1 through MW12). The soil analytical results can be found in Table 1 and Figure 7. Surface water analytical results are summarized in Table 2, groundwater analytical results and grab groundwater results are summarized in Tables 3 and 4 respectively.

2.2.1. CONSTITUENTS OF POTENTIAL CONCERN

Constituents of potential concern ("COPCs") based on current and past uses of the Property include the compounds listed in WAC Chapter 173-340-900 Table 830-1 Required Testing for Petroleum Releases. The following table lists COPCs for the Site:

Potential Source	COPCs
Former Gasoline Service Station Tanks and Fuel Conveyance System	• TPHg • TPHd • TPHo • BTEX • HVOCs • PAHs • PCBs • Total Lead

Based on the laboratory analytical results from environmental activities conducted at the Site, concentrations of TPHg and BTEX have been detected above MTCA Method A screening levels in

groundwater and soil samples.

2.2.2. SOIL

Locations of soil samples are depicted on Figure 7. Soil samples have been analyzed for TPHg, TPHd, TPHo BTEX, HVOCs, PCBs and lead. Laboratory analytical results indicated TPHg and BTEX above the MTCA Method A screening levels. The depths of the soil samples range from 2.5 to 14.5 feet bgs. A summary of laboratory analytical results, sample depth, and sample date for each soil sample submitted for analysis is presented in Table 1.

2.2.3. SURFACE WATER

Two samples of surface water were collected on February 26, 2018 from the Bio-Swale utilizing a teflon bailer (Table 2). One was collected from the northeast corner of the Bio Swale, down the bank from MW10 (POND-NE) and the other at the outfall exit from the pond (POND-EXIT; Figure 8). Each sample was analyzed for TPHg and BTEX, POND-NE contained concentrations of TPHg at 140 ug/L and the POND-EXIT was below all laboratory detection limits.

2.2.4. GROUNDWATER

Twelve groundwater monitoring wells (MW1 through MW12; Figure 8) have been installed at the Site since 2016.

Aerotech installed six 2-inch PVC groundwater monitoring wells, north, west and southwest of the former *Gasamet* pump island and UST areas. Two wells, MW-1 and MW-2, were installed to the north of the excavation, and three wells, MW-4, MW-5, and MW-6, were installed south and west of the interim excavation. One well, MW-3, was installed at a "hot spot" near the center of the excavated area.

On July 14, 2017, Aerotech installed three 1-inch PVC groundwater monitoring wells south and east of the former *Gasamet* pump island and UST areas. Two wells, MW-7 and MW-8, were installed in the cross-gradient groundwater flow direction to the south, and one well, MW9, was installed in the upgradient groundwater flow direction to the east.

Groundwater monitoring wells MW10-MW12 were installed in February 2018 to define extent of impacted groundwater in the west and southwest directions.

A summary of laboratory analytical results, and sample date for each groundwater sample submitted for analysis is presented in Tables 3 and 4.

2.2.5. SEDIMENT

Sediment has not been evaluated on the Property.

2.2.6. AIR/SOIL VAPOR

Air/Soil vapor concentrations have not been evaluated on the Property.

2.2.7. NATURAL RESOURCES/WILDLIFE

A Terrestrial Ecological Evaluation ("TEE") form has been completed as part of the previously submitted VCP Application.

2.2.8. CULTURAL HISTORY/ARCHEOLOGY

No information or reports of historical investigations have indicated a need for additional research of Property history or archaeology.

2.2.9. INTERIM ACTIONS

Aerotech, along with Langseth Environmental Services Inc. ("Langseth"), performed a Remedial Excavation in two phases during the month of October 2016. Analytical results from the Supplemental

Phase II Environmental Site Assessment were used to guide the initial stages of the excavation. Analytical results from samples collected during the Site Remedial Excavation and during Test Pit activities were used to determine the final extents. Major subsurface utilities were identified at several locations on the Property and limited the removal of soil containing petroleum hydrocarbons at concentration above the MTCA Method A screening levels at these locations. TPHg, Benzene, Toluene, Ethylbenzene, and Xylenes remain Constituents of Concern at the Site. Chlorinated Volatile Organic Compounds, TPHd, and TPHo not detected above laboratory Minimum Reporting Limits. Lead was detected, but at concentrations well below the MTCA Method A screening level for soil. A saturated, wooded. Bio-Swale is located on-Property to the Northwest of the Site Remedial Excavation and limited soil removal in that direction. Southwest of the Property, the topography slopes downward into a water retaining drainage area, which also limited soil removal. Former fueling station conveyance system remnants along with 1,685.24 tons of potentially contaminated soil to the LRI Landfill located at 30919 Meridian Street East, Graham, Washington. A total of 84 soil samples were collected from the sidewalls and bottom of the excavation in the vicinity of the former fuel pump and former UST basin. Groundwater was encountered on Site at levels ranging from 3 to 10 feet bgs (Aerotech, 2016a). Figure 7 illustrates the sample locations and extent of excavation completed during this action.

2.3. SITE CHARACTERIZATION - JULY 2018

Aerotech completed Soil Borings B2–B9 to determine the current soil and groundwater conditions along the Fife RV Center property boundary north and southwest of the former *Gasamet Gasoline Station* (Figures 7 & 8).

2.3.1. NOTIFICATIONS – "PUBLIC UTILITIES"

A public utility locate notification was performed prior to the start of work. Aerotech performed the "public" utilities notification on June 26, 2018 and was issued Ticket Number 18273696 by the Utilities Underground Location Center.

According to the Utilities Underground Location Center the utilities necessary for notification included:

District	Company	Marking	Customer Service	Repair
CC7711	COMCAST CABLE	(800)762-0592	(800)266-2278	(855)537-6296
ELCLT01	ZAYO FNA INTEGRA TELECOM	(888)267-1063	(443)403-2023	(888)267-1063
FIFE01	CITY OF FIFE	(253)922-9315	(253)922-9315	(253)922-9315
MCCHRD01	MC CHORD PIPELINE COMPANY	(253)383-1651	(253)383-1651	(253)383-1651
MTRMED01	ZAYO FNA ABOVENET	(888)267-1063	(443)403-2023	(888)267-1063
OLYPE01	BP/OLYMPIC PIPE LINE COMPANY	(425)981-2517	(425)981-2517	(888)271-8880
PUGE07	PUGET SOUND ENERGY ELECTRIC	(888)728-9343	(888)225-5773	(888)225-5773
QLNWA24	CTLQL-CENTURYLINK	(800)778-9140	(800)283-4237	(800)573-1311
TACPWR01	TACOMA PWR & CLICK NETWORK	(253)502-8263	(253)502-8600	(253)383-0982
WSDOT10	WA DOT - OLYMPIC REGION	(360)357-2647	(360)357-2647	(360)357-2647

2.3.2. PRIVATE UTILITIES LOCATION:

Additionally, Aerotech engaged personnel of Mountain View Locating Services of Bonney Lake, Washington to locate building and site utilities on July 3, 2018, prior to the start of the on Site drilling activities. No unanticipated or unexpected situations were discovered or encountered during the "private" locating activities.

Based in part upon pavement markings made by utility location technicians; the location of utility fixtures such as water, electrical, or manholes, and the presence of anomalies detected by induction or ground radar methodologies, monitoring well soil boring locations were chosen.

2.3.3. GROUND PENETRATING RADAR SURVEY:

A Ground Penetrating Radar ("GPR") Survey conducted by Mountain View Locating Services staff on July 3, 2018 in order to augment the induced current methodology, and to verify the presence of utility trenches such as sewer and water main trenches. Mr. Dave Schaff of Mountain View Locating Services, LLC employed Radar equipment utilizing Dual Frequency Antennae (300 MHz/800 MHz) manufactured by Geophysical Survey Systems. The locations of the water main and storm sewers were confirmed by means of GPR activities.

2.3.4. SITE ACTIVITIES:

Eight soil borings were advanced on July 3, 2018, under contract with Aerotech Environmental Consulting, Inc. All the work was performed during normal business hours. No unusual or unforeseen circumstances occurred during the Site activities.

2.3.5. DRILLING ACTIVITIES:

Drilling operations utilized a Jackhammer-mounted Limited Access Direct Push Rig, equipped with 2-inch diameter, four-foot long stainless-steel sampling rods.

The subsurface soil borings were performed by equipment owned and operated by a Licensed Driller from Standard Environmental Probe (“Standard”) of Tacoma, Washington. The on-Site drilling equipment was operated by personnel employed by Standard, Mr. Russell Vaughn (State of Washington Department of Ecology Well Drillers License No. 3143). All subsurface work was overseen by State of Washington Licensed Geologist, Mr. Justin Foslien (State of Washington License No. 2320). The laboratory analytical services were performed by a State of Washington licensed lab, Advanced Analytical Labs located in Redmond, Washington.

2.3.6. SOIL BORINGS:

A total of four soil borings were advanced on the southern and southwestern Property Boundary adjacent to the Interstate ROW, south and southwest of the former *Gasamet Gasoline Station*. An additional four borings were advanced in the gravel lot situated south of the Jack-in-the-Box building, north of one pair of former gasoline USTs and in the midst of the former pump island (which straddled the current Property Line) associated with the former *Gasamet Gasoline Station* (Figure 7).

2.3.7. SOIL SAMPLE COLLECTION:

A total of 17 discrete soil samples were collected on July 3, 2018 at eight soil boring locations.

Soils collected from each location were visually inspected for color quality and evidence of discoloration, and physically observed for the purpose of recording composition and noting odor, where distinctive. Each sample was handled with a fresh pair of clean nitrile gloves. Samples were placed in sterile four-ounce glass jars and 40cc glass vials preserved with 5ml methanol in accordance with procedures specified for USEPA Method 5035A.

Each sample was given a unique identifier number and placed in an iced cooler for sample preservation. Samples were held in the custody of the project manager, Nicholas Gerkin, and ice was checked and replenished while samples were held in the evening and maintained to the time of delivery to the lab. A Chain of Custody was maintained to record details associated with the collection and handling of each sample. The remaining soil samples were retained by the laboratory for analysis if the soil samples selected for laboratory analysis revealed elevated levels of constituents. Following the production of the initial Site sample results for soil, no follow-up laboratory analyses were requested for the subject Site, as of the date of this report.

2.3.8. GRAB GROUNDWATER SAMPLE COLLECTION:

A total of three (3) groundwater 'grab' samples were collected on July 3, 2018. The groundwater samples were collected through temporary well casings inserted in Soil Borings B6, B7, and B9. The groundwater samples were submitted for analyses based on the Scope of work discussed in the previous section.

The groundwater samples were extracted from the temporary well casings using a peristaltic pump. Each groundwater sample was extracted using new disposable polyethylene tubing with a fresh pair of clean nitrile gloves. Samples were then placed into laboratory supplied containers.

Each sample was given a unique identifier number and placed into an iced cooler for preservation. Samples were kept on ice until delivery to Advance Analytical Laboratory of Redmond, Washington.

2.3.9. EQUIPMENT DECONTAMINATION:

All sample acquisition equipment was decontaminated before and after the completion of each borehole to eliminate the potential for cross-contamination between borings, as required. All reusable sampling equipment for soil sampling, drive rods, and probes were decontaminated after each sampling point by washing with an Alconox-distilled water solution and rinsing with distilled water.

2.3.10. SITE RESTORATION:

Each borehole was complete with bentonite chips and gravel to match the surrounding surfaces. No landscape restoration was necessary.

2.3.11. RESULTS:

SUMMARY OF SAMPLE ACQUISITION

A total of eight soil borings were advanced in the Area of Concern to a maximum depth of 12 feet bgs. A total of seventeen soil samples were collected of which 15 were analyzed and three grab groundwater samples were collected of which all were analyzed. Detailed descriptions of each soil boring location, observations made during the acquisition, sampling information, and the field screening process are documented in soil boring logs attached to this report.

Total Petroleum Hydrocarbons – Gasoline and other Petroleum Constituents:

Gasoline and Benzene were detected above the MTCA Method A screening levels completed in nine of fifteen soil samples. Gasoline and Benzene were detected above the MTCA Method A screening levels in three of three grab groundwater samples. A summary of the remaining results may be found in Tables 1 & 3, including results from the previous investigations.

APPLICABLE ANALYTICAL METHODOLOGIES AND PARAMETERS

The analytical parameters were chosen based upon the results of previous investigations to provide a comprehensive characterization of the subsurface soils and groundwater present at the Site Areas of Concern and to comply with State of Washington recommendations.

Analytical Methodology:

Soil: **Gasoline Range Organics & Benzene, Ethylbenzene, Toluene, and Xylenes**

State of Washington NWTPH-Gx (TPHg)

USEPA 8021B (BTEX)

Laboratory Analysis:

Laboratory analysis was provided by:

Advanced Analytical Laboratory, LLC
4078 148 Avenue NE
Redmond, WA 98052
425.702.8571
aachemlab@yahoo.com

3. NATURAL CONDITIONS

3.1. SITE GEOLOGY

The Puget Sound lies within a tectonic trough situated between the Olympic Mountains to the west, and the northern Cascade Mountains to the east. This trough is characterized by fault zones accommodating north-south compressional rotation, commonly resulting in predominant north-south and northwest-southeast oriented faults and fault zones. Elliott Bay lies north of the Seattle Fault Zone, while Tacoma's Commencement Bay lies south of the northernmost Tacoma Fault zone rupture. A major fault is mapped below the bluffs on which central Tacoma was developed, along the western margin of Commencement Bay. Commencement Bay and the Puyallup River Basin lie on the down dropped side of the fault. The uppermost soils are dominated by alluvial sediments and occasionally volcanic mud flows originating on the slopes of Mount Rainier. Deep borehole data indicate approximately 1,800 feet of unconsolidated glacial and interglacial sediments in the former tidal flats in the vicinity of the subject Property.

The subject Site and vicinity, south of the Blair Waterway, are mapped as Quaternary Alluvium. These soils are characterized as:

"Gravel, sand, silt, and clay. Deposited chiefly by modern streams, but includes some swamp deposits. Includes marine deposits near the mouth of the Puyallup river.... thickness ranges from a few feet to as much as 600 feet. Yield small to moderate quantities of water to wells. Locally capable of large yields."

(Walters and Kimmel, 1968; Booth et al, 2004; Smith, 1977; Jones et el, 1999)

Unconsolidated sediments documented in soil borings advanced at the subject Property include: 1) Gravel at depths between the ground surface and a depth of 3 feet, and 2) Sandy silt at depths between 3 feet and 8 feet. A Washington Department of Transportation test boring advanced near the intersection of the Port of Tacoma Road and Interstate 5, documents the presence of gravel with sand and sand to a depth of 8 feet, underlain by at least 12 feet of silt or silt with sand. The shallow gravels may represent fill material placed atop natural fluvially and alluvially deposited silts and sandy silts. These fill materials may be expected underneath roadways and developed properties. They are often designed to elevate the surface above shallow groundwater and reduce susceptibility to flooding due to groundwater flooding during wet periods; and flooding due to heavy precipitation or breaches and overtopping of the levee system or the associated ditch systems.

A Northwest-Southeast and Southwest-Northeast geologic cross section illustrating subsurface conditions observed at the Property can be found on Figure 8.

3.2. SITE HYDROGEOLOGY

The principal aquifers in the Puget Sound Region occur in glacial drift, that along with finer grained interglacial sediments, underlie the basin lowland to depths often exceeding 1,000 feet. Sand and gravel units within the glacial drift form the principle aquifers. These aquifers receive ample recharge from the typically heavy precipitation characteristic of western Washington. The glacial drift in the Puget Sound region varies greatly in composition and water yielding capacity. Typically, wells in glacial drift that tap silt, clay, or till in the region at approximately 75 to 100 feet below ground surface may have yields of 100 gallons or more per minute. Deeper wells tapping thick, saturated layers of highly permeable gravel and coarse sand, typically at depths greater than 250 feet below ground surface, can yield more than 1,000 gallons per minute.

The calculated groundwater flow direction at the Site is to the west and west southwest toward the bioswale to the west and the ditch to the west-southwest (Figure, Pot Map and Rose Diagram). Groundwater gradients increased markedly in close proximity to the ditch and bioswale areas, within a few tens of feet of the southwest corner of the Site.

Static water levels north and east of the subject Property have been recorded by other consultants between depths of three to six feet bgs. During the AESI Phase II, water levels were reported to range from three to seven feet bgs on the subject Property. Ditches in the vicinity are estimated to be as much

as four to five feet deep. Groundwater flow direction has been documented at the property to the north as flowing to the south-southwest; to the west and southwest at the current Travelodge property, adjacent to the east; and at the former Unocal/Texaco/Chevron Station and current Tahoma Express station, adjacent to the northwest, as flowing to the west-southwest, or to the south or southwest.

A groundwater divide, north of which groundwater flow may be expected to flow toward Commencement Bay, is likely present perhaps as near as a few hundred feet to the north of the Site; this groundwater divide may migrate considerable. The straightened and levee-bound Lower Puyallup River channel is located approximately 3,000 feet south west of the subject Property. Groundwater in the vicinity of the Site, based upon water level data may flow predominantly in the direction of the Puyallup River channel, but may also flow to the west or northwest where the groundwater system is influence by elevated Puyallup River water levels during flood stage or the wet winter seasons.

Components of an extensive ditch system are visible south of the Site, along the northern and southern margins of Interstate 5, and north of Pacific Highway East. Portions of the ditch system to the north may discharge to Wapato Creek to the east. Ditches to the south do not appear to be connected to the system to the north. The ditch adjoining the Site appears to discharge to the east, and then to the south via pipe underneath Interstate 5. When the water table is low, during dry summer months, water entering ditches may, in part, infiltrate vertically to a seasonally low water table; when the water table is higher, during wet winter periods, groundwater may discharge to deeper drainage ditches.

Because tidal fluctuations approach 15 or more feet in the Tacoma area, rhythmic fluctuations in ground water levels twice daily and flow direction may occur within some low-lying areas near Commencement Bay. Under some conditions, tidal fluctuations may potentially influence groundwater flow at the subject Property, given its location approximately 4,000 feet from the Blair Waterway and approximately 3,000 feet northeast of the Puyallup River channel. Groundwater flow direction at low tide may potentially be diverted somewhat to the west or even northwest. The predominant groundwater flow direction south of this nearby section of Pacific Highway appears to be to the west-southwest or west. Tidal influence is negligible based on no change in elevations on the Site for up to 9 hours in one day. .The Puyallup River in the area has been straightened and is protected by a levy system. Aside from the immediate influence of the designed ditch system at and near the Site, it is at this time expected to represent the primary boundary condition likely to influence overall groundwater flow near the Site.

Jones, Orr and Ebbert depict the shallow alluvial aquifer of Commencement Bay as hydraulically connected to adjoining glacial aquifers above; in general groundwater is expected to flow from the bluffs above, toward Commencement Bay and the Puyallup River, with a significant flow component in the direction of river flow, toward Commencement Bay.

The upper alluvial aquifer is characterized as a distinct hydrogeologic unit, hydraulically connected to more permeable sandy or gravelly units along the valley margins, often lying underneath glacial till

"Aquifer Qcl [Jones et al, 1999] is generally a confined aquifer except where it is exposed at the surface, where it is unconfined, or not completely saturated beneath Qvt (Vashon Till). It consists largely of sand and gravel deposits but does contain silt and clay within the sand and gravel matrix.... The altitude of the top of this aquifer ranges from 50 feet below sea level to 509 feet above sea level."

3.2.1. GROUNDWATER CONDITIONS

Groundwater occurs in the shallow saturated zone beneath the Site comprised of poorly graded fill sand as well as silty sand or sandy silt. The water table depth typically ranges between approximately 1 and 5.5 feet bgs (Table 3). Previous maps summarize in a rose diagram depict the local flow of groundwater is toward the southwest and the Puyallup River (Figure 12).

Recent dewatering associated with DOT construction project that is updating the Interstate 5 interchange with Port of Tacoma Road have depressed the water elevation as much as 8.39 feet at MW6 along the southwestern parcel boundary. This depression has also resulted in the increase of gradient and change in direction toward the southeast compared to previous events. Photographs of the ongoing construction activities are included in Appendix G.

3.3. SURFACE WATER

The Site is currently covered with compacted gravel, concrete and asphalt. In the event of a storm water overflow at the Property, stormwater surface runoff is collected via catch basins and conveyed via storm sewer located on the south-central portion of the Property and trends east west draining toward the west and the Bio-Swale Pond. The Bio-Swale then discharges to the west via 36-inch perforated pipe. This pipe flows under the I5 southbound off-ramp to additional drainage swale and ultimately to an outfall in the Puyallup River.

Currently there is no water present in the Bio-Swale due to the pumping and construction activity previously mentioned.

The nearest surface water body is the Puyallup River located approximately ½ mile southwest of the *Fife RV Center*. The Puyallup River flows west into Puget Sound approximately 2.75 miles northwest of the Site (Google Earth, 2018).

3.4. ECOLOGICAL RECEPTORS

3.4.1. SENSITIVE RECEPTOR SURVEY ANALYSIS

The nearest surface water body is the Puyallup River located approximately ½ mile southeast of the Property (Google Earth, 2018). Based on: 1) the previous interim removal of source areas of hydrocarbon concentrations above the MTCA Method A screening levels on the Property; 2) the presence of a bioswale on the northwest corner of the property; and future surface water drainage construction to include additional stormwater runoff controls it is unlikely that groundwater or soil beneath the subject property would pose a future risk to surface waters.

The nearest potable water well is located approximately 0.75 mile upgradient to the south of the Site on the western side of the Puyallup River (Health, 2018). The Property is not located within any groundwater well protection areas.

3.4.2. TERRESTRIAL ECOLOGICAL EVALUATION

A Terrestrial Ecological Evaluation (TEE) Form was completed for the Property as part of the VCP Application based on data at that time. A Simplified TEE was completed based on approximately 2.0 acres of contiguous undeveloped land on or within 500 feet of the subject site. An aerial map with a 500-foot radius encompassing the Property can be found in Appendix H along with a completed Simplified TEE exposure analyses procedure (Table 749-1). No further evaluation was necessary because according to WAC 173-340-7492(2)(a), the area of soil contamination is less than 350 square feet.

The TEE will be updated to reflect the area of delineated impacts once the final extent of the MTCA Site boundary is determined.

4. CONCEPTUAL SITE MODEL

The conceptual site model is a "conceptual understanding of a site that identifies potential or suspected sources of hazardous substances, types and concentrations of hazardous substances, potentially contaminated media, and actual and potential exposure pathways and receptors." As defined by MTCA WAC 173-340-200 (WAC, 2017). This report has provided details regarding how COPCs were released, the types and extent of constituents detected at the Site, and actual and potential receptors. This section provides a conceptual summary of the detailed information described in the previous sections. Figure 13 presents a graphical representation of the conceptual model for the Site.

4.1. SOURCES OF CONSTITUENTS OF CONCERN

The sources of hydrocarbons on the Site are the releases to soil of COPCs that were stored and distributed by the Former *Gasamet* G*asoline Station*. These COPCs occurred via releases from USTs, pipes, and dispensers. These releases were focused in the vicinity of the first generation of UST basin and the former pump islandsThe COPCs were released to soil; the hydrocarbons then spread by vapor transport into the vadose zone, by partitioning from soil vapor into groundwater, and by direct leaching to groundwater from saturated soils. The Property is currently utilized as parking for recreation vehicles and the surface cover is compacted gravel.

4.2. FATE AND TRANSPORT

The sources of hydrocarbons on the Site are the releases to soil of COPCs that were stored and distributed by the former *Gasamet Gasoline Station*. These COPCs occurred via releases from USTs, pipes, and dispensers. These releases were focused in the vicinity of the first generation of UST basin and the former pump islands.

The COPCs were released to soil; the hydrocarbons then spread by vapor transport into the vadose zone, by partitioning from soil vapor into groundwater, and by direct leaching to groundwater from saturated soils. The presence of shallow groundwater beneath the Site also likely enabled some of the COPCs to be released directly to groundwater. The Property is currently unpaved with compacted gravel and vegetation around the Bio-Swale pond. Therefore, the potential of infiltration of rainwater that could leach COPCs from the soil or entrain soil vapors from chemicals and carry them downward to the water table is high.

4.3. EXPOSURE PATHWAYS AND RECEPTORS

The Property is within a regional commercial use area that includes public streets, businesses, and other industrial activities. The streets and parking lots are covered with asphalt or concrete. There is some terrestrial habitat in the area, associated with the Bio-Swale and buffers around Interstate 5. A municipal well field, utilized during high demand periods, is located over 3 miles west of the site (Aerotech, 2016). Current exposure pathways and receptors are limited to the following:

- Incidental ingestion of surface soils;
- Incidental ingestion of groundwater from leaching of soil:
- Inhalation of indoor air from volatilization of soil;
- Inhalation of outdoor air from volatilization of soil;
- Inhalation of indoor air from volatilization of groundwater; and
- Inhalation of outdoor air from volatilization of groundwater

The property surface is compacted gravel and no redevelopment is currently planned. However, a structure erected over the area of soil containing residual hydrocarbons could trap vapor containing COPCs. The soil and groundwater containing hydrocarbons remaining at the Site is the source of these vapors. Cleanup levels will be developed for indoor air based on the vapor intrusion pathway. based on recent guidance and planned confirmation sample data.

There is a potential for a future direct contact exposure pathway whereby construction workers digging in subsurface soil may be exposed to COPCs. Cleanup levels will be developed based on industrial worker exposure cleanup levels.

4.4. POTENTIAL FUTURE EXPOSURE PATHWAYS AND RECEPTORS

Future land use in the area is expected to remain general commercial, therefore the MTCA Method A and B Cleanup Levels are applicable to this Site. No significant changes in zoning are expected in the foreseeable future.

4.5. SOIL CLEANUP STANDARDS

The following pathways are considered for the establishment of soil cleanup levels at the Site:

- Protection of human health via direct exposure using the MTCA Method A Cleanup Levels;
- Protection of ecological receptors, an ecological evaluation is required under MTCA;
- Protection of groundwater resources from COCs leaching from soil; and
- Protection of indoor air from vapor intrusion from soil containing hydrocarbon concentrations exceeding the MTCA Method A Cleanup Levels.

In developing cleanup levels, the following Site-specific information is relevant:

- The Site and the adjacent properties are currently zoned for regional commercial use;
- Soil containing residual COPCs remains near buried water and electrical lines on the *Fife RV Center* parcel; and
- Soil containing residual COPCs remains along the property boundary with *Jack in the Box* and likely extends beyond the property boundary

Although definition of the release to soil has not been achieved, Aerotech selected MTCA A Cleanup Levels based on the current data.

4.6. GROUNDWATER CLEANUP STANDARDS

The following pathways are considered for the establishment of groundwater cleanup levels at the Site:

- Protection of human health via direct exposure using the MTCA Method A Cleanup Levels;
- Protection of ecological receptors, an ecological evaluation is required under MTCA;
- Protection of groundwater resources from COCs leaching from soil; and
- Protection of indoor air from vapor intrusion from soil containing hydrocarbon concentrations exceeding the MTCA Method A Cleanup Levels.

In developing cleanup levels, the following Site-specific information is relevant:

- The Site and the adjacent properties are currently zoned for regional commercial use; and
- Groundwater containing residual COPCs is present at the Site (Tables 3 & 4).
- Groundwater containing residual COPCs at the Property has not been defined and at least extends to the northern Property boundary shared with *Jack in the Box* from the area surrounding the former USTs in the central portion of the Property.

4.7. CLEANUP STANDARDS FOR INDOOR/AMBIENT AIR, SOIL GAS, SUB-SLAB SOIL GAS

In developing cleanup levels for indoor air, the following Site-specific information is relevant:

- Soil containing residual COPCs at the Property has not been defined and at least extends to the norther Property boundary shared with *Jack in the Box* from the area surrounding the former USTs in the central portion of the Property. Additionally, toward the southwest and the Property boundary shared with the Interstate 5 off ramp.
- Vapor intrusion from soil containing residual has not been evaluated.

4.8. CLEANUP LEVELS

CULs will be updated as additional data is collected from investigations. Based on the current conditions present at the Site, MTCA Method A is the appropriate CUL for both soil and groundwater.

	MTCA Cleanup Levels			
COPC	**Soil – Method A (mg/kg)**	**Soil – Method B Direct Contact (µg/kg)**	**Groundwater (µg/L)**	**Indoor Air (µg/m3)**
Benzene	0.030	N/A	5	N/A
Toluene	7	N/A	1,000	N/A
Ethylbenzene	6	N/A	700	N/A
Xylenes	9	N/A	1,000	N/A
TPHg	100a/30b	N/A	800a/1,000b	N/A
TPHd	2000	N/A	500	N/A
TPHo	2000	N/A	500	N/A
Lead	250	N/A	15	N/A

a = TPHg soil cleanup level is 30 mg/kg, unless benzene is not detected in the sample, or if toluene, ethylbenzene, and total xylenes constitute less than 1% of the TPHg present in the sample. If these conditions are met, the cleanup level for TPHg may be elevated to 100 mg/kg.
b = 800 mg/L if benzene is present in groundwater; 1,000 mg/L if no detectable benzene in groundwater

5. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1. SUMMARY AND CONCLUSIONS

From the mid 1960's to the late l980's a *Gasamet Gasoline Station* occupied the western portion of the western gravel paved lot on the Subject Property and the southern portion of the Jack in the Box Property. Fuel dispenser islands were located south and east of the eastern terminus of the current restaurant drive-thru, with UST Basins situated both to the east and west, and a building farther south. A triangular-shaped wooded water retention area (Bio-Swale) is located at the west side of the Site.

In 1987, Rittenhouse-Zeman & Associates (RZA) completed a geotechnical investigation where, hydrocarbon odors were encountered at soil boring B-1 (located beneath the present restaurant building) between 5 and 10 feet bgs. Samples collected from B-1; S-5 (11-12.5 feet), contained TPH in above the current MTCA Method A CULs") (RZA, 1988). RZA advanced four soil borings at the corners of the property (B-1A, B-2, B-3, B-4) in January 1998. No petroleum odor was observed in any of the four soil borings. Soil Sample S-4 collected from B-2 at 10-11.5 feet bgs contained TPH above the CUL (RZA, 1988). The location of this boring corresponded to the northwest corner of the *Jack in the Box* parcel.

In 2014, *Associated Earth Sciences,* Inc. conducted a *Supplemental Phase II Environmental Site Assessment* at the subject Property. Petroleum hydrocarbons were detected at concentrations above the Model Toxic Control Act ("MTCA") Method A Cleanup Levels in soil and groundwater samples in the vicinity of the former *Gasamet* pump islands and UST Basins. Based on these results, Mr. Chris LaVerdiere, requested *Langseth Environmental* ("Langseth") *and Aerotech Environmental Consulting, Inc.* ("Aerotech") initiate site remedial excavation and environmental consulting services to address petroleum impacted soils.

1,685.24 tons of petroleum impacted soil were removed in late 2016. The first six groundwater monitoring wells were installed immediately thereafter, followed by upgradient wells (MW7, MW8, and MW9) in July of 2017.

Analytical data collected during the July 2018 site assessment indicate that groundwater and soil contain concentrations above MTCA Method A CULs exist along the northern Fife RV Center property shared with *Jack in the Box*. Soil borings B7-B9 advanced along the fenced property line indicated the extent of soil and groundwater impacted by petroleum related hydrocarbons extends into the *Jack in the Box* parcel immediately to the north.

Soil and water samples collected from soil boring B3 at the southwestern property boundary also contained concentrations above MTCA Method A Cleanup Levels. Groundwater samples collected from monitoring well MW12 have also contained concentrations of benzene above MTCA Method A CULs. Additional investigation in necessary to define the Site toward the WSDOT right of way associated with the Interstate 5 Off-Ramp.

5.2. RECOMMENDATIONS

Based on the existing information collected from the *Fife RV Center* property, further action will be required to delineate the extent of petroleum- related contamination associated with the former *Gasamet Gasoline Station*. Aerotech recommends submitting this report to the Ecology with a request for opinion on the activities completed to date; and to help facilitate the negotiation of access to complete definition of the MTCA Site boundary.

6. LIMITATIONS

For any documents cited that were not generated by Aerotech, the data taken from those documents is used "as is" and is assumed to be accurate. Aerotech does not guarantee the accuracy of this data and makes no warranties for the referenced work performed nor the inferences or conclusions stated in these documents.

This report and the works performed have been undertaken in good faith, with due diligence and with the expertise, experience capability and specialized knowledge necessary to perform the Work in a good and workmanlike manner and within all accepted standards pertaining to providers of environmental services, in Washington at the time of investigation. No soil engineering or geotechnical references are implied or should be inferred. The evaluation of the geologic conditions at the site for this investigation is made from a limited number of data points. Subsurface conditions may vary away from these data points.

7. REFERENCES

Associated Earth Sciences. August 16, 2014. *Supplemental Phase II Site Assessment,* Freddie's Casino Property*,* 3410 Pacific Highway East, Fife Washington 98424.

Aerotech. November 1, 2016a. *Site Remedial Excavation Report*, Fife RV Center, 3410 Pacific Highway East, Fife Washington 98424.

Aerotech. November 17, 2016b. *Groundwater Monitoring Well Installation Report*. Fife RV Center, 3410 Pacific Highway East, Fife Washington 98424.

Aerotech. December 9, 2016c. *Groundwater Monitoring Report: First Quarterly Sampling – November 2016,* Fife RV Center, 3410 Pacific Highway East, Fife, Washington 98424.

Aerotech. March 8, 2017a. *Groundwater Monitoring Report: 2nd Quarter – February 2017,* Fife RV Center, 3410 Pacific Highway East, Fife, Washington 98424.

Aerotech. June 7, 2017b. *Groundwater Monitoring Report: 3rd Quarter – May 2017*, Fife RV Center, 3410 Pacific Highway East, Fife, Washington 98424.

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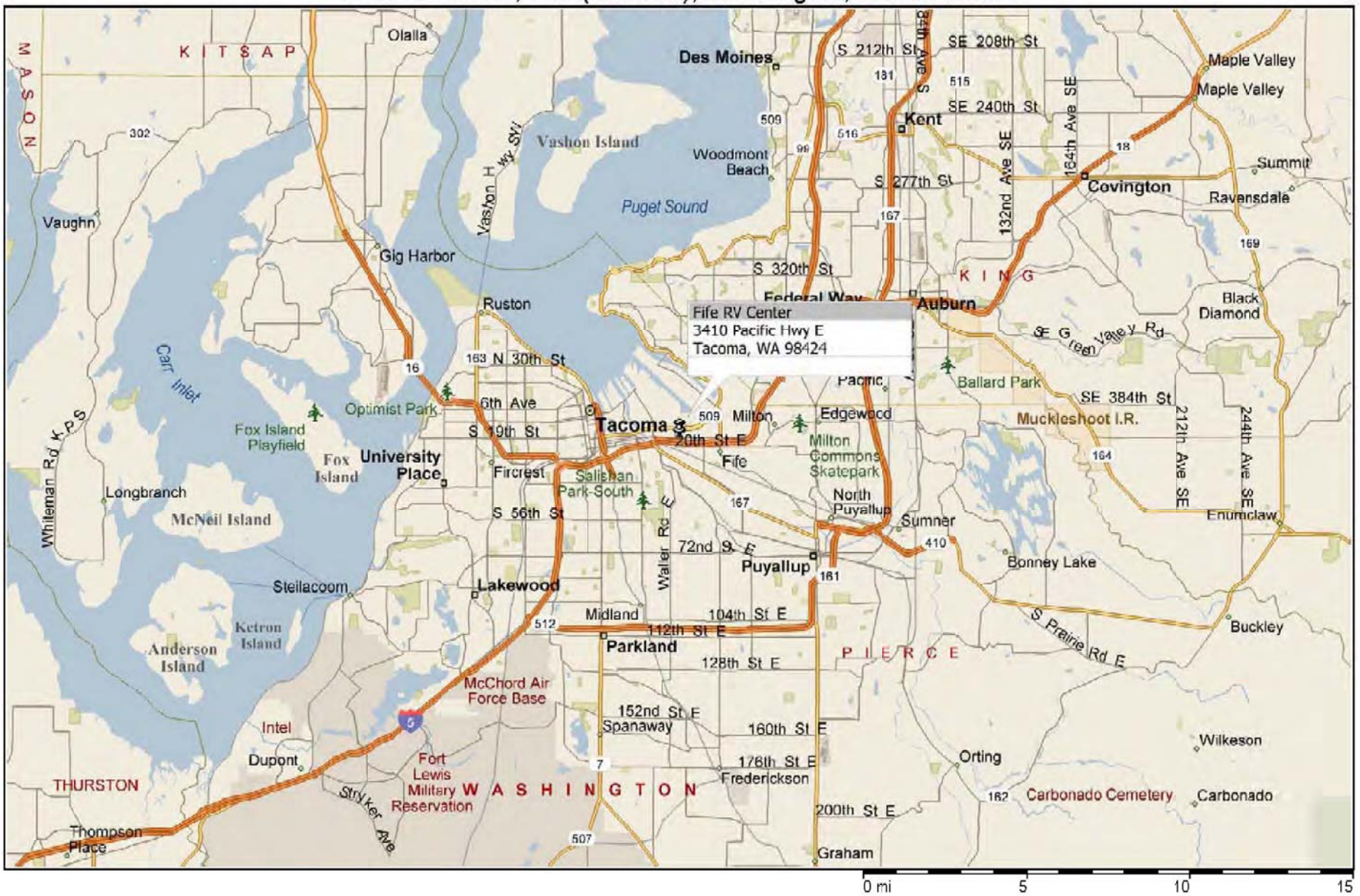
• Figures

N

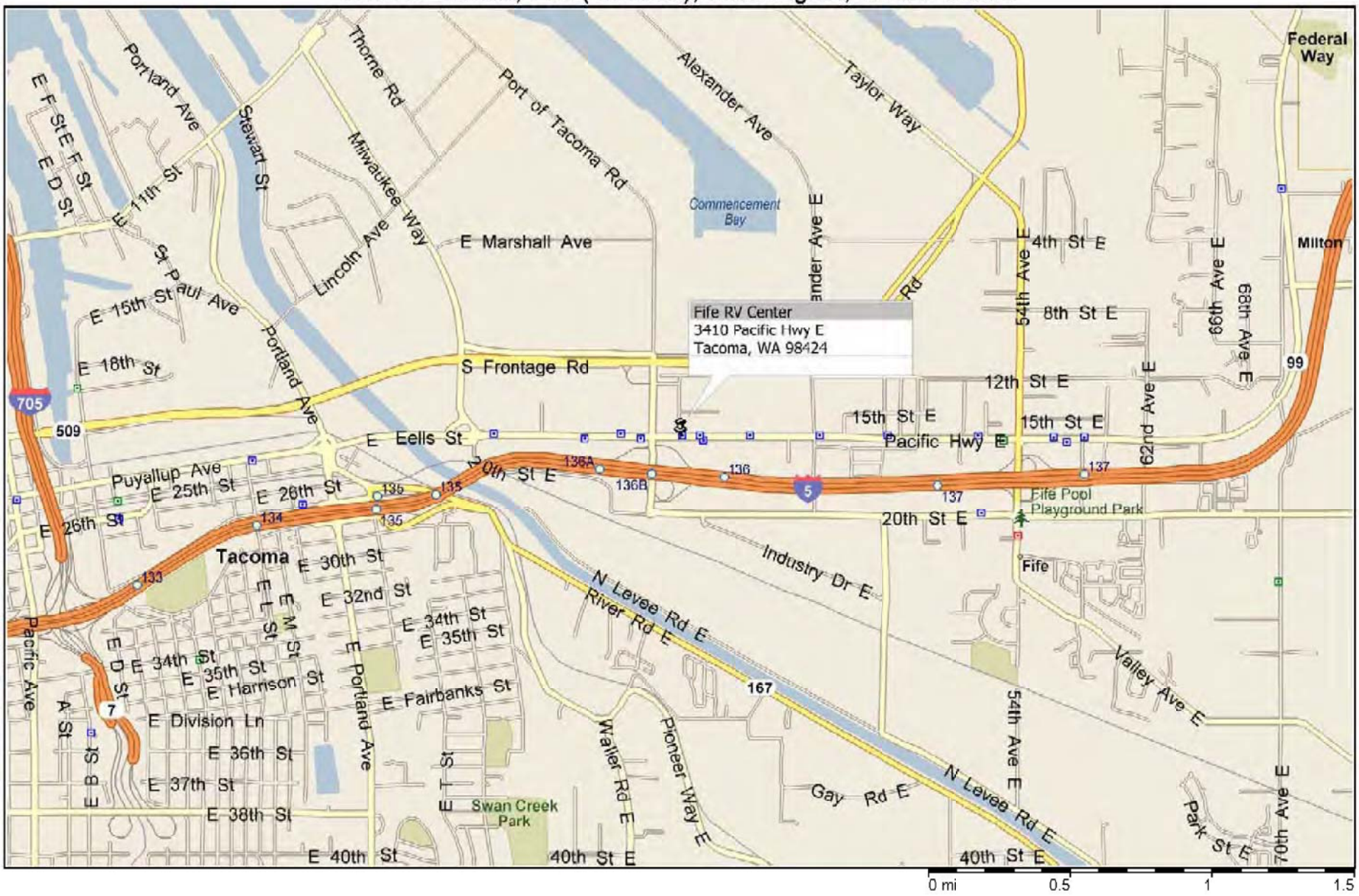
Fife RV Center, Fife (Tacoma), Washington, United States



AEROTECH ENVIRONMENTAL CONSULTING	**REGIONAL MAP**	**Fife RV Center** **3410 Pacific Highway East** **Fife, Washington**		**Date:** 12/08/16 **By:** Nick Gerkin **Figure:** 1

N

Fife RV Center, Fife (Tacoma), Washington, United States



AEROTECH ENVIRONMENTAL CONSULTING	**NEIGHBORHOOD STREET MAP**	**Fife RV Center** **3410 Pacific Highway East** **Fife, Washington**		**Date:** 12/08/16 **By:** Nick Gerkin **Figure:** 2

EXPLANATION

- Parcel Property Boundary
- Area of Focus
- 032011067 — Pierce County Parcel Number

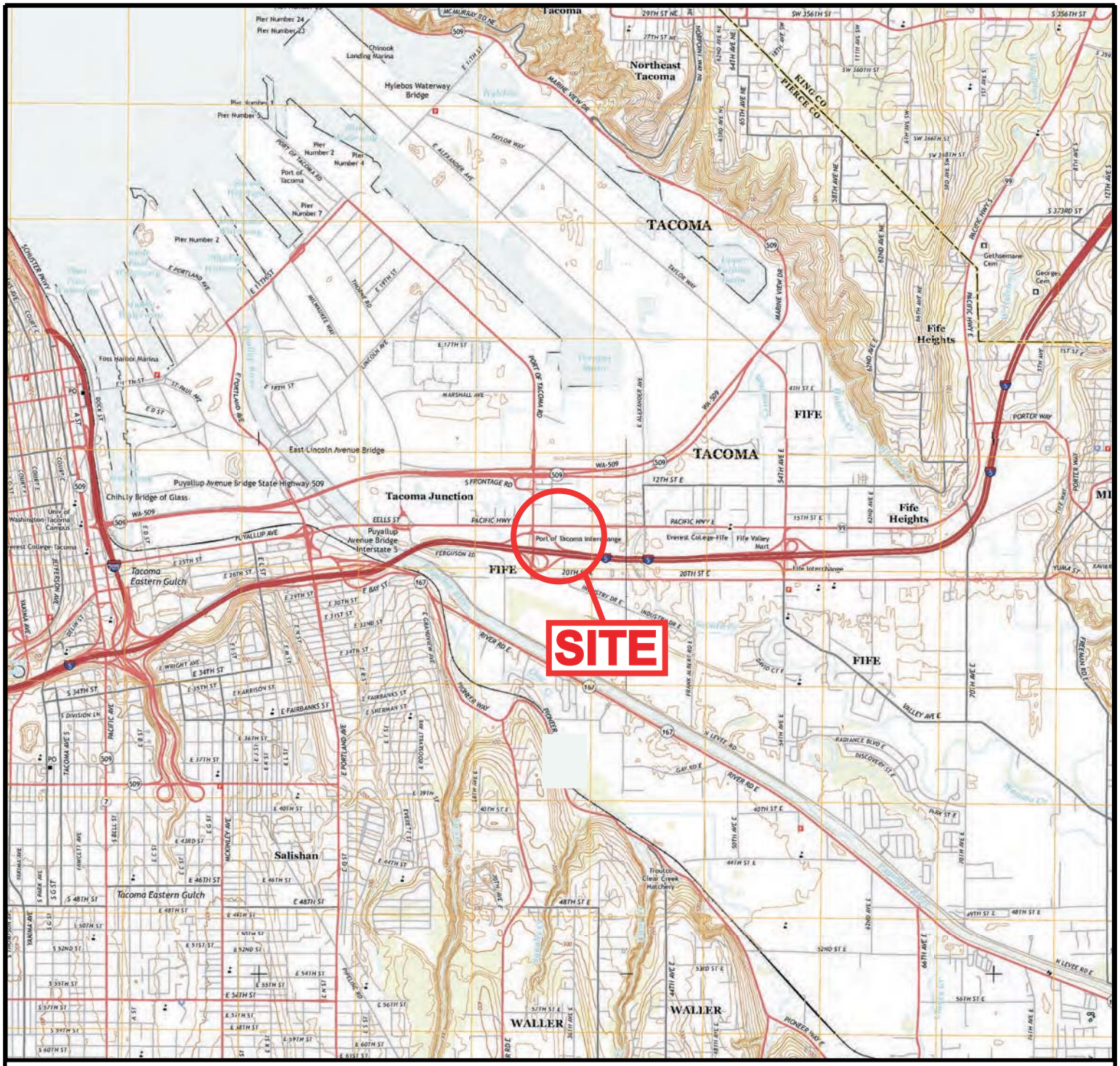
AEROTECH ENVIRONMENTAL CONSULTING

SITE VICINITY MAP

Fife RV Center
3410 Pacific Highway East
Fife, Washington

0 150 300
SCALE (feet)

Date: 9/5/18
By: Justin Foslien
Figure: 3

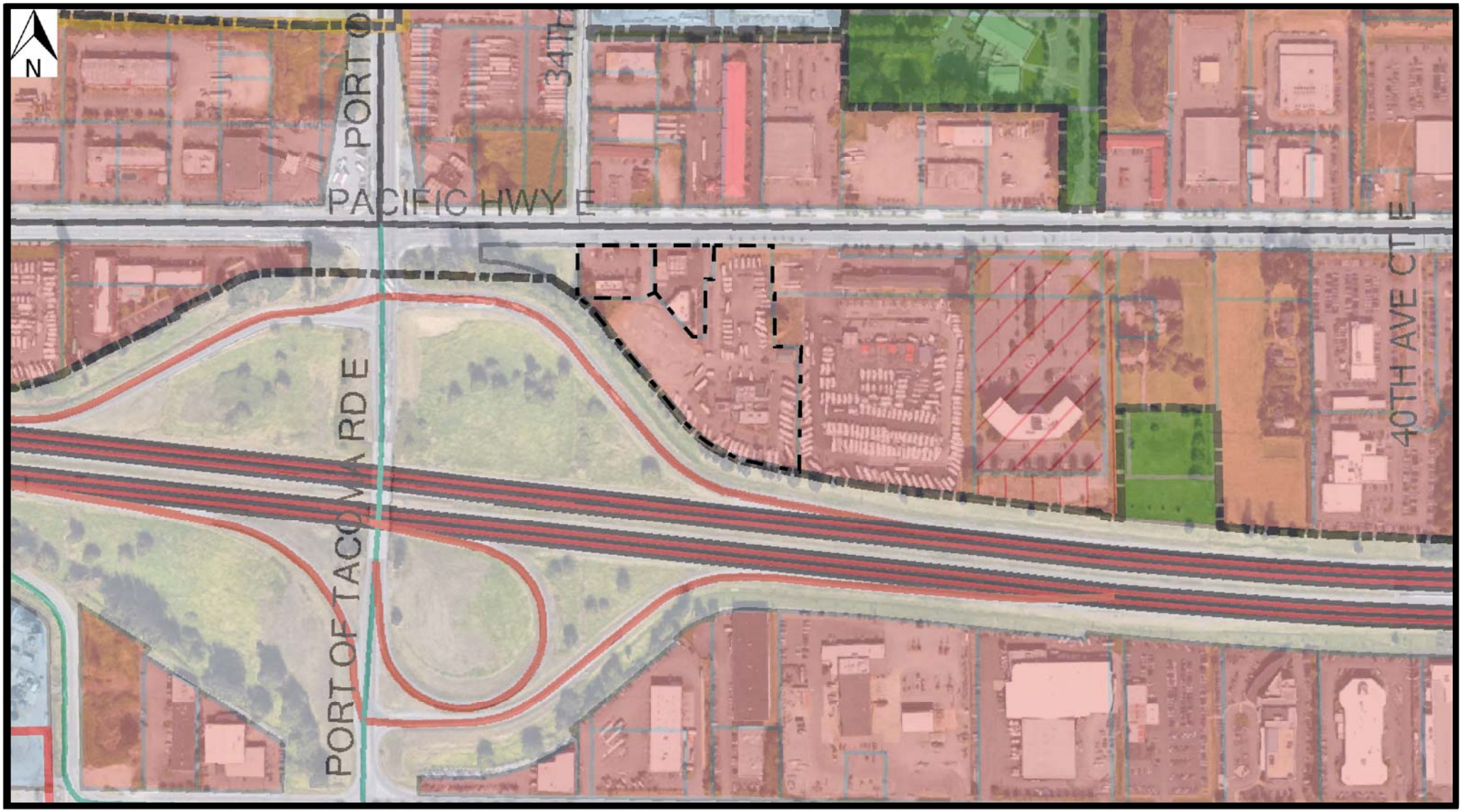


AEROTECH ENVIRONMENTAL CONSULTING

USGS TOPOGRAPHIC MAP

Fife RV Center
3410 Pacific Highway East
Fife, Washington

Date: 10/30/16
By: Nick Gerkin
Figure: 4



EXPLANATION

Parcel Property Boundary

- PUBLIC USE/OPEN SPACE
- COMMUNITY MIXED USE
- SINGLE FAMILY RESIDENTIAL
- SMALL LOT RESIDENTIAL
- MEDIUM DENSITY RESIDENTIAL
- HIGH DENSITY RESIDENTIAL
- NEIGHBORHOOD RESIDENTIAL
- NEIGHBORHOOD COMMERCIAL
- COMMUNITY COMMERCIAL
- REGIONAL COMMERCIAL
- BUSINESS PARK
- INDUSTRIAL

AEROTECH ENVIRONMENTAL CONSULTING

VICINITY ZONING MAP

Fife RV Center
3410 Pacific Highway East
Fife, Washington

0 400 800
SCALE (feet)

Date: 11/06/18
By: Nick Gerkin
Figure: 5

N

Landscaping

JACK IN THE BOX
DRIVE-THRU

B' ACCESS EASEMENT
Pacific Highway East
100 Feet to the North

UST BASIN
(25 Feet to the North)

Landscaping

POSSIBLE FORMER
UST BASIN

Discharge to
Drainage Ditch
(3'D Perforated Pipe)

FORMER
PUMP
ISLANDS

BIO-SWALE
POND

MW10

MW2

MW1

TACOMA EXPRESS
(Former Unocal Service Station 7343)
Ecology Cleanup Site ID 5015

MW11

MW4

FORMER
UST BASINS

MW12

MW3

MW9

DOT CONSTRUCTION AREA
(FUTURE OFF-RAMP)

MW5

MW6

MW7

Fire
Hydrant

MW8

0 15 30
SCALE (feet)

Green numbers and symbols indicate concentrations below the MTCA Method A Cleanup Levels

Red numbers and symbols indicate concentrations above the MTCA Method A Cleanup Levels

AEROTECH
ENVIRONMENTAL CONSULTING

EXPLANATION

MW12 Groundwater Monitoring Well

Former Fill Port Location

Property Boundary

Fencing

Storm Sewer

Electrical Utility

Gas Utility

Water Utility

FORMER STATION FEATURES & UTILITIES MAP

Fife RV Center
3410 Pacific Highway East
Fife, Washington

Date: 11/08/18

By: Nick Gerkin

Figure: 6

N

Landscaping

JACK IN THE BOX
DRIVE-THRU

ACCESS EASEMENT
Pacific Highway East
100 Feet to the North

UST BASIN
(25 Feet to the North)

Landscaping

POSSIBLE FORMER
UST BASIN

Discharge to
Drainage Ditch
(3'D Perforated Pipe)

FORMER
PUMP
ISLANDS

BIO-SWALE
POND

TACOMA EXPRESS
(Former Unocal Service Station 7343)
Ecology Cleanup Site ID 5015

B7 B6 B8 B9 MW10 MW2 P1 EB4 P2 P3 MW1 EB3 P4 P12 P10 P6 P5 P13 P16 P8 P7 EB2 P15 MW4 P14 P20 EB6 P18 EB5 P9 P11 TP1 B5 MW12 P19 TP7 P17 B1 P25 P29 TP2 B4 P21 P24 P30 EB9 P26 P28 TP3 MW3 TP10 B3 TP9 P31 P22 MW5 EB7 P23 P27 MW9 B2 TP4 P32 TP11 TP5 TP6 EB1 P34 TP8 TP19 Fire Hydrant MW6 P33 TP12 TP17 MW7 EB8 TP14 TP13 TP16 TP18 TP15 MW8

0 15 30
SCALE (feet)

Green numbers and symbols indicate concentrations below the MTCA Method A Cleanup Levels

Red numbers and symbols indicate concentrations above the MTCA Method A Cleanup Levels

AEROTECH
ENVIRONMENTAL CONSULTING

EXPLANATION

MW12 Groundwater Monitoring Well

TP19 Excavation Test Pit

2016 Excavation Extent

Soil Boring

Excavation Confirmation

Former Fill Port Location

Property Boundary

Fencing

Cool Guard HRL36 Liner Installed to 10-Foot Depth

CUMULATIVE SOIL ANALYTICAL RESULTS MAP

Fife RV Center
3410 Pacific Highway East
Fife, Washington

Date: 10/3/18

By: Justin Foslien

Figure: 7

N

JACK IN THE BOX DRIVE-THRU

Landscaping

Landscaping

Discharge to Drainage Ditch (3'D Perforated Pipe)

BIO-SWALE POND (Dry During July Sampling)

FORMER PUMP ISLANDS

POSSIBLE FO UST BAS

POSSIBLE UST BASIN

Fire Hydrant

MW11	
04/03/18	07/02/18
<100	120
<200	<200
<500	<500
<1.0	<1.0
<1.0	<1.0
<1.0	<1.0
<1.0	<1.0
ND	ND
<2.0	<2.0
<0.1	<0.1
<0.1	<0.1

MW10	
04/03/18	07/02/18
530	610
<200	<200
<500	<500
17	42
2.3	1.0
<1.0	<1.0
1.2	<1.0
ND	ND
<2.0	<2.0
0.40	0.94
<0.1	<0.1

B7	B6	B9
07/03/18	07/03/18	07/03/18
9,600	11,000	95,000
200	84	390

TPHg

Benzene

MW1			
11/30/17	04/03/18	07/02/18	10/12/18
<100	<100	<100	Pumped Dry
<200	<200	<200	
<500	<500	<500	
<1.0	<1.0	<1.0	DOT Construction Dewatering
<1.0	<1.0	<1.0	
<1.0	<1.0	<1.0	
<1.0	<1.0	<1.0	
--	--	--	
<2.0	<2.0	<2.0	
--	--	--	
--	--	--	

MW12	GW Monitoring Well ID
07/02/18	Date
790	TPHg
<200	TPHd
<500	TPHo
170	Benzene
1.3	Toluene
<1.0	Ethylbenzene
4.0	Xylenes
ND	VOCs
<2.0	Total Lead
<0.1	Naphthalene
<0.1	cPAHs

All Concentrations Reported in µg/L

MW12			
04/03/18	07/02/18		
240	790		
<200	<200		
<500	<500		
60	170		
<1.0	1.3		
<1.0	<1.0		
<1.0	4.0		
ND	ND		
<2.0	<2.0		
<0.1	<0.1		
<0.1	<0.1		

MW2			
11/30/17	04/03/18	07/02/18	10/12/18
64,000	2,000	1,100	Insufficient Water Volume
<200	<200	<200	
<500	<500	<500	
2,800	65	35	DOT Construction Dewatering
94	1.0	<1.0	
1,800	<1.0	<1.0	
3,000	120	28	
ND	ND	ND	
<2.0	<2.0	<2.0	
25	1.1	0.28	
<0.1	<0.1	<0.1	

MW3			
11/30/17	04/03/18	07/02/18	10/12/18
830	210	240	Insufficient Water Volume
<200	<200	<200	
<500	<500	<500	
<1.0	<1.0	<1.0	DOT Construction Dewatering
<1.0	<1.0	<1.0	
3.9	<1.0	<1.0	
1.7	<1.0	2.1	
ND	ND	ND	
<2.0	<2.0	<2.0	
0.62	1.4	<0.1	
<0.1	<0.1	<0.1	

MW5			
	11/30/17	04/03/18	07/02/18
	<100	110	<100
	<200	<200	<200
	<500	<500	<500
	<1.0	3.2	<1.0
	<1.0	<1.0	<1.0
	<1.0	<1.0	<1.0
	<1.0	<1.0	<1.0
	ND	ND	ND
	<2.0	<2.0	<2.0
	<0.1	2.5	1.9
	<0.1	<0.1	<0.1

MW4			
11/30/17	04/03/18	07/02/18	10/12/18
6,400	4,100	1,000	Insufficient Water Volume
<200	<200	<200	
<500	<500	<500	
320	130	16	DOT Construction Dewatering
17	6.3	1.2	
370	270	<1.0	
58	1.0	1.6	
ND	ND	ND	
<2.0	<2.0	<2.0	
9.9	13	10	
<0.1	<0.1	<0.1	

MW9			
11/30/17	04/03/18	07/02/18	10/12/18
<100	<100	<100	Insufficient Water Volume
<200	<200	<200	
<500	<500	<500	
<1.0	<1.0	<1.0	DOT Construction Dewatering
<1.0	<1.0	<1.0	
<1.0	<1.0	<1.0	
<1.0	<1.0	<1.0	
--	--	--	
<2.0	<2.0	<2.0	
--	--	--	
--	--	--	

MW6			
08/01/17	11/30/17	04/03/18	07/02/18
	<100	<100	<100
	<200	<200	<200
	<500	<500	<500
	<1.0	<1.0	<1.0
	<1.0	<1.0	<1.0
	<1.0	<1.0	<1.0
	<1.0	<1.0	<1.0
	ND	ND	ND
	<2.0	<2.0	<2.0
	--	<0.1	<1.0
	--	<0.1	<1.0

MW7			
11/30/17	04/03/18	07/02/18	10/12/18
<100	<100	<100	Insufficient Water Volume
<200	<200	<200	
<500	<500	<500	
<1.0	<1.0	<1.0	DOT Construction Dewatering
<1.0	<1.0	<1.0	
<1.0	<1.0	<1.0	
<1.0	<1.0	<1.0	
--	--	--	
<2.0	<2.0	<2.0	
--	--	--	
--	--	--	

MW8			
11/30/17	04/03/18	07/02/18	10/12/18
<100	<100	<100	Insufficient Water Volume
<200	<200	<200	
<500	<500	<500	
<1.0	<1.0	<1.0	DOT Construction Dewatering
<1.0	<1.0	<1.0	
<1.0	<1.0	<1.0	
<1.0	<1.0	<1.0	
--	--	--	
<2.0	<2.0	<2.0	
--	--	--	
--	--	--	

0 15 30

SCALE (feet)

Blue numbers and symbols indicate concentrations below the MTCA Method A Cleanup Levels

Red numbers and symbols indicate concentrations above the MTCA Method A Cleanup Levels

AEROTECH ENVIRONMENTAL CONSULTING

EXPLANATION

MW12 — Groundwater Monitoring Well

Property Boundary

Fencing

Cool Guard HRL36 Liner Installed to 10-Foot Depth

All other analytes were not detected at or above the Laboratory Minimum Reporting Llimits

GROUNDWATER ANALYTICAL RESULTS MAP - 07/02/18

Fife RV Center
3410 Pacific Highway East
Fife, Washington

Date: 07/30/18

By: Nick Gerkin

Figure: 8

A

A'

Former Tank Area

Former Dispenser Area

Former Tank Area

MW11

EB6

MW4

P20

P19

P17

P26

MW3

TP3

MW9

TP11

TP19

Bio-Swale Pond

FILL

FILL

7-7.5'
1,300
<0.4

3'
2,500
0.34

4.5'
13,000
9.3

Gasoline & Benzene Concentrations > 1,000 TPHg (mg/kg) and/or > 1 (mg/kg) Benzene in Soil

7-7.5' Depth
1,300 TPHg
1,300 Benzene

B

B'

WSDOT I5 Off-Ramp

TOP OF BERM

Fife RV Parcel #032011067

Jack in the Box Parcel #0320024104

Former Dispenser Area

Former Tank Area

Potential Former UST Basin

MW5

EB6

P22 TP9

P21

TP7

P20

MW4

P14

P13

P12

MW2

P1

B8

B9

B2

(Projected)

FILL

P22
5'
1,100
0.83

5'
1,200
0.65

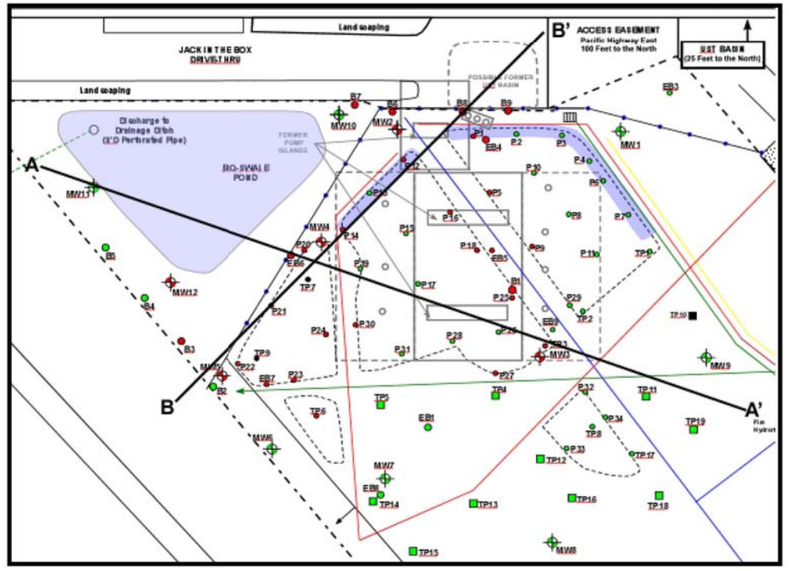
7-7.5'
1,300
<0.4

4'
1,100
2.5

5'
2,800
2.2

6'
1,100
3.9

5.5'



-Horizontal Distances in Feet
-Elevations in Feet Above MSL
-3X Vertical Exaggeration

AEROTECH ENVIRONMENTAL CONSULTING

Green numbers and symbols indicate concentrations below the MTCA Method A Cleanup Levels

Red numbers and symbols indicate concentrations above the MTCA Method A Cleanup Levels

Black numbers and symbols indicate historic concentrations above the MTCA Method A Cleanup Levels that have subsequently been confirmed or excavated

Cool Guard HRL36 Liner Installed to 10-foot Depth

EXPLANATION

Historical Water Level (Highs & Lows)

Extent of Excavation

Screened Interval

20' Soil Sample Location

SP

SM/ML

10/12/18 Water Level

Electrical Line

Water Line

Sewer Line

CROSS SECTIONS

FIfe RV Center
3410 Pacific Highway East
Fife, Washington

Date: 10/10/18

By: Nick Gerkin

Figure: 9

N

Landscaping

JACK IN THE BOX
DRIVE-THRU

ACCESS EASEMENT
Pacific Highway East
100 Feet to the North

UST BASIN
(25 Feet to the North)

PUMP ISLANDS
(50 Feet to the North)

Landscaping

TACOMA EXPRESS
(Former Unocal Service Station 7343)
Ecology Cleanup Site ID 5015

B7
B6
B8
B9

MW10
5.04

MW2
5.36

MW1
5.66

Water surface presumed to be at or near groundwater table and hydraulically connected by a 3' diameter perforated pipe leading to additional subsurface piping to the adjoining Drainage Ditch to the southwest

MW11
3.18

BIO-SWALE
POND
(Dry During July Sampling)

FORMER
PUMP
ISLANDS

MW4
4.89

MW12
3.28

POSSIBLE FORMER
UST BASIN

POSSIBLE FORMER
UST BASIN

MW3
5.65

MW9
5.59

MW5
3.37

3.5

4.0

MW6
4.49

4.5

5.5

Fire
Hydrant

DRAINAGE DITCH

Flows to
Hylebos Creek

MW7
4.81

5.0

MW8
5.34

0 15 30
SCALE (feet)

Blue numbers and symbols indicate concentrations below the MTCA Method A Cleanup Levels

Red numbers and symbols indicate concentrations above the MTCA Method A Cleanup Levels

AEROTECH
ENVIRONMENTAL CONSULTING

EXPLANATION

MW12
Groundwater Monitoring Well

3.28
Groundwater Elevation in Feet

Groundwater Elevation Contour Line (Isopotential Line)

Property Boundary

Fencing

Cool Guard HRL36 Liner Installed to 10-Foot Depth

Storm Sewer

Electrical Utility

Gas Utility

Water Utility

POTENTIOMETRIC SURFACE MAP 07/02/18

Fife RV Center
3410 Pacific Highway East
Fife, Washington

Date: 07/30/18

By: Nick Gerkin

Figure: 10

N

Landscaping

JACK IN THE BOX
DRIVE-THRU

B' ACCESS EASEMENT
Pacific Highway East
100 Feet to the North

UST BASIN
(25 Feet to the North)

Landscaping

POSSIBLE FORMER
UST BASIN

B7

B6

B9

MW10
1.52

MW2

Discharge to
Drainage Ditch
(3'D Perforated Pipe)

FORMER
PUMP
ISLANDS

BIO-SWALE
POND

MW1
-3.84

Calculated Groundwater Flow
Direction and Gradient:

0.071 ft/ft

MW11
1.94

MW4

1

MW12
0.70

0

-1

-2

-3

COMPACTED GRAVEL STAGING AREA
(up to Fife RV Property Line)

MW5
-3.75

MW3

MW9

Fire
Hydrant

MW6
-3.90

MW7

MW8

0 15 30
SCALE (feet)

Blue numbers and symbols indicate concentrations below the MTCA Method A Cleanup Levels

Red numbers and symbols indicate concentrations above the MTCA Method A Cleanup Levels

AEROTECH
ENVIRONMENTAL CONSULTING

EXPLANATION

MW12 Groundwater Monitoring Well

Former Fill Port Location

Fencing

Cool Guard HRL36 Liner
Installed to 10-Foot Depth

Property Boundary

Storm Sewer

Electrical Utility

Gas Utility

Water Utility

POTENTIOMETRIC SURFACE MAP 10/12/18

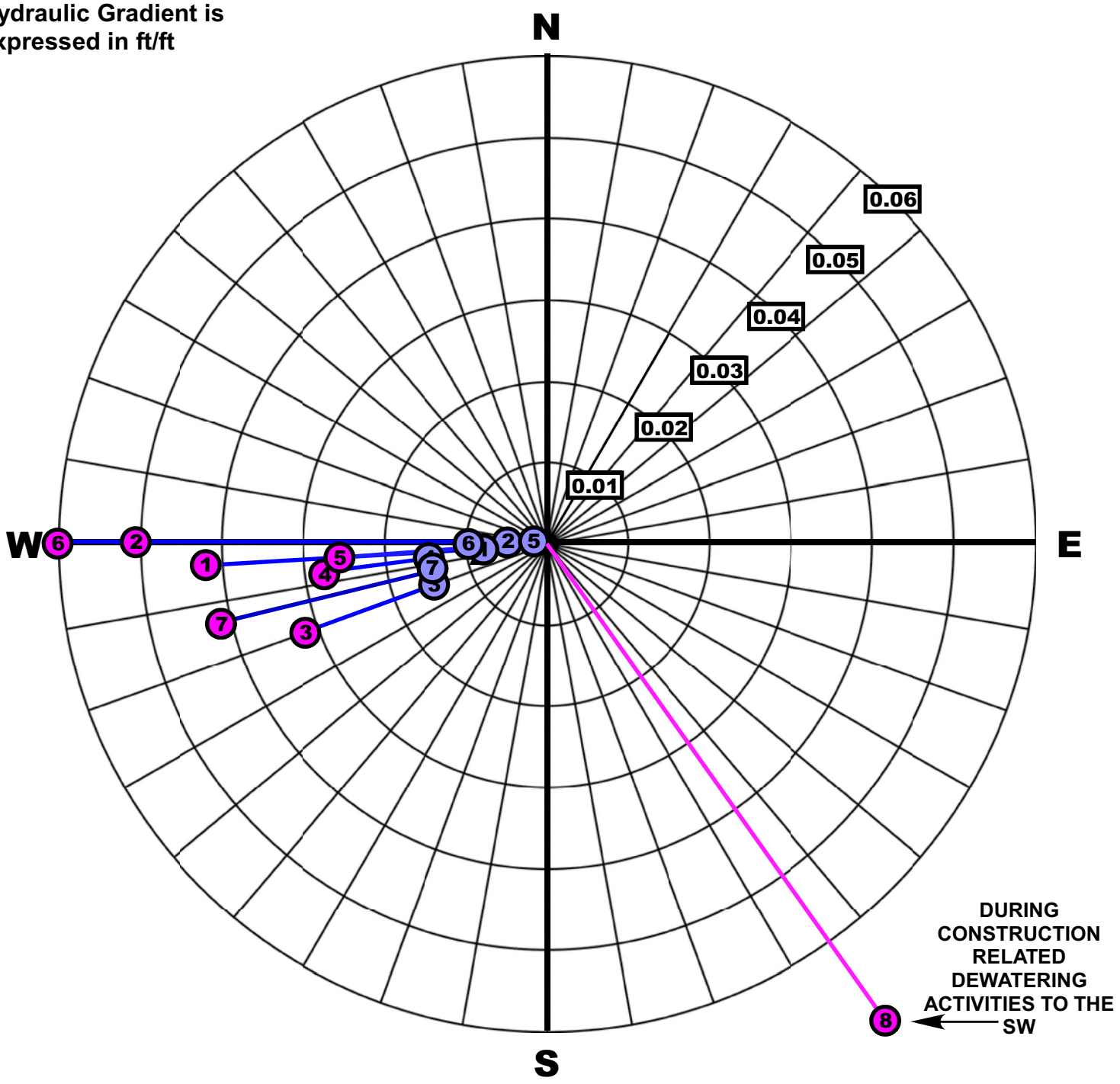
Fife RV Center
3410 Pacific Highway East
Fife, Washington

Date: 11/06/18

By: Nick Gerkin

Figure: 11

Hydraulic Gradient is expressed in ft/ft



HYDRAULIC GRADIENT RANGE AND SHALLOW GROUNDWATER FLOW DIRECTION

1	11/18/16	5	11/30/17
2	02/20/17	6	04/03/18
3	05/23/17	7	07/02/18
4	08/01/17	8	10/12/18

2 Maximum Calculated Gradient

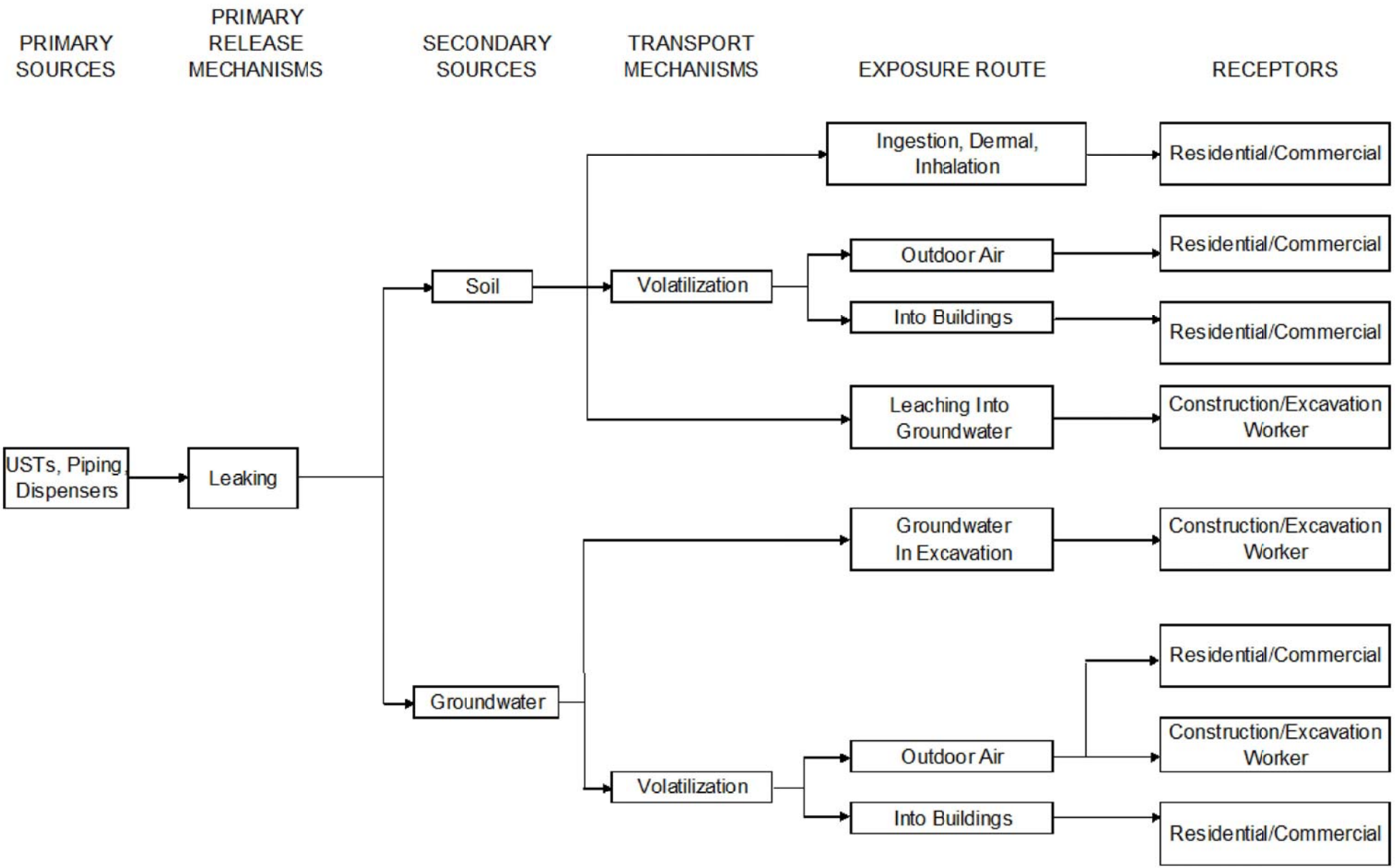
2 Minimum Calculated Gradient

AEROTECH ENVIRONMENTAL CONSULTING

ROSE DIAGRAM

Fife RV Center
3410 Pacific Highway East
Fife, Washington

Date: 11/06/18
By: Nick Gerkin
Figure: 12



AEROTECH ENVIRONMENTAL CONSULTING

CONCEPTUAL SITE MODEL

Fife RV Center
3410 Pacific Highway East
Fife, Washington

Date: 11/09/18
By: Nick Gerkin
Figure: 13

• Tables

TABLE 1
SOIL ANALYTICAL RESULTS
Fife RV Center
3410 Pacific Highway East
Fife, Washington

Associated Earth Sciences, Inc. - Supplemental Phase II Environmental Site Assessment - January 24, 2014

Sample ID	Soil Boring/Point Well ID	Sampling Date	Sample Depth	TPHg	TPHd	TPHo	Benzene	Toluene	Ethyl-benzene	Total Xylenes	EDB	EDC	MTBE	Methylene Chloride	TCE	Naph-thalene	PAHs	PCBs	Total Lead
			Feet BGS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EB 1 2.5-3.5'	EB1	12/19/13	2.5 - 3.5	<20	<50[5]	<250[5]	<0.02	<0.02	<0.02	<0.06	--	--	--	--	--	--	--	--	--
EB 1 9.5-10'	EB1	12/19/13	9.5 - 10	<20	<50[5]	<250[5]	<0.02	<0.02	<0.02	<0.06	--	--	--	--	--	--	--	--	--
EB 2 8.5'	EB2	12/19/13	9	<20	<50[5]	<250[5]	<0.02[4]	<0.02[4]	<0.02[4]	<0.06[4]	--	--	--	--	--	--	--	--	--
EB 3 4-5'	EB3	12/19/13	4 - 5	<20	<50[5]	<250[5]	<0.02	<0.02	<0.02	<0.06	--	--	--	--	--	--	--	--	--
EB 4 4-5'[1]	EB4	12/19/13	4 - 5	**2,000**	660[3,5]	<250[5]	**1.8**	**9.6**	**41**	**120**	--	--	--	--	--	--	--	--	12.3
EB 4 6.5-7.5'	EB4	12/19/13	6.5 - 7.5	3.9	<50[5]	<250[5]	<0.02	0.031	<0.02	<0.06	--	--	--	--	--	--	--	--	--
EB 5 4-5'	EB5	12/19/13	4 - 5	**730**	220[3,5]	<250[5]	**1.4**	4.3	**12**	**50**	--	--	--	--	--	--	--	--	--
EB 5 5.5-6.5'	EB5	12/19/13	5.5 - 6.5	**100**	<50[3,5]	<250[5]	**0.27**	0.75	0.27	0.89	--	--	--	--	--	--	--	--	7.08
EB 5 6.5-7.5'	EB5	12/19/13	6.5 - 7.5	22	<50[5]	<250[5]	**0.41**	0.25	0.038	<0.06	--	--	--	--	--	--	--	--	--
EB 5 9-10'	EB5	12/19/13	9 - 10	**1,300**	560[3,5]	--	<0.02	<0.02	<0.02	<0.06	--	--	--	--	--	--	--	--	--
EB 6 7-7.5'	EB6	12/19/13	7 - 7.5	--	--	<250[5]	**<0.4**	**8**	**16**	5.1	--	--	--	--	--	--	--	--	9
EB 6 9.5-10'	EB6	12/19/13	9.5 - 10	5.7	<50[5]	<250[5]	**0.66**	<0.02	0.035	0.2	--	--	--	--	--	--	--	--	--
EB 6 10-11'	EB6	12/19/13	10 - 11	--	--	--	<0.02	<0.02	<0.02	<0.06	--	--	--	--	--	--	--	--	--
EB 7 5.5-6'	EB7	12/19/13	5.5 - 6	<2	<50[5]	<250[5]	0.027	<0.02	<0.02	<0.06	--	--	--	--	--	--	--	--	--
EB 8 4-5'	EB8	12/19/13	4 - 5	<20	<50[5]	<250[5]	<0.02	<0.02	<0.02	<0.06	--	--	--	--	--	--	--	--	--
EB 8 8-9'	EB8	12/19/13	8 - 9	<20	<50[5]	<250[5]	<0.02	<0.02	<0.02	<0.06	--	--	--	--	--	--	--	--	--
EB 9 3-4'	EB9	12/19/13	3 - 4	4	--	--	<0.02	<0.02	<0.02	<0.06	--	--	--	--	--	--	--	--	--
EB 10 4-4.5'	EB10	12/19/13	4 - 4.5	<2	<50[5]	<250[5]	<0.02	<0.02	<0.02	<0.06	--	--	--	--	--	--	--	--	--
MTCA Method A Cleanup Levels				30	2,000	2,000	0.03	7	6	6	0.005	0.0232*	0.1	0.02	0.03	5	0.1^	1	250

Aerotech Environmental Consulting, Inc. - Site Remedial Excavation Report - November 1, 2016

Sample ID	Soil Boring/Point Well ID	Sampling Date	Sample Depth	TPHg	TPHd	TPHo	Benzene	Toluene	Ethyl-benzene	Total Xylenes	EDB	EDC	MTBE	Methylene Chloride	TCE	Naph-thalene	PAHs	PCBs	Lead
			Feet BGS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
P1(10')	P1	10/03/16	10	9.0	<20	<50	**0.096**	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
P2(5')	P2	10/03/16	5	<5.0	<20	<50	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
P3(10')	P3	10/03/16	10	<5.0	<20	<50	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
P4(5')	P4	10/03/16	5	8.5	<20	<50	<0.020	<0.050	0.10	<0.050	--	--	--	--	--	--	--	--	--
P5(5')	P5	10/03/16	5	**53**	<20	<50	**0.16**	0.071	0.84	0.15	<0.005	<0.02	<0.1	<0.02	<0.02	--	--	--	7.8
P5(10')	P5	10/04/16	10	<5.0	<20	<50	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
P6(10')	P6	10/04/16	10	<5.0	<20	<50	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
P7(3')	P7	10/04/16	3	<5.0	<20	<50	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
P8(10')	P8	10/04/16	10	<5.0	<20	<50	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	
P9(5')	P9	10/04/16	5	**110**	<20	<50	**0.15**	<0.050	5.1	<0.050	--	--	--	--	--	--	--	--	5.2
P9(10')	P9	10/04/16	10	23	<20	<50	<0.020	<0.050	0.34	<0.050	--	--	--	--	--	--	--	--	--
P10(10')	P10	10/04/16	10	<5.0	<20	<50	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
P11(10')	P11	10/04/16	10	<5.0	<20	<50	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
P12(5')	P12	10/05/16	5	**100**	<20	<50	**0.42**	0.18	1.7	0.54	--	--	--	--	--	--	--	--	--
P12(10')	P12	10/05/16	10	<5.0	<20	<50	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
P13(5')	P13	10/05/16	5	6.7	<20	<50	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
P13(10')	P13	10/05/16	10	<5.0	<20	<50	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
P14(5')	P14	10/05/16	5	**60**	<20	<50	**0.15**	0.17	0.096	0.16	--	--	--	--	--	--	--	--	--
P14(10')	P14	10/05/16	10	<5.0	<20	<50	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
P15(10')	P15	10/06/16	10	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
MTCA Method A Cleanup Levels				30	2,000	2,000	0.03	7	6	6	0.005	0.0232*	0.1	0.02	0.03	5	0.1^	1	250

TABLE 1
SOIL ANALYTICAL RESULTS
Fife RV Center
3410 Pacific Highway East
Fife, Washington

Aerotech Environmental Consulting, Inc. - Site Remedial Excavation Report - November 1, 2016 (continued)

Sample ID	Soil Boring/Point Well ID	Sampling Date	Sample Depth	TPHg	TPHd	TPHo	Benzene	Toluene	Ethyl-benzene	Total Xylenes	EDB	EDC	MTBE	Methylene Chloride	TCE	Naph-thalene	PAHs	PCBs	Lead
			Feet BGS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
P16(5')	P16	10/06/16	5	**1,100**	<20	<50	**0.72**	0.072	**7.5**	**32**	--	--	--	--	--	--	--	--	7.0
P16(10')	P16	10/06/16	10	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
P17(5')	P17	10/06/16	5	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
P17(10')	P17	10/06/16	10	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
P18(5')	P18	10/06/16	5	**130**	--	--	**0.29**	<0.050	1.5	2.4	--	--	--	--	--	--	--	--	--
P18(10')	P18	10/06/16	10	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
P19(5')	P19	10/06/16	5	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
P19(10')	P19	10/06/16	10	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
TP1(5')	TP1	10/06/16	5	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
TP2(5')	TP2	10/06/16	5	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
TP2(10')	TP2	10/06/16	10	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
TP3(3')	TP3	10/06/16	3	**2,500**	--	--	**0.34**	0.35	**15**	**10**	<0.005	<0.02	<0.1	<0.02	<0.02	--	--	--	--
TP3(5')	TP3	10/06/16	5	**650**	--	--	**0.53**	5.3	**7.5**	**7.3**	<0.005	<0.02	<0.1	<0.02	<0.02	--	--	--	--
TP3(10')	TP3	10/06/16	10	27	--	--	<0.020	<0.050	0.18	0.25	--	--	--	--	--	--	--	--	--
TP4(3')	TP4	10/06/16	3	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
TP4(5')	TP4	10/06/16	5	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
TP4(10')	TP4	10/06/16	10	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
TP5(5')	TP5	10/06/16	5	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
TP5(10')	TP5	10/06/16	10	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
TP6(5')	TP6	10/06/16	5	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
TP6(10')	TP6	10/06/16	10	12	--	--	**0.071**	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
TP7(5')[1]	TP7	10/06/16	5	**690**	<20	<50	**0.90**	1.9	**32**	0.33	--	--	--	--	--	--	--	--	--
TP8(3')[1]	TP8	10/06/16	3	**60**	--	--	<0.020	<0.050	1.2	<0.050	--	--	--	--	--	--	--	--	--
TP8(5')	TP8	10/06/16	5	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
TP9(5')[1]	TP9	10/06/16	5	**6,090**	<20	<50	**4.0**	4.0	**66**	**130**	<0.005	<0.02	<0.1	<0.02	<0.02	--	--	--	--
TP9(10')[1]	TP9	10/06/16	10	**240**	--	--	**0.59**	1.5	1.6	3.7	--	--	--	--	--	--	--	--	--
TP11(5')	TP11	10/06/16	5	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
TP12(5')	TP12	10/06/16	5	18	--	--	<0.020	<0.050	<0.050	0.082	--	--	--	--	--	--	--	--	--
TP13(5')	TP13	10/06/16	5	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
TP14(5')	TP14	10/06/16	5	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
TP14(10')	TP14	10/06/16	10	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
TP15(5')	TP15	10/07/16	5	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
TP15(10')	TP15	10/07/16	10	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
TP16(3')	TP16	10/07/16	3	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
TP16(5')	TP16	10/07/16	5	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
TP17(3')	TP17	10/07/16	3	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
TP17(5')	TP17	10/07/16	5	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
TP18(3')	TP18	10/07/16	3	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
TP19(3')	TP19	10/07/16	3	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
TP19(5')	TP19	10/07/16	5	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
P20(5')	P20	10/20/16	5	**57**	--	--	**0.065**	0.101	0.15	0.16	--	--	--	--	--	--	--	--	--
P20(10')	P20	10/20/16	10	20	--	--	**0.24**	<0.050	0.09	0.084	--	--	--	--	--	--	--	--	--
P21(5')	P21	10/20/16	5	**1,200**	--	--	**0.65**	0.59	**8.1**	**24**	--	--	--	--	--	--	--	--	--
MTCA Method A Cleanup Levels				30	2,000	2,000	0.03	7	6	6	0.005	0.0232*	0.1	0.02	0.03	5	0.1^	1	250

TABLE 1
SOIL ANALYTICAL RESULTS
Fife RV Center
3410 Pacific Highway East
Fife, Washington

Aerotech Environmental Consulting, Inc. - Site Remedial Excavation Report - November 1, 2016 (continued)

Sample ID	Soil Boring/Point Well ID	Sampling Date	Sample Depth	TPHg	TPHd	TPHo	Benzene	Toluene	Ethyl-benzene	Total Xylenes	EDB	EDC	MTBE	Methylene Chloride	TCE	Naph-thalene	PAHs	PCBs	Lead
			Feet BGS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
TP18(3')	TP18	10/07/16	3	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
TP19(3')	TP19	10/07/16	3	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
TP19(5')	TP19	10/07/16	5	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
P20(5')	P20	10/20/16	5	**57**	--	--	**0.065**	0.101	0.15	0.16	--	--	--	--	--	--	--	--	--
P20(10')	P20	10/20/16	10	20	--	--	**0.24**	<0.050	0.09	0.084	--	--	--	--	--	--	--	--	--
P21(5')	P21	10/20/16	5	**1,200**	--	--	**0.65**	0.59	**8.1**	**24**	--	--	--	--	--	--	--	--	--
P21(10')	P21	10/20/16	10	**66**	--	--	**0.11**	0.14	0.34	0.74	--	--	--	--	--	--	--	--	--
P22(5')	P22	10/20/16	5	**1,100**	--	--	**0.83**	1.9	**20**	**7.9**	--	--	--	--	--	--	--	--	--
P22(10')	P22	10/20/16	10	**34**	--	--	0.029	<0.050	0.43	0.19	--	--	--	--	--	--	--	--	--
P22(12')	P22	10/20/16	12	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
P23(5')	P23	10/20/16	5	**760**	--	--	**0.46**	0.74	4.8	2.4	--	--	--	--	--	--	--	--	--
P23(10')	P23	10/20/16	10	16	--	--	<0.020	<0.050	0.22	0.10	--	--	--	--	--	--	--	--	--
P24(5')	P24	10/20/16	5	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
P24(10')	P24	10/20/16	10	**50**	--	--	**0.26**	<0.050	1.5	0.86	--	--	--	--	--	--	--	--	--
P25(5')	P25	10/21/16	5	**5,200**	--	--	**4.6**	**25**	**35**	**230**	--	--	--	--	--	--	--	--	--
P25(10')	P25	10/21/16	10	**350**	--	--	**0.16**	3.4	1.6	**16**	--	--	--	--	--	--	--	--	--
P26(10')	P26	10/21/16	10	12	--	--	<0.020	<0.050	<0.050	0.41	--	--	--	--	--	--	--	--	--
P27(5')	P27	10/21/16	5	**58**	--	--	<0.020	<0.050	0.095	0.39	--	--	--	--	--	--	--	--	--
P28(5')	P28	10/21/16	5	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
P28(10')	P28	10/21/16	10	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
P29(3')	P29	10/24/16	3	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
P30(5')	P30	10/24/16	5	**200**	--	--	**0.086**	0.19	0.28	0.40	--	--	--	--	--	--	--	--	--
P30(10')	P30	10/24/16	10	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
P31(10')	P31	10/24/16	10	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
P32(3')	P32	10/24/16	3	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
P33(3')	P33	10/24/16	3	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
P34(3')	P34	10/24/16	3	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
MTCA Method A Cleanup Levels				30	2,000	2,000	0.03	7	6	6	0.005	0.0232*	0.1	0.02	0.03	5	0.1^	1	250

Aerotech Environmental Consulting, Inc. - Groundwater Monitoring Well Installation Report - November 17, 2016

Sample ID	Soil Boring/Point Well ID	Sampling Date	Sample Depth	TPHg	TPHd	TPHo	Benzene	Toluene	Ethyl-benzene	Total Xylenes	EDB	EDC	MTBE	Methylene Chloride	TCE	Naph-thalene	PAHs	PCBs	Lead
			Feet BGS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
MW-1 (4.5')	MW-1	11/10/16	4.5	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
MW-1 (10')	MW-1	11/10/16	10	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
MW-2 (4')	MW-2	11/10/16	4	**250**	--	--	**0.53**	0.54	3.8	0.84	--	--	--	--	--	--	--	--	--
MW-2 (9')	MW-2	11/10/16	9	24	--	--	<0.020	0.065	0.6	0.16	--	--	--	--	--	--	--	--	--
MW-3 (4.5')	MW-3	11/10/16	4.5	**13,000**	--	--	**9.3**	2.6	**470**	5.4	--	--	--	--	--	--	--	--	--
MW-3 (9')	MW-3	11/10/16	9	**51**	--	--	<0.020	<0.050	0.27	0.096	--	--	--	--	--	--	--	--	--
MW-3 (14.5')	MW-3	11/10/16	14.5	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
MW-4 (5')	MW-4	11/10/16	5	**55**	--	--	**0.061**	0.27	0.22	0.2	--	--	--	--	--	--	--	--	--
MW-4 (10.5)	MW-4	11/10/16	10.5	**150**	--	--	**0.51**	1.2	1.1	1.7	--	--	--	--	--	--	--	--	--
MW-4 (14.5)	MW-4	11/10/16	14.5	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
MTCA Method A Cleanup Levels				30	2,000	2,000	0.03	7	6	6	0.005	0.0232*	0.1	0.02	0.03	5	0.1^	1	250

TABLE 1
SOIL ANALYTICAL RESULTS
Fife RV Center
3410 Pacific Highway East
Fife, Washington

Aerotech Environmental Consulting, Inc. - Groundwater Monitoring Well Installation Report - November 17, 2016 (continued)

Sample ID	Soil Boring/Point Well ID	Sampling Date	Sample Depth	TPHg	TPHd	TPHo	Benzene	Toluene	Ethyl-benzene	Total Xylenes	EDB	EDC	MTBE	Methylene Chloride	TCE	Naph-thalene	PAHs	PCBs	Lead
			Feet BGS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
MW-5 (6')	MW-5	11/10/16	6	**34**	--	--	**0.090**	0.66	0.25	0.31	--	--	--	--	--	--	--	--	--
MW-5 (10')	MW-5	11/10/16	10	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
MW-6 (9')	MW-6	11/11/16	9	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
MW-6 (10.5')	MW-6	11/11/16	10.5	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
MTCA Method A Cleanup Levels				30	2,000	2,000	0.03	7	6	6	0.005	0.0232*	0.1	0.02	0.03	5	0.1^	1	250

Aerotech Environmental Consulting, Inc. - Upgradient Delineation Groundwater Monitoring Well Installation Report - August 16, 2017

Sample ID	Soil Boring/Point Well ID	Sampling Date	Sample Depth	TPHg	TPHd	TPHo	Benzene	Toluene	Ethyl-benzene	Total Xylenes	EDB	EDC	MTBE	Methylene Chloride	TCE	Naph-thalene	PAHs	PCBs	Lead
			Feet BGS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
B1(5)	B1	07/13/17	5	**1,200**	350[2]	<50	**2.1**	2.4	**51**	**26**	<0.005	<0.02	<0.1	**0.22**	**0.29**	0.97	0.0068	<0.20	14
B1(9)	B1	07/13/17	9	--	--	--	--	--	--	--	<0.005	<0.02	<0.1	<0.02	<0.02	--	--	--	--
MW7(11)	MW7	07/13/17	11	<5.0	<20	<50	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
MW8(5)	MW8	07/13/17	5	--	<20	<50	--	--	--	--	--	--	--	--	--	--	--	--	--
MW8(10)	MW8	07/13/17	10	<5.0	<20	<50	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	2.9
MW9(3)	MW9	07/13/17	3	<5.0	<20	<50	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	37
MTCA Method A Cleanup Levels				30	2,000	2,000	0.03	7	6	6	0.005	0.0232*	0.1	0.02	0.03	5	0.1^	1	250

Aerotech Environmental Consulting, Inc. - Downgradient Groundwater Monitoring Well Installation Report - April 27, 2018

Sample ID	Soil Boring/Point Well ID	Sampling Date	Sample Depth	TPHg	TPHd	TPHo	Benzene	Toluene	Ethyl-benzene	Total Xylenes	EDB	EDC	MTBE	Methylene Chloride	TCE	Naph-thalene	PAHs	PCBs	Lead
			Feet BGS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
MW10(4)	MW10	02/23/18	4	<5.0	<20	<50	<0.020	<0.050	<0.050	<0.050	<0.005	<0.02	<0.1	<0.02	<0.02	<0.10	<0.10	<0.20	5.3
MW10(9)	MW10	02/23/18	9	14	<20	<50	<0.020	<0.050	0.110	<0.050	<0.005	<0.02	<0.1	<0.02	<0.02	<0.10	<0.10	<0.20	6.9
MW10(14)	MW10	02/23/18	14	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
MW11(3.3)	MW11	02/23/18	3.3	<5.0	<20	<50	<0.020	<0.050	<0.050	<0.050	<0.005	<0.02	<0.1	<0.02	<0.02	<0.10	<0.10	<0.20	16
MW11(6.3)	MW11	02/23/18	6.3	6.3	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
MW11(9.3)	MW11	02/23/18	9.3	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
MW12(4.5)	MW12	02/23/18	4.5	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	<0.10	<0.10	--	7.9
MW12(7)	MW12	02/23/18	7	**32**	<20	<50	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
MW12(12.5)	MW12	02/23/18	12.5	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
MTCA Method A Cleanup Levels				30	2,000	2,000	0.03	7	6	6	0.005	0.0232*	0.1	0.02	0.03	5	0.1^	1	250

Aerotech Environmental Consulting, Inc. - Remedial Investigation Report - November 09, 2018

Sample ID	Soil Boring/Point Well ID	Sampling Date	Sample Depth	TPHg	TPHd	TPHo	Benzene	Toluene	Ethyl-benzene	Total Xylenes	EDB	EDC	MTBE	Methylene Chloride	TCE	Naph-thalene	PAHs	PCBs	Lead
			Feet BGS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
B2(5.5)	B2	07/03/18	5.5	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
B3(7)	B3	07/03/18	7	**70**	--	--	**0.070**	0.16	2.4	0.99	--	--	--	--	--	--	--	--	--
B3(12)	B3	07/03/18	12	6.4	--	--	<0.020	<0.050	0.075	<0.050	--	--	--	--	--	--	--	--	--
B4(6)	B4	07/03/18	6	9.2	--	--	<0.020	<0.050	0.075	<0.050	--	--	--	--	--	--	--	--	--
B5(3.5)	B5	07/03/18	3.5	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
B5(6)	B5	07/03/18	6	<5.0	--	--	<0.020	<0.050	<0.050	<0.050	--	--	--	--	--	--	--	--	--
B6(6)	B6	07/03/18	6	**190**	--	--	**0.59**	1.2	3.1	1.1	--	--	--	--	--	--	--	--	--
B6(7)	B6	07/03/18	7	**120**			**0.12**	0.32	4.2	<0.050	--	--	--	--	--	--	--	--	--
MTCA Method A Cleanup Levels				30	2,000	2,000	0.03	7	6	6	0.005	0.0232*	0.1	0.02	0.03	5	0.1^	1	250

TABLE 1
SOIL ANALYTICAL RESULTS
Fife RV Center
3410 Pacific Highway East
Fife, Washington

Aerotech Environmental Consulting, Inc. - Remedial Investigation Report - November 09, 2018 (continued)

Sample ID	Soil Boring/Point Well ID	Sampling Date	Sample Depth	TPHg	TPHd	TPHo	Benzene	Toluene	Ethyl-benzene	Total Xylenes	EDB	EDC	MTBE	Methylene Chloride	TCE	Naph-thalene	PAHs	PCBs	Lead
			Feet BGS	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
B7(5)	B7	07/03/18	5	**2,400**	--	--	**0.48**	1.6	**20**	**34**	--	--	--	--	--	--	--	--	--
B7(7)	B7	07/03/18	7	**920**	--	--	**6.0**	0.86	**14**	**7.0**	--	--	--	--	--	--	--	--	--
B8(4)	B8	07/03/18	4	**350**	--	--	**0.70**	1.4	3.0	1.6	--	--	--	--	--	--	--	--	--
B9(4)	B9	07/03/18	4	**1,200**	--	--	**2.5**	2.8	7.4	1.8	--	--	--	--	--	--	--	--	--
B9(5)	B9	07/03/18	5	**2,800**	--	--	**2.2**	2	**13**	**26**	--	--	--	--	--	--	--	--	--
B9(6)	B9	07/03/18	6	**1,100**	--	--	**3.9**	2.0	**23**	4.4	--	--	--	--	--	--	--	--	--
B9(8)	B9	07/03/18	8	24	--	--	<0.020	<0.050	0.49	0.11									
MTCA Method A Cleanup Levels				30	2,000	2,000	0.03	7	6	6	0.005	0.0232*	0.1	0.02	0.03	5	0.1^	1	250

EXPLANATION

MTCA = Model Toxic Control Act Cleanup Level (WAC173-340-900)
BGS = Below Ground Surface mg/kg = milligram of analyte per kilogram of soil j
< = not detected at indicated Laboratory Detection Limits -- = not analyzed
Benzene , Toluene, Ethylbenzene, Xylenes by EPA Method 8021B
TPHg - Total Petroleum Hydrocarbons - Gasoline by NWTPH-Gx
TPHd - Total Petroleum Hydrocarbons - Diesel by NWTPH-Dx
TPHo - Total Petroleum Hydrocarbons - Motor Oil by NWTPH-Dx extended
MTBE = Methyl-tert-butyl-ether EDC = 1,2-Dichloroethane EDB = 1,2-Dibromoethane TCE = Trichloroethene Methylene Chloride; by EPA Method 8260B
Lead by EPA Method 7010
ND = Not Detected (minimum detection limit unknown)
Bolded numbers and red-shaded cells denote concentrations above the MTCA Method A Cleanup Levels for soil
* = Method B Cleanup Level, Ecology does not have a Method A Cleanup Level designated for EDC
1 = Soil from which this sample originated was removed during the Remedial Excavation
2 = Unidentifiable petroleum product in diesel range, possibly creosote (see lab report for further detail and chromatograph)
3 = The sample chromatographic pattern does not resemble the fuel standard used for quantitation.
4 = The sample was received in a container not approved by the method. The value reported should be considered an estimate.
5 = The sample extract was passed through a silica gel column prior to analyses.
^ = Effective concentration using Toxic Equivalency Factor per WAC 173-340-708{e}: SUM(Benzo(a)pyrene (x1), Benzo(a)anthracine (x0.1), Benzo(b)fluoranthene (x0.1), Benzo(k)fluoranthene (x0.1), Chrysene (x0.01), Dibenz(a,h)anthracene (x0.1), Indeno(1,2,3-cd)pyrene (x0.1)

TABLE 2
SURFACE WATER ANALYTICAL RESULTS
Fife RV Center
3410 Pacific Highway East
Fife, Washington

Aerotech Environmental Consulting, Inc. - Remedial Investigation Report - November 09, 2018

Sample ID	Location Description	Sampling Date	TPHg	TPHd	TPHo	Benzene	Toluene	Ethyl- benzene	Total Xylenes
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
POND-NE	NE BioSwale - Down the Bank from MW10	02/23/18	140	--	--	<1.0	<1.0	1.3	<1.0
POND-EXIT	Perforated Casing Where BioSwale Water Exits to SW Drainiage Ditch	02/23/18	<100	--	--	<1.0	<1.0	<1.0	<1.0
MTCA Method A Cleanup Levels			800	500	500	5	1,000	700	1,000

EXPLANATION
MTCA = Model Toxic Control Act Cleanup Level (WAC173-340-900)
BGS = Below Ground Surface µg/L = microgram of analyte per liter of water
< = not detected at indicated Laboratory Detection Limits -- = not analyzed
Benzene, Toluene, Ethylbenzene, and Total Xylenes
TPHg - Total Petroleum Hydrocarbons - Gasoline by NWTPH-Gx
TPHd - Total Petroleum Hydrocarbons - Diesel by NWTPH-Dx
TPHo - Total Petroleum Hydrocarbons - Motor Oil by NWTPH-Dx extended
Bolded numbers and red-shaded cells denote concentrations above the MTCA Method A Cleanup Levels for surface Water.

TABLE 3
GROUNDWATER ANALYTICAL RESULTS
Fife RV Center
3410 Pacific Highway East
Fife, Washington

MW1

Well Depth	Sampling Date	Ground Water Level	Elevation (TOC north)	Water Level Elevation	TPHg	TPHd	TPHo	Benzene	Toluene	Ethyl-benzene	Xylenes	EDB	EDC	MTBE	HVOCs	Naph-thalene	cPAHs*	Dissolved Lead	Total Lead
Feet		Feet Below TOC	Feet Above MSL	Feet Above MSL	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
14.4	11/18/16	1.37	8.37	7.00	<100	<200	<500	<1.0	<1.0	<1.0	<1.0	<0.01	<1.0	<5.0	--	--	--	<2.0	<2.0
	02/20/17	1.19	8.37	7.18	<100	<200	<500	<1.0	<1.0	<1.0	<1.0	<0.01	<1.0	<5.0	--	--	--	<2.0	<2.0
	05/23/17	1.72	8.37	6.65	<100	<200	<500	<1.0	<1.0	<1.0	<1.0	<0.01	<1.0	<5.0	--	--	--	<2.0	<2.0
	08/01/17	2.92	8.37	5.45	<100	<200	<500	<1.0	<1.0	<1.0	<1.0	<0.01	<1.0	<5.0	ND	<0.1	<0.1	--	<2.0
	11/30/17	1.37	8.37	7.00	<100	<200	<500	<1.0	<1.0	<1.0	<1.0	--	--	--	--	--	--	--	<2.0
	04/03/18	1.97	8.37	6.40	<100	<200	<500	<1.0	<1.0	<1.0	<1.0	--	--	--	--	--	--	--	<2.0
	07/03/18	2.71	8.37	5.66	<100	<200	<500	<1.0	<1.0	<1.0	<1.0	--	--	--	--	--	--	--	<2.0
	10/12/18	12.21	8.37	-3.84	Pumped Dry During Low-Flow Sampling Procedures - Site Dewatered from DOT Off-Ramp Construction Activities														
		MTCA Method A Cleanup Levels			800	500	500	5	1,000	700	1,000	0.01	5	20	Variable	160	0.1	15	15

MW2

Well Depth	Sampling Date	Ground Water Level	Elevation (TOC north)	Water Level Elevation	TPHg	TPHd	TPHo	Benzene	Toluene	Ethyl-benzene	Xylenes	EDB	EDC	MTBE	HVOCs	Naph-thalene	cPAHs*	Dissolved Lead	Total Lead
Feet		Feet Below TOC	Feet Above MSL	Feet Above MSL	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
14.2	11/18/16	2.53	9.40	6.87	**18,000**	<200	<500	**470**	18	210	200	<0.01	<1.0	<5.0	--	--	--	<2.0	<2.0
	02/20/17	2.25	9.40	7.15	**29,000**	<200	<500	**720**	26	490	700	<0.01	<1.0	<5.0	--	--	--	<2.0	<2.0
	05/23/17	3.02	9.40	6.38	**10,000**	<200	<500	**300**	18	93	400	<0.01	<1.0	<5.0	--	--	--	<2.0	<2.0
	08/01/17	4.40	9.40	5.00	**25,000**	<200	<500	**980**	62	540	**1,300**	<0.01	<1.0	<5.0	ND	4.3	<0.1	--	<2.0
	11/30/17	2.43	9.40	6.97	**64,000**	<200	<500	**2,800**	94	**1,800**	**3,000**	<0.01	<1.0	<5.0	ND	25	<0.1	--	<2.0
	04/03/18[1]	3.32	9.57	6.25	**2,000**	<200	<500	**65**	1	<1.0	120	<0.01	<1.0	<5.0	ND	1.1	<0.1	--	<2.0
	07/03/18	4.21	9.57	5.36	**1,100**	<200	<500	**35**	<1.0	<1.0	28	<0.01	<1.0	<5.0	ND	0.28	<0.1	--	<2.0
	10/12/18	13.48	9.57	-3.91	Insufficient Water Volume for Low-Flow Sampling - Site Dewatered from DOT Off-Ramp Construction Activities														
		MTCA Method A Cleanup Levels			800	500	500	5	1,000	700	1,000	0.01	5	20	Variable	160*	0.1	15	15

MW3

Well Depth	Sampling Date	Ground Water Level	Elevation (TOC north)	Water Level Elevation	TPHg	TPHd	TPHo	Benzene	Toluene	Ethyl-benzene	Xylenes	EDB	EDC	MTBE	HVOCs	Naph-thalene	cPAHs*	Dissolved Lead	Total Lead
Feet		Feet Below TOC	Feet Above MSL	Feet Above MSL	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
14.6	11/18/16	2.19	9.43	7.24	**42,000**	<200	<500	**130**	16	**2,800**	120	<0.01	<1.0	<5.0	--	--	--	<2.0	<2.0
	02/20/17	2.02	9.43	7.41	**10,000**	<200	<500	**28**	<1,000	620	92	<0.01	<1.0	<5.0	--	--	--	<2.0	<2.0
	05/23/17	2.65	9.43	6.78	**6,700**	<200	<500	**21**	1.4	210	57	<0.01	<1.0	<5.0	--	--	--	<2.0	<2.0
	08/01/17	4.05	9.43	5.38	620	<200	<500	<1.0	<1.0	2.4	1.3	<0.01	<1.0	<5.0	ND	0.60	<0.1	--	<2.0
	11/30/17	2.22	9.43	7.21	**830**	<200	<500	<1.0	<1.0	3.9	1.7	<0.01	<1.0	<5.0	ND	0.62	<0.1	--	<2.0
	04/03/18	2.85	9.43	6.58	210	<200	<500	<1.0	<1.0	<1.0	<1.0	<0.01	<1.0	<5.0	ND	1.4	<0.1	--	<2.0
	07/03/18	3.78	9.43	5.65	240	<200	<500	<1.0	<1.0	<1.0	2.1	<0.01	<1.0	<5.0	ND	<0.1	<0.1	--	<2.0
	10/12/18	12.60	9.43	-3.17	Insufficient Water Volume for Low-Flow Sampling - Site Dewatered from DOT Off-Ramp Construction Activities														
		MTCA Method A Cleanup Levels			800	500	500	5	1,000	700	1,000	0.01	5	20	Variable	160*	0.1	15	15

MW4

Well Depth	Sampling Date	Ground Water Level	Elevation (TOC north)	Water Level Elevation	TPHg	TPHd	TPHo	Benzene	Toluene	Ethyl-benzene	Xylenes	EDB	EDC	MTBE	HVOCs	Naph-thalene	cPAHs*	Dissolved Lead	Total Lead
Feet		Feet Below TOC	Feet Above MSL	Feet Above MSL	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
14.5	11/18/16	3.31	10.12	6.81	**1,900**	<200	<500	**140**	<1.0	13	7.70	<0.01	<1.0	<5.0	--	--	--	<2.0	<2.0
	02/20/17	3.08	10.12	7.04	**6,800**	<200	<500	**220**	35	340	22	<0.01	<1.0	<5.0	--	--	--	<2.0	<2.0
	05/23/17	3.88	10.12	6.24	**1,600**	<200	<500	**120**	6.0	12	3.8	<0.01	<1.0	<5.0	--	--	--	<2.0	<2.0
	08/01/17	5.61	10.12	4.51	**2,100**	<200	<500	**94**	4.4	170	1.0	<0.01	<1.0	<5.0	ND	<0.1	<0.1	--	<2.0
	11/30/17	3.15	10.12	6.97	**6,400**	<200	<500	**320**	17	370	58	<0.01	<1.0	<5.0	ND	9.90	<0.1	--	<2.0
	04/03/18	4.10	10.12	6.02	**4,100**	<200	<500	**130**	6.3	270	1.0	<0.01	<1.0	<5.0	ND	13	<0.1	--	<2.0
	07/03/18	5.23	10.12	4.89	**1,000**	<200	<500	**16**	1.2	<1.0	1.6	<0.01	<1.0	<5.0	ND	10	<0.1	--	<2.0
	10/12/18	14.27	10.12	-4.15	Insufficient Water Volume for Low-Flow Sampling - Site Dewatered from DOT Off-Ramp Construction Activities														
		MTCA Method A Cleanup Levels			800	500	500	5	1,000	700	i	0.01	5	20	Variable	160*	0.1	15	15

TABLE 3
GROUNDWATER ANALYTICAL RESULTS
Fife RV Center
3410 Pacific Highway East
Fife, Washington

MW5

Well Depth	Sampling Date	Ground Water Level	Elevation (TOC north)	Water Level Elevation	TPHg	TPHd	TPHo	Benzene	Toluene	Ethyl-benzene	Xylenes	EDB	EDC	MTBE	HVOCs	Naph-thalene	cPAHs*	Dissolved Lead	Total Lead
Feet		Feet Below TOC	Feet Above MSL	Feet Above MSL	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
17.5	11/18/16	5.17	11.27	6.10	**2,100**	<200	<500	**250**	1.6	5.6	2.1	<0.01	<1.0	<5.0	--	--	--	<2.0	<2.0
	02/20/17	5.16	11.27	6.11	700	<200	<500	**52**	<1.0	2.2	2.4	<0.01	<1.0	<5.0	--	--	--	<2.0	<2.0
	05/23/17	6.34	11.27	4.93	<100	<200	<500	<1.0	<1.0	<1.0	<1.0	<0.01	<1.0	<5.0	--	--	--	<2.0	<2.0
	08/01/17	8.31	11.27	2.96	<100	<200	<500	<1.0	<1.0	<1.0	<1.0	<0.01	<1.0	<5.0	ND	<0.1	<0.1	--	<2.0
	11/30/17	5.07	11.27	6.20	<100	<200	<500	<1.0	<1.0	<1.0	<1.0	<0.01	<1.0	<5.0	ND	<0.1	<0.1	--	<2.0
	04/03/18	6.13	11.27	5.14	110	<200	<500	3.2	<1.0	<1.0	<1.0	<0.01	<1.0	<5.0	ND	2.5	<0.1	--	<2.0
	07/03/18	7.90	11.27	3.37	<100	<200	<500	<1.0	<1.0	<1.0	<1.0	<0.01	<1.0	<5.0	ND	1.9	<0.1	--	<2.0
	10/12/18	15.02	11.27	-3.75	Pumped Dry During Low-Flow Sampling Procedures - Site Dewatered from DOT Off-Ramp Construction Activities														
		MTCA Method A Cleanup Levels			800	500	500	5	1,000	700	1,000	0.01	5	20	Variable	160*	0.1	15	15

MW6

Well Depth	Sampling Date	Ground Water Level	Elevation (TOC north)	Water Level Elevation	TPHg	TPHd	TPHo	Benzene	Toluene	Ethyl-benzene	Xylenes	EDB	EDC	MTBE	HVOCs	Naph-thalene	cPAHs*	Dissolved Lead	Total Lead
Feet		Feet Below TOC	Feet Above MSL	Feet Above MSL	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
17.5	11/18/16	4.72	11.40	6.68	<100	<200	<500	<1.0	<1.0	<1.0	<1.0	<0.01	<1.0	<5.0	--	--	--	<2.0	<2.0
	02/20/17	4.69	11.40	6.71	<100	<200	<500	<1.0	<1.0	<1.0	<1.0	<0.01	<1.0	<5.0	--	--	--	<2.0	<2.0
	05/23/17	5.85	11.40	5.55	<100	<200	<500	<1.0	<1.0	<1.0	<1.0	<0.01	<1.0	<5.0	--	--	--	<2.0	<2.0
	08/01/17	7.32	11.40	4.08	<100	<200	<500	<1.0	<1.0	<1.0	<1.0	<0.01	<1.0	<5.0	ND	<0.1	<0.1	--	<2.0
	11/30/17	6.72	11.40	4.68	<100	<200	<500	<1.0	<1.0	<1.0	<1.0	<0.01	<1.0	<5.0	--	--	--	--	<2.0
	04/03/18	5.67	11.40	5.73	<100	<200	<500	<1.0	<1.0	<1.0	<1.0	<0.01	<1.0	<5.0	ND	<0.1	<0.1	--	<2.0
	07/03/18	6.91	11.40	4.49	<100	<200	<500	<1.0	<1.0	<1.0	<1.0	<0.01	<1.0	<5.0	ND	<0.1	<0.1	--	<2.0
	10/12/18	15.30	11.40	-3.90	<100	--	--	<1.0	<1.0	<1.0	<1.0	--	--	--	--	--	--	--	--
		MTCA Method A Cleanup Levels			800	500	500	5	1,000	700	1,000	0.01	5	20	Variable	160*	0.1	15	15

MW7

Well Depth	Sampling Date	Ground Water Level	Elevation (TOC north)	Water Level Elevation	TPHg	TPHd	TPHo	Benzene	Toluene	Ethyl-benzene	Xylenes	EDB	EDC	MTBE	HVOCs	Naph-thalene	cPAHs*	Dissolved Lead	Total Lead
Feet		Feet Below TOC	Feet Above MSL	Feet Above MSL	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
14.2	08/01/17	5.83	10.09	4.26	<100	<200	<500	<1.0	<1.0	<1.0	<1.0	<0.01	<1.0	<5.0	ND	<0.1	<0.1	--	<2.0
	11/30/17	3.12	10.09	6.97	<100	<200	<500	<1.0	<1.0	<1.0	<1.0	<0.01	<1.0	<5.0	--	--	--	--	<2.0
	04/03/18	4.12	10.09	5.97	<100	<200	<500	<1.0	<1.0	<1.0	<1.0	--	--	--	--	--	--	--	<2.0
	07/03/18	5.28	10.09	4.81	<100	<200	<500	<1.0	<1.0	<1.0	<1.0	--	--	--	--	--	--	--	<2.0
	10/12/18	12.51	10.09	-2.42	Insufficient Water Volume for Low-Flow Sampling - Site Dewatered from DOT Off-Ramp Construction Activities														
		MTCA Method A Cleanup Levels			800	500	500	5	1,000	700	1,000	0.01	5	20	Variable	160*	0.1	15	15

MW8

Well Depth	Sampling Date	Ground Water Level	Elevation (TOC north)	Water Level Elevation	TPHg	TPHd	TPHo	Benzene	Toluene	Ethyl-benzene	Xylenes	EDB	EDC	MTBE	HVOCs	Naph-thalene	cPAHs*	Dissolved Lead	Total Lead
Feet		Feet Below TOC	Feet Above MSL	Feet Above MSL	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
14.1	08/01/17	5.26	10.26	5.00	<100	<200	<500	<1.0	<1.0	<1.0	<1.0	<0.01	<1.0	<5.0	ND	<0.1	<0.1	--	<2.0
	11/30/17	3.16	10.26	7.10	<100	<200	<500	<1.0	<1.0	<1.0	<1.0	<0.01	<1.0	<5.0	--	--	--	--	<2.0
	04/03/18	3.78	10.26	6.48	<100	<200	<500	<1.0	<1.0	<1.0	<1.0	--	--	--	--	--	--	--	<2.0
	07/03/18	4.92	10.26	5.34	<100	<200	<500	<1.0	<1.0	<1.0	<1.0	--	--	--	--	--	--	--	<2.0
	10/12/18	12.46	10.26	-2.20	Insufficient Water Volume for Low-Flow Sampling - Site Dewatered from DOT Off-Ramp Construction Activities														
		MTCA Method A Cleanup Levels			800	500	500	5	1,000	700	1,000	0.01	5	20	Variable	160*	0.1	15	15

TABLE 3
GROUNDWATER ANALYTICAL RESULTS
Fife RV Center
3410 Pacific Highway East
Fife, Washington

MW9

Well Depth	Sampling Date	Ground Water Level	Elevation (TOC north)	Water Level Elevation	TPHg	TPHd	TPHo	Benzene	Toluene	Ethyl-benzene	Xylenes	EDB	EDC	MTBE	HVOCs	Naph-thalene	cPAHs*	Dissolved Lead	Total Lead
Feet		Feet Below TOC	Feet Above MSL	Feet Above MSL	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
14.3	08/01/17	3.57	8.84	5.27	<100	<200	<500	<1.0	<1.0	<1.0	<1.0	<0.01	<1.0	<5.0	ND	<0.1	<0.1	--	<2.0
	11/30/17	1.58	8.84	7.26	<100	<200	<500	<1.0	<1.0	<1.0	<1.0	<0.01	<1.0	<5.0	--	--	--	--	<2.0
	04/03/18	3.25	8.84	5.59	<100	<200	<500	<1.0	<1.0	<1.0	<1.0	--	--	--	--	--	--	--	<2.0
	07/03/18	3.47	8.84	5.37	<100	<200	<500	<1.0	<1.0	<1.0	<1.0	--	--	--	--	--	--	--	<2.0
	10/12/18	11.50	8.84	-2.66	Insufficient Water Volume for Low-Flow Sampling - Site Dewatered from DOT Off-Ramp Construction Activities														
		MTCA Method A Cleanup Levels			800	500	500	5	1,000	700	1,000	0.01	5	20	Variable	160	0.1	15	15

MW10

Well Depth	Sampling Date	Ground Water Level	Elevation (TOC north)	Water Level Elevation	TPHg	TPHd	TPHo	Benzene	Toluene	Ethyl-benzene	Xylenes	EDB	EDC	MTBE	HVOCs	Naph-thalene	cPAHs*	Dissolved Lead	Total Lead
Feet		Feet Below TOC	Feet Above MSL	Feet Above MSL	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
	04/03/18	7.01	12.94	5.93	530	<200	<500	**17**	2.30	<1.0	1.20	<0.01	<1.0	<5.0	ND	0.40	<0.1	--	<2.0
	07/03/18	7.90	12.94	5.04	610	<200	<500	**42**	1.0	<1.0	<1.0	<0.01	<1.0	<5.0	ND	0.94	<0.1	--	<2.0
	10/12/18	11.42	12.94	1.52	**15,000**	--	--	**190**	7.5	570	77	--	--	--	--	--	--	--	--
		MTCA Method A Cleanup Levels			800	500	500	5	1,000	700	1,000	0.01	5	20	Variable	160*	0.1	15	15

MW11

Well Depth	Sampling Date	Ground Water Level	Elevation (TOC north)	Water Level Elevation	TPHg	TPHd	TPHo	Benzene	Toluene	Ethyl-benzene	Xylenes	EDB	EDC	MTBE	HVOCs	Naph-thalene	cPAHs*	Dissolved Lead	Total Lead
Feet		Feet Below TOC	Feet Above MSL	Feet Above MSL	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
	04/03/18	4.59	9.12	4.53	<100	<200	<500	<1.0	<1.0	<1.0	<1.0	<0.01	<1.0	<5.0	ND	<0.1	<0.1	--	<2.0
	07/03/18	5.94	9.12	3.18	120	<200	<500	<1.0	<1.0	<1.0	<1.0	<0.01	<1.0	<5.0	ND	<0.1	<0.1	--	<2.0
	10/12/18	7.18	9.12	1.94	120	--	--	<1.0	<1.0	<1.0	<1.0	--	--	--	--	--	--	--	--
		MTCA Method A Cleanup Levels			800	500	500	5	1,000	700	1,000	0.01	5	20	Variable	160*	0.1	15	15

MW12

Well Depth	Sampling Date	Ground Water Level	Elevation (TOC north)	Water Level Elevation	TPHg	TPHd	TPHo	Benzene	Toluene	Ethyl-benzene	Xylenes	EDB	EDC	MTBE	HVOCs	Naph-thalene	cPAHs*	Dissolved Lead	Total Lead
Feet		Feet Below TOC	Feet Above MSL	Feet Above MSL	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
	04/03/18	7.05	11.74	4.69	240	<200	<500	**60**	<1.0	<1.0	<1.0	<0.01	<1.0	<5.0	ND	<0.1	<0.1	--	<2.0
	07/03/18	8.46	11.74	3.28	790	<200	<500	**170**	1.3	<1.0	4.0	<0.01	<1.0	<5.0	ND	<0.1	<0.1	--	<2.0
	10/12/18	11.04	11.74	0.70	**1,100**	--	--	**64**	1.4	<1.0	2.1	--	--	--	--	--	--	--	--
		MTCA Method A Cleanup Levels			800	500	500	5	1,000	700	1,000	0.01	5	20	Variable	160	0.1	15	15

EXPLANATION

MTCA = Model Toxic Control Act Cleanup Level (WAC173-340-900)

TOC = Top of Casing MSL = Mean Sea Level

< = not detected at indicated Laboratory Detection Limits -- not analyzed NM = Not Measured

TPHg - Total Petroleum Hydrocarbons - Gasoline by Method NWTPH-Gx

TPHd - Total Petroleum Hydrocarbons - Diesel by Method NWTPH-Dx TPHmo - Total Petroleum Hydrocarbons - Motor Oil by Method NWTPH-Dx extended

Benzene, Toluene, Ethylbenzene and Xylenes by EPA Method 8021B

MTBE = Methyl-tert-butyl-ether EDC = 1,2-Dichloroethane EDB = 1,2-Dibromoethane HVOCs = Halogenated Volatile Organic Compounds; by EPA Method 8260B

PAHs (including Naphthalene) by EPA Method 8270

Total and Dissolved Lead by EPA Method 7010

* = Effective concentration using Toxic Equivalency Factor per WAC 173-340-708{e}: SUM(Benzo(a)pyrene (x1), Benzo(a)anthracine (x0.1), Benzo(b)fluoranthene (x0.1), Benzo(k)fluoranthene (x0.1), Chrysene (x0.01), Dibenz(a,h)anthracene (x0.1), Indeno(1,2,3-cd)pyrene (x0.1)

1 = Wells surveyed/resurveyed on 02/28/18

ND = Not Detected above Laboratory Minimum Reporting Limits or applicable cleanup levels (see laboratory report for further detail)

Bolded numbers and red-shaded cells denote concentrations above the MTCA Cleanup Levels for groundwater

TABLE 4
GRAB GROUNDWATER ANALYTICAL RESULTS
Fife RV Center
3410 Pacific Highway East
Fife, Washington

Associated Earth Sciences, Inc. - Supplemental Phase II Environmental Site Assessment - January 24, 2014

Sample ID	Soil Boring/Point Well ID	Sampling Date	DTW	TPHg	TPHd	TPHo	Benzene	Toluene	Ethylbenzene	Total Xylenes	Methylene Chloride	Naphthalene	1,3,5-Trimethylbenze
			Feet BGS	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EB 1 W	EB 1	12/19/13	7	<100	--	--	<1	8.8	1	9.2	--	--	--
EB 2 W	EB 2	12/19/13	7	<100	--	--	<1	6.7	<1	6.4	--	--	--
EB 3 W	EB 3	12/19/13	7	<100	<50	350	<1	8.9	1.2	9.2	--	--	--
EB 4 W	EB 4	12/19/13	4	**49,000**	**6000**[1]	<250	**1,100**	420	**2,800**	**6,000**	--	--	--
EB 5 W	EB 5	12/19/13	4	**16,000**	420[1]	<250	**430**	200	510	**1,970**	58[3]	130	**210**
EB 6 W	EB 6	12/19/13	5	**15,000**	**3800**[1]	<250	**510**	22	**1,500**	40	<5	**540**	4.4
EB 7 W	EB 7	12/19/13	6	**2,900**	**520**[1]	<250	**260**[2]	24	5.1	27	<5	<1	<1
EB 8 W	EB 8	12/19/13	6	<100	--	--	1.9	14	1.6	9.1	--	--	--
EB 9 W	EB 9	12/19/13	5	110	--	--	1.1	15	2.3	15	--	--	--
EB 10 W	EB 10	12/19/13	5	<100	<55	<280	<1	9.1	<1	5.1	--	--	--
MTCA Method A Cleanup Levels				800	500	500	5	1,000	700	1,000	5	160	--

Aerotech Environmental Consulting, Inc. - Remedial Investigation Report - November 09, 2018

Sample ID	Soil Boring/Point Well ID	Sampling Date	DTW	TPHg	TPHd	TPHo	Benzene	Toluene	Ethyl- benzene	Total Xylenes	Methylene Chloride	Naphthalene	1,3,5-Trimethylbenze
			Feet BGS	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
W-B6	B6	07/03/18	4.5	**11,000**	--	--	**84**	52	530	7.6	--	--	--
W-B7	B7	07/03/18	5	**9,600**	--	--	**200**	11	400	160	--	--	--
W-B9	B9	07/03/18	5	**95,000**	--	--	**390**	94	**2,000**	**1,800**	--	--	--
MTCA Method A Cleanup Levels				800	500	500	5	1,000	700	1,000	5	160	--

EXPLANATION

MTCA = Model Toxic Control Act Cleanup Level (WAC173-340-900)
BGS = Below Ground Surface µg/L = microgram of analyte per liter of water
< = not detected at indicated Laboratory Detection Limits -- = not analyzed
Volatile Organic Compounds of Samples EB 5 W though EB 7 W by EPA Method 8260C
Benzene, Toluene, Ethylbenzene, and Total Xylenes of Samples EB 1 W though EB 4 W and EB 8 W through EB 10 W by EPA Method 8021B
TPHg - Total Petroleum Hydrocarbons - Gasoline by NWTPH-Gx
TPHd - Total Petroleum Hydrocarbons - Diesel by NWTPH-Dx
TPHo - Total Petroleum Hydrocarbons - Motor Oil by NWTPH-Dx extended
Naphthalene; 1,3,5-Trimethylbenzene; Methylene Chloride; by EPA Method 8260B
ND = Not Detected (minimum detection limit unknown)
Bolded numbers and red-shaded cells denote concentrations above the MTCA Method A Cleanup Levels for groundwater
1 = The sample chromatographic pattern does not resemble the fuel standard used for quantitation.
2 = Estimated concentration. A dilution is required to obtain an accurate quantification of the analyte.
3 = The presence of the compound indicated is likely due to laboratory contamination.
4 = The current Method B Non-carcinogen Standard Value was used in the table. No Method A or Method B carcinogen values have been established for this parameter.

Appendix A

Legal Description of Property & Owner and Operator History

APPENDIX A

LEGAL DESCRIPTION OF PROPERTY

Tax Description Parcel 0320111067

Section 11 Township 20 Range 03 Quarter 11 L 2 OF BLA 2001-03-23-5010 DESC AS COM AT NW COR OF NE OF NE TH E ALG N LI THEREOF 192.93 FT TH S 87 DEG 39 MIN 27 SEC E 29.45 FT TH N 2 DEG 20 MIN 33 SEC E 114.52 FT TO N LI OF NE OF NE TH CONT N 2 DEG 20 MIN 33 SEC E 35.19 FT TH S 88 DEG 18 MIN 46 SEC E 20 FT TH N 2 DEG 20 MIN 33 SEC E 64.73 FT TH S 88 DEG 02 MIN 46 SEC E 150.02 FT TH S 2 DEG 20 MIN 33 SEC W 100 FT TO N LI OF SEC TH S 88 DEG 02 MIN 46 SEC E ALG SD LI 5.06 FT TO ELY OF W 15 ACS OF SD NE OF NE TH S ALG SD LI 137.55 FT TH E PAR/W N LI OF SEC 65 FT TH S 2 DEG 31 MIN 07 SEC W 317.58 FT TO NLY LI OF PSH #1 TH WLY & NLY ALG SD LI N 76 DEG 51 MIN 45 SEC W 117.35 FT TO BEG OF C TO R HAVING RAD OF 309.30 FT TH NWLY ALG CURVE THRU CENTRAL ANGLE OF 39 DEG 17 MIN 30 SEC 212.11 FT TH N 37 DEG 34 MIN 15 SEC W 325.20 FT TO C TO L HAVING RAD OF 418.30 FT TH NWLY ALG CURVE THRU CENTRAL ANGLE OF 11 DEG 18 MIN 28 SEC 82.56 FT TO W LI OF NE OF NE TH N ALG SD LI .44 FT TH E PAR TO N LI OF SEC 159.60 FT TH N 65 DEG 31 MIN 29 SEC E 36.77 FT TO POB TOG/W THAT POR ABUTT CYD BY CY OF FIFE PER ETN 4198513 DESC AS W 150.02 FT OF FOLL DESC PROP S 20 FT OF A STRIP OF LD 120 FT WIDE BEING 70 FT ON S & 50 FT ON N OF C/L OF PACIFIC HWY E EASE OF RECORD COMB FOR TAX PURPOSES ONLY COMB OF 1-063 & POR OF 0320024091 SEG 2009-0347 10/29/08 SK

CHRONOLOGICAL LISTING OF KNOWN PAST OWNERS AND OPERATORS

OWNER	LESSEE	BUSINESS OPERATOR	YEARS OF OCCUPATION
Unknown	--	Gasamet Service Station	1964-1987
Unknown	--	Freddie's Club of Fife	Closed in 2012
Hana Hou Wailea LLC	--	Fife RV Center	2008-present

Appendix B

Summary of Previous Investigations

APPENEDIX B

Summary of Previous Investigations
Fife RV Center
3410 Pacific Highway East
Fife, Washington

Site Assessment
Jack In The Box (Parcel 0320024104)

In December 1987, Rittenhouse-Zeman & Associates ("RZA") completed a soil and foundation survey for Foodmaker Inc. While completing the geotechnical investigation, hydrocarbon odors were encountered at soil boring B-1 between 5 and 10 feet below ground surface ("bgs"). Samples collected from B-1; S-5 (11.0 -12.5 feet), contained TPH in above the current MTCA Method A screening levels ("screening levels") (RZA, 1988).

In January 1988, RZA completed additional investigation to further evaluate hydrocarbon previously noted. RZA advanced four soil borings at the corners of the property (B-1A, B-2, B-3, B-4) on January 5, 1988. No petroleum odor was observed in any of the four soil borings. Soil Sample S-4 collected from B-2 at 10-11.5 feet bgs contained TPH above the screening level (RZA, 1988).

Tahoma Express (Parcel 0320024105)

GeoEngineers explored subsurface soil conditions at the Unocal Service Station 7473 in 1990. Three test borings were advanced and constructed at groundwater monitoring wells MW-1, MW-2 and MW-3. The flow of groundwater was generally flat but toward the northwest. The study concluded that petroleum related contamination in subsurface soil and groundwater beneath the service station based on concentrations of benzene above drinking water standards in samples collected from MW-1 and MW-2. The wells were located adjacent to the UST basin (GeoEngineers, 1990).

GeoEngineers completed an additional investigation to evaluate the potential of groundwater contamination detected beneath the property was generated by the former Gasamet service station or an another of property source. Aerial photographs reviewed indicated the Gasamet station was previously located approximately 100 feet to the southwest of the Unocal Service Station 7343 and cross gradient to the groundwater flow direction beneath the parcel. A soil sample collected via hand auger in the UST backfill (HA-3) contained benzene at 1.7 mg/kg well above the screening levels. A review of the analytical results and the location of the service stations relative to the groundwater flow measured lead GeoEngineers to determine the source of the petroleum related contamination at the parcel was the result of releases from the Unocal station (GeoEngineers, 1991).

Fife RV (Parcel 0320111067)

In October 2013, Associated Earth Sciences, Inc. ("AESI") conducted a Phase I Environmental Site Assessment at the subject Property, now called Fife RV Center, located at 2410 Pacific Highway East in Fife, Washington. Within the Phase I, they state that a *Gasamet* fueling station operated at the northwest corner of the Property from the 1960s through the 1980s, and that the Property was listed on the Washington State Department of Ecology ("Ecology") CSCSL list for a petroleum release and arsenic release in the groundwater. Arsenic was determined not to be a contaminant of concern. A separate, remediated release was discovered at the northeast adjoining Chevron fueling station (which received a No Further Action designation from Ecology in 1993) (AESI, 2014).

Within the Phase I, AESI also stated that a third party conducted a Phase II investigation in 2004, finding that the soil and groundwater were impacted. Aerotech Environmental Consulting, Inc. ("Aerotech") tried to locate this document, but without success (AESI, 2014).

In December 2013, AESI observed a geophysical survey consisting of electromagnetism and ground-penetrating radar. No abandoned underground storage tanks ("USTs") or former UST basins were discovered from the survey.

The following day, AESI observed the advancement of ten direct push borings: nine to a depth of 10 feet bgs, with EB6 to 15 feet bgs. Soil samples were collected at every borehole, and analyzed for TPHg, TPHd, TPHo, and BTEX. Select samples from EB4 through EB6 (near the former pump islands) were additionally analyzed for total lead. Concentrations of TPHg and BTEX were detected above screening levels in EB4 at 5 feet bgs. Concentrations of TPHg, benzene, ethylbenzene, and total xylenes were detected above screening levels in EB5. Concentrations of benzene, toluene, and ethylbenzene were detected above screening levels in EB6. No other analytes were detected above the screening levels (AESI, 2014).

One groundwater grab sample was collected from the screened interval at the base of each of the ten temporary borings: nine at a depth of 10 feet bgs, while EB6 was at a depth of 15 feet bgs. All samples were analyzed for TPHg and BTEX. EB3W through EB7W, as well as EB10W, were additionally analyzed for TPHd and TPHo. EB5W through EB7W were also analyzed volatile organic compounds by EPA Method 8260C. Concentrations of TPHg and benzene were detected above screening levels for groundwater in EB4W though EB7W (i.e. within and immediately southeast of the fueling area.) Concentrations of TPHd were detected above screening levels in EB4W and EB6W, for which AESI states, "The sample chromatographic pattern does not resemble the fuel standard used for quantitation." Concentrations of ethylbenzene was detected above screening levels in EB4W and EB6W, while total xylenes were detected above screening levels in EB4W and EB5W. Naphthalene was detected above the groundwater screening levels in EB6W. Methylene chloride was detected above screening levels in EB5W, however AESI attributed this to laboratory contamination.

Aerotech can confirm that the lab results from Friedman & Bruya, Inc. provided within the report, indicate a separate analysis of EPA Method 8260C for this sample does not detect methylene chloride above detection limits. Concentrations of 1,3,5-trimethylbenzene were detected above MTCA Method B Non-carcinogen Standard Values in EB5W. No Method A or Method B Carcinogen values are set for this compound. No other analytes were detected above the MTCA Method A screening levels (AESI, 2014).

Aerotech installed six 2-inch PVC Groundwater Monitoring Wells, north, west and southwest of the former *Gasamet* Pump island and UST areas. Two wells, MW-1 and MW-2, were installed in the probable upgradient groundwater flow direction to the north, and three wells, MW-4, MW-5, and MW-6, were installed in the probable downgradient direction, south and west. Well screens were placed between 4 and 15 feet bgs, in order to accommodate water level fluctuations related to daily tides and Puyallup River water level variations, as well as local recharge. One well, MW-3, was installed at a "hot spot" near the center of the excavated area (Aerotech, 2016b).

Total Petroleum Hydrocarbons-Gasoline were detected above MTCA Method A screening levels for soil at MW-2, MW-4, and MW-5, at concentrations between 34 and 250 mg/kg (benzene at 0.061 to 0.530 mg/kg), and at MW-3 at 13,000 mg/kg (benzene at 9.3 mg/kg) (Aerotech, 2016b).

On July 14, 2017, Aerotech installed three 1-inch PVC Groundwater Monitoring Wells south and east of the former *Gasamet* Pump island and UST areas. Two wells, MW-7 and MW-8, were installed in the cross-gradient groundwater flow direction to the south, and one well, MW9, was installed in the upgradient groundwater flow direction to the east. Screens were placed at 14 feet bgs (Aerotech, 2017).

Four soil samples collected during well installation operations were analyzed. Lead, gasoline, diesel, and oil constituents were not detected. One additional borehole (B-1) was advanced in the unexcavated water main *hot zone* northwest of MW-3 in order to document additional MCTA Table 830 parameters; PCBs, cPAHs, and fuel additives were not detected or were below CULs, while methylene chloride and trichloroethylene (TCE) exceedances were documented in soil at B-1 (Aerotech, 2017).

On February 23, 2018, BoreTec Drilling, Inc., along with Aerotech Environmental Consulting, Inc. installed three 2-inch diameter PVC Groundwater Monitoring Wells west and southwest of the former *Gasamet*-related station features. Two wells, MW11 and MW12, were installed on the southside of the Bio-Swale pond, downgradient groundwater flow direction to the west and southwest. The other well, MW10, was installed downgradient groundwater flow direction from groundwater monitoring well MW2. Groundwater Monitoring Wells MW10 and MW12 were screened from 4 to 14 feet bgs. MW11 was screened from 2 to 9 feet bgs. Wells were developed by surge block and pump method on February 28, 2018 (Aerotech, 2018).

Nine soil samples collected during well installation operations were analyzed. petroleum constituents, lead, PCBs and VOCs were not detected above the MTCA Method A screening levels except for MW12(7), which contained gasoline concentrations above (Aerotech, 2018).

Historical Remediation Activities

Tahoma Express (Parcel 0320024105)

GeoEngineers monitored the UST removal and remedial activities at the Unocal Service Station 7343. Joe Hall Construction removed two 12,000-gallon USTs and associated product lines on August 18, September 2 and September 3. Two groundwater monitoring wells (MW-1 and MW-2 were removed during the excavation activities. No evidence of pits or holes were observed on the exterior surfaces of the tanks (GeoEngineers, 1992).

The gasoline tank excavation measured approximately 70 by 40 feet and extended to a depth of approximately 15.5 feet bgs. Field screening indicated the presence of gasoline impacted soil and pea gravel within the western portion of the excavation, primarily along the west wall and the base. Approximately 700 cubic yards of pea gravel and backfill material were removed from the excavation (GeoEngineers, 1992).

Groundwater was observed at 8 feet bgs and a sheen was noted on the groundwater seeping in from the west sidewall. A 22,000-gallon capacity Baker tank was used to store approximately 15,000 gallons of water removed from the excavation. Waste Disposal disposed of the water on September 2, 1992 (GeoEngineers, 1992).

Product lines associated with the USTs were removed by Joe Hall Construction from excavations that were approximately 40 by 4 feet and extending to a depth of 3.6 to 5 feet bgs. Approximately 50 cubic yards of soil were removed from the excavation. In total approximately 750 cubic yards were disposed at the Coal Creek Landfill from the UST and product line excavations (GeoEngineers, 1992).

A temporary groundwater recovery system and treatment system was installed at the Unocal service station on February 11, 1993 by GeoEngineers. The systems purpose was to remediate impacted groundwater detected in the pore spaces of the backfill surrounding the USTs. GeoEngineers concluded the gasoline impacted soil adjacent to the leaking turbine pump on the former easternmost UST appeared to be the source of the groundwater contamination. After operating for two weeks samples collected from effluent and the surrounding monitoring wells indicated remediation associated with the turbine release had been achieved (GeoEngineers, 1993).

Fife RV (Parcel 0320111067)

No known remediation activities occurred between the 1960s and December 19, 2013 (AESI, 2014).

Aerotech, along with Langseth Environmental Services Inc. (“Langseth”) excavate, performed a Remedial Excavation in two phases during the month of October 2016. Analytical results from the Phase II Supplemental Phase II Environmental Site Assessment were used to guide the initial stages of the excavation. Analytical results

from samples collected during the Site Remedial Excavation and during Test Pit activities were used to determine the final extents. Major subsurface utilities were identified at several locations on the Property and limited the removal of soil containing petroleum hydrocarbons at concentration above the MTCA Method A screening levels at these locations. TPHg, Benzene, Toluene, Ethylbenzene, and Xylenes remain Constituents of Concern at the Site. Chlorinated Volatile Organic Compounds, TPHd, and TPHo not detected above laboratory Minimum Reporting Limits. Lead was detected, but at concentrations well below the MTCA Method A screening level for Soil. A saturated, wooded Bio-Swale is located on-Property to the Northwest of the subject Property Remedial Excavation and limited soil removal in that direction. Southwest of the Property, the topography slopes downward into a water retaining drainage area, which also limited soil removal. Former fueling station conveyance system remnants along with 1,685.24 tons of potentially contaminated soil to the LRI Landfill located at 30919 Meridian Street East, Graham, Washington. A total of 84 soil samples were collected from the sidewalls and bottom of the excavation in the vicinity of the former fuel pump and former UST basin. Groundwater was encountered on Site at levels ranging from 3 to 10 feet bgs (Aerotech, 2016a).

Groundwater Monitoring Activities

Tahoma Express (Parcel 0320024105)

GeoEngineers conducted groundwater monitoring at the Unocal station from March 1990 until May 1993. Gasoline-range hydrocarbons were not detected in the May 1993 groundwater samples. The remediation of the subsurface soil and groundwater appeared to be achieved. GeoEngineers recommended Unocal to request closure from Ecology and the Tacoma Pierce County Health Department and to abandon groundwater monitoring wells MW-1A, MW2A, MW3, MW4, RW-1 and RW-2 in accordance with WAC Chapter 173-160.

Fife RV (Parcel 0320111067

Nine monitoring wells (MW-1 to MW-9) were sampled on August 1, 2017. Gasoline constituent exceedances were documented at only two wells, MW-2 and MW-4. Diesel fuel, VOCs, naphthalene, and lead were not detected in groundwater. Refer to the July 2017 quarterly groundwater monitoring report for details (Aerotech, 2017).

Appendix C

Historical Soil Boring Logs

Associated Earth Sciences, Inc.

Exploration Log

Project Number	Exploration Number	Sheet
TV130509B	EB-1	1 of 1

Project Name: Freddie's Casino
Location: Fife, WA
Driller/Equipment: ESN / Direct Push / Geoprobe
Hammer Weight/Drop: N/A

Ground Surface Elevation (ft):
Datum: N/A
Date Start/Finish: 12/19/13,12/19/13
Hole Diameter (in): 2 inches

Depth (ft)	ST	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot (10 20 30 40)	Other Tests
				Alluvium					
				Slightly moist, brown, fine to medium silty SAND, few fine gravel; no odor (SM). **EB1-2.5-3.5** PID = 0.0 ppm					
5				Becomes fine to medium silty SAND, with fine to coarse gravel; no odor (SM). **EB1-4-5** PID = 0.0 ppm		▼			
10				Slightly moist, brown, fine to coarse silty SAND, few fine to coarse gravel; no odor (SM). **EB1-9.5-10** PID = 0.1 ppm					
				Bottom of exploration boring at 10 feet Backfilled with bentonite.					
15									

Sampler Type (ST):
- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample

M - Moisture
- Water Level ()
- Water Level at time of drilling (ATD)

Logged by: ESC
Approved by:

AESIBOR 130509B.GPJ January 10, 2014

Associated Earth Sciences, Inc.	Exploration Log		
	Project Number TV130509B	Exploration Number EB-2	Sheet 1 of 1

Project Name: Freddie's Casino
Location: Fife, WA
Driller/Equipment: ESN / Direct Push / Geoprobe
Hammer Weight/Drop: N/A

Ground Surface Elevation (ft):
Datum: N/A
Date Start/Finish: 12/19/13,12/19/13
Hole Diameter (in): 2 inches

Depth (ft)	ST	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot (10 20 30 40)	Other Tests
				Alluvium					
				Slightly moist, brown, fine to medium silty SAND, few fine gravel; no odor (SM). PID = 0.1 ppm Slightly moist, blue and gray, fine to medium SAND, little fine to coarse gravel; slight organic odor (SW). PID = 0.1 ppm					
				Grades to moist. **EB2-4-5** PID = 0.1 ppm					
5				Moist, gray, fine to coarse sandy SILT, trace fine gravel (ML). **EB2-6-7** PID = 0.1 ppm		▼			
				Grades to very moist, brown, fine SILT; organic odor (ML).					
				EB2-8.5 PID = 0.1 ppm					
				Moist, dark brown, fine to medium SAND; organic odor (SP). **EB2-9.5-10** PID = 0.1 ppm					
10				Bottom of exploration boring at 10 feet					
15									

Sampler Type (ST):
- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample

M - Moisture
▽ Water Level ()
▼ Water Level at time of drilling (ATD)

Logged by: ESC
Approved by:

AESIBOR 130509B.GPJ January 20, 2014

Associated Earth Sciences, Inc.	Exploration Log		
	Project Number TV130509B	Exploration Number EB-3	Sheet 1 of 1

Project Name: Freddie's Casino
Location: Fife, WA
Driller/Equipment: ESN / Direct Push / Geoprobe
Hammer Weight/Drop: N/A

Ground Surface Elevation (ft):
Datum: N/A
Date Start/Finish: 12/19/13,12/19/13
Hole Diameter (in): 2 inches

Depth (ft)	ST	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot (10 20 30 40)	Other Tests
				Alluvium					
				Slightly moist, gray and blue, fine to coarse silty SAND, few fine to medium gravel; organic odor (SM). PID = 0.4 ppm					
				Slightly moist, brown, fine SILT; organic odor (ML). **EB3-4-5** PID = 0.4 ppm					
5				PID = 0.4 ppm Very moist, brown, fine to medium sand, SILT; organic odor (ML) PID = 0.1 ppm					
				EB3-6-7 PID = 0.1 ppm		▼			
				Very moist, brown, fine silty SAND; organic odor (SM). **EB3-7-7.5** PID = 0.1 ppm					
				Very moist, brown, fine SILT; organic odor (ML). PID = 0.1 ppm **EB3-8-9** PID = 0.1 ppm					
				EB3-9-10 PID = 0.1 ppm					
10				Bottom of exploration boring at 10 feet Backfilled with bentonite.					
15									

Sampler Type (ST):
- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample

M - Moisture
▽ Water Level ()
▼ Water Level at time of drilling (ATD)

Logged by: ESC
Approved by:

AESIBOR 130509B.GPJ January 10, 2014

Associated Earth Sciences, Inc.

Exploration Log

Project Number	Exploration Number	Sheet
TV130509B	EB-4	1 of 1

Project Name	Freddie's Casino	Ground Surface Elevation (ft)	
Location	Fife, WA	Datum	N/A
Driller/Equipment	ESN / Direct Push / Geoprobe	Date Start/Finish	12/19/13,12/19/13
Hammer Weight/Drop	N/A	Hole Diameter (in)	2 inches

Depth (ft)	ST	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot 10 20 30 40	Other Tests
				Alluvium					
				Slightly moist, gray and blue, fine to coarse silty SAND, few fine to coarse gravel; petroleum odor (SM). **EB4-2.5-3** PID = 4.9 ppm					
				Slightly moist, dark brown, fine SILT; petroleum odor (ML). **EB4-3.5-4** PID = 84.3 ppm		▼			
				Moist, dark brown, fine SILT (ML). **EB4-4-5** PID = 86.9 ppm					
5				Very moist, brown, fine sandy SILT; petroleum odor (SW). PID = 5.2 ppm					
				Grades to moist; slight petroleum odor. **EB4-6.5-7.5** PID = 0.5 ppm					
				Organic odor. **EB4-8-9** PID = 0.5 ppm					
10				Organic odor. **EB4-9-10** PID = 0.6 ppm					
				Bottom of exploration boring at 10 feet Ground water has slight sheen. Backfilled with bentonite.					
15									

Sampler Type (ST):

- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample

M - Moisture

- Water Level ()
- Water Level at time of drilling (ATD)

Logged by: ESC

Approved by:

AESIBOR 130509B.GPJ January 10, 2014

Associated Earth Sciences, Inc.

Exploration Log

Project Number	Exploration Number	Sheet
TV130509B	EB-5	1 of 1

Project Name	Freddie's Casino	Ground Surface Elevation (ft)	
Location	Fife, WA	Datum	N/A
Driller/Equipment	ESN / Direct Push / Geoprobe	Date Start/Finish	12/19/13,12/19/13
Hammer Weight/Drop	N/A	Hole Diameter (in)	2 inches

Depth (ft)	ST	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot 10 20 30 40	Other Tests
				Alluvium					
				Slightly moist, gray and blue, fine to coarse silty SAND, few fine to coarse gravel; petroleum odor (SM). PID = 6.2 ppm **EB5-3-4** PID = 11.1 ppm		▼			
				Slightly moist, brown, fine SILT; petroleum odor (ML). **EB5-4-5** PID = 138 ppm					
5				Very moist, brown, fine sandy SILT; petroleum odor (ML). **EB5-5.5-6.5** PID = 184 ppm					
				Organic odor. **EB5-6.5-7.5** PID = 3.4 ppm PID = 4.1 ppm Organic odor.					
				PID = 0.7 ppm Moist, brown, fine SILT; organic odor (ML). **EB5-9-10** PID = 0.7 ppm					
10				Bottom of exploration boring at 10 feet Backfilled with bentonite.					
15									

Sampler Type (ST):

- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample

M - Moisture

- Water Level ()
- Water Level at time of drilling (ATD)

Logged by: ESC

Approved by:

AESIBOR 130509B.GPJ January 10, 2014

Associated Earth Sciences, Inc.	Exploration Log		
	Project Number TV130509B	Exploration Number EB-6	Sheet 1 of 1

Project Name: Freddie's Casino
Location: Fife, WA
Driller/Equipment: ESN / Direct Push / Geoprobe
Hammer Weight/Drop: N/A

Ground Surface Elevation (ft):
Datum: N/A
Date Start/Finish: 12/19/13,12/19/13
Hole Diameter (in): 2 inches

Depth (ft)	ST	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot 10 20 30 40	Other Tests
				Alluvium					
				Slightly moist, brown, fine to coarse silty SAND, little fine to coarse gravel; slight petroleum odor (SM). **EB6-3-4** PID = 3.9 ppm					
				Grades to brown.					
5				Grades to blue and gray. **EB6-4-5** PID = 1.2 ppm		▼			
				Slightly moist, bray and blue, fine to medium silty SAND, few fine to coarse gravel; petroleum odor (SM). **EB6-6-7** PID = 103 ppm					
				EB6-7-7.5 PID = 43.8 ppm					
				Moist, brown, fine SILT; petroleum odor (ML). **EB6-7.5-8** PID = 5.5 ppm					
				Organic odor.					
				PID = 12.2 ppm					
10				**EB6-9.5-10** PID = 5.8 ppm Wet, dark brown, fine SILT; slight petroleum odor (ML) **EB6-10-11** PID = 0.6 ppm					
15				Bottom of exploration boring at 15 feet Standing water in 10 to 15 foot sleeve has sheen. Backfilled with bentonite.					

Sampler Type (ST):
- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample

M - Moisture
- Water Level ()
- Water Level at time of drilling (ATD)

Logged by: ESC
Approved by:

AESIBOR 130509B.GPJ January 10, 2014

Associated Earth Sciences, Inc.

Exploration Log

Project Number	Exploration Number	Sheet
TV130509B	EB-7	1 of 1

Project Name: Freddie's Casino
Location: Fife, WA
Driller/Equipment: ESN / Direct Push / Geoprobe
Hammer Weight/Drop: N/A

Ground Surface Elevation (ft):
Datum: N/A
Date Start/Finish: 12/19/13,12/19/13
Hole Diameter (in): 2 inches

Depth (ft)	ST	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot (10 20 30 40)	Other Tests
				Alluvium					
				Slightly moist, brown, fine to coarse silty SAND, few fine gravel; no odor (SM). **EB7-3.5-4** PID = 2.5 ppm **EB7-4-5** PID = 1.9 ppm					
5				Slightly moist, gray, fine SILT; slight petroleum odor (ML). **EB7-5.5-6** PID = 2.5 ppm		▼			
10				Bottom of exploration boring at 10 feet Water has a slight sheen. Backfilled with bentonite.					
15									

Sampler Type (ST):
- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample

M - Moisture
- Water Level ()
- Water Level at time of drilling (ATD)

Logged by: ESC
Approved by:

AES|BOR 130509B.GPJ January 20, 2014

Associated Earth Sciences, Inc.

Exploration Log

Project Number	Exploration Number	Sheet
TV130509B	EB-8	1 of 1

Project Name: Freddie's Casino
Location: Fife, WA
Driller/Equipment: ESN / Direct Push / Geoprobe
Hammer Weight/Drop: N/A

Ground Surface Elevation (ft):
Datum: N/A
Date Start/Finish: 12/19/13,12/19/13
Hole Diameter (in): 2 inches

Depth (ft)	USCS	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot (10 20 30 40)	Other Tests
				Alluvium					
				Slightly moist, brown, fine to coarse silty SAND; no odor (SM). PID = 0.0 ppm **EB8-4-5** PID = 0.0 ppm					
5						▼			
				Moist, dark brown, fine SILT; organic odor (ML). **EB8-8-9** PID = 0.0 ppm					
				Becomes slightly moist. PID = 0.0 ppm **EB8-9-10** PID = 0.0 ppm					
10				Bottom of exploration boring at 10 feet Backfilled with bentonite.					
15									

Sampler Type (ST):
- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample

M - Moisture
Water Level ()
Water Level at time of drilling (ATD)

Logged by: ESC
Approved by:

AESIBOR 130509B.GPJ January 10, 2014

Associated Earth Sciences, Inc.	Exploration Log		
	Project Number TV130509B	Exploration Number EB-9	Sheet 1 of 1

Project Name: Freddie's Casino
Location: Fife, WA
Driller/Equipment: ESN / Direct Push / Geoprobe
Hammer Weight/Drop: N/A

Ground Surface Elevation (ft):
Datum: N/A
Date Start/Finish: 12/19/13,12/19/13
Hole Diameter (in): 2 inches

Depth (ft)	ST	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot 10 20 30 40	Other Tests
				Alluvium					
				Slightly moist, brown, fine to medium silty SAND, trace fine gravel; no odor (SM). **EB9-2-3** PID = 0.0 ppm					
				Slightly moist, gray and blue, fine to coarse silty SAND, little fine gravel; petroleum odor (SM). **EB9-3-4** PID = 0.4 ppm PID = 0.0 ppm					
5				Slightly moist, dark brown, fine SILT; organic odor (ML). **EB9-4.5-5** PID = 0.0 ppm		▼			
				Slightly moist, gray, fine SILT; organic odor (ML). **EB9-5.5-6.5** PID = 0.0 ppm Becomes moist. PID = 0.0 ppm					
				EB9-7-7.5 PID = 0.0 ppm Very moist, dark brown, fine SAND; organic odor (SW). **EB9-7.5-8** PID = 0.0 ppm Slightly moist, brown, fine SILT; organic odor (ML).					
				EB9-9-10 PID = 0.0 ppm Organic odor.					
10				Bottom of exploration boring at 10 feet Backfilled with bentonite.					
15									

Sampler Type (ST):
- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample

M - Moisture
Water Level ()
Water Level at time of drilling (ATD)

Logged by: ESC
Approved by:

AESIBOR 130509B.GPJ January 10, 2014

Associated Earth Sciences, Inc.	Exploration Log		
	Project Number TV130509B	Exploration Number EB-10	Sheet 1 of 1

Project Name	Freddie's Casino	Ground Surface Elevation (ft)	
Location	Fife, WA	Datum	N/A
Driller/Equipment	ESN / Direct Push / Geoprobe	Date Start/Finish	12/19/13,12/19/13
Hammer Weight/Drop	N/A	Hole Diameter (in)	2 inches

Depth (ft)	S T	Samples	Graphic Symbol	DESCRIPTION	Well Completion	Water Level	Blows/6"	Blows/Foot 10 20 30 40	Other Tests
				Alluvium					
				Slightly moist, gray and blue, fine to medium silty SAND, few fine gravel; slight petroleum odor (SM).					
				EB10-4-4.5 PID = 20.0 ppm					
5				PID = 12.0 ppm		▼			
				Slightly moist, gray, fine SILT; no odor (ML).					
				EB10-7.5-8.5 PID = 0.0 ppm					
				PID = 0.0 ppm					
				EB10-9-10 PID = 0.0 ppm					
10				Bottom of exploration boring at 10 feet Backfilled with bentonite.					
15									

Sampler Type (ST):

- 2" OD Split Spoon Sampler (SPT)
- 3" OD Split Spoon Sampler (D & M)
- Grab Sample
- No Recovery
- Ring Sample
- Shelby Tube Sample

M - Moisture

- Water Level ()
- Water Level at time of drilling (ATD)

Logged by: ESC

Approved by:

AESIBOR 130509B.GPJ January 20, 2014

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MONITORING WELL ID: **BORING LOG #: MW-1** **Page 1 of 1**

Project Name: FIFE RV, Fife, Wa **BIS 683**

Project Number: 216-8246

Drilling Information

Drilling Contractor:	Boretech, Bellevue
Drilling Method:	H.S.A.
Borehole Diameter:	8"
Sampler Type:	Stainless Steel Split Spoon Sampler

Driller: Carlos Gardea (Wa Lic No 3143)

Site Location: 3410 Pacific Hwy E, Fife, Wa (Gravel lot S of Tahoma Gas and Jack-in-the-Box)

Borehole Location: 3.5 ft S of N Fence + 10 ft from bend in fence + 60 east of NWX fence

Borehole Area (AOC): N-NE of eastern terminus of upgradient fabric / Former UST-Pump areas

Logged by: J. McDermott: Boring Depth: 14.5 feet

GW Encountered: YES Static GW Level: 5 ft bgs

Low tide Commencement Bay at 0700 - high tide at 1300 - per NOAA Tables

Notes: 2 inch PVC GW Monitoring Well installed - No 10 screen at 4 to 14 ft bgs

Approx. Surface Elevation:

Start Date: 11-10-16 End Date: Same

Depth (ft)	Groundwater	PID	Visual or Olfactory Evidence	Blow Counts	Recovery	USCS Classification	Soil Classification/ Description	Well Construction
						GP	Gravel Pavement *Concrete pad atop bentonite seal -->*	
1								
							Air-knife 3.5 ft west of natural gas main / electrical / storm sewer	
2					Air	SW	Air knife to 5.5 ft bgs	
					Knife		FILL - SAND, very fine to coarse, well graded, with silt, little to trace clay,	
3							little small to large subround tosubangular gravel, gray to olive gray,	
							slightly moist, wet below 5 ft. Very slight but indistinct odor.	
4			0824					
		0.3	LAB			SW	Hand auger sample from beneath air knife hole	--
5								--
								--
6				2				--
				3		ML	SILT, trace very fine sand, wet. No foul odor.	--
7			LAB	3				--
		0.0	0905				*No. 10-20 Colorado Silica Sand in annular space -->*	--
8								--
								--
9				1				--
			0915	1			SILT, trace very fine sand, roots below 9 ft. very moist to wet. No foul	--
10		0.1	LAB	1				--
				3				--
11				3		SP	SAND, very fine to fine, trace silt, gray, wet.	--
		0.0		3				--
12								--
								--
13								--
				3				--
14		0.1	0935	3		SM	SILT AND SAND, very fine to fine,gray, wet.	--
			LAB	4			No foul odor.	
15							Note 11-12 ft deep tank basin to NE most likely penetrates silt	
							Also, former Gasamet Station UST basin to south.	
16								
							WELL CONSTRUCTION DETAIL:	
17							2 inch Sched 40 PVC - 10 ft No 10 slot PVC screen at 4-14ft bgs	
							5 x 50 lbs bags of No. 10-20 Silica Sand + 1bag grout (3ft thick)	
18							Finished with 4 sq ft concrete pad and flush-mount monument	
							Bottom of borehole at 14.5 feet	
19							Groundwater encountered at 5 feet. Well installed at 4 - 14 ft.	
							Borehole completed with bentonite chips.	
20								

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MONITORING WELL ID: I31 **Page 2 of**

Project Name:

Project Number:

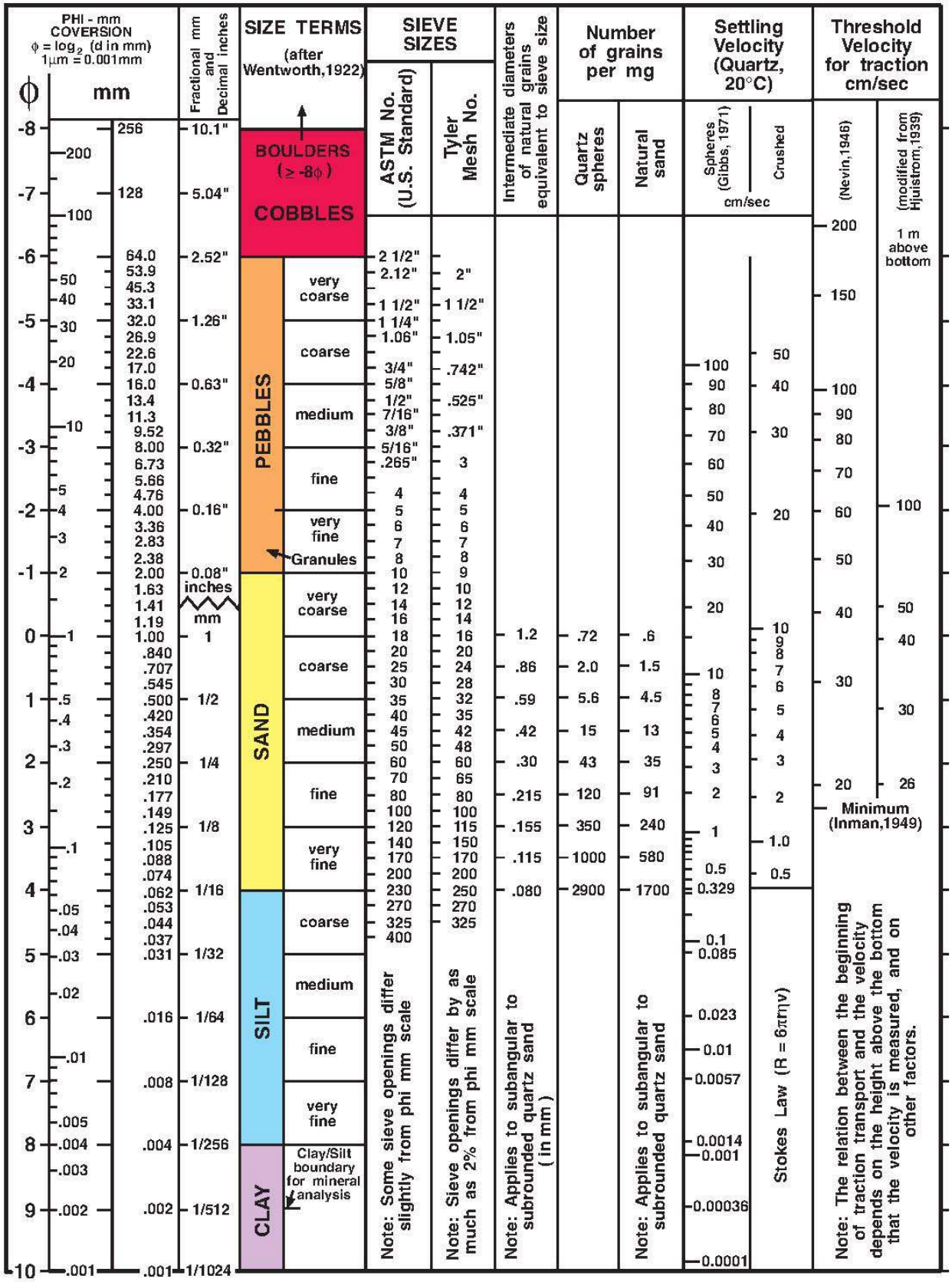
Drilling Information

Drilling Contractor:

Logged by:

Start Date: End Date:

Depth (ft)	Groundwater		Visual or Olfactory Evidence	Blow Counts	Recovery		**USCS** Classification	Soil Classification/ Description **UNIFIED SOIL CLASSIFICATION SYSTEM EXPLANATION**	Well Construction		
							GW	**GRAVELS**, well-graded* OR Gravel+Sand mix, little-no fines			
							GP	**GRAVELS**, poorly-graded* OR Gravel+Sand mix, little-no fines			
							GM	**GRAVELS**, silty OR Gravel-sand-silt mix			
							GC	**GRAVELS**, clayey OR Gravel-sand-clay mix			
							SW	**SAND**, well-graded OR **Gravelly Sands**, little-no fines			
							SP	**SAND**, poorly-graded OR **Gravelly Sands**, little-no fines			
							SM	**SAND**, silty OR Sand-silt mix			
							SC	**SAND**, clayey OR Sand-clay mix			
							ML	**SILT**, inorganic (very fine sands, rock flour, silty or clayey fine			
								sands) OR Clayey silts with slight plasticity			
							CL	**CLAY**, inorganic, low-med plasticity (gravelly, sandy, silty, lean)			
							OL	**SILT**, organic, AND **SILT-CLAY**, organic, low plasticity			
							MH	**SILT**, inorganic (micaceous or diatomaceous fn sndy/silty soils)			
								OR SILTY SOILS, elastic SILTS			
							CH	**CLAY**, inorganic, high plasticity, fat clays			
							OH	**CLAY**, organic, med-high plasticity OR Organic SILTS			
							PT	**PEAT** and other highly organic SOILS			
								Glacial Till - High density, USCS/color indicates grain size			
								* **Terminology clarification**: The term "**Well graded**" is a synonym for "**Poorly sorted**," both meaning that a wide range of particle sizes are present. The former term is employed in geotechnical descriptions, while the latter is preferred by the USDA in characterizing topsoils and subsoils.			



US Geological Survey

CALIFORNIA DEPARTMENT OF TRANSPORTATION (CALTRANS)

UNIFIED SOIL CLASSIFICATION SYSTEM

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

COARSE-GRAINED SOILS (more than 50% of material is larger than No. 200 sieve size.)			
GRAVELS More than 50% of coarse fraction larger than No. 4 sieve size	Clean Gravels (Less than 5% fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
		GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines
	Gravels with fines (More than 12% fines)	GM	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay mixtures
SANDS 50% or more of coarse fraction smaller than No. 4 sieve size	Clean Sands (Less than 5% fines)	SW	Well-graded sands, gravelly sands, little or no fines
		SP	Poorly graded sands, gravelly sands, little or no fines
	Sands with fines (More than 12% fines)	SM	Silty sands, sand-silt mixtures
		SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS (50% or more of material is smaller than No. 200 sieve size.)			
SILTS AND CLAYS Liquid limit less than 50%		ML	Inorganic silts and very fine sands, rock flour, silty of clayey fine sands or clayey silts with slight plasticity
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		OL	Organic silts and organic silty clays of low plasticity
SILTS AND CLAYS Liquid limit 50% or greater		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
		CH	Inorganic clays of high plasticity, fat clays
		OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS		PT	Peat and other highly organic soils

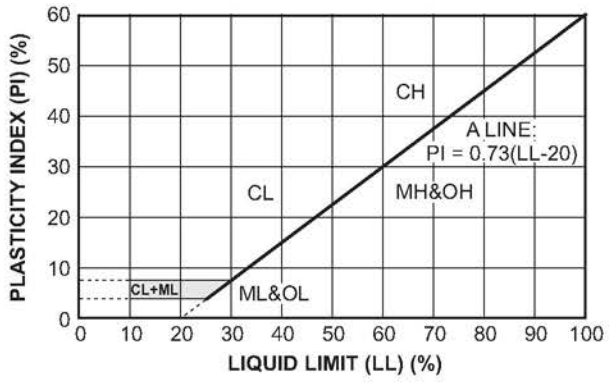
LABORATORY CLASSIFICATION CRITERIA

GW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3	
GP	Not meeting all gradation requirements for GW	
GM	Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
GC	Atterberg limits above "A" line with P.I. greater than 7	
SW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3	
SP	Not meeting all gradation requirements for GW	
SM	Atterberg limits below "A" line or P.I. less than 4	Limits plotting in shaded zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols.
SC	Atterberg limits above "A" line with P.I. greater than 7	

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:

Less than 5 percent ..... GW, GP, SW, SP
More than 12 percent ..... GM, GC, SM, SC
5 to 12 percent ..... Borderline cases requiring dual symbols

PLASTICITY CHART



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MONITORING WELL ID: **BORING LOG #: MW-2** **Page 1 of 1**

Project Name: FIFE RV, Fife, Wa **BIS 684**

Project Number: 216-8246

Drilling Information

Drilling Contractor:	Boretech, Bellevue
Drilling Method:	H.S.A.
Borehole Diameter:	8"
Sampler Type:	Stainless Steel Split Spoon Sampler

Driller: Carlos Gardea (Wa Lic No 3143)

Site Location: 3410 Pacific Hwy E, Fife, Wa (Gravel lot S of Tahoma Gas and Jack-in-the-Box)

Borehole Location: 5 ft east of west fence + 7 ft from NE lot corner post - Near NE corner of bioswale

Borehole Area (AOC): NW corner of tank and pump island area (NW corner of fenced lot)

Logged by: J. McDermott: Boring Depth: 14.5 feet

GW Encountered: YES Static GW Level: 3 ft bgs

Notes: 2 inch PVC GW Monitoring Well installed - No 10 screen at 4 to 14 ft bgs

Notes: Low tide Commencement Bay at 0700 - high tide at 1300 - per NOAA Tables

Approx. Surface Elevation:

Start Date: 11-10-16 End Date: Same

Depth (ft)	Groundwater	PID	Visual or Olfactory Evidence	Blow Counts	Recovery		USCS Classification	Soil Classification/ Description	Well Construction
							GP	Gravel Pavement	
1									
								Air knife to 5.5 ft bgs - Concrete fragment (8 in +) at 2 ft	
2					Air		SW		
					Knife			FILL - SAND, very fine to coarse, well graded, with silt, little to trace clay, little small to large subround tosubangular gravel, gray to olive gray, slightly moist, wet below 5 ft. Moderate gasoline odor.	
3			0948						
		82		LAB					
4							SW	Hand auger sample from beneath air knife hole at 4-4.3 ft	--
									--
5			1037						--
		38	LAB	2					--
6				2			ML	SILT, some very fine sand, trace clay, wet. Strong gasoline odor at 5.5 ft.	--
				1					--
7									--
									--
8			1045						--
		16.9	LAB	1					--
9				1			ML	Same as above. Very moist to wet. Very slight gasoline odor above 9 ft. No foul odor below 9 ft	--
				1					--
10									--
								Silt is generally wet in upper portions; very moist to moist below.	--
11									--
									--
12								*Note 11-12 ft deep tank basin to NE very likely penetrates this generally thinner silt unit. Sand lenses may be present between intervals sampled by split spoon tool. Note: former Gasamet UST basin was situated to SE*	--
									--
13				1					--
			1050	2					--
14		1.1	LAB	3			SP	SAND, very fine to fine, poorly graded trace silt, gray, wet. No foul odor.	
15									
								WELL CONSTRUCTION DETAIL:	
16								2 inch Sched 40 PVC - 10 ft No 10 slot PVC screen at 4-14ft bgs	
								6.5 x 50 lbs bags of No. 10-20 Silica Sand + 1bag grout (3ft thick)	
17								Finished with 4 sq ft concrete pad and flush-mount monument	
18									
								Bottom of borehole at 14.5 feet	
19								Groundwater encountered at 5 ft, rises to 3 ft. Well installed at 14 ft	
								Borehole completed with bentonite chips.	
20									

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MONITORING WELL ID: **BORING LOG #: MW-3** **Page 1 of 1**

Project Name: FIFE RV, Fife, Wa **BIS 685**

Project Number: 216-8246

Drilling Information

Drilling Contractor:	Boretech, Bellevue
Drilling Method:	H.S.A.
Borehole Diameter:	8"
Sampler Type:	Stainless Steel Split Spoon Sampler

Driller: Carlos Gardea (Wa Lic No 3143)

Site Location: 3410 Pacific Hwy E, Fife, Wa (Gravel lot S of Tahoma Gas and Jack-in-the-Box)

Borehole Location: 71ft south and 10 ft west of SW corner Tahoma Bldg (73 ft to Power Pole)

Borehole Area (AOC): UST Basin area

Logged by: J. McDermott: Boring Depth: 14.5 feet

GW Encountered: YES Static GW Level: 5ft bgs

Notes: 2 inch PVC GW Monitoring Well installed - No 10 screen at 4 to 14 ft bgs

Notes: Low tide Commencement Bay at 0700 - high tide at 1300 - per NOAA Tables

Approx. Surface Elevation:

Start Date: 11-10-16 End Date: Same

Depth (ft)	Groundwater	PID	Visual or Olfactory Evidence	Blow Counts	Recovery		USCS Classification	Soil Classification/ Description	Well Construction
							GP	Gravel Pavement	
1									
								Air knife to 5.5 ft bgs - Concrete fragment (8 in +) at 2 ft	
2					Air		SW		
					Knife			FILL - SAND, fine to coarse, well graded, trace silt, little small to large subround to subangular gravel, gray to olive gray, slightly moist, wet below 5 ft. Moderately strong gasoline odor.	
3									
		VPH	1118						
4		662		LAB			SW	Hand auger sample from beneath air knife hole at 4-4.3 ft	--
5									--
			1135						--
6		1		3					--
		870		1			SW	FILL- SAND, fine to coarse, well graded, trace silt, little small to large subround to subangular gravel, gray 6.9-7.0 ft, wet, strong to very strong gasoline odor.	--
7				2					--
									--
8									--
			1205						--
9		LAB	LAB	1					--
		203		1			SW	Same as above. Very moist to wet. No foul odor.	--
10				2					--
									--
11								*PRESUMED FORMER GASAMET UST BASIN AREA- SILT UNIT ABSENT*	--
									--
12									--
									--
13									--
				4				SAND, very fine to medium, few coarse, poorly graded, medium brown, bottom six inches dark brown, very moist to wet. No foul odor.	--
14			1221	3			SP		--
		9.5	LAB	3					
15									
16								**WELL CONSTRUCTION DETAIL:**	
								2 inch Sched 40 PVC - 10 ft No 10 slot PVC screen at 4-14ft bgs	
17								5 x 50 lbs bags of No. 10-20 Silica Sand + 1bag grout (3ft thick)	
								Finished with 4 sq ft concrete pad and flush-mount monument	
18									
								Bottom of borehole at 14.5 feet	
19								Groundwater encountered at 5 ft. Well installed at 14 ft	
								Borehole completed with bentonite chips.	
20									

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MONITORING WELL ID: **BORING LOG #: MW-4** **Page 1 of 1**

Project Name: FIFE RV, Fife, Wa **BIS 686**

Project Number: 216-8246

Drilling Information

Drilling Contractor:	Boretech, Bellevue
Drilling Method:	H.S.A.
Borehole Diameter:	8"
Sampler Type:	Stainless Steel Split Spoon Sampler

Driller: Carlos Gardea (Wa Lic No 3143)

Site Location: 3410 Pacific Hwy E, Fife, Wa (Gravel lot S of Tahoma Gas and Jack-in-the-Box)

Borehole Location: 38 ft south of NW corner of fenced portion of lot; 4 ft east of west fence

Borehole Area (AOC):

Logged by: J. McDermott: Boring Depth: 14.5 feet

GW Encountered: YES Static GW Level: 5 ft

Notes:

Approx. Surface Elevation:

Start Date: 11-10-16 End Date: Same

Depth (ft)	Groundwater	PID	Visual or Olfactory Evidence	Blow Counts	Recovery	USCS Classification	Soil Classification/ Description	Well Construction
							Gravel Pavement	
1								
2							FILL - SAND, very fine to coarse, well graded, with silt, little to trace clay, little small to large subround tosubangular gravel, gray to olive gray, moist. Slight gasoline odor.	
3								
4				49				
			1310	6				
5		16	LAB	8				
6							*This well adjoins the bio-swale area to the west and in which standing water is present (perhaps bottom of basin at 8 approx. ft bgs) - pre-development (post demo of Gasamet Station) test pits in this area indicated strong petrol odors - suspect extensive excavation of impacted soils prior to bio-swale construction, and extending to the vicinity of MW-4*	
7								
8								
9				2			Possible FILL - SAND, very fine to very coarse, well graded, some clay, trace subrounded gravel, heterogeneous mix of colors: dark brown, gray, and light brown,slight odor, very moist.	
			1335	1				
10		19	LAB	1				
11							(Possible sluff- no silt present)	
12								
13				2			SILT, some 1/2" fine sand lenses, and a few clay lenses, few plant fragments, light brown, very moist. No foul odor. .[Bottom 1.5" brown fine sand, poorly graded.]	
			1400	2				
14		0.2	LAB	4				
15							**WELL CONSTRUCTION DETAIL:**	
16							2 inch Sched 40 PVC - 10 ft No 10 slot PVC screen at 4-14ft bgs	
							5 x 50 lbs bags of No. 10-20 Silica Sand + 1bag grout (3ft thick)	
17							Finished with 4 sq ft concrete pad and flush-mount monument	
18							Bottom of borehole at 14.5 feet	
							Groundwater encountered at 5 feet. well screened at 4-14 ft bgs.	
19							Borehole completed with bentonite chips.	
20								

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MONITORING WELL ID: **BORING LOG #: MW-5** **Page 1 of 1**

Project Name: FIFE RV, Fife, Wa **BIT 785**

Project Number: 216-8246

Drilling Information

Drilling Contractor:	Boretech, Bellevue
Drilling Method:	H.S.A.
Borehole Diameter:	8"
Sampler Type:	Stainless Steel Split Spoon Sampler

Driller: Carlos Gardea (Wa Lic No 3143)

Site Location: 3410 Pacific Hwy E, Fife, Wa (Gravel lot S of Tahoma Gas and Jack-in-the-Box)

Borehole Location: 5 ft north of south fence and 5 ft east of west fence - on slope below lot

Borehole Area (AOC): SW corner of Fenced area - SE of bioswale

Logged by: J. McDermott: Boring Depth: 14.5 feet

GW Encountered: YES Static GW Level: 4.5 ft bgs (approx 2 ft below lot level)

Notes: Gravel surface slopes down to north toward Catch Basins west of MW-3 at fence

Approx. Surface Elevation:

Start Date: 11-10-16 End Date: Same

Depth (ft)	Groundwater	PID	Visual or Olfactory Evidence	Blow Counts	Recovery		USCS Classification	Soil Classification/ Description	Well Construction
				2					
1		0.1		3				FILL - SAND, fine to coarse, well graded, trace to little organic silt, trace	
				3			SW	small subrounded gravel, light brown, dry. No foul odor.	
2									
	Near low tide - 8am								
3	11-11-16 water from TOC: 5.46							No foul odor in cutting 1.5 to 5 ft	
	= approx 4 ft bgs terrace								
4									
									--
5							SP	SAND, very fine, poorly graded, gray, wet	--
			1514	2				SILT, little very fine sand, gray, trace wood and plant fragments, wet. No	--
6		4.1	LAB	1				foul odor / possible VER faint gasoline odor.	--
				1			ML		--
7									--
									--
8								Silt is wet in upper portions; very moist to moist below.	--
									--
9									--
									--
10			1522	1			ML	SILT, little very fine sand, common wood and plant fragments and rare	--
		0.6	LAB	1			PT	peat layers less than 1/4 - 1/2 inch, very moist to wet.Organic odor near	--
11				1			ML	peat layers - approx 10 - 10.5 ft	--
									--
12									--
									--
13									--
			1535	2			CH	CLAY and SILT, trace very fine sand, gray, moist. No foul odor. Clay is	--
14		0.2	LAB	2				highly plastic,	--
				2			ML	SILT, little very fine sand, gray, moist. No foul odor.	
15								**WELL CONSTRUCTION DETAIL:**	
								Excavated a limited terrace on the slope SW of gravel lot	
16								2 inch Sched 40 PVC - 10 ft No 10 slot PVC screen at 4-14ft bgs	
								5 x 50 lbs bags of No. 10-20 Silica Sand + 1bag grout (3ft thick)	
17								Finished with 2 sq ft concrete 'base' and above-ground steel	
								monument protected by four bollards	
18									
								Bottom of borehole at 4.5 feet	
19								Groundwater encountered at 4.5 feet. Well screen at 4 - 14 ft bgs	
								Borehole completed with bentonite chips.	
20									

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MONITORING WELL ID: **BORING LOG #: MW-6** **Page 1 of 1**

Project Name: FIFE RV, Fife, Wa **BIT 786**

Project Number: 216-8246

Drilling Information

Drilling Contractor:	Boretech, Bellevue
Drilling Method:	H.S.A.
Borehole Diameter:	8"
Sampler Type:	Stainless Steel Split Spoon Sampler

Driller: Carlos Gardea (Wa Lic No 3143)

Site Location: 3410 Pacific Hwy E, Fife, Wa (Gravel lot S of Tahoma Gas and Jack-in-the-Box)

Borehole Location: 5 ft NE of SW perimeter fence and 32 feet north of west fence along prop line

Borehole Area (AOC): 24 feet east of MW-5 - downgradient perimeter of Property.

Logged by: J. McDermott: Boring Depth: 14.5 feet

GW Encountered: YES Static GW Level:

Notes:

Approx. Surface Elevation:

Start Date: 11-11-16 End Date: Same

Depth (ft)	Groundwater	PID	Visual or Olfactory Evidence	Blow Counts	Recovery		USCS Classification	Soil Classification/ Description	Well Construction
1									
2									
3							SW	No foul odor in cutting 1.5 to 4 ft	
4			0859					FILL - SAND, fine-coarse, well graded, brown, moist. No foul odor.	
5		0.1	LAB	2			SC	FILL - SAND, SILT, little clay, brown. Moist to dry. No foul odor	--
				2			SP	FILL - SAND, fine-coarse, poorly graded, brown, moist. No foul odor.	--
				1				SILT, with very fine sand, gray, wet. No foul odor.	--
6									--
									--
7							ML	*Note base of ditch approx 30 ft south estimated near 5-7 ft bgs*	--
								as recorded at location of MW-6 (7 - 9 ft bgs relative to gravel lot)	--
8									--
								Same as above to 8.7 ft bgs	--
9			0910						--
		0.2	LAB	1			PT	PEAT, with silt and clay, gray. Very moist to wet. No foul odor.	--
10				1				SILT, with very fine sand, very moist to wet. No foul odor.	--
		0.1	LAB	1					--
11			0915				ML		--
									--
12									--
									--
13									--
			0925	4			SP	SAND, very fine, poorly graded, gray, wet. No foul odor.	--
14		0.1	LAB	5					--
				6					
15								**WELL CONSTRUCTION DETAIL:**	
								Excavated a limited terrace on the slope SW of gravel lot	
16								2 inch Sched 40 PVC - 10 ft No 10 slot PVC screen at 4-14ft bgs	
								5 x 50 lbs bags of No. 10-20 Silica Sand + 1bag grout (3ft thick)	
17								Finished with 2 sq ft concrete 'base' and above-ground steel	
								monument protected by four bollards	
18								All wellheads were sealed with twist-lock compression caps	
								Bottom of borehole at 14.5 feet	
19								Groundwater encountered at 5 feet. Well installed at14.5 ft bgs.	
								Borehole completed with bentonite chips.	
20									

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BORING LOG #: MW7

Site Name: Fife RV Center
Project Number: 217-4025

Site Location: 3410 Pacific Highway East, Fife, WA
AOC: South of Former UST Basin
Borehole Location: 52' Southwest of MW3

Logged by: N. Gerkin **Boring Depth:** 16 feet **GW Encountered:** YES

Drilling Information

Drilling Contractor:	SEP, Tumwater, WA
Drilling Method:	2-inch Direct Push
Sampler Type:	Core sampler + virgin poly-sleeve
ECY Well Tag:	BJP689

Approx. Surface Elev.: 10.5' above MSL
Work Date: 07/14/17

Depth (ft)	Groundwater	PID (ppm)	Sample	Blow Counts	Recovery	USCS Classification	Soil Classification/ Description	Well Construction
							Gravel Parking Surface	
1–3						GW	FILL - GRAVEL and SAND, light brown to gray, damp, fine to coarse sand and gravel, subangular to subrounded gravel, Well graded, trace silt. No petrol odor.	
4		0.0				GW	FILL - GRAVEL and SAND, light brown to gray, damp, fine to coarse sand and gravel, subangular to subrounded gravel, Well graded, trace silt. No petrol odor.	
5–6						GW	FILL - GRAVEL and SAND, light brown to gray, damp, fine to coarse sand and gravel, subangular to subrounded gravel, Well graded, trace silt. No petrol odor.	
7–8		0.0				ML	SILT with some very fine Sand, maroon to brown, wet, no petrol odor.	
9–10						ML	Same as above	
11		0.0	Lab			SP	SAND, very fine to fine, marooon to brown, wet, poorly graded, trace silt, no petrol odor.	
12–13						SP	SAND, very fine to fine, marooon to brown, wet, poorly graded, trace silt, no petrol odor.	
14		0.0				SP	SAND, very fine to fine, marooon to brown, wet, poorly graded, trace silt, no petrol odor.	
15–16						SP	SAND, very fine to fine, marooon to brown, wet, poorly graded, trace silt, no petrol odor.	
17–20								
21–24							1" Diameter Schedule 80 PVC, 0.010" Screen from 4 to 14 ft bgs Well completed with Colorado Silica Sand from 3 to 14 ft bgs Bentonite from 1 to 3 ft bgs and Concrete from 0.5 to 1 ft bgs	
25								

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BORING LOG #: MW8

Site Name: Fife RV Center
Project Number: 217-4025

Site Location: 3410 Pacific Highway East, Fife, WA
AOC: South of Former UST Basin
Borehole Location: 50' South of MW3

Logged by: N. Gerkin **Boring Depth:** 16 feet **GW Encountered:** YES

Drilling Information

Drilling Contractor:	SEP, Tumwater, WA
Drilling Method:	2-inch Direct Push
Sampler Type:	Core sampler + virgin poly-sleeve
ECY Well Tag:	BJP688

Approx. Surface Elev.: 10.5' above MSL
Work Date: 07/14/17

Depth (ft)	Groundwater	PID (ppm)	Sample	Blow Counts	Recovery	USCS Classification	Soil Classification/ Description	Well Construction
							Gravel Parking Surface	
1							FILL - GRAVEL and SAND, light brown to gray, damp, fine to coarse sand and gravel, subangular to subrounded gravel, Well graded, trace silt. No petrol odor.	
2		0.0						
3						GW		
4							Same as above, increased silt. No petrol odor.	
5		0.0	Lab				Wet at 5'	
6								
7						ML	SILT with some very fine Sand, maroon to brown, wet, no petrol odor.	
8								
9								
10		0.0	Lab					
11						ML	SILT, dark brown, satuerated, plastic, some clay. No petrol odor.	
12								
13								
14		0.0						
15						SP	SAND, very fine to fine, marooon to brown, wet, poorly graded, trace silt, no petrol odor.	
16								
17								
18								
19								
20								
21							1" Diameter Schedule 80 PVC, 0.010" Screen from 4 to 14 ft bgs Well completed with Colorado Silica Sand from 3 to 14 ft bgs Bentonite from 1 to 3 ft bgs and Concrete from 0.5 to 1 ft bgs	
22								
23								
24								
25								

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BORING LOG #: MW9

Site Name: Fife RV Center
Project Number: 217-4025

Site Location: 3410 Pacific Highway East, Fife, WA
AOC: East (upgradient) of Former UST Basin
Borehole Location: 45' East of MW3

Logged by: N. Gerkin **Boring Depth:** 16 feet **GW Encountered:** YES

Drilling Information

Drilling Contractor:	SEP, Tumwater, WA
Drilling Method:	2-inch Direct Push
Sampler Type:	Core sampler + virgin poly-sleeve
ECY Well Tag:	BJP687

Approx. Surface Elev.: 9' above MSL
Work Date: 07/14/17

Depth (ft)	Groundwater	PID (ppm)	Sample	Blow Counts	Recovery	USCS Classification	Soil Classification/ Description	Well Construction
							Gravel Parking Surface	
1–5		0.0	Lab			GW	FILL - GRAVEL and SAND, light brown to gray, damp, fine to coarse sand and gravel, subangular to subrounded gravel, Well graded, trace silt. No petrol odor. Same as above, increased silt. No petrol odor. Wet at 4.5'	
6–10		0.0				GP	FILL - GRAVEL, medium subangular to subrounded, brown to gray, saturated. No petrol odor. Appears to be associated with trench fill for the 12" sewer nearby.	
10–11		0.0				ML	SILT with some very fine Sand, maroon to brown, wet, no petrol odor.	
12–16		0.0				SP	SAND, very fine to fine, marooon to brown, wet, poorly graded, trace silt, no petrol odor.	
17–24							1" Diameter Schedule 80 PVC, 0.010" Screen from 4 to 14 ft bgs Well completed with Colorado Silica Sand from 3 to 14 ft bgs Bentonite from 1 to 3 ft bgs and Concrete from 0.5 to 1 ft bgs	
25								

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BORING LOG #: B1

Site Name: Fife RV Center
Project Number: 217-4025

Site Location: 3410 Pacific Highway East, Fife, WA
AOC: Former UST Basin
Borehole Location: 15' NW of MW3 (nearest to P25)

Logged by: N. Gerkin **Boring Depth:** 16 feet **GW Encountered:** YES

Drilling Information

Drilling Contractor:	SEP, Tumwater, WA
Drilling Method:	2-inch Direct Push
Sampler Type:	Core sampler + virgin poly-sleeve
ECY Well Tag:	N/A

Approx. Surface Elev.: 10' above MSL
Work Date: 07/14/17

Depth (ft)	Groundwater	PID (ppm)	Sample	Blow Counts	Recovery	USCS Classification	Soil Classification/ Description	Well Construction
							Gravel Parking Surface	
1							FILL - GRAVEL and SAND, light brown to gray, damp, fine to coarse sand and gravel, subangular to subrounded gravel, Well graded. No petrol odor.	
2		0.0						
3						SW	FILL - SAND, fine to coarse, gray to blue-gray, wet below 5', fine to large subrounded to subangular gravel, very well graded. Strong gasoline odor.	
4								
5		462	LAB					
6								
7								
8							Same as Above	
9		123	LAB			SM	Sandy SILT, reddish dark gray, saturated, fine-grained sand. Moderate petrol odor.	
10								
11								
12		0.2				ML	SILT with some very fine Sand, maroon to brown, wet, no petrol odor.	
13								
14								
15		0.0				SP	SAND, very fine to fine, marooon to brown, wet, poorly graded, trace silt, no petrol odor.	
16								
17								
18								
19								
20							Bottom of borehole at 16 feet.	
21							No well installed.	
22							Borehole completed with bentonite chips.	
23								
24								
25								

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BORING LOG #: MW10

Site Name: Fife RV Center
Project Number: 217-4034

Drilling Contractor:	Boretec, Valleyford
Drilling Method:	HSA 8.25"
Sampler Type:	Split Soon
ECY Well Tag:	BJN085
Licensed Driller:	Carlos Gardea 3143
Surveyed Casing Elev.:	12.94' above MSL
Work Date:	02/23/18

Site Location: 3410 Pacific Highway East, Fife, WA
AOC: West of MW2, Northeast Corner of Bio-Swale
Borehole Location: 16' West of MW2

Logged by: N. Gerkin **Boring Depth:** 14.5 feet **GW Encountered:** YES

Depth (ft)	PID (ppm)	Sample	Blow Counts	USCS Classification	Soil Classification/ Description
					Gravel
4	0.4	Lab	3, 2, 1	GW	FILL - GRAVEL and SAND with Silt, light brown to gray, damp, fine to coarse sand and gravel, subangular to subrounded gravel, Well graded. No petrol odor.
9	9.1	Lab	2, 2, 2	SP	SAND with Silt, gray, saturated, slight petrol odor. (Possible Northwestern Tank Basin)
13			2	ML	SILT with some very fine Sand, maroon to brown, wet, slight petrol odor.
14	0.0	Lab	1, 2		

2" Diameter Schedule 40 PVC, 0.020" Screen from 4 to 14 ft bgs
Well completed with Colorado Silica Sand from 3 to 14 ft bgs
Bentonite from 1 to 3 ft bgs and Concrete from 0.5 to 1 ft bgs

Well Construction (Casing within Bollard)

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BORING LOG #: MW11

Site Name: Fife RV Center
Project Number: 217-4034

Drilling Contractor:	Boretec, Valleyford
Drilling Method:	HSA 8.25"
Sampler Type:	Split Soon
ECY Well Tag:	NA (<10')
Licensed Driller:	Carlos Gardea 3143

Surveyed Casing Elev.: 9.12' above MSL
Work Date: 02/23/18

Site Location: 3410 Pacific Highway East, Fife, WA
AOC: Furthest Downgradient Well, 33' NW of MW12
Borehole Location: Western Corner of Bioswale

Logged by: N. Gerkin **Boring Depth:** 14.5 feet **GW Encountered:** YES

Depth (ft)	Groundwater	PID (ppm)	Sample	Blow Counts	Recovery	USCS Classification	Soil Classification/ Description	Well Construction (Casing within Bollard)
+2							Concrete Pad	
+1							Earthen Mound (Built Prior to Drilling to Allow for Well Seal)	
1								
2				2		SW	SAND, coarse to medium, well graded, brown, moist. No foul odor.	
3				2				
		0.8	Lab	1			Sandy SILT, very fine sand, very moist to wet, mottled staining. greyish brown . No foul odor.	
4				4				
				3				
5		0.5		2			As above, saturated	
				2				
6				3				
		0.8	Lab	4			As above	
7				4				
				3				
8		4.1		1				
				1				
9				1				
		0.0	Lab	1			As above	
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								

Though exempt per WAC per shallow depth (- 9.5 ft below constructed mound) / - 8.3 ft bgs), the objective was to meet or exceed the seal requirements for wells extending more than - 10 ft bgs in order to adhere to the 'spirit' of the code'. An additional objective was to place at least one downgradient well (on property) at which the top of screen would be present above the water table at those times at which water levels were present at the rim of the steel riser drain pipe controlling maximum bioswale water levels.

So, in order to achieve this, as the pipe rim was estimated at or slightly less than 18 inches below the - 0.0 bgs (at well location):

+1.2 to + 2.0 ft bgs Concrete Pad
+0.0 to +1.2 ft bgs Earthen mound - compacted
+0.3 to - 1.1 ft bgs Bentonite pellets
'Geo-barrier': 6 folded layers of 0.7mm thick plastic sheeting
- 1.1 to - 2.1 ft bgs Riser pipe with annular sand pack
- 2.1 to - 9.6 ft bgs Screened interval with annular sand pack

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BORING LOG #: MW12

Site Name: Fife RV Center
Project Number: 217-4034

Drilling Contractor:	Boretec, Valleyford
Drilling Method:	HSA 8.25"
Sampler Type:	Split Soon
ECY Well Tag:	BJN087
Licensed Driller:	Carlos Gardea 3143
Surveyed Casing Elev.:	11.74' above MSL
Work Date:	02/23/18

Site Location: 3410 Pacific Highway East, Fife, WA
AOC: West of MW2, Northeast Corner of Bio-Swale
Borehole Location: 30' Northwest of MW5

Logged by: N. Gerkin **Boring Depth:** 14.5 feet **GW Encountered:** YES

Depth (ft)	Groundwater	PID (ppm)	Sample	Blow Counts	Recovery	USCS Classification	Soil Classification/ Description	Well Construction (Casing within Bollard)
1–3								
4		0.8	Lab	5 4 3		GW	FILL - GRAVEL and SAND with Silt, light brown to gray, damp, saturated @5', fine to coarse sand and gravel, subangular to subrounded gravel, Well graded. Trace Organics, No petrol odor.	
5–6								
7		4.1	Lab	1 1 2		ML	SILT with some very fine Sand, maroon to brown, wet, plastic, slight petrol odor. (Possible Northwestern Tank Basin)	
8–9								
10				7 2 1			As above	
11–12								
13		0.0	Lab	2 1 2		ML	As above, increased organics	
14								
15–19								
20–22							2" Diameter Schedule 40 PVC, 0.020" Screen from 4 to 14 ft bgs Well completed with Colorado Silica Sand from 3 to 14 ft bgs Bentonite from 1 to 3 ft bgs and Concrete from 0.5 to 1 ft bgs	
23								

Appendix D

July 2018 Soil Boring Logs

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Depth (ft)	Groundwater		Visual or Olfactory Evidence	Blow Counts	Recovery		USCS Classification	Soil Classification/ Description **UNIFIED SOIL CLASSIFICATION SYSTEM EXPLANATION**	Well Construction		
							GW	**GRAVELS**, well-graded* OR Gravel+Sand mix, little-no fines			
							GP	**GRAVELS**, poorly-graded* OR Gravel+Sand mix, little-no fines			
							GM	**GRAVELS**, silty OR Gravel-sand-silt mix			
							GC	**GRAVELS**, clayey OR Gravel-sand-clay mix			
							SW	**SAND**, well-graded OR **Gravelly Sands**, little-no fines			
							SP	**SAND**, poorly-graded OR **Gravelly Sands**, little-no fines			
							SM	**SAND**, silty OR Sand-silt mix			
							SC	**SAND**, clayey OR Sand-clay mix			
							ML	**SILT**, inorganic (very fine sands, rock flour, silty or clayey fine			
								sands) OR Clayey silts with slight plasticity			
							CL	**CLAY**, inorganic, low-med plasticity (gravelly, sandy, silty, lean)			
							OL	**SILT**, organic, AND **SILT-CLAY**, organic, low plasticity			
							MH	**SILT**, inorganic (micaceous or diatomaceous fn sndy/silty soils)			
								OR SILTY SOILS, elastic SILTS			
							CH	**CLAY**, inorganic, high plasticity, fat clays			
							OH	**CLAY**, organic, med-high plasticity OR Organic SILTS			
							PT	**PEAT** and other highly organic SOILS			
								**** Terminology clarification:*** *The term "**Well graded**" is a synonym for "**Poorly sorted**," both meaning that a wide range of particle sizes are present. The former term is employed in geotechnical descriptions, while the latter is preferred by the USDA in characterizing topsoils and subsoils.*			

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BORING LOG B2

Site Name: Fife RV Center
Project: Property Line Characterization

Drilling Information

Drilling Contractor:	SEP, Tumwater, WA
Drilling Method:	2-inch Direct Push
Sampler Type:	Core sampler + virgin poly-sleeve

Site Location: 3410 Pacific Highway East, Fife, WA
AOC: Southern Property Boundary, SW of Former Station Features
Borehole Location: 5' SW of MW5, on Property Line

Approx. Surface Elev.: 8' above MSL
Work Date: 07/02/18

Logged by: N. Gerkin **Boring Depth:** 8 feet **GW Encountered:** YES

Depth (ft)	Groundwater	PID (ppm)	Sample	Blow Counts	Recovery		USCS Classification	Soil Classification/ Description	Well Construction
1–2		0.0					GW	FILL - GRAVEL and SAND, light brown to gray, damp, fine to coarse sand and gravel, subangular to subrounded gravel, Well graded, trace silt. No petroleum odor.	
3–4		0.3					SM	Silty SAND with Organics, dry to damp, dark brown, no petroleum odor.	
5–6		0.3	LAB				SM		
7–8							ML	Clayey SILT with some very fine Sand, maroon to brown, saturated,moderate plasticity, no petroleum odor.	
9–22								Backfilled with Bentonite from 0 to 8 ft bgs	
23									

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BORING LOG B3

Site Name: Fife RV Center
Project: Property Line Characterization

Site Location: 3410 Pacific Highway East, Fife, WA
AOC: Southern Property Boundary
Borehole Location: Between MW5 & MW12, on Property Line

Logged by: N. Gerkin **Boring Depth:** 12 feet **GW Encountered:** YES

Drilling Information

Drilling Contractor:	SEP, Tumwater, WA
Drilling Method:	2-inch Direct Push
Sampler Type:	Core sampler + virgin poly-sleeve

Approx. Surface Elev.: 9.5' above MSL
Work Date: 07/02/18

Depth (ft)	Groundwater	PID (ppm)	Sample	Blow Counts	Recovery		USCS Classification	Soil Classification/ Description	Well Construction
1		0.0					GW	FILL - GRAVEL and SAND, light brown to gray, damp, fine to coarse sand and gravel, subangular to subrounded gravel, Well graded, trace silt. No petroleum odor.	
2									
3									
4		0.3					SM	Silty SAND with Organics, dry to damp, dark brown, no petroleum odor.	
5									
6									
7		21.6	LAB				ML	Clayey SILT with some very fine Sand, maroon to brown, saturated,moderate plasticity, no petroleum odor.	
8									
9									
10									
11		0.3						As above, damp.	
12			LAB						
13									
14									
15									
16									
17									
18									
19									
20								Backfilled with Bentonite from 0 to 12 ft bgs	
21									
22									
23									

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BORING LOG B4

Site Name: Fife RV Center
Project: Property Line Characterization

Drilling Information

Drilling Contractor:	SEP, Tumwater, WA
Drilling Method:	2-inch Direct Push
Sampler Type:	Core sampler + virgin poly-sleeve

Site Location: 3410 Pacific Highway East, Fife, WA
AOC: Southern Property Boundary, W of Former Station Features
Borehole Location: 8' SW of MW12, on Property Line

Approx. Surface Elev.: 9' above MSL
Work Date: 07/02/18

Logged by: N. Gerkin **Boring Depth:** 8 feet **GW Encountered:** YES

Depth (ft)	Groundwater	PID (ppm)	Sample	Blow Counts	Recovery		USCS Classification	Soil Classification/ Description	Well Construction
1		0.0					GW	FILL - GRAVEL and SAND, light brown to gray, damp, fine to coarse sand and gravel, subangular to subrounded gravel, Well graded, trace silt. No petroleum odor.	
2									
3									
4		0.2					SM	Silty SAND with Organics, dry to damp, dark brown, no petroleum odor.	
5									
6		0.9	LAB						
7							ML	Clayey SILT with some very fine Sand, maroon to brown, saturated,moderate plasticity, no petroleum odor.	
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20								Backfilled with Bentonite from 0 to 8 ft bgs	
21									
22									
23									

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BORING LOG B5

Site Name: Fife RV Center
Project: Property Line Characterization

Drilling Information

Drilling Contractor:	SEP, Tumwater, WA
Drilling Method:	2-inch Direct Push
Sampler Type:	Core sampler + virgin poly-sleeve

Site Location: 3410 Pacific Highway East, Fife, WA
AOC: Southern Property Boundary, W of Former Station Features
Borehole Location: Between MW5 & MW12, on Property Line

Approx. Surface Elev.: 7' above MSL
Work Date: 07/02/18

Logged by: N. Gerkin **Boring Depth:** 8 feet **GW Encountered:** YES

Depth (ft)	Groundwater	PID (ppm)	Sample	Blow Counts	Recovery		USCS Classification	Soil Classification/ Description	Well Construction
1		0.0					GW	FILL - GRAVEL and SAND, light brown to gray, damp, fine to coarse sand and gravel, subangular to subrounded gravel, Well graded, trace silt. No petroleum odor.	
2									
3								SILT, brown, dry, compacted. No Petroleum Odor.	
4		0.4	LAB						
5							ML	Clayey SILT with some very fine Sand, maroon to brown with heavy oxidation at interface with water, saturated,moderate plasticity, no petroleum odor.	
6		0.1	LAB						
7								SAND, medium-grained, black, saturated, poorly graded. No petroleum odor.	
8		0.1					SP		
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19								Backfilled with Bentonite from 0 to 8 ft bgs	
20									
21									
22									
23									

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BORING LOG B6

Site Name: Fife RV Center
Project: Property Line Characterization

Site Location: 3410 Pacific Highway East, Fife, WA
AOC: Original PI & USTs located on both Fife RV & Jack in the Box Properties
Borehole Location: North of MW2, on Northern Property Line

Logged by: N. Gerkin **Boring Depth:** 12 feet **GW Encountered:** YES

Drilling Information

Drilling Contractor: SEP, Tumwater, WA
Drilling Method: 2-inch Direct Push
Sampler Type: Core sampler + virgin poly-sleeve

Approx. Surface Elev.: 9.5' above MSL
Work Date: 07/02/18

Depth (ft)	Groundwater	PID (ppm)	Sample	Blow Counts	Recovery		USCS Classification	Soil Classification/ Description	Well Construction
1							GW	FILL - GRAVEL and SAND, light brown to gray, damp, fine to coarse sand and gravel, subangular to subrounded gravel, Well graded, trace silt. No petroleum odor.	
2		0.0							
3		5.3						Silty SAND, fine-grained, reduced, dark gray, moderate petroleum odor.	
4		22							
5			H_2O					As Above, maroon brown/gray, saturated. Strong petroleum odor.	
6		212	LAB						
7		1213	LAB				SM		
8									
9									
10		0.7							
11							ML	Clayey SILT with some very fine Sand, maroon to brown, moist,moderate plasticity, no petroleum odor.	
12									
13									
14									
15									
16									
17									
18									
19									
20								Backfilled with Bentonite from 0 to 12 ft bgs	
21									
22									
23									

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BORING LOG B7

Site Name: Fife RV Center
Project: Property Line Characterization

Site Location: 3410 Pacific Highway East, Fife, WA
AOC: West of Original PI & USTs located on both Fife RV & Jack in the Box Properties
Borehole Location: NE of MW10, on Northern Property Line

Logged by: N. Gerkin **Boring Depth:** 8 feet **GW Encountered:** YES

Drilling Information

Drilling Contractor: SEP, Tumwater, WA
Drilling Method: 2-inch Direct Push
Sampler Type: Core sampler + virgin poly-sleeve

Approx. Surface Elev.: 9.5' above MSL
Work Date: 07/02/18

Depth (ft)	Groundwater	PID (ppm)	Sample	Blow Counts	Recovery		USCS Classification	Soil Classification/ Description	Well Construction
1		0.0					GW	FILL - GRAVEL and SAND, light brown to gray, damp, fine to coarse sand and gravel, subangular to subrounded gravel, Well graded, trace silt. No petroleum odor.	
2									
3		0.3					SM	Silty SAND, fine-grained, reduced, dark gray, moderate petroleum odor.	
4									
5		920	H_2O LAB				ML	Clayey SILT with some very fine Sand, maroon to brown, moist,moderate plasticity, no petroleum odor.	
6									
7		1582	LAB				SM	Silty SAND, fine-grained, maroon/brown, moderate petroleum odor.	
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19								Backfilled with Bentonite from 0 to 8 ft bgs	
20									
21									
22									
23									

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BORING LOG B8

Site Name: Fife RV Center
Project: Property Line Characterization

Drilling Information

Drilling Contractor:	SEP, Tumwater, WA
Drilling Method:	2-inch Direct Push
Sampler Type:	Core sampler + virgin poly-sleeve

Site Location: 3410 Pacific Highway East, Fife, WA
AOC: Original PI & USTs located on both Fife RV & Jack in the Box Properties
Borehole Location: North of Liner

Approx. Surface Elev.: 9.5' above MSL
Work Date: 07/02/18

Logged by: N. Gerkin **Boring Depth:** 4 feet **GW Encountered:** YES

Depth (ft)	Groundwater	PID (ppm)	Sample	Blow Counts	Recovery		USCS Classification	Soil Classification/ Description	Well Construction
1		0.0					GW	FILL - GRAVEL and SAND, light brown to gray, damp, fine to coarse sand and gravel, subangular to subrounded gravel, Well graded, trace silt. No petroleum odor.	
2									
3		215					SM	Silty SAND, fine-grained, reduced, dark gray, strong petroleum odor.	
4								REFUSAL @ 4 Feet BGS	
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20								Refusal First 3 Tries @ 4' Backfilled with Bentonite from 0 to 4 ft bgs	
21									
22									
23									

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BORING LOG B9

Site Name: Fife RV Center
Project: Property Line Characterization

Drilling Information

Drilling Contractor:	SEP, Tumwater, WA
Drilling Method:	2-inch Direct Push
Sampler Type:	Core sampler + virgin poly-sleeve

Site Location: 3410 Pacific Highway East, Fife, WA
AOC: West of Original PI & USTs located on both Fife RV & Jack in the Box Properties
Borehole Location: Between MW1 & MW2, on Northern Property Line

Approx. Surface Elev.: 9.5' above MSL
Work Date: 07/02/18

Logged by: N. Gerkin **Boring Depth:** 8 feet **GW Encountered:** YES

Depth (ft)	Groundwater	PID (ppm)	Sample	Blow Counts	Recovery		USCS Classification	Soil Classification/ Description	Well Construction
1		0.0					GW	FILL - GRAVEL and SAND, light brown to gray, damp, fine to coarse sand and gravel, subangular to subrounded gravel, Well graded, trace silt. No petroleum odor.	
2									
3									
4		1577	LAB				SM	Silty SAND, fine-grained, reduced, dark gray, damp. Strong petroleum odor.	
5		1660	H_2O LAB					As above, saturated. Sheen present.	
6		526	LAB						
7							ML	Clayey SILT with some very fine Sand, maroon to brown, saturated,moderate plasticity. Strong petroleum odor.	
8		5.3	LAB						
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19								Backfilled with Bentonite from 0 to 8 ft bgs	
20									
21									
22									
23									

Appendix E

Laboratory Analytical Reports – July 2018 Site Assessment

Advanced Analytical Laboratory
(425) 702-8571

AAL Job Number:	C80704-3
Client:	Aerotech Environmental
Project Manager:	Nick Gerkin
Client Project Name:	Fife RV Center
Client Project Number:	na
Date received:	07/04/18

AAL Job Number: C80704-3
Client: Aerotech Environmental
Project Manager: Nick Gerkin
Client Project Name: Fife RV Center
Client Project Number: na
Date received: 07/04/18

Analytical Results

NWTPH-Gx/BTEX		MTH BLK	LCS	W-B6	W-B7	W-B9	Dupl W-B9	RPD W-B9
Matrix	Water	Water	Water	Water	Water	Water	Water	Water
Date analyzed	Reporting Limits	07/04/18	07/04/18	07/04/18	07/04/18	07/04/18	07/04/18	07/04/18
NWTPH-Gx, ug/L								
Mineral spirits/Stoddard	100	nd		nd	nd	nd	nd	
Gasoline	100	nd		11,000	9,600	95,000	100,000	5%
BTEX 8021B, µg/L								
Benzene	1.0	nd	94%	84	200	390	500	25%
Toluene	1.0	nd	106%	52	11	94	120	24%
Ethylbenzene	1.0	nd		530	400	2,000	2,200	10%
Xylenes	1.0	nd		7.6	160	1,800	2,300	24%
Surrogate recoveries:								
Trifluorotoluene		75%	78%	C	C	C	C	
Bromofluorobenzene		96%	100%	C	C	C	C	

Data Qualifiers and Analytical Comments
nd - not detected at listed reporting limits
na - not analyzed
C - coelution with sample peaks
Acceptable Recovery limits: 70% TO 130%
Acceptable RPD limit: 30%

AAL Job Number: C80704-3
Client: Aerotech Environmental
Project Manager: Nick Gerkin
Client Project Name: Fife RV Center
Client Project Number: na
Date received: 07/04/18

Analytical Results

NWTPH-Gx/BTEX		MS	MSD	RPD
Matrix	Water	Water	Water	Water
Date analyzed	Reporting Limits	07/04/18	07/04/18	07/04/18
NWTPH-Gx, ug/L				
Mineral spirits/Stoddard	100			
Gasoline	100			
BTEX 8021B, µg/L				
Benzene	1.0	93%	104%	11%
Toluene	1.0	94%	104%	9%
Ethylbenzene	1.0			
Xylenes	1.0			
Surrogate recoveries:				
Trifluorotoluene		82%	86%	
Bromofluorobenzene		102%	101%	

Data Qualifiers and Analytical Comments
nd - not detected at listed reporting limits
na - not analyzed
C - coelution with sample peaks
Acceptable Recovery limits: 70% TO 130%
Acceptable RPD limit: 30%

AAL Job Number: C80704-3
Client: Aerotech Environmental
Project Manager: Nick Gerkin
Client Project Name: Fife RV Center
Client Project Number: na
Date received: 07/04/18

Analytical Results

NWTPH-Gx / BTEX		MTH BLK	LCS	B2(5.5)	B3(7)	B4(6)	B5(3.5)	B5(6)
Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Date extracted	Reporting	07/10/18	07/10/18	07/10/18	07/10/18	07/10/18	07/10/18	07/10/18
Date analyzed	Limits	07/10/18	07/10/18	07/10/18	07/10/18	07/10/18	07/10/18	07/10/18
NWTPH-Gx, mg/kg								
Mineral spirits/Stoddard	5.0	nd		nd	nd	nd	nd	nd
Gasoline	5.0	nd		nd	70	9.2	nd	nd
BTEX 8021B, mg/kg								
Benzene	0.020	nd	85%	nd	0.070	nd	nd	nd
Toluene	0.050	nd	89%	nd	0.16	nd	nd	nd
Ethylbenzene	0.050	nd		nd	2.4	0.075	nd	nd
Xylenes	0.050	nd		nd	0.99	nd	nd	nd
Surrogate recoveries:								
Trifluorotoluene		86%	87%	70%	73%	80%	82%	75%
Bromofluorobenzene		104%	99%	101%	114%	120%	126%	109%

Data Qualifiers and Analytical Comments
nd - not detected at listed reporting limits
na - not analyzed
M - matrix interference
C - coelution with sample peaks
Results reported on dry-weight basis
Acceptable Recovery limits: 70% TO 130%
Acceptable RPD limit: 30%

AAL Job Number: C80704-3
Client: Aerotech Environmental
Project Manager: Nick Gerkin
Client Project Name: Fife RV Center
Client Project Number: na
Date received: 07/04/18

Analytical Results

NWTPH-Gx / BTEX		B6(6)	B6(7)	B7(5)	B7(7)	B8(4)	B9(4)	B9(5)
Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Date extracted	Reporting	07/10/18	07/10/18	07/10/18	07/10/18	07/10/18	07/10/18	07/10/18
Date analyzed	Limits	07/10/18	07/10/18	07/10/18	07/10/18	07/10/18	07/10/18	07/10/18
NWTPH-Gx, mg/kg								
Mineral spirits/Stoddard	5.0	nd	nd	nd	nd	nd	nd	nd
Gasoline	5.0	190	120	2,400	920	350	1,200	2,800
BTEX 8021B, mg/kg								
Benzene	0.020	0.59	0.12	0.48	6.0	0.70	2.5	2.2
Toluene	0.050	1.2	0.32	1.6	0.86	1.4	2.8	2.0
Ethylbenzene	0.050	3.1	4.2	20	14	3.0	7.4	13
Xylenes	0.050	1.1	nd	34	7.0	1.6	1.8	26
Surrogate recoveries:								
Trifluorotoluene		120%	87%	C	C	78%	C	73%
Bromofluorobenzene		111%	124%	C	C	119%	C	100%

Data Qualifiers and Analytical Comments
nd - not detected at listed reporting limits
na - not analyzed
M - matrix interference
C - coelution with sample peaks
Results reported on dry-weight basis
Acceptable Recovery limits: 70% TO 130%
Acceptable RPD limit: 30%

AAL Job Number: C80704-3
Client: Aerotech Environmental
Project Manager: Nick Gerkin
Client Project Name: Fife RV Center
Client Project Number: na
Date received: 07/04/18

Analytical Results

NWTPH-Gx / BTEX		B9(6)	B9(8)	MS	MSD	RPD	MTH BLK	LCS
Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Date extracted	Reporting	07/10/18	07/10/18	07/10/18	07/10/18	07/10/18	07/12/18	07/12/18
Date analyzed	Limits	07/10/18	07/10/18	07/10/18	07/10/18	07/10/18	07/12/18	07/12/18
NWTPH-Gx, mg/kg								
Mineral spirits/Stoddard	5.0	nd	nd				nd	
Gasoline	5.0	1,100	24				nd	
BTEX 8021B, mg/kg								
Benzene	0.020	3.9	nd	72%	80%	11%	nd	78%
Toluene	0.050	2.0	nd	79%	82%	3%	nd	83%
Ethylbenzene	0.050	23	0.49				nd	
Xylenes	0.050	4.4	0.11				nd	
Surrogate recoveries:								
Trifluorotoluene		84%	75%	91%	93%		84%	86%
Bromofluorobenzene		109%	123%	108%	103%		104%	103%

Data Qualifiers and Analytical Comments
nd - not detected at listed reporting limits
na - not analyzed
M - matrix interference
C - coelution with sample peaks
Results reported on dry-weight basis
Acceptable Recovery limits: 70% TO 130%
Acceptable RPD limit: 30%

AAL Job Number: C80704-3
Client: Aerotech Environmental
Project Manager: Nick Gerkin
Client Project Name: Fife RV Center
Client Project Number: na
Date received: 07/04/18

Analytical Results

NWTPH-Gx / BTEX		B3(12)
Matrix	Soil	Soil
Date extracted	Reporting	07/12/18
Date analyzed	Limits	07/12/18
NWTPH-Gx, mg/kg		
Mineral spirits/Stoddard	5.0	nd
Gasoline	5.0	6.4
BTEX 8021B, mg/kg		
Benzene	0.020	nd
Toluene	0.050	nd
Ethylbenzene	0.050	nd
Xylenes	0.050	nd
Surrogate recoveries:		
Trifluorotoluene		79%
Bromofluorobenzene		107%

Data Qualifiers and Analytical Comments
nd - not detected at listed reporting limits
na - not analyzed
M - matrix interference
C - coelution with sample peaks
Results reported on dry-weight basis
Acceptable Recovery limits: 70% TO 130%
Acceptable RPD limit: 30%

Appendix F

Field Protocols

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SOIL BORING AND WELL INSTALLATION STANDARD OPERATING PROCEDURE

EQUIPMENT *(Items in italic provided by drilling subcontractor, verify according to the site sampling plan they bring the appropriate equipment and material.)*

- Sampling and Analyses Plan (SAP)
- Site-specific sampling plan
- Sample location map
- Sample table
- Safety equipment, as specified in the Health and Safety Plan
- Permanent pens/marker (e.g. Sharpies®)
- Site logbook, boring log and/or sampling form
- Camera
- Candlestick/cones/barricade
- Caution tape
- Trash bags/plastic sheeting
- Assorted tools (e.g. shovels, wrenches, etc.)
- *Annular materials: silica sand, bentonite pellets and chips, grout*
- *Monitoring well materials: 2-inch schedule 40 PVC riser, well screen and end caps*
- *Completion materials: posts or traffic rated steel monuments, concrete mix, concrete forms*
- *Drilling rig (e.g. hollow stem auger, air/mud rotary, direct push, or sonic)*
- *Disposable acetate liners for direct push*
- *Decontamination equipment such as pressure washer to decontaminate rig and bucket with water and phosphate-free soap (e.g. Alconox®, Liquinox®) for split spoon samplers*

Preliminary Activities

Prior to the onset of field activities at the site, Aerotech obtains the appropriate permit(s) from the governing agency(s). Advance notification is made as required by the agency(s) prior to the start of work. Aerotech marks the borehole locations and contacts the local one call utility locating service at least 2 full business days prior to the start of work to mark buried utilities. Borehole locations may also be checked for buried utilities by a private geophysical surveyor. Additionally, borehole locations may be cleared via air-knife and vacuum operations where proposed locations are in close proximity of buried utilities. Fieldwork is conducted under the advisement of a state registered professional geologist. Monitoring well construction will

comply with Monitoring Well Construction: General, 690-240-100 through Well Seals, WAC 173-160.

Drilling

Aerotech contracts a licensed driller to advance each boring and collect soil samples. The specific drilling method (e.g., hollow-stem auger, direct push method, or sonic drilling), sampling method [e.g., core barrel or California-modified split spoon sampler (CMSSS)] and sampling depths are documented on the boring log and may be specified in a work plan. Soil samples are typically collected at the capillary fringe and at 5-foot intervals to the total depth of the boring. To determine the depth of the capillary fringe prior to drilling, the static groundwater level is measured with a water level indicator in the closest monitoring well to the boring location, if available.

The borehole is advanced to just above the desired sampling depth. For CMSSSs, the sampler is placed inside the auger and driven to a depth of 18 inches past the bit of the auger. The sampler is driven into the soil with a standard 140-pound hammer repeatedly dropped from a height of 30 inches onto the sampler. The number of blows required to drive the sampler each 6-inch increment is recorded on the boring log. For core samplers (e.g., direct push), the core is driven 18 inches using the rig apparatus.

Soil Sampling

Soil is collected according to Aerotech's SOIL SAMPLING STANDARD OPERATING PROCEDURE.

Grab Groundwater Sampling from Soil Boring

In the event that undeveloped grab-groundwater samples are necessary for the scope of work, a temporary well screen is placed across the desired interval of the soil boring. The sample can be collected via disposable bailer or peristaltic pump and disposable tubing. Additionally if direct push technology has been utilized for advancing the soil boring, a groundwater sample, is collected from the boring by using HydropunchTM sampling technology. In the case of using HydropunchTM technology, after collecting the capillary fringe soil sample, the boring is advanced to the top of the soil/groundwater interface and a sampling probe is pushed to approximately 2 feet below the top of the static water level. The probe is opened by partially withdrawing it and thereby exposing the screen. New polyethylene tubing with a peristaltic pump or decontaminated bailer is used to collect a water sample from the probe. The water sample is then emptied into laboratory-supplied containers constructed of the correct material and with the correct volume and preservative to comply with the proposed laboratory test. The container is slowly filled with the retrieved water sample until no headspace remains and then promptly sealed with a Teflon-lined cap, checked for the presence of bubbles, labeled, entered onto a COC record and placed in chilled storage at 4° Celsius. Laboratory-supplied trip blanks accompany the water samples as a quality assurance/quality control procedure. Equipment blanks may be collected as required. The samples are kept in chilled storage and transported under COC protocol to a client-approved, state-certified laboratory for analysis.

Field Screening Procedures

Aerotech staff place the soil from the middle of the sampling interval into a plastic re-sealable bag. The bag is then labeled with the sample number. The tip of a photoionization detector (PID) or similar device is inserted through the plastic bag to measure organic vapor concentrations in the headspace. The highest sustained PID measurement is recorded on the boring log. At a minimum, the PID or organic vapor monitoring device is calibrated on a daily basis in accordance with manufacturer's specifications using a hexane or isobutylene standard. The calibration gas and concentration are recorded on a calibration log. Instruments such as the PID are useful for evaluating relative concentrations of volatilized hydrocarbons, but they do not measure the concentration of petroleum hydrocarbons in the soil matrix with the same precision as laboratory analysis. Aerotech trained personnel describe the soil in the bag according to the Unified Soil Classification System and record the description on the boring log, which is included in the final report.

Backfilling of Soil Boring

If a well is not installed, the boring is backfilled from total depth to approximately 5 feet below ground surface (bgs) with either neat cement or bentonite grout using a tremie pipe. The boring is backfilled from 5 feet bgs to approximately 1 foot bgs with hydrated bentonite chips. The borehole is completed from 1 foot bgs to surface grade with material that best matches existing surface conditions and meets local agency requirements. Site-specific backfilling details are shown on the respective boring log.

Monitoring Well Construction

A well (if constructed) is completed using materials documented on the boring log or specified in a work plan. The well is constructed with slotted casing across the desired groundwater sampling depth(s) and completed with blank casing to within 6 inches of surface grade. No further construction is conducted on temporary wells. For permanent wells, the annular space of the well is backfilled with Monterey sand from the total depth to approximately 2 feet above the top of the screened casing. A hydrated granular bentonite seal is placed on top of the sand filter pack. Grout may be placed on top of the bentonite seal to the desired depth using a tremie pipe. The well may be completed to surface grade with a 1-foot thick concrete pad. A traffic-rated well vault and locking cap for the well casing may be installed to protect against surface-water infiltration and unauthorized entry. Site-specific well construction details including type of well, well depth, casing diameter, slot size, length of screen interval and sand size are documented on the boring log or specified in the work plan.

Monitoring Well Development

Following well construction, each monitoring well is developed and surveyed according to Aerotech's MONITORING WELL DEVELOPMENT AND SURVEYING STANDARD OPERATING PROCEDURE.

Well Sampling

Following development, groundwater is collected according to Aerotech's LOW-FLOW GROUNDWATER SAMPLING STANDARD OPERATING PROCEDURE.

Decontamination Procedures

Aerotech and/or the contracted driller decontaminate soil and water sampling equipment between each sampling event with a non-phosphate solution, followed by a minimum of two tap water rinses. Deionized water may be used for the final rinse. Downhole drilling equipment is steam-cleaned prior to drilling the borehole and at completion of the borehole.

Waste Treatment and Soil Disposal

Soil cuttings and decontamination fluids generated from the drilling or sampling are stored on site in labeled, Department of Transportation-approved, 55-gallon drums or other appropriate storage container. Unless otherwise specified in the contract with Aerotech, the client is responsible for disposal of investigation derived waste. Should Aerotech be contracted to complete disposal for the client, drums containing investigation derived waste are subsequently transported under manifest to a client- and regulatory-approved facility for disposal.

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SOIL SAMPLING STANDARD OPERATING PROCEDURE

EQUIPMENT

- Sampling and Analyses Plan (SAP)
- Site-specific sampling plan
- Sample location map
- Sample table
- Safety equipment, as specified in the Health and Safety Plan
- Permanent pens/marker (e.g. Sharpies®)
- Site logbook and/or sampling form
- Camera
- Screening equipment (e.g. Photoionization detector (PID))
- Survey stakes or flags
- Tape measure or measuring wheel
- Plastic sheet
- Soil collection device, heavy equipment (e.g. spoons spade shovel, hand auger, hollow stem auger – split spoon sampler, direct push rig – macro core, shelby tube, backhoe)
- Syringes for EPA Method 5035
- Syringe tool for EPA Method 5035 (e.g. En Core® sampler)
- Pre-weighed and preserved sample vials for EPA Method 5035
- Stainless steel and/or plastic bowls (only if homogenizing composite samples)
- Sample containers, precleaned (e.g., I-Chem)
- Chain-of-custody forms, custody seals, sample labels
- Ziploc® Bags
- Insulated cooler
- Ice
- Plastic bags for sample containers and ice
- Decontamination equipment including tap water and/or deionized water and phosphate-free soap (e.g. Alconox®, Liquinox®)

Soil Sampling

Soil samples are preserved in the metal or plastic sleeve used with the California-modified split spoon sampler (CMSSS) or core sampler, in glass jars or other containers according to the test method and regulatory guidelines (e.g., Environmental Protection Agency Method 5035). Sleeves are removed from the sample barrel, and the lowermost sample sleeve is labeled. Soil is collected from the split spoon sample or direct push core sample into appropriate containers based on the planned test method. Besides the use of a drilling rig, soil may also be collected via hand auger or with a scoop or spoon from the surface or a selected interval from an excavation, trench or test pit.

Soil Sample Collection

Aerotech field personnel are to review the SAP for sample locations and analysis as well as obtain photograph(s) of the material before sampling. If the soil sample is to be a discrete sample, collect soil using a clean/decontaminated stainless-steel (organic analyses) or plastic (inorganic analyses) spoon. If the soil sample is to be a composite, collect soil from all locations to be sampled into one stainless-steel (organic analyses) or plastic (inorganic analyses) bowl and homogenize the soil. If the soil sample is to be a discrete sample for volatile analyses, collect soil using a syringe and place into appropriate pre-weighed sample vial (Volatiles samples may not be composited.).

Next, use the syringe, stainless-steel or plastic spoon to transfer soil sample as appropriate into sample container as specified by the analytical test method. Label and manage sample containers. Decontaminate sampling equipment between each sampling event with a non-phosphate solution, followed by a minimum of two tap water rinses. Deionized water may be used for the final rinse. Ensure activities are well documented in the site logbook or on a designated sampling form. (i.e. collection method, presence of sheen or odor and PID measurement.

Field Screening Procedures

Aerotech field staff place soil from sampling interval into a plastic re-sealable bag. The bag is then labeled with the sample number. The tip of a photoionization detector (PID) or similar device is inserted through the plastic bag to measure organic vapor concentrations in the headspace. The highest sustained PID measurement is recorded on the boring log. At a minimum, the PID or organic vapor monitoring device is calibrated on a daily basis in accordance with manufacturer's specifications using a hexane or isobutylene standard. The calibration gas and concentration are recorded on a calibration log. Instruments such as the PID are useful for evaluating relative concentrations of volatilized hydrocarbons, but they do not measure the concentration of petroleum hydrocarbons in the soil matrix with the same precision as laboratory analysis. Aerotech trained personnel describe the soil in the bag according to the Unified Soil Classification System and record the description on the boring log, sampling form or logbook. Selected soil samples for analysis are then placed Samples are placed in a cooler chilled to 4º Celsius and transported to a state-certified laboratory under chain-of custody (COC) protocol.

Extractable Petroleum Hydrocarbons (EPH)/Volatile Petroleum Hydrocarbons (VPH)

To evaluate the potential utilization of site specific cleanup levels (e.g. Ecology's Method B or Method C cleanup levels), Aerotech field personnel will collect additional sample volume to complete EPH/VPH analysis. This test will be completed on samples that are containing petroleum hydrocarbons only, utilizing the previously discussed field screening procedures as well as contaminant source data from previous investigation work.

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MONITORING WELL DEVELOPMENT AND SURVEYING

EQUIPMENT

- Well location map
- Safety equipment, as specified in the Health and Safety Plan
- Permanent pens and markers (e.g. Sharpies®)
- Field notebook and/or sampling form
- Survey equipment
- Surge Block
- 55-Gallon Drums
- 5-Gallon Buckets
- 3/8" Tubing
- DC Power Source
- Whale® Pump
- Water Level Indicator
- Hand Tools (e.g. socket set, screw drivers)
- Watch
- Decontamination equipment including tap water and/or deionized water and phosphate-free soap (e.g. Alconox®, Liquinox®)

Preliminary Activities

Prior to the onset of field activities at the site, Aerotech obtains permission from the client to perform activities and obtains any appropriate permit(s) from potential governing agencies. Aerotech field personnel acquires surge block, tubing, down well pump, water quality monitoring equipment, containers for storing purge water and decontamination fluids and survey equipment, and verifies all are in operating condition. Fieldwork is conducted under the advisement of a state registered professional geologist.

Monitoring Well Development

When a permanent groundwater monitoring well is installed, proper well development is necessary to ensure that complete hydraulic connection is made and maintained between the well and the aquifer material surrounding the well screen and filter pack. Well development should

begin no sooner than 48 to 72 hours after well installation to allow grout to cure prior to improvement.

A surge block is used to move sediments from the filter pack into the well casing. A surge block consists of a rubber and metal plunger attached to Schedule 80 PVC sections of sufficient length to reach the bottom of the well. The surge block is constructed of materials that will not introduce contamination into the well. The surge block is moved up and down the well screen interval and then removed, followed by pumping with a downwell pump to remove any sand and silt brought into the well by the surging action. Care is taken to not surge too strongly with subsequent casing deformation or collapse. Surging will be followed by additional pumping to remove fine materials that may have entered the well during the surging effort.

After surging has been completed and the sand content of the pumped water has decreased, a submersible pump is used to continue well development. The pump should be moved up and down the well screen interval until the obtained water is relatively clear. Well development will continue until the water in the well clarifies. It should be noted that where very fine-grained formations are opposite the screened interval, continued well development until clear water is obtained might be impossible. Decisions regarding when to cease development where silty conditions exist will be made between amongst Aerotech personnel.

During well development, the primary criteria used to evaluate whether the well has been completely developed is water clarity. As mentioned above, clear water can often be impossible to obtain with environmental monitoring wells.

The minimum volume of water purged from the well during development will be approximately a minimum of 3 borehole volumes (wells will typically not reach stabilization of water quality parameters before this condition is achieved and may not have reached stability even after this threshold has been achieved). The above is a general guideline for difficult well development. Development water will be stored in 55-gallon Department of Transportation (DOT) -approved drums.

Surveying

If required, wells are surveyed relative to an established benchmark of known elevation above mean sea level to an accuracy of +/- 0.005 foot. The casing is notched or marked on one side to identify a consistent surveying and measuring point.

Decontamination Procedures

Aerotech personnel completing the monitoring well development equipment will also decontaminate between each monitoring well. The decontamination procedure will consist of washing with a non-phosphate solution, followed by a minimum of two tap water rinses. Deionized water may be used for the final rinse.

Waste Storage and Disposal

Decontamination fluids and purge water from well development and sampling activities are stored on site in labeled, DOT-approved storage containers. No containers will be left on-site

without a label indicating the material matric, accumulation date, project name, project address and Aerotech contact information. Unless otherwise specified in the contract with Aerotech, the client is responsible for disposal of investigation derived waste. Should Aerotech be contracted to complete disposal for the client, drums containing investigation derived waste are subsequently transported under manifest to a client- and regulatory-approved facility for disposal.

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(360) 710-5899

512 W. International Airport Road, Suite 201
Anchorage, Alaska 99518
(907) 575-6661

LOW-FLOW GROUNDWATER SAMPLING STANDARD OPERATING PROCEDURE

EQUIPMENT

- Sampling and Analyses Plan (SAP)
- Site-specific sampling plan
- Sample location map
- Sample table
- Safety equipment, as specified in the Health and Safety Plan
- Permanent pens and markers (e.g. Sharpies®)
- Field notebook and/or sampling form
- Camera
- YSI water quality monitoring equipment (e.g. YSI monitor and flow through cell)
- Sample containers, precleaned (e.g., I-Chem)
- 55-Gallon Drums
- Two 5-Gallon Buckets
- 3/8" Tubing
- Power Source/cables
- Peristaltic or down-well pump
- Water Level Indicator
- Tool box with hand tools (e.g. socket set, screw drivers)
- Trash bags/plastic sheeting
- Candlestick/cones/barricade
- Caution tape
- Scissors/knife
- Paper towels
- Watch
- Decontamination equipment including tap water and/or deionized water and phosphate-free soap (e.g. Alconox®, Liquinox®)
- Chain-of-custody forms, custody seals, sample labels
- Ziploc® Bags
- Insulated cooler
- Ice
- Plastic bags for sample containers and ice

The following protocol and sampling procedures were designed to meet or exceed standards for groundwater monitoring well sampling, as specified by the State of Washington Department of Ecology *"Standard Operating Procedures for Purging and Sampling Monitoring Wells, Version 1.0,"* dated and approved on October 4, 2011. These procedures are strictly adhered to by Aerotech field staff:

Cross-Contamination Mitigation Protocol

A sampling table is set up adjacent to the well head in order to protect field equipment from contact with the ground, to prevent or minimize the possible introduction of foreign materials into the wells, and in general in order to mitigate the possibility of cross-contamination. Where previous laboratory data is available, or where visual of olfactory indicators provide initial evidence, well sampling order is arranged to proceed with the least contaminated well, often the upgradient groundwater monitoring wells, and sampling order proceeds by sampling wells associated with successively higher contamination levels. Thus, the wells exhibiting the highest contamination levels are sampled last, in order to minimize the possibility of cross contamination.

A fresh pair of disposable Nitrile gloves is worn at each well. Equipment neither disposable nor dedicated to wells, is washed in a dedicated container prepared with non-phosphate detergent and triple rinsed in a second container prepared with distilled and/or deionized water. Surfaces that cannot be readily submerged for the purpose of decontamination, are sprayed with wash water followed by rinse water, and wiped with a fresh disposable paper towel. For shallow wells that require a peristaltic pump, dedicated tubing is left in each well after sampling, however, for deeper wells that require a submersible pump, dedicated tubing is recovered from wells after each use, and deployed to a designated dedicated clean plastic bag, bearing a label indicating well identification information.

Water Level Measurement

Prior to the well purge process and the collection of groundwater samples, groundwater levels are measured at the north side of the ("TOC") with a piezometer/water level indicator, by slowly lowering the sensor into wells prior to purging, in order to minimize disturbances. The water levels are measured twice, with tape a marked in 0.01 foot increments, in order to reduce possible reading error. Where appropriate, free product thickness is measured with gas level indicator paste or an interface indicator. Upon arrival, each well is visual inspected and the condition of the well and well head are noted.

Groundwater Monitoring Well Purge and Sampling Methodologies

Prior to groundwater sample collection, A dedicated length of high density polyethylene tubing is lowered into each well to a level near the middle of the screened interval. A dedicated length of clean silicone tubing is utilized within the pump mechanism. The wells are purged by means of low flow techniques, during which time groundwater is monitored for physical parameters, including temperature, pH, specific conductivity, dissolved oxygen (DO), and oxidation-reduction potential (ORP), by means of a multi-parameter device mounted upon a flow cell, until such time as values recorded have stabilized and equilibrium conditions are verified according to State guidelines. This protocol ensures that collected groundwater samples are

representative of in-situ groundwater conditions. Readings are recorded once every 2 to 5 minutes, including water level measurement. The pumping rate shall remain below 1 L/min during monitoring and sampling procedures. This is verified by periodically filling a one-Liter graduated cylinder and recording the rate, adjusting the pump as necessary. The water column within the well should remain within 5% of the static height during the purge and sample process, if this cannot be achieved, the pump rate will be reduced until the water level stabilizes. The following conditions must be met in three consecutive readings prior to sampling:

• pH	+/- 0.1 standard units
• Specific Conductivity	+/- 10.0 mS/cm for values < 1,000 mS/cm
	+/- 20.0 mS/cm for values > 1,000 mS/cm
• DO	+/- 0.05 mg/L for values < 1 mg/L
	+/- 0.2 mg/L for values > 1 mg/L
• Temperature	+/- 0.1 degrees Celcius
• ORP	+/- 10 mV

Groundwater samples are collected in containers specified by the laboratory for the analyses established at the Site, and in accordance with State of Washington regulations or guidelines. Sample containers are labeled with site name, well identification, and date of collection information. Each sample is documented on a *Chain of Custody* (“”COC”) form, and immediately placed in an iced cooler (maintained at 4 degrees Celcius or less) for transport to a certified laboratory for analysis. Please note that any purge water suspected or confirmed to contain concentrations above the MTCA Cleanup Levels is drummed and left on Site.

Appendix G

Photographs

Setup at B2 Location (MW5 in the Foreground)

Drilling at B3 Location (MW5 to the Left, MW12 to the Right)

Soil Profile of B2

Soil Profile of B3

Area of Soil Borings B6 through B9, at the Northern Property Boundary

Sampling Tube Extractor at B5 Location

Looking Southwest at the Piping and Pump Housing, MW5 with Low-Flow Setup in the Foreground (10/12)

Looking Northwest Down the Property Line from MW5 (10/12)

Off-Ramp Construction Area with MW5 in the Foreground (10/12)

Looking Southeast down the Property Line from the BioSwale (MW11 in the Foreground) (10/12)

View from MW5/6 Looking Southwest Across the Drainage Ditch (Pre-Construction 7/3/18)

Pump Housing located in the Off-Ramp Construction Area to the SW (10/12/18)

Appendix H

Terrestrial Ecological Evaluation

Voluntary Cleanup Program

Washington State Department of Ecology
Toxics Cleanup Program

TERRESTRIAL ECOLOGICAL EVALUATION FORM

Under the Model Toxics Control Act (MTCA), a terrestrial ecological evaluation is necessary if hazardous substances are released into the soils at a Site. In the event of such a release, you must take one of the following three actions as part of your investigation and cleanup of the Site:

1. Document an exclusion from further evaluation using the criteria in WAC 173-340-7491.
2. Conduct a simplified evaluation as set forth in WAC 173-340-7492.
3. Conduct a site-specific evaluation as set forth in WAC 173-340-7493.

When requesting a written opinion under the Voluntary Cleanup Program (VCP), you must complete this form and submit it to the Department of Ecology (Ecology). The form documents the type and results of your evaluation.

Completion of this form is not sufficient to document your evaluation. You still need to document your analysis and the basis for your conclusion in your cleanup plan or report.

If you have questions about how to conduct a terrestrial ecological evaluation, please contact the Ecology site manager assigned to your Site. For additional guidance, please refer to www.ecy.wa.gov/programs/tcp/policies/terrestrial/TEEHome.htm.

Step 1: IDENTIFY HAZARDOUS WASTE SITE

Please identify below the hazardous waste site for which you are documenting an evaluation.	
Facility/Site Name: Fife RV Center.	
Facility/Site Address: 3410 Pacific Highway East, Fife, Washington 98424	
Facility/Site No:	VCP Project No.:

Step 2: IDENTIFY EVALUATOR

Please identify below the person who conducted the evaluation and their contact information.		
Name: Justin Foslien		Title: Licensed Geologist
Organization: Aerotech Environmental		
Mailing address: 13925 Interurban Avenue South #210		
City: Tukwila	State: WA	Zip code: 98168
Phone: 206 257 4211	Fax: 206 402 3872	E-mail: justin@dirtydirt.us

Step 3: DOCUMENT EVALUATION TYPE AND RESULTS

A. Exclusion from further evaluation.

1. Does the Site qualify for an exclusion from further evaluation?

☐ Yes *If you answered **"YES,"** then answer **Question 2**.*

☒ No or Unknown *If you answered **"NO" or "UKNOWN,"** then skip to **Step 3B** of this form.*

2. What is the basis for the exclusion? *Check all that apply. Then skip to **Step 4** of this form.*

Point of Compliance: WAC 173-340-7491(1)(a)

☐ All soil contamination is, or will be,* at least 15 feet below the surface.

☐ All soil contamination is, or will be,* at least 6 feet below the surface (or alternative depth if approved by Ecology), and institutional controls are used to manage remaining contamination.

Barriers to Exposure: WAC 173-340-7491(1)(b)

☐ All contaminated soil, is or will be,* covered by physical barriers (such as buildings or paved roads) that prevent exposure to plants and wildlife, and institutional controls are used to manage remaining contamination.

Undeveloped Land: WAC 173-340-7491(1)(c)

☐ There is less than 0.25 acres of contiguous[#] undeveloped[±] land on or within 500 feet of any area of the Site and any of the following chemicals is present: chlorinated dioxins or furans, PCB mixtures, DDT, DDE, DDD, aldrin, chlordane, dieldrin, endosulfan, endrin, heptachlor, heptachlor epoxide, benzene hexachloride, toxaphene, hexachlorobenzene, pentachlorophenol, or pentachlorobenzene.

☒ For sites not containing any of the chemicals mentioned above, there is less than 1.5 acres of contiguous[#] undeveloped[±] land on or within 500 feet of any area of the Site.

Background Concentrations: WAC 173-340-7491(1)(d)

☐ Concentrations of hazardous substances in soil do not exceed natural background levels as described in WAC 173-340-200 and 173-340-709.

* An exclusion based on future land use must have a completion date for future development that is acceptable to Ecology.

[±] "Undeveloped land" is land that is not covered by building, roads, paved areas, or other barriers that would prevent wildlife from feeding on plants, earthworms, insects, or other food in or on the soil.

[#] "Contiguous" undeveloped land is an area of undeveloped land that is not divided into smaller areas of highways, extensive paving, or similar structures that are likely to reduce the potential use of the overall area by wildlife.

B. Simplified evaluation.

1. Does the Site qualify for a simplified evaluation?

☒ Yes *If you answered **"YES,"** then answer **Question 2** below.*

☐ No or Unknown *If you answered **"NO"** or **"UNKNOWN,"** then skip to **Step 3C** of this form.*

2. Did you conduct a simplified evaluation?

☒ Yes *If you answered **"YES,"** then answer **Question 3** below.*

☐ No *If you answered **"NO,"** then skip to **Step 3C** of this form.*

3. Was further evaluation necessary?

☐ Yes *If you answered **"YES,"** then answer **Question 4** below.*

☒ No *If you answered **"NO,"** then answer **Question 5** below.*

4. If further evaluation was necessary, what did you do?

☐ Used the concentrations listed in Table 749-2 as cleanup levels. *If so, then skip to **Step 4** of this form.*

☐ Conducted a site-specific evaluation. *If so, then skip to **Step 3C** of this form.*

5. If no further evaluation was necessary, what was the reason? *Check all that apply. Then skip to **Step 4** of this form.*

Exposure Analysis: WAC 173-340-7492(2)(a)

☐ Area of soil contamination at the Site is not more than 350 square feet.

☒ Current or planned land use makes wildlife exposure unlikely. Used Table 749-1.

Pathway Analysis: WAC 173-340-7492(2)(b)

☐ No potential exposure pathways from soil contamination to ecological receptors.

Contaminant Analysis: WAC 173-340-7492(2)(c)

☐ No contaminant listed in Table 749-2 is, or will be, present in the upper 15 feet at concentrations that exceed the values listed in Table 749-2.

☐ No contaminant listed in Table 749-2 is, or will be, present in the upper 6 feet (or alternative depth if approved by Ecology) at concentrations that exceed the values listed in Table 749-2, and institutional controls are used to manage remaining contamination.

☐ No contaminant listed in Table 749-2 is, or will be, present in the upper 15 feet at concentrations likely to be toxic or have the potential to bioaccumulate as determined using Ecology-approved bioassays.

☐ No contaminant listed in Table 749-2 is, or will be, present in the upper 6 feet (or alternative depth if approved by Ecology) at concentrations likely to be toxic or have the potential to bioaccumulate as determined using Ecology-approved bioassays, and institutional controls are used to manage remaining contamination.

C. Site-specific evaluation. A site-specific evaluation process consists of two parts: (1) formulating the problem, and (2) selecting the methods for addressing the identified problem. Both steps require consultation with and approval by Ecology. *See* WAC 173-340-7493(1)(c).

1. Was there a problem? *See* WAC 173-340-7493(2).

☐ Yes *If you answered **"YES,"** then answer **Question 2** below.*

☐ No *If you answered **"NO,"** then identify the reason here and then skip to **Question 5** below:*

- ☐ No issues were identified during the problem formulation step.
- ☐ While issues were identified, those issues were addressed by the cleanup actions for protecting human health.

2. What did you do to resolve the problem? *See* WAC 173-340-7493(3).

☐ Used the concentrations listed in Table 749-3 as cleanup levels. *If so, then skip to **Question 5** below.*

☐ Used one or more of the methods listed in WAC 173-340-7493(3) to evaluate and address the identified problem. *If so, then answer **Questions 3 and 4** below.*

3. If you conducted further site-specific evaluations, what methods did you use? *Check all that apply. See* WAC 173-340-7493(3).

- ☐ Literature surveys.
- ☐ Soil bioassays.
- ☐ Wildlife exposure model.
- ☐ Biomarkers.
- ☐ Site-specific field studies.
- ☐ Weight of evidence.
- ☐ Other methods approved by Ecology. If so, please specify:

4. What was the result of those evaluations?

- ☐ Confirmed there was no problem.
- ☐ Confirmed there was a problem and established site-specific cleanup levels.

5. Have you already obtained Ecology's approval of both your problem formulation and problem resolution steps?

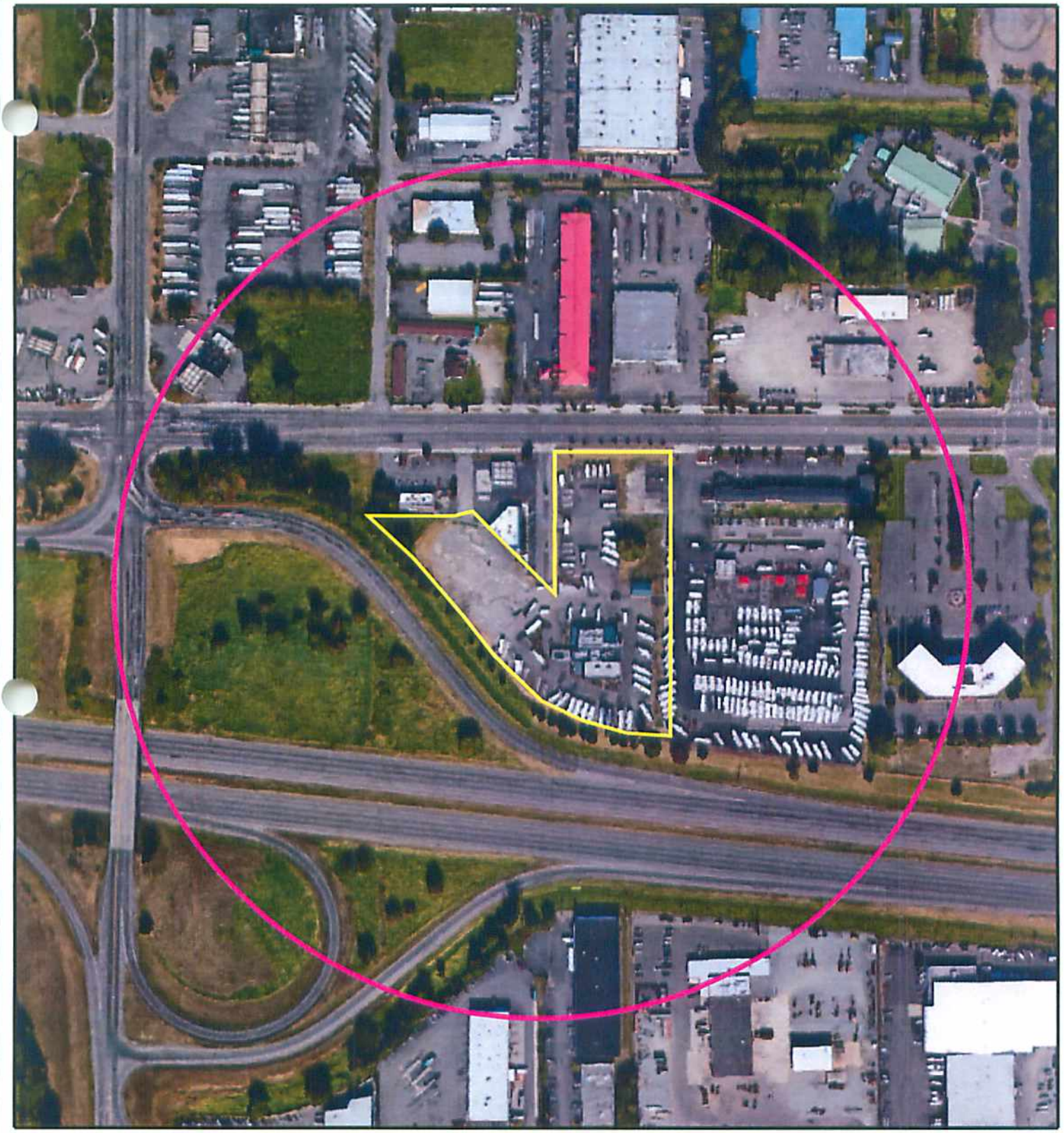
☐ Yes If so, please identify the Ecology staff who approved those steps:

☐ No

Step 4: SUBMITTAL

Please mail your completed form to the Ecology site manager assigned to your Site. If a site manager has not yet been assigned, please mail your completed form to the Ecology regional office for the County in which your Site is located.

Northwest Region: Attn: VCP Coordinator 3190 160th Ave. SE Bellevue, WA 98008-5452	**Central Region:** Attn: VCP Coordinator 15 W. Yakima Ave., Suite 200 Yakima, WA 98902
Southwest Region: Attn: VCP Coordinator P.O. Box 47775 Olympia, WA 98504-7775	**Eastern Region:** Attn: VCP Coordinator N. 4601 Monroe Spokane WA 99205-1295



Subject Site

0 200 400

SCALE (feet)

500-Foot Radius of Site

AEROTECH ENVIRONMENTAL CONSULTING

500-FOOT RADIUS MAP

Fife RV Center
3410 Pacific Highway East
Fife, Washington

Date: 12/27/16
By: Nick Gerkin
Figure: TEE

Table 749-1

Simplified Terrestrial Ecological Evaluation-Exposure Analysis Procedure

Estimate the area of contiguous (connected) undeveloped land on the site or within 500 feet of any area of the site to the nearest 1/2 acre (1/4 acre if the area is less than 0.5 acre).	
1) From the table below, find the number of points corresponding to the area and enter this number in the field to the right.	~ 2.0
Area (acres) — Points 0.25 or less — 4 0.5 — 5 1.0 — 6 1.5 — 7 2.0 — 8 2.5 — 9 3.0 — 10 3.5 — 11 4.0 or more — 12	8
2) Is this an industrial or commercial property? If yes, enter a score of 3. If no, enter a score of 1	3
3)[a] Enter a score in the box to the right for the habitat quality of the site, using the following rating system[b]. High=1, Intermediate=2, Low=3	1
4) Is the undeveloped land likely to attract wildlife? If yes, enter a score of 1 in the box to the right. If no, enter a score of 2.[c]	1
5) Are there any of the following soil contaminants present: Chlorinated dioxins/furans, PCB mixtures, DDT, DDE, DDD, aldrin, chlordane, dieldrin, endosulfan, endrin, heptachlor, benzene hexachloride, toxaphene, hexachlorobenzene, pentachlorophenol, pentachlorobenzene? If yes, enter a score of 1 in the box to the right. If no, enter a score of 4.	4
6) Add the numbers in the boxes on lines 2-5 and enter this number in the box to the right. If this number is larger than the number in the box on line 1, the simplified evaluation may be ended.	9

Notes for Table 749-1

[a] It is expected that this habitat evaluation will be undertaken by an experienced field biologist. If this is not the case, enter a conservative score of (1) for questions 3 and 4.

[b] **Habitat rating system.** Rate the quality of the habitat as high, intermediate or low based on your professional judgment as a field biologist. The following are suggested factors to consider in making this evaluation:

> **Low:** Early successional vegetative stands; vegetation predominantly noxious, nonnative, exotic plant species or weeds. Areas severely disturbed by human activity, including intensively cultivated croplands. Areas isolated from other habitat used by wildlife.

High: Area is ecologically significant for one or more of the following reasons: Late-successional native plant communities present; relatively high species diversity; used by an uncommon or rare species; priority habitat (as defined by the Washington Department of fish and Wildlife); part of a larger area of habitat where size or fragmentation may be important for the retention of some species.

Intermediate: Area does not rate as either high or low.

[c] Indicate "yes" if the area attracts wildlife or is likely to do so. Examples: Birds frequently visit the area to feed; evidence of high use b mammals (tracks, scat, etc.); habitat "island" in an industrial area; unusual features of an area that make it important for feeding animals; heavy use during seasonal migrations.

[Area Calculation Aid] [Aerial Photo with Area Designations] [TEE Table 749-1] [Index of Tables]

[Exclusions Main] [TEE Definitions] [Simplified or Site-Specific?] [Simplified Ecological Evaluation] [Site-Specific Ecological Evaluation] [WAC 173-340-7493]

[TEE Home]

Table 749-2

Priority contaminants of ecological concern for sites that qualify for the simplified terrestrial ecological evaluation[a]

Priority Contaminant	Soil Concentration (mg/kg)	
	Unrestricted Land Use[b]	Industrial or Commercial Site
METALS[c]		
Antimony	See Note [d]	See Note [d]
Arsenic III	20 mg/kg	20 mg/kg
Arsenic IV	95 mg/kg	260 mg/kg
Barium	1,250 mg/kg	1,320mg/kg
Beryllium	25 mg/kg	See Note [d]
Cadmium	25 mg/kg	36 mg/kg
Chromium (total)	42 mg/kg	135 mg/kg
Cobalt	See Note [d]	See Note [d]
Copper	100 mg/kg	550 mg/kg
Lead	220 mg/kg	220 mg/kg
Magnesium	See Note [d]	See Note [d]
Manganese	See Note [d]	23,500 mg/kg
Mercury, inorganic	9 mg/kg	9 mg/kg
Mercury, organic	0.7 mg/kg	0.7 mg/kg
Molybdenum	See Note [d]	71 mg/kg
Nickel	100 mg/kg	1,850 mg/kg
Selenium	0.8 mg/kg	0.8 mg/kg
Silver	See Note [d]	See Note [d]
Tin	275 mg/kg	See Note [d]
Vanadium	26 mg/kg	See Note [d]
Zinc	270 mg/kg	570 mg/kg
PESTICIDES		
Aldicarb/aldicarb sulfone (total)	See Note [d]	See Note [d]
Aldrin	0.17 mg/kg	0.17 mg/kg
Benzene hexachloride (including lindane)	10 mg/kg	10 mg/kg

Carbofuran	See Note [d]	See Note [d]
Chlordane	1 mg/kg	7 mg/kg
Chlorpyrifos/chlorpyrifos-methal (total)	See Note [d]	See Note [d]
DDT/DDD/DDE	1 mg/kg	1 mg/kg
Dieldrin	0.17 mg/kg	0.17 mg/kg
Endosulfan	See Note [d]	See Note [d]
Endrin	0.4 mg/kg	0.4 mg/kg
Heptachlor/heptachlor epoxide (total)	0.6 mg/kg	0.6 mg/kg
Hexachlorobenzene	31 mg/kg	31 mg/kg
Parathion/methyl parathion (total)	See Note [d]	See Note [d]
Pentachlorophenol	11 mg/kg	11 mg/kg
Toxaphene	See Note [d]	See Note [d]
OTHER CHLORINATED ORGANICS		
Chlorinated dibenzofurans (total)	3E-06 mg/kg	3E-06 mg/kg
Dioxins	5E-06 mg/kg	5E-06 mg/kg
Hexchlorophene	See Note [d]	See Note [d]
PCB mixtures (total)	2 mg/kg	2 mg/kg
Pentachlorobenzene	168 mg/kg	See Note [d]
OTHER NONCHLORINATED ORGANICS		
Acenaphthene	See Note [d]	See Note [d]
Benzo(a)pyrene	30 mg/kg	300 mg/kg
Bis (2-ethylhexyl) phthalate	See Note [d]	See Note [d]
Di-n-butyl phthalate	200 mg/kg	See Note [d]
PETROLEUM		
Gasoline Range Organics	200 mg/kg	12,000 mg/kg except that the concentration shall not exceed residual saturation at the soil surface.
Diesel Range Organics Common examples of diesel range organics include: Diesel #2, Fuel Oil #2, and light oil including some bunker oils. Refer to Table 830-1	460 mg/kg	15,000 mg/kg except that the concentration shall not exceed residual saturation at the soil surface.

Table 749-2 Notes

[a] Caution on misusing these chemical concentration numbers. These values have been developed for use at sites where a site-specific terrestrial ecological evaluation is not required. They are not intended to be protective of terrestrial ecological receptors at every site. Exceedances of the values in this table do not necessarily trigger requirements for cleanup action under this chapter. The table is not intended for purposes such as evaluating sludges or wastes.

This list does not imply that sampling must be conducted for each of these chemicals at every site. Sampling should be conducted for those chemicals that might be present based on available information, such as current and past uses of chemicals at the site.

[b] Applies to any site that does not meet the definition of industrial or commercial.

[c] For arsenic, use the valence state most likely to be appropriate for site conditions, unless laboratory information is available. Where soil conditions alternate between saturated, anaerobic and unsaturated, aerobic states, resulting in the alternating presence of arsenic III and arsenic V, the arsenic III concentrations shall apply.

[d] Safe concentration has not yet been established.

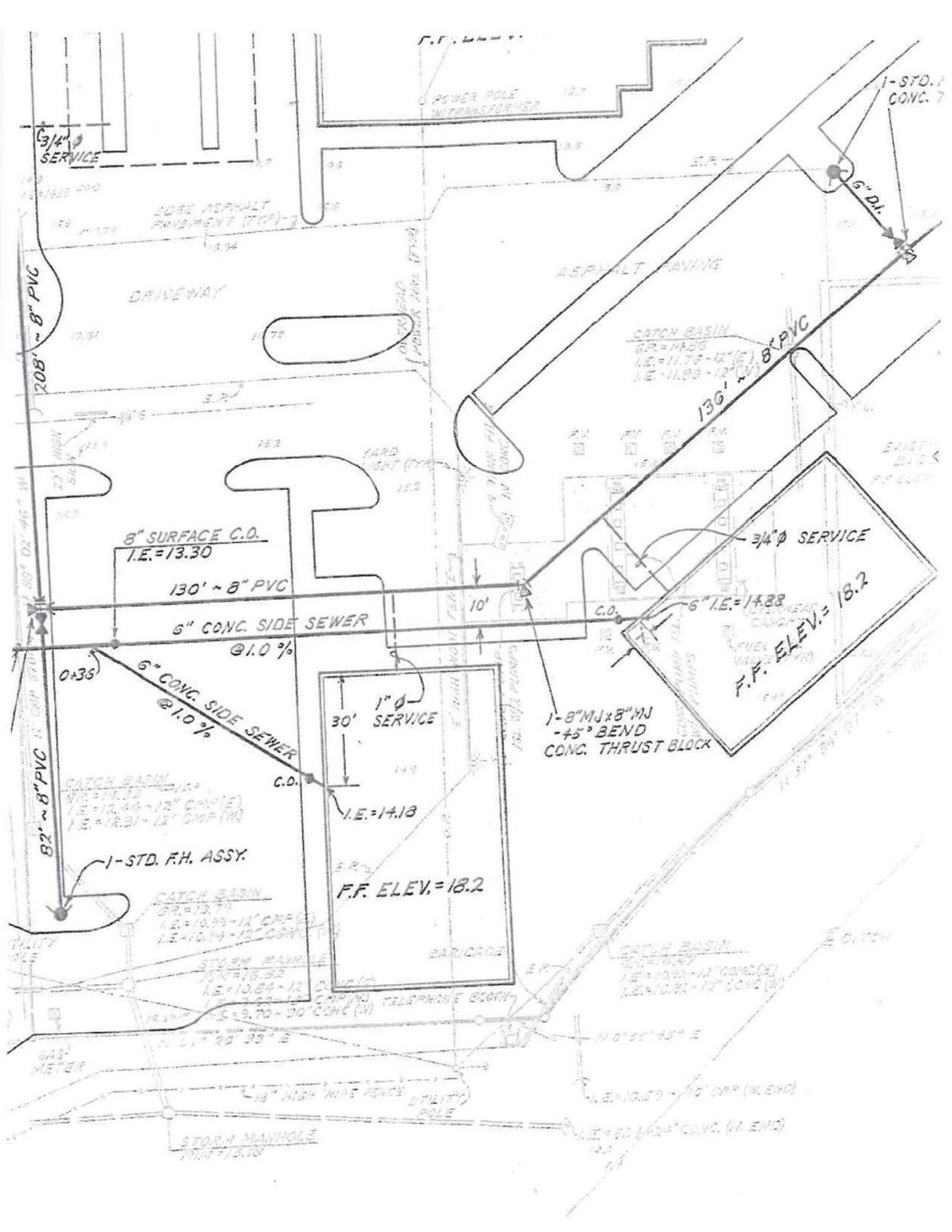
[Area Calculation Aid] [Aerial Photo with Area Designations] [TEE Table 749-1] [TEE Table 749-2] [TEE Table 749-3] [TEE Table 749-4] [TEE Table 749-5] [TEE Table 830-1]

[Exclusions Main] [TEE Definitions] [Simplified or Site-Specific?] [Simplified Ecological Evaluation] [Site-Specific Ecological Evaluation] [WAC 173-340-7493]

[TEE Home]

Appendix I

Supplemental Documents – Previously Proposed Development with As-Builts


3/4" Ø SERVICE
208' ~ 8" PVC
DRIVEWAY
8" SURFACE C.O.
I.E.=13.30
130' ~ 8" PVC
6" CONC. SIDE SEWER
@1.0 %
0+35
6" CONC. SIDE SEWER
@1.0 %
82' ~ 8" PVC
1-STD. F.H. ASSY.
C.O.
I.E.=14.18
30'
1" Ø SERVICE
F.F. ELEV.=18.2
BARRICADE
10'
C.O.
1-8"MJ x 8"MJ
-45° BEND
CONC. THRUST BLOCK
3/4" Ø SERVICE
6" I.E.=14.88
F.F. ELEV.=18.2
130' ~ 8" PVC
6" DI.
1-STD.
CONC.
ASPHALT PAVING
CATCH BASIN
STORM MANHOLE
UTILITY POLE
GAS METER
TELEPHONE BOOTH

Appendix J

Supplemental Documents – RZA Reports on Jack in the Box Parcel

Subsurface Exploration and Geotechnical Engineering Report
Proposed Jack-In-The-Box Restaurant
Pacific Highway South and Port of Tacoma Road
Fife, Washington

Prepared for

Foodmaker, Inc.
2395 American Avenue
Hayward, California 94545

Prepared By

Rittenhouse-Zeman & Associates, Inc.
1400 - 140th Avenue N.E.
Bellevue, Washington 98005

December 1987

W-5435

2 December 1987

W-5435

Foodmaker, Inc.
2395 American Ave.
Hayward, California 94545

Attention: Mr. Chris Smith

Subject: Subsurface Exploration and Geotechnical Engineering Report
Proposed Jack-In-The-Box Restaurant
Pacific Highway South and Port of Tacoma Road
Fife, Washington

Gentlemen:

We are pleased to present herein a copy of the above referenced report. This report presents the results of our subsurface exploration and geotechnical engineering study relative to the foundation and construction considerations for the proposed project. Authorization to proceed with this study was provided verbally from Chris Smith of Foodmaker, Inc. on 2 November 1987. This report has been completed in general accordance with our preliminary findings and Proposal for Supplemental Geotechnical Services in a letter dated 30 October 1987.

We appreciate this opportunity to be of service to you and will be pleased to discuss the contents of this report or other aspects of the project with you at your convenience.

Respectfully submitted,

RITTENHOUSE-ZEMAN & ASSOCIATES, INC.

James S. Dransfield, P.E.
Senior Project Engineer

SUBSURFACE EXPLORATION AND
GEOTECHNICAL ENGINEERING REPORT
PROPOSED JACK-IN-THE-BOX RESTAURANT
PACIFIC HIGHWAY SOUTH AND PORT OF TACOMA ROAD
FIFE, WASHINGTON

1.0 SUMMARY

The proposed project construction is considered feasible with respect to the subsurface conditions encountered at the subject site. A brief summary of the main project geotechnical considerations is presented below:

- Our subsurface exploration program at the site consisted of two backhoe test pits and one hollow-stem auger boring.
- Subsurface conditions disclosed in our explorations generally consisted of 5 to 6 feet of medium dense to very dense gravelly sand fill overlying roughly 14 feet of soft to medium stiff silt with interbedded loose sand, underlain by denser sands with interbedded silts to the bottom of our deepest exploration at 59 feet the ground surface. The groundwater table was encountered approximately 17 feet below the ground surface.
- In our opinion, shallow spread footings founded upon either a preloaded fill or a prerolled subgrade would perform satisfactorily with respect to bearing capacity. However, long-term settlements of footings founded on existing site conditions are anticipated to be on the order of 2 inches. A short-term preload could reduce the anticipated total long-term settlements to 1 inch or less. If the owner cannot allow time to surcharge the site, and cannot tolerate the risk of settlement associated with "floating" the foundation, consideration should be given to a pile foundation.
- The risk of settlement of the floor slab constructed on the existing site grade is moderate. Again, the amount of settlement could be reduced by a site preload. Alternatively, only minimal settlements would be likely with a structurally supported floor in conjunction with a pile foundation.

This summary is presented for introductory purposes and should be used in conjunction with the full text of this report. The project description, site

conditions and our detailed design recommendations are presented in the text of this report. The exploration procedures and logs are presented in Appendix A.

2.0 PROJECT DESCRIPTION

The site is a rectangular shaped lot located roughly 100 feet east of the southeast corner of the intersection of Pacific Highway South and Port of Tacoma Road in Fife, Washington. The parcel has about 150 feet of frontage along Pacific Highway South, and is roughly 130 feet deep in a north-south direction.

The proposed project would consist of the construction of a single-story restaurant, with slab-on-grade floors. We understand footing loads will be moderately light. Major portions of the north side of the site are already asphalt paved and will serve as future parking areas. The portion of the site immediately surrounding the restaurant is to be developed for drive-thru lanes and dumpster aprons with rigid concrete pavement. We understand that the new building and surrounding pavement will be at approximately the same elevation as existing site grade. The location of the proposed structure and the approximate locations of the explorations accomplished for this study are shown on the Site and Exploration Plan, Figure 1.

The purpose of this study was to establish general subsurface conditions at the site, from which conclusions and recommendations for foundation design and construction for the project could be formulated. The scope of work consisted of field explorations, geotechnical engineering analyses and report preparation. In the event of any changes in the nature, design or location of the structures, the conclusions and recommendations contained in this report should be reviewed and modified, if necessary, to reflect the changes. This report has been prepared for the exclusive use of Foodmaker, Inc. and their agents, for specific application to this project in accordance with generally accepted geotechnical engineering practices.

3.0 SITE CONDITIONS

The site conditions were evaluated for this study in October and November 1987. The surface and subsurface conditions are described below, while the exploration

procedures and interpretive logs of the explorations are apresented in Appendix A. The proposed site development and approximate locations of the explorations accomplished for this study are indicated on the Site and Exploration Plan, Figure 1.

3.1 SURFACE CONDITIONS

The topography across the parcel was observed to be fairly flat-lying, with the exception of a triangular-shaped detention pond roughly 6 feet deep and about 50 feet on each side in dimension. The detention pond was located immediately south of the building pad. The southeast corner of the building pad, and areas to the east and north were mostly asphalt paved. The majority of the building pad and portions of the site to the west were non-paved. Only sparse vegetation was noted on the non-paved portions of the site at the time of our study. No surface water was noted at the time of our site visit. However, the low area on the site reportedly serves as a storm water detention basin.

3.2 SUBSURFACE CONDITIONS

The subsurface conditions encountered in our explorations across the site consisted of a 5 to 6 foot layer of relatively dense sand fill over interbedded softer alluvial deposits. The two test pits and one boring were advanced within the building pad area and encountered 5 to 6 feet of medium dense to very dense, gravelly sand (fill), with one interbedded silt layer at 3 to 3-1/2 feet in test pit TP-2. Intermixed construction debris was noted in the lower portions of the fill in both test pits. Beneath the sand fill, soft to medium stiff, wet to saturated brownish-gray silt with some intermixed peat was encountered which extended to 19 feet below the ground surface. An interbedded silty, fine sand layer was encountered at 12 to 14 feet below the ground surface in our test boring. Beneath the soft to medium stiff silt layer, medium dense to dense dark gray to black, silty, fine sand was encountered to 41-1/2 feet below the ground surface. A 4-1/2 foot layer of soft silt was encountered below the medium dense to dense sand. The test boring bottomed in a layer of dense silty, sand interbedded with very stiff to hard fine sandy silt, to the full depth of our exploration at 59 feet below the ground surface.

Groundwater was measured in an observation well (installed during drilling) at roughly 17 feet below the ground surface twelve days after completion of the drilling. Slight seepage was noted in our test pits at 10.5 feet below the ground surface. It should be noted that the groundwater level and subsurface seepage volumes may fluctuate due to variations in rainfall, season, the level of the adjacent detention pond, changes in site utilization and other factors.

4.0 CONCLUSIONS AND RECOMMENDATIONS

The project site is to be developed for a single-story restaurant with slab-on-grade floors, surrounded by asphalt-paved parking and driveways. In addition to asphalt-paved areas, we understand a concrete drive-thru lane is to be constructed and a concrete pad will be installed in front of the trash enclosure. We understand grades will remain at roughly the same elevation, to match the level of the existing parking area to the north.

Based on our understanding of construction of nearby buildings, and reported site history, we understand the site was filled with the 5 to 6 feet of fill to its present level at least two to three years ago. We understand the nearby light structures including a high single-story restaurant and a single-story deli were "floated" on the upper sand fill with no mitigative site pretreatment. Based upon our explorations, laboratory testing, and our understanding of site history, the parcel appears adequate for the proposed development, utilizing shallow foundation support and slab-on-grade floors without pretreatment, assuming that your structure can tolerate some differential settlement. The risk of somewhat greater settlements should be anticipated over the long-term (say 10 to 20 years) if the structure is floated on the existing site soils. If the structure is not settlement tolerant, it would be necessary to surcharge or use piles. Surcharging is often more economical but does add a time constraint to construction. A pile foundation and a structural floor would provide more positive assurance with regard to settlement and can be installed rapidly.

We estimate long-term settlements of as much as 2 inches may occur if the building is "floated" on existing site grade. Settlements could be reduced to 1 inch or

less if a surcharge of 5 feet is placed on the site for roughly 45 to 60 days. Based upon our previous discussions with the owner, we assume that settlements exceeding 1 inch would not be acceptable. The following recommendations in this report therefore, are based on our recommended alternative of surcharging the building pad, and then removing that surcharge prior to construction of a slab-on-grade and shallow foundation system. We can provide more detailed information for the pile foundation option if desired.

If the owner elects to "float" the structure, the following recommendations would apply (excluding, of course, the preloading discussion). Where the fill is penetrated, or structures or utilities are installed more than 18 inches below grade, we recommend overexcavating 2 feet lower and backfilling with "structural fill" (as described subsequently).

4.1 Site Preparation

All vegetation, fill mounds, topsoil and other debris on the surface of the site should be removed from building and pavement areas as a first step in site preparation and prior to preloading. The subgrade surface should then be compacted to a minimum of 90 percent density, using ASTM:D 1557 as the standard. The preload fill below slab or pavement grade should be then be placed as "structural fill" (as described in the subsequent section), compacted to 90 percent density at least up to finished floor subgrade elevation. Fill placed above finished grades need only be nominally compacted to allow for equipment traffic and easy passage. Settlement plates roughly 18 inches square should be placed at the base of the fill prior to fill placement, fitted with pipes extending up through the fill to serve as survey monuments to monitor site settlement response with time.

With increasing thickness of preload fill and longer duration for the preload, future settlements would be reduced and site densification would increase. We have performed a consolidation test on a sample of the compressible silts obtained at roughly 10 feet below the ground surface. The results of this test are attached as Appendix B at the end of this report. We would recommend placement of about

5 feet of fill for about 45 to 60 days as a minimum preloading duration for the site. The settlement plates should be monitored by survey twice weekly immediately after their installation, and weekly thereafter. We should be provided with the surveying results of the settlement plates during preloading, so that the progress of the preload can be evaluated, and so that the preload fill can be removed as soon as possible to accommodate the remaining construction activities.

4.2 Structural Fill

All fill placed beneath building areas, parking areas, drives and walkways, should be placed in accordance with the recommendations herein for structural fill. Prior to placement of structural fill, the surfaces to receive soil should be prepared as previously recommended. Structural fill should be placed in loose lifts not exceeding 8 inches in thickness. Individual lifts should be mechanically compacted to a density of at least 90 percent of the modified Proctor maximum density (ASTM:D 1557). We recommend that a representative of our firm be present during placement of structural fill to observe the work and perform a representative number of in place density tests. In this way, the adequacy of the earthwork may be evaluated as the grading progresses.

The suitability of soils for structural fill use depends primarily on the gradation and moisture of the soil when it is placed. As the amount of fines (that portion passing the U.S. No. 200 sieve) increases, the soils become increasingly sensitive to small changes in moisture content and adequate compaction becomes more difficult or impossible to achieve. Portions of the near surface soils we encountered on the site contained more than about 5 percent fines by weight, and could not be consistently compacted to a firm, non-yielding condition when the moisture content is more than about 2 percent above optimum. Therefore, at this site, earthwork should be scheduled during warm, dry weather, in order to use the onsite soils as structural fill. Even then, delays in grading are common due to inclement weather. If rain occurs while the subgrade is exposed or during placement of onsite silty materials (or any soil with over 5 percent fines), the wetted material must be allowed to dry prior to additional filling. It may be necessary to scarify the

upper layer, allow it to dry, and then recompact prior to additional filling. Over-excavation and removal of wet materials may be necessary if weather conditions preclude drying and recompaction.

If the site soils cannot be used for fill, due to their elevated silt and moisture content, it may be expedient to import a "clean" granular material for structural fill use. Similarly, only "clean" granular material should ideally be utilized for preload fill, since such material could be reused as structural fill during most weather conditions. In this case, the imported soils should contain no more than 5 percent (by weight) material passing the U.S. No. 200 sieve when measured on the minus No. 4 fraction. A material of this type may be successfully placed and compacted under a wide variety of weather conditions. Structural fill should be free of organics and other deleterious material with individual particles no greater than 6 inches in diameter.

4.3 Foundations

The proposed foundation may be supported by conventional spread or continuous footings. These foundation elements should be supported by the existing medium to very dense fill soils, or structural fill placed directly above these suitable bearing soils. We anticipate that footing loads will be light to moderate. Contingent on this condition, we recommend that the foundations be designed with an allowable bearing pressure of 2100 pounds per square foot (psf). This allowable bearing pressure may be increased by up to one-third to accommodate seismic or transient loads. Exterior footings should penetrate at least 18 inches below lowest surrounding ground surface for frost protection. Interior footings need only extend 12 inches below the surrounding ground or slab surfaces. All footings should have a minimum width of at least 12 inches. In all cases, footings must penetrate into the prescribed bearing stratum. Foundation elements should not be set in or above loose or disturbed soils or topsoil. For foundation elements on the site founded upon the preloaded sand fills, maximum future total settlements may be on the order of 1 inch with differential settlement equal to roughly one-half of the total observed. If loose, disturbed or soft materials are left within

the foundation area prior to concrete placement, the above settlements may be increased. Therefore, it would be appropriate to have the conditions of all footings observed by the geotechnical engineer or his representative immediately prior to concrete placement, in order to confirm bearing conditions are uniform and consistent with those assumed in design.

4.4 Slab-On-Grade Floors

The subgrade to support the ground level floor slab should be prepared in accordance with our previous site preparation recommendations. Slabs-on-grade should be founded on a preloaded fill with its surface compacted to at least 90 percent density (ASTM:D 1557). We recommend the uppermost 4 inches of fill beneath the slab consist of clean, sand and gravel, crushed rock or pea gravel, to serve as a capillary break and working surface. The fines content of the capillary break should be limited to 5 percent or less, and the capillary break should contain at least 40 percent gravel, by weight. Additionally, an impervious moisture barrier should be utilized to protect the slab from dampness. If the floor slab level is near or below adjacent exterior grades, perforated pipe perimeter drains should be installed around the buildings and footing trenches.

4.5 Drainage Considerations

Portions of the subsoils are silty and can result in the development of a temporarily perched groundwater condition. Additionally, traffic across the soils when they are wet will lead to the disturbance of otherwise firm strata. Therefore, prior to site work and construction, the contractor should be prepared to carry surface runoff around the exposed ground. This may be accomplished by the use of open ditches or other measures.

In planning, site grades should be set so that water does not collect adjacent to the building. Instead, the ground should be sloped away from the structures so that runoff may be carried to the storm drain system. All perimeter footings and retaining walls should be provided with a perforated pipe drain at the base. This drainpipe should be fully enveloped by at least 6 inches of pea gravel. The foundation drainage system should be routed via tight-line downslope by gravity to

a suitable discharge point. Roof and surface runoff should not discharge into the footing drain system. Instead, a separate tight-line drain or splashblocks should be used. In those areas where excavations are made, seepage zones may develop from cut faces. Such localized seepage areas should be blanketed by rock to control piping and erosion.

4.6 Pavement

We understand the existing asphalt-paved parking area to the north will be used for the facility. Some portions of the south half of the site will be asphalt-paved, and other areas will be developed to support rigid concrete pavement for drive-thru lanes and sidewalks, and dumpster apron. Pavement design, it must be recognized, is a compromise between high initial cost with little maintenance on one side and low initial cost coupled with the need for periodic repairs. As a result, the owner will need to take part in development of the appropriate pavement sections. Critical features which govern the durability of a surfacing include the stability of the subgrade, the presence or absence of moisture, free water and organics, the fines content of the subgrade soils, the traffic volume, and the frequency of use by heavy vehicles.

4.6.1 Asphalt Pavement

The on-site soils are relatively dense sands with some silt and exhibit moderate subgrade support characteristics. We would recommend the surface of the subgrade be compacted to 90 percent density (ASTM:D 1557). A recommended minimum pavement section for the parking areas and drive-thru lanes would have an asphaltic-concrete thickness of 3 inches underlain by a minimum of 4 inches of crushed aggregate.

If the risk of some cracking of the asphalt and the attendant need for periodic maintenance could be tolerated, a thinner pavement section could be considered. This may best be evaluated during construction, when the performance of the existing pavement under heavy truck traffic can be observed. A possible alternative section would be to construct a thicker pavement section in heavy traffic lanes such as main driveways, entrances, etc., and to use a thinner section for dedicated parking areas not subjected to truck or heavy traffic.

4.6.2 Rigid Concrete Pavement

For rigid pavment design, we recommend utilizing a modulus of vertical subgrade reaction of 200 pci (pounds per cubic inch), if the concrete roadway is underlain by free-draining granular backfill compacted to 90 percent density using ASTM:D 1557 as the standard. We have assumed a working stress (modulus of rupture) in the concrete of 335 psi. For design of concrete drive-thru lanes and dumpster areas, we assumed 100,000 equivalent 18 kip axle-loads occurring over the 20-year design life. Based on review of design charts ("Principles of Pavement Design", Yoder and Witzak (1975)), a minimum slab thickness of 6 inches would be recommended for both drive-thru lanes and the dumpster approach apron.

5.0 CLOSURE

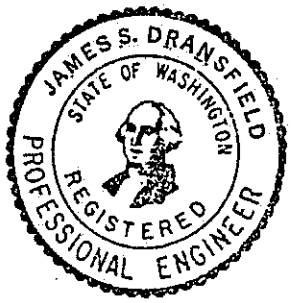
The conclusions and recommendations presented in this report are based on the explorations accomplished for this study. The number, location and depth of the explorations were completed within the site and proposal constraints so as to yield the information used to formulate the design recommendations. The integrity of the foundation depends on proper site preparation and construction procedures. Because of the settlement sensitivity of the facility, geotechnical engineering decisions may be required in the event that localized variations become apparent during construction. It is recommended that we be retained to provide geotechnical engineering services during the site preparation, preload placement, and foundation construction phases of this project.

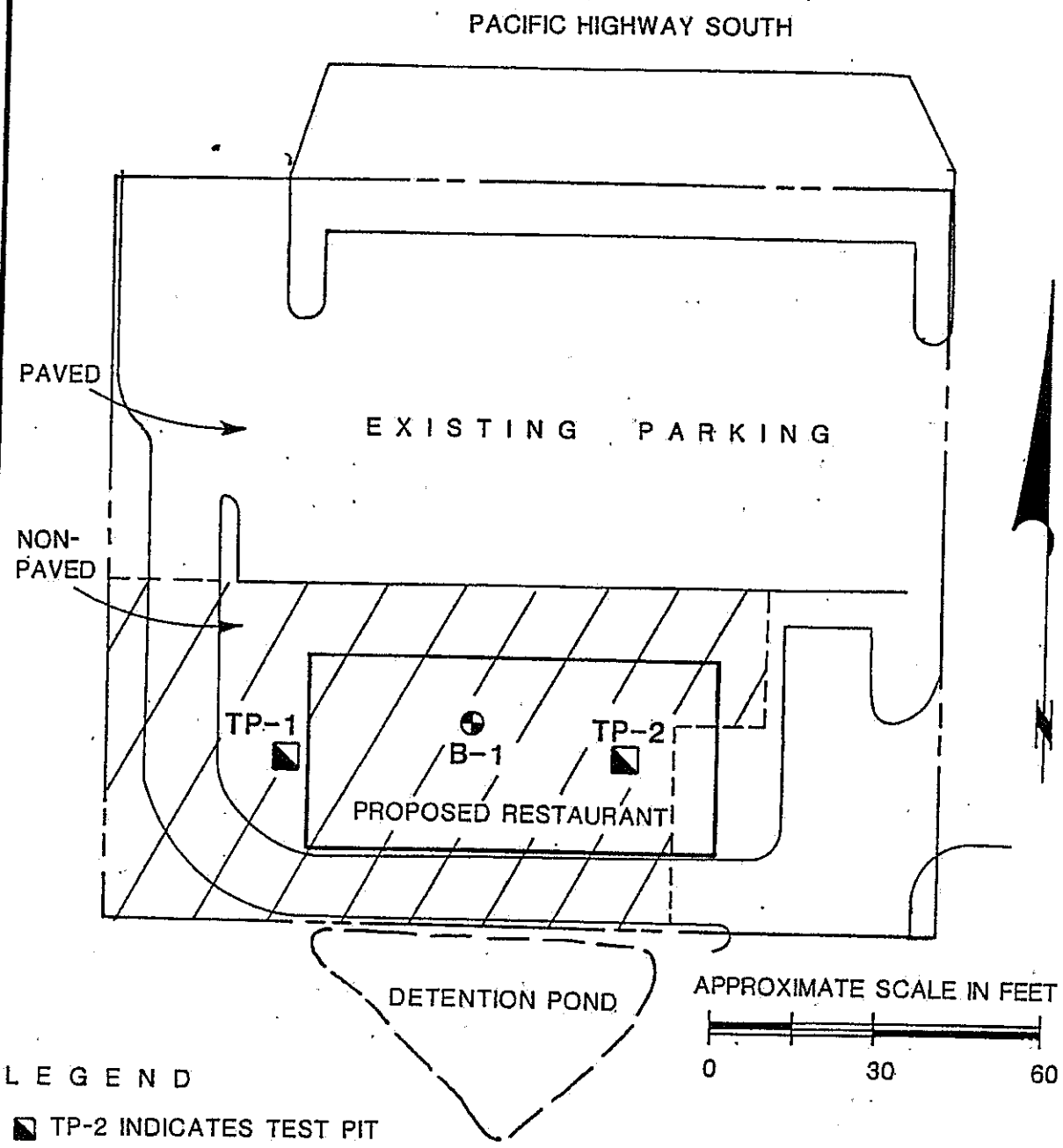
Respectfully submitted,

RITTENHOUSE-ZEMAN & ASSOCIATES, INC.

James S. Dransfield, P.E.
Senior Project Engineer

Kurt W. Groesch, P.E.
Associate





LEGEND

TP-2 INDICATES TEST PIT NUMBER & APPROXIMATE LOCATION

B-1 INDICATES BORING NUMBER & APPROXIMATE LOCATION

FIFE JACK-IN-THE-BOX

SITE & EXPLORATION PLAN

FIGURE 1

W.O. W-5435
BY JSD
DATE NOV 1987
SCALE NOTED

Base map from Schematic Site Plan provided by client

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RZA

APPENDIX A

SUBSURFACE EXPLORATION PROCEDURES AND LOGS

App A

APPENDIX A

W-5435

SUBSURFACE EXPLORATION

The field exploration program conducted for this study consisted of advancing a series of 2 test pits and one deep test boring. The approximate exploration locations are illustrated on the Site and Exploration Plan, Figure 1. The locations were obtained in the field by pacing from existing site features.

Test Pit Excavations

The test pits were excavated with a rubber-tired backhoe on 22 October 1987, by a local excavating contractor. The test pits were observed and logged by an engineering geologist from our firm. Disturbed but representative samples of the soils in the test pits were retrieved, classified in the field and transported in plastic bags to our laboratory for detailed evaluation and classification. The test pit logs are presented in this appendix and are based on the inspection of the samples secured and the field logs. The relative soil densities indicated on the test pit logs are interpretative descriptions based on the conditions observed during the excavation.

Hollow Stem Auger Boring

The boring was drilled on 5 November 1987 by a local exploration drilling company under subcontract to our firm. The boring consisted of advancing a 4-inch inside diameter, hollow-stem auger with a truck-mounted drill rig. During the drilling process, samples were obtained at generally 2.5 or 5.0 foot depth intervals. The borings were continuously observed and logged by an engineering geologist from our firm.

Undisturbed samples were obtained by pushing a 3-inch outside diameter, seamless steel Shelby tube into the soil by the hydraulic system on the drill rig in accordance with ASTM:D 1587. Since the thin wall tube is pushed rather than driven,

continued

the sample obtained is considered relatively undisturbed. The samples were classifed in the field by examining each end prior to sealing with plastic caps. The samples were then transported to our laboratory where they were extruded for further classification and laboratory testing.

Disturbed samples were obtained by using the Standard Penetration Test Procedure as described in ASTM:D 1586. This test and sampling method consists of driving a standard 2-inch outside diameter split barrel sampler a distance of 18 inches into the soil with a 140 pound hammer free falling a distance of 30 inches. The number of blows for each 6 inch interval is recorded. The number of blows required to drive the sampler the final 12 inches is considered the Standard Penetration Resistance ("N") or blow count. The blow count is presented graphically on the boring logs in this appendix. If a total of 50 blows is recorded within one 6 inch interval, the blow count is recorded as 50 blows for the number of inches of penetration. The resistance, or "N" value, provides a measure of the relative density of granular soils or the relative consistency of cohesive soils.

The soil samples obtained from the split-barrel sampler were classified in the field and representative portions placed in watertight containers. The samples were then transported to our laboratory for further visual classification and laboratory testing. Samples are generally saved for a period of 30 days unless special arrangements are made.

The boring logs presented in this appendix are based on the drilling action, inspection of the samples secured, laboratory results and field logs. The various types of soils are indicated as well as the depths where the soils or characteristics of the soils changed. It should be noted that these changes may have been gradual, and if the changes occured between sample intervals, they were interpreted.

The ground water conditions observed during the exploration program are indicated on the boring log and test pit logs. These subsurface water conditions were

continued

evaluated by observing the moisture condition of the samples, the free water on the sampling rods or the sidewalls of the excavation in the case of the test pits. The ground water level is indicated on the boring logs where appropriate by the water symbol. An observation well was installed in the boring to monitor ground water levels following drilling. The observation well consists of a 3/4-inch diameter slotted PVC pipe placed in the boring, which extended to the ground surface.

TEST PIT LOGS

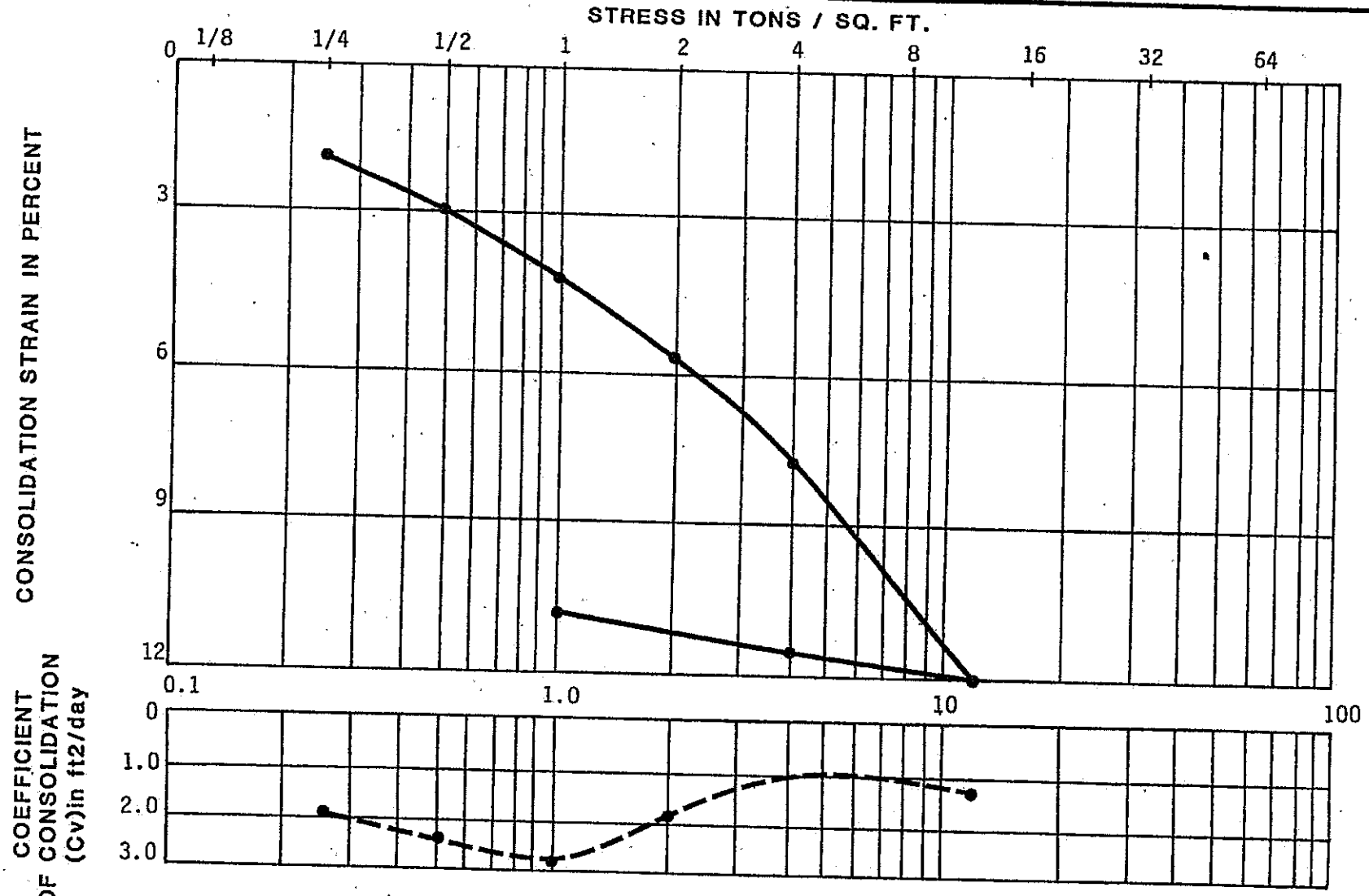
Depth (feet)	Soil Classification	W-5435

Test Pit TP-1

0.0 - 2.5	Dense, moist to wet, brown, gravelly SAND with trace silt (Fill)
2.5 - 6.0	Dense, moist to wet, gray, gravelly SAND; miscellaneous debris including barbed wire, wood, etc. (Fill)
6.0 - 14.0	Soft, wet to saturated, brown-gray SILT with interbedded sandy layers and organics
	Slight seepage and caving below 10.5 feet
	Moisture content at 7 feet: 44.4%

Test Pit TP-2

0.0 - 3.0	Dense, moist to wet, brown, gravelly SAND with trace silt (Fill)
3.0 - 3.5	Medium stiff, wet, gray SILT with trace to some sand and some roots (Fill)
3.5 - 5.0	Dense, moist to wet, gray to brown-gray, gravelly, SAND with interbedded debris (Fill)
5.0 - 13.5	Soft, wet to saturated, brown-gray, SILT with trace sand and intermixed organics
	Moderate caving below 8 feet
	Slight seepage below 10.5 feet
	Moisture content at 12 feet: 48.4%



BORING No.: B-1 SAMPLE No.: S-2

DEPTH: 10 ft

WATER CONTENT: 45.3 LL: PL:

DRY UNIT WEIGHT: 76.7 pcf

SOIL DESCRIPTION: Silt

Figure B-1

CONSOLIDATION TEST

w.o. W-5435

By JSD

Date NOV 1987

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Geotechnical Consultants
1400 140th Avenue N.E.
Bellevue, Wash. 98005

RZA

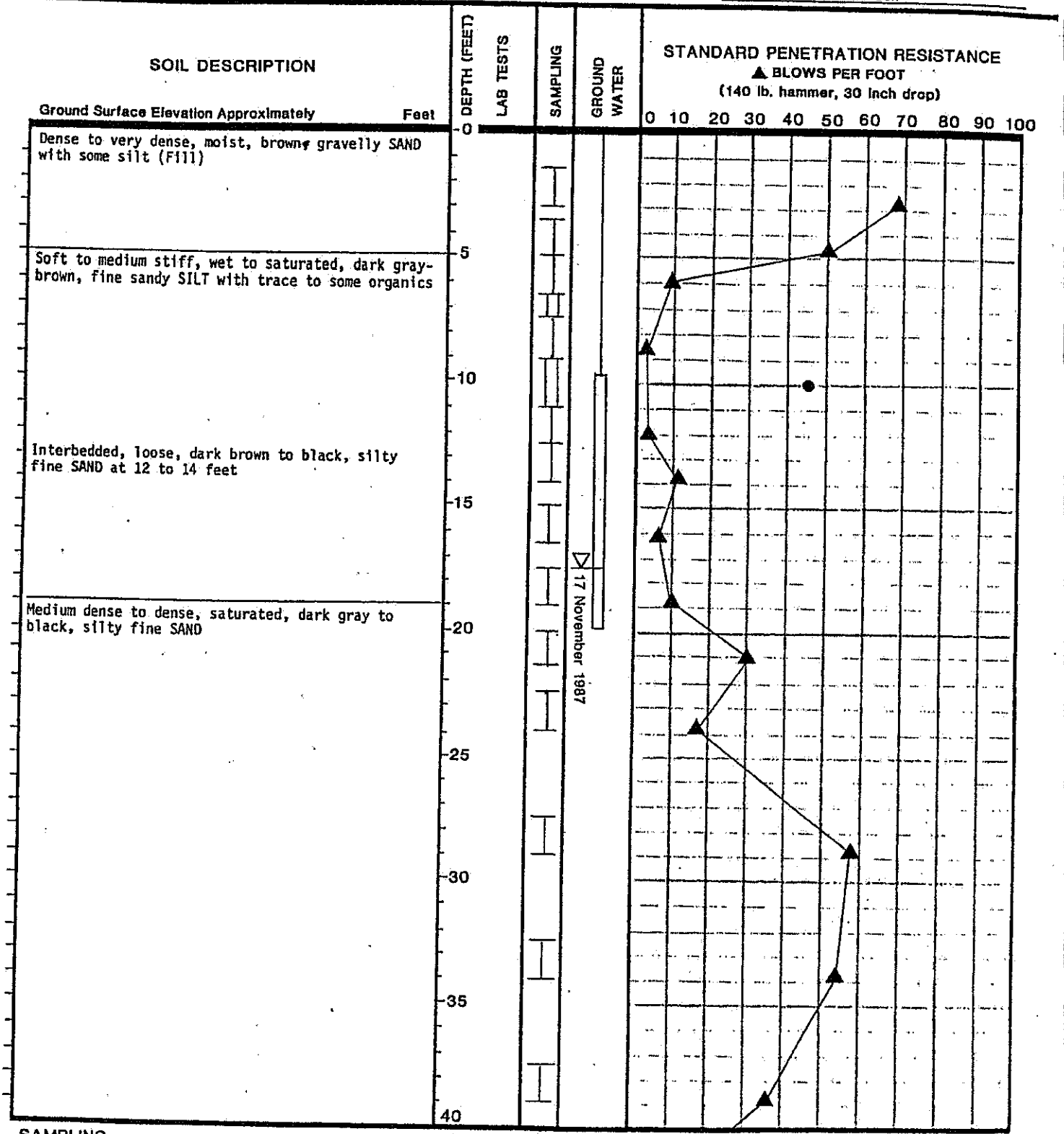
RZA

RITTENHOUSE-ZEMAN & ASSOC., INC.

Geotechnical / Hydrogeological Consultants

BORING NUMBER B-1 W.O. W-5435

PROJECT NAME Fife Jack-In-The-Box



SAMPLING

I 2" OD SPLIT SPOON SAMPLE
II 3" OD SHELBY SAMPLE
☒ 2.5" ID RING SAMPLE
B BULK SAMPLE
★ SAMPLE NOT RECOVERED

GROUND WATER

SEAL
DATE
WATER LEVEL AT TIME OF DRILLING ATD
OBSERVATION WELL TIP

LABORATORY TESTS

● % WATER CONTENT
NP NON PLASTIC
LIQUID LIMIT
NATURAL WATER CONTENT
PLASTIC LIMIT

RITTENHOUSE-ZEMAN & ASSOC., INC.
Geotechnical / Hydrogeological Consultants

BORING NUM B-1 (cont.) W.O. W-5435

PROJECT NAME Fife Jack-In-The-Box

SOIL DESCRIPTION	DEPTH (FEET)	LAB TESTS	SAMPLING	GROUND WATER
Ground Surface Elevation Approximately Feet				
(As above)	40			
Soft, saturated, brown-gray SILT with some clay	45			
Interbedded dense, saturated, brown-gray, silty fine SAND, and very stiff to hard, fine sandy SILT	50			
	55			
Boring terminated at 59 feet 5 November 1987	60			

STANDARD PENETRATION RESISTANCE
▲ BLOWS PER FOOT
(140 lb. hammer, 30 inch drop)
0 10 20 30 40 50 60 70 80 90 100

SAMPLING
I 2" OD SPLIT SPOON SAMPLE
II 3" OD SHELBY SAMPLE
2.5" ID RING SAMPLE
B BULK SAMPLE
★ SAMPLE NOT RECOVERED

GROUND WATER
SEAL
DATE
WATER LEVEL AT TIME OF DRILLING ATD
OBSERVATION WELL TIP

LABORATORY TESTS
● % WATER CONTENT
NP NON PLASTIC
LIQUID LIMIT
NATURAL WATER CONTENT
PLASTIC LIMIT

APPENDIX B

LABORATORY TEST PROCEDURES AND RESULTS

APPENDIX B

W-5435

LABORATORY TESTING PROCEDURES

A series of laboratory tests were performed during the course of this study to evaluate the index and geotechnical engineering properties of the subsurface soils. Descriptions of the types of tests performed are given below.

Visual Classification

Samples recovered from the exploration locations were visually classified in the field during the exploration program. Representative portions of the samples were carefully packaged in watertight containers and transported to our laboratory where the field classifications were verified or modified as required. Visual classification was done in general accordance with the Unified Soil Classification system. Visual soil classification includes color, relative moisture content, soil type based on grain size, and accessory soil types included in the sample. Soil classifications are presented on the exploration logs in Appendix A.

Moisture Content Determinations

Moisture content determinations were performed on representative samples obtained from the explorations in order to aid in identification and correlation of soil types. The determinations were made in general accordance with the test procedures described in ASTM:D 2216. The results of the tests are shown on the exploration logs in Appendix A.

Consolidation Test

A one-dimensional consolidation test was performed in general accordance with ASTM:D 2435 on a selected sample of the site soils to provide data for developing settlement estimates. The undisturbed soil sample was carefully trimmed and fit

continued

into a rigid ring. Porous stones were placed on both the top and bottom of the sample to allow drainage. Vertical loads were then applied to the sample incrementally in such a way that the sample was allowed to consolidate under each load increment. The rebound of the sample during unloading was also measured. The results of the consolidation test are presented in this appendix as a plot of percent consolidation (strain) versus applied load (stress).

Petroleum Hydrocarbon Oil and Grease Analyses

Petroleum odor was noted in our test boring, at 5 to 10 feet below the ground surface. Samples were obtained in plastic jars and returned to our laboratory. The samples from the test borings with the most notable odor were submitted to an analytical laboratory for further testing. The submitted samples are as follows:

Boring No.	Sample No.	Depth (feet)
B-1	S-3	5.0 - 6.5
B-1	S-4	7.5 - 9.0
B-1	S-5	11.0 - 12.5

The soil samples were recovered using standard geotechnical drilling procedures. The samples returned to the laboratory in plastic jars were then transferred to laboratory-treated glass jars and submitted to the chemical testing laboratory in accordance with RZA's chain-of-custody procedures. The petroleum hydrocarbon oil and grease analyses were subcontracted to AmTest, Inc. in Redmond, Washington. Samples were analyzed for total oil and grease concentrations, petroleum hydrocarbon oil and grease concentrations and volatile aromatic hydrocarbons (benzene, tolulene, and xylene). The total oil and grease values include the animal,

continued

vegetable, and petroleum oil and grease contained in the sample. The petroleum hydrocarbon oil and grease value is that amount of the total oil and grease that is petroleum-based. The volatile aromatic hydrocarbons (benzene, tolulene and xylene) are the mobile and toxic constiuents of petroleum products. The results were reported in micrograms per gram (µg/g) for oil and grease, and the BTX in micrograms per kilogram (µg/g). The results of the petroleum hydrocarbon testing are attached in this Appendix.

am test inc.
14603 N.E. 87th St. • REDMOND, WASHINGTON 98052 • 206/885-1664

ANALYSIS REPORT

CLIENT: Rittenhouse - Zeman & Associates, Inc.

REPORT TO: Jim Dransfield
1400 - 140th NE
Bellevue, WA 98005

DATE RECEIVED: 11/6/87

DATE REPORTED: 11/23/87

JOB NO.: W 5435

BTX BY EPA METHOD 8020

Laboratory Sample Nos.	Client Identification	Benzene (ug/kg)	Toluene (ug/kg)	m+p-Xylene (ug/kg)	o-Xylene (ug/kg)
715234	B1, S-3	ND	ND	43.	3.0
715235	B1, S-4	ND	68.	882.	17.6
715236	B1, S-5	22.	ND	10.8	25.
DETECTION LIMIT		3.0	3.0	6.0	3.0

ND = Not Detected.

Continued . . . . .

RZA
RITTENHOUSE-ZEMAN & ASSOCIATES, INC.
Geotechnical Consultants
1400 140th Avenue N.E.
Bellevue, Washington 98005
(206) 746-8020

14 January 1988

W-5435-1

Foodmaker, Inc.
2395 American Avenue
Hayward, California 94545

Attention: Mr. Greg Pace

Subject: Soil Quality Evaluation
Proposed Jack-In-The-Box Restaurant Site
Pacific Highway South and Port-of-Tacoma Road
Fife, Washington

Gentlemen:

This letter presents the results of our subsurface exploration and soil quality evaluation conducted for the above referenced project. This work was performed as additional work based on the results of our "Subsurface Exploration and Geotechnical Engineering Report" for the above referenced project dated 2 December 1987. The scope of work for this additional study was limited to four test borings on the site and submittal of selected samples for hydrocarbon testing. Verbal authorization to proceed with this study was granted by Mr. Greg Pace on 30 December 1987.

PROJECT BACKGROUND

A soils and foundation study entitled "Subsurface Exploration and Geotechnical Engineering Report" was performed by our firm for the above referenced project, dated 2 December 1987. Our field work consisted of advancing two backhoe test pits to 13.5 and 14.5 feet, and one test boring to 59 feet below the ground surface.

During the drilling of boring B-1, a petroleum product odor was noted at 5 to 10 feet below the ground surface. We informed Foodmaker, Inc. of our findings, and the samples obtained which exhibited odor were submitted at the request of Foodmaker, Inc. the next day for chemical testing.

The testing was performed by AmTest, Inc. of Redmond, Washington. The measured concentrations of m plus p xylene in sample S-4, and the measured concentrations of total oil and grease and petroleum hydrocarbon in sample S-5 were higher than Washington Department of Ecology suggested minimums. However, it should be noted that these samples were obtained using standard geotechnical drilling procedures, and were not collected in accordance with our standard soil quality evaluation methods. Specifically, the augers were not steam cleaned and our sampler was not decontaminated prior to its use.

In order to further evaluate the site, Foodmaker, Inc. requested us to drill borings at each of the four corners of the site, and submit representative samples for chemical analysis.

SUBSURFACE EXPLORATION

Four borings (designated B-1A, B-2, B-3 and B-4) were drilled on 5 January 1988 by a local exploration drilling company under subcontract to our firm. The borings consisted of advancing 4-inch inside diameter, hollow-stem auger with a truck-mounted drill rig. During the drilling process, samples were obtained at generally 2.5 foot depth intervals. The borings were continuously observed and logged by an engineering geologist from our firm.

Soil samples delivered to the analytical laboratory were collected at the following locations:

Boring Number	Sample Number	Depth (Feet)
B-1A	S-2	5.0 - 6.5
B-1A	S-4	10.0 - 11.5
B-1A	S-7	17.5 - 19.0
B-2	S-1	2.5 - 4.0
B-2	S-4	10.0 - 11.5
B-2	S-6	15.0 - 16.5
B-3	S-2	5.0 - 6.5
B-3	S-3	7.5 - 9.0
B-3	S-6	17.5 - 19.0
B-4	S-1	2.5 - 4.0
B-4	S-3	10.0 - 11.5
B-4	S-5	17.5 - 19.0

No petroleum odor was noted in any of the samples from the four most recent borings. The samples collected from above 5 feet consisted of fill soils, while the remainder of the samples represented native sands and silts. The results of the laboratory tests are attached as Tables 1 and 2. The samples identified as B-1 on Tables 1 and 2 correspond to RZA boring B-1A.

The soil samples at each interval were recovered using procedures designed to minimize the risk of cross contamination. Prior to mobilizing to the site, the drilling equipment and sampling tools were steam cleaned. Between each sampling attempt, the sampling tools were scrubbed with a stiff brush and a detergent solution consisting of alconox and warm water, and then rinsed with potable water and liberal quantities of deionized water. The samples were classified in the field and immediately transferred to laboratory treated glass jars and tightly sealed with a foil-lined threaded cap. The samples were kept on ice with approximately 4°C throughout the field program. Selected samples were subsequently transferred to the chemical testing laboratory in accordance with RZA's chain-of-custody procedures. The remaining samples were transported to our laboratory for further visual classification. Samples are generally saved for a period of 30 days unless special arrangements are made.

As requested in a 16 November 1987 letter from Mr. Charles Watson of Foodmaker, Inc., soil samples are to be tested to verify that they are "clean" in accordance with the Federal Safe Drinking Water Standard where there is no local standard. As we have discussed with you in the past, Washington Department of Ecology has not established an "official" standard for testing methods or acceptable levels at this time. Based on our discussions with local testing laboratories, the most extensive testing of soil samples for petroleum product commonly performed consists of measurement of BTEX, total petroleum hydrocarbon, total oil and grease, and total lead. As discussed, this is the level of testing we have performed for this study. These laboratory analyses were subcontracted to AmTest, Inc. in Redmond, Washington.

The samples were analyzed for total oil and grease concentrations, petroleum hydrocarbon oil and grease concentration, volatile aromatic hydrocarbons (benzene, toluene, ethyl-benzene and xylene), and total lead. The total oil and grease values include the animal, vegetable, and petroleum oil and grease contained in the sample. The petroleum hydrocarbon oil and grease value is that amount of the total and grease that is petroleum based. The volatile aromatic hydrocarbons (benzene, toluene, ethyl-benzene and xylene) are the more mobile and toxic

constituents of petroleum products. Measurement of total lead is made to determine if lead concentrations are above typical background levels for soils in the Pacific Northwest. It should be noted that lead content is expressed as total lead content including organo-lead (presumably derived from leaded fuel) and inorganic lead. We contacted Ms. Gail Culver of WDOE recently regarding the significance of these total lead results. She indicated the background levels vary depending on the soil type, however, total lead values of less than about 100 ppm would generally not be of concern. According to WDOE, it is not actually the total lead concentration that is of concern, but instead the leachable extractable portion of the lead (which is measured by EP toxicity testing). The total lead data may be useful for screening purposes where gross contamination exists. Total solids data presented has no significance with respect to soil quality, but must be computed in order to measure total lead. The results of the BTEX tests are reported in micrograms per kilogram (ug/kg), which is equivalent to parts per billion (ppb). Results for the other tests were reported in micrograms per gram (ug/g), which is equivalent to parts per million (ppm).

TEST RESULTS

The results of the laboratory testing are attached as Tables 1 and 2 at the end of this letter. The measured concentrations are below WDOE suggested minimums. Based upon recent discussions with Ms. Lynn Cashion of WDOE, concentrations of BTEX less than 666 ppb, or oil and grease plus petroleum less than 200 ppm would not be high enough to recommend remediation.

We trust this letter is sufficient for your current needs. If you have any questions, or we can be of further assistance, please call.

Respectfully submitted,

RITTENHOUSE-ZEMAN AND ASSOCIATES

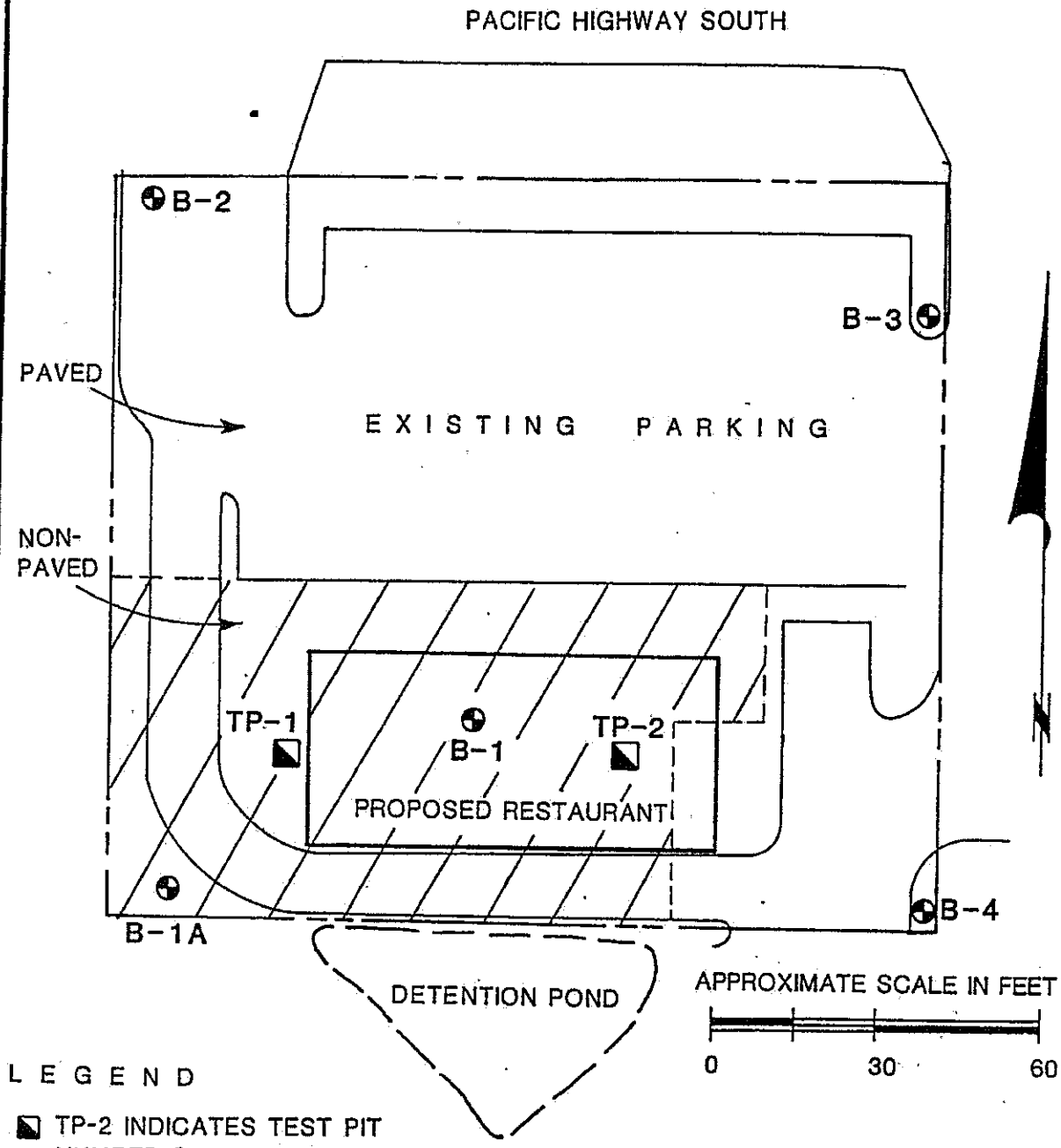
James S. Dransfield, P.E.
Senior Project Engineer

Kurt W. Groesch,P.E.
Associate

Attachments: Figure 1 - Site and Exploration Plan
Appendix A - Laboratory Test Results

cc: Foodmaker, Inc. Attn: Mr. Jack Bosch

Foodmaker, Inc. Attn: Mr. Lee Simon



FIFE JACK-IN-THE-BOX

SITE & EXPLORATION PLAN
FIGURE 1

W.O. W-5435
BY JSD
DATE NOV 1987
SCALE NOTED

Base map from Schematic Site Plan provided by client

RITTENHOUSE-ZEMAN & & ASSOCIATES, INC.
Geotechnical & Hydrogeological Consultants
1400 140th Avenue N.E.
Bellevue, WA 98005

RZA

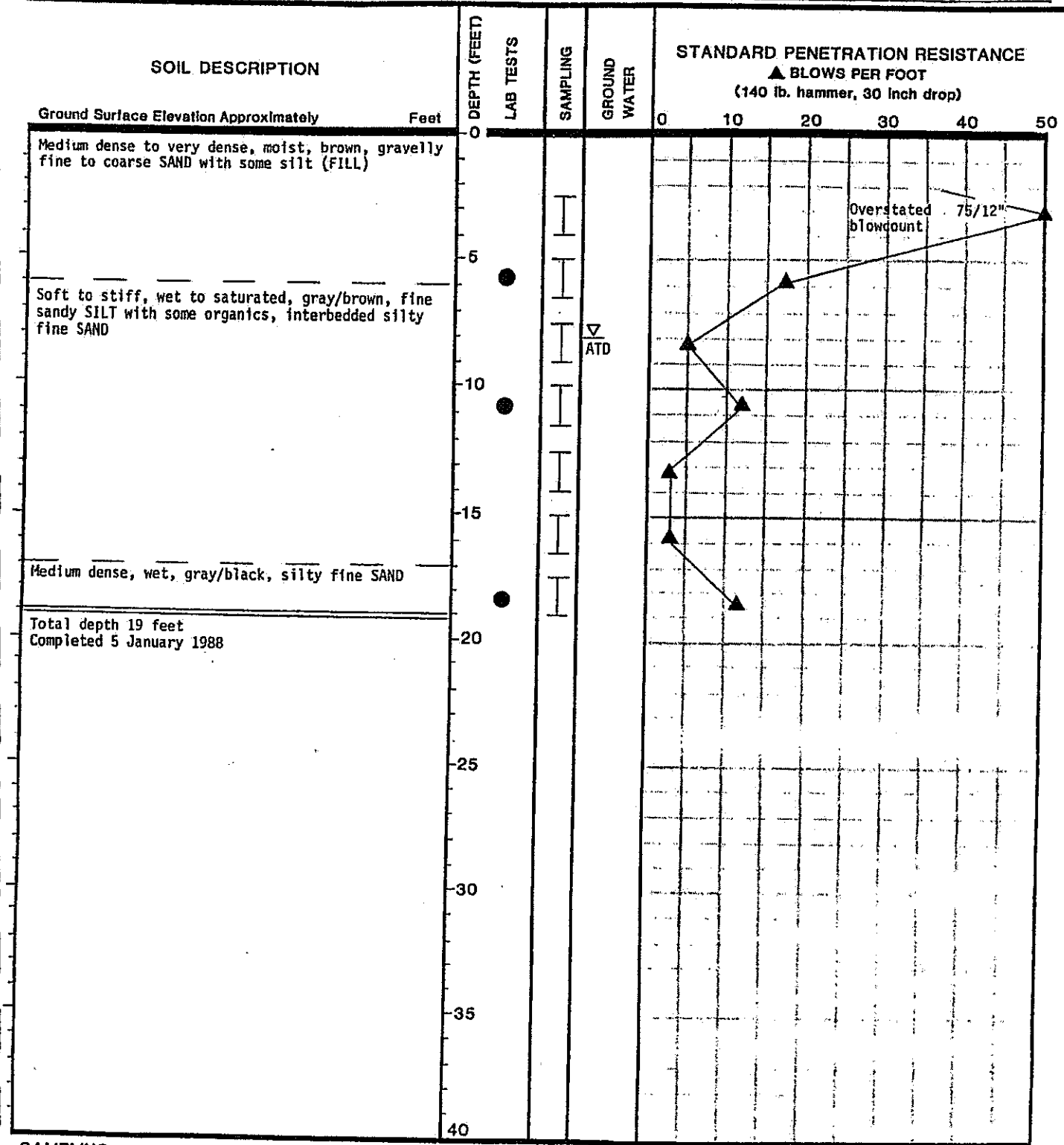
RZA

RITTENHOUSE-ZEMAN & ASSOC., INC.

Geotechnical / Hydrogeological Consultants

BORING NUMBER B-1A W.O. 5435-1

PROJECT NAME Fife - Jack-In-The Box



SAMPLING

- 2" OD SPLIT SPOON SAMPLE
- 3" OD SHELBY SAMPLE
- 2.5" ID RING SAMPLE
- B BULK SAMPLE
- ★ SAMPLE NOT RECOVERED

GROUND WATER

- SEAL
- DATE
- WATER LEVEL AT TIME OF DRILLING ATD
- OBSERVATION WELL TIP

LABORATORY TESTS

- ● % WATER CONTENT
- NP NON PLASTIC
- LIQUID LIMIT
- NATURAL WATER CONTENT
- PLASTIC LIMIT
- ● CHEMICAL ANALYSIS

RITTENHOUSE-ZEMAN & ASSOC., INC.
Geotechnical / Hydrogeological Consultants

BORING NUMBER B-2 W.O. 5435-1

PROJECT NAME Fife - Jack-In-The-Box

Ground Surface Elevation Approximately _____ Feet

SOIL DESCRIPTION	DEPTH (FEET)
Asphalt	0
Medium dense, moist, brown, gravelly, fine to coarse SAND with some silt (FILL)	
Loose, moist to wet, brown/gray, silty fine SAND with some medium to coarse sand, trace gravel	5
Soft, wet, brown/gray, fine sandy SILT with some medium sand, trace organics	10
Medium dense, moist, gray, silty fine SAND with trace organics	15
Total depth 19 feet Completed 5 January 1988	20
	25
	30
	35
	40

LAB TESTS

SAMPLING

GROUND WATER

ATD

STANDARD PENETRATION RESISTANCE
▲ BLOWS PER FOOT
(140 lb. hammer, 30 inch drop)

0 10 20 30 40 50

SAMPLING
- I 2" OD SPLIT SPOON SAMPLE
- II 3" OD SHELBY SAMPLE
- ⊠ 2.5" ID RING SAMPLE
- B BULK SAMPLE
- ★ SAMPLE NOT RECOVERED

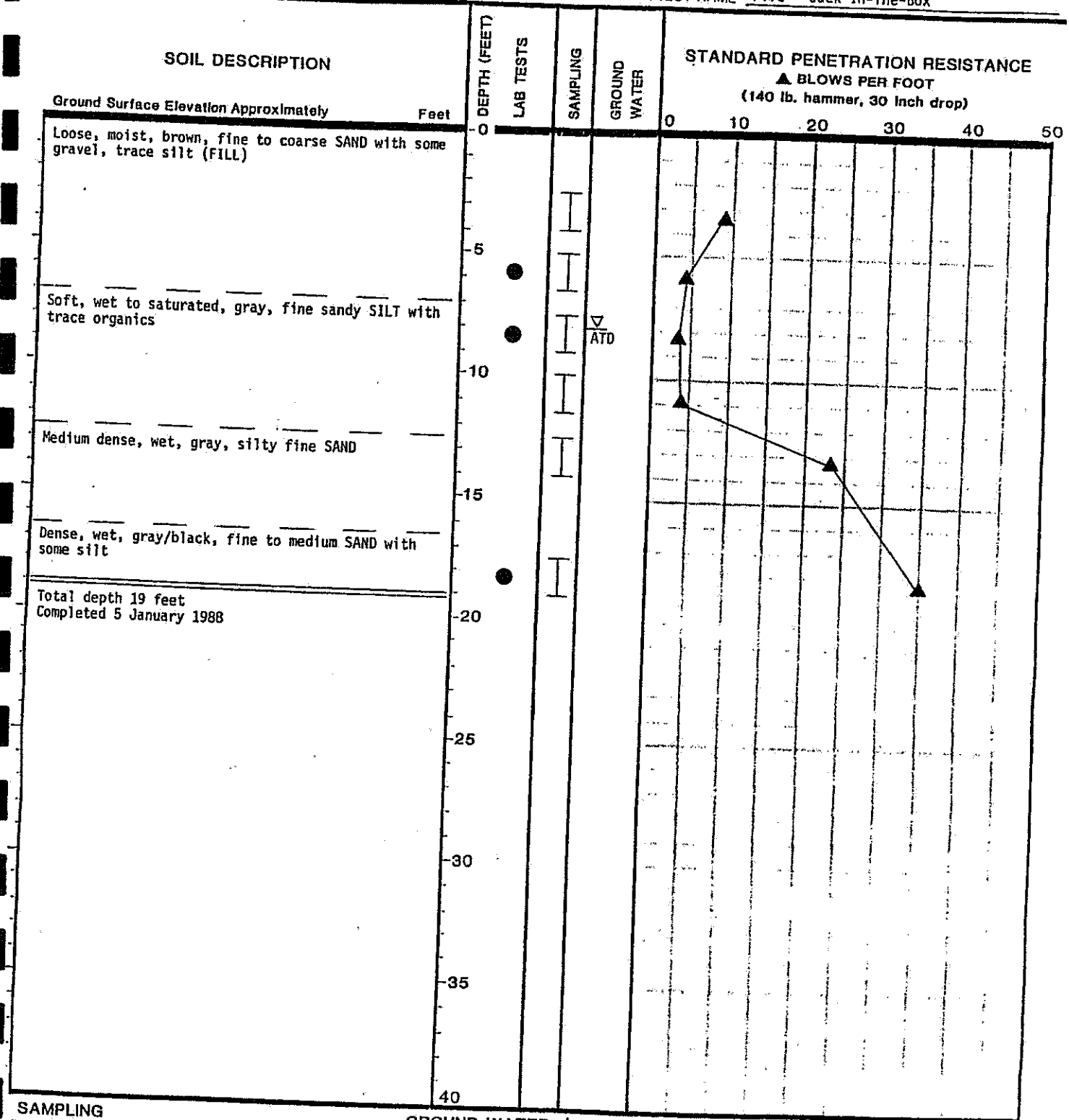
GROUND WATER
- SEAL
- DATE
- WATER LEVEL AT TIME OF DRILLING ATD
- OBSERVATION WELL TIP

LABORATORY TESTS
- ● % WATER CONTENT
- NP NON PLASTIC
- LIQUID LIMIT
- NATURAL WATER CONTENT
- PLASTIC LIMIT
- ● CHEMICAL ANALYSIS

RITTENHOUSE-ZEMAN & ASSOC., INC.
Geotechnical / Hydrogeological Consultants

BORING NUMBER B-3 W.O. 5435-1

PROJECT NAME Fife - Jack-In-The-Box



SAMPLING
- 2" OD SPLIT SPOON SAMPLE
- 3" OD SHELBY SAMPLE
- 2.5" ID RING SAMPLE
- B BULK SAMPLE
- ★ SAMPLE NOT RECOVERED

GROUND WATER
- SEAL
- DATE
- WATER LEVEL AT TIME OF DRILLING ATD
- OBSERVATION WELL TIP

LABORATORY TESTS
- ● % WATER CONTENT
- NP NON PLASTIC
- LIQUID LIMIT
- NATURAL WATER CONTENT
- PLASTIC LIMIT
- ● CHEMICAL ANALYSIS

RITTENHOUSE-ZEMAN & ASSOC., INC.
Geotechnical / Hydrogeological Consultants

BORING NUMBER B-4 W.O. 5435-1

PROJECT NAME Fife - Jack-In-The-Box

SOIL DESCRIPTION	DEPTH (FEET)
Ground Surface Elevation Approximately Feet	0
Medium dense, moist, brown/gray, gravelly fine to coarse SAND with some silt (FILL)	
Soft to stiff, moist to wet, brown/gray, fine sandy SILT with some medium sand, trace organics	5
	10
Medium dense, wet, gray/black, silty fine SAND	15
Dense to very dense, wet, gray/black, fine to medium SAND with trace silt, gravel	20
Total depth 19 feet Completed 5 January 1988	25
	30
	35
	40

LAB TESTS

SAMPLING

GROUND WATER

ATD

STANDARD PENETRATION RESISTANCE
▲ BLOWS PER FOOT
(140 lb. hammer, 30 inch drop)

0 10 20 30 40 50

Overstated blowcount

50/4"

SAMPLING
- 2" OD SPLIT SPOON SAMPLE
- 3" OD SHELBY SAMPLE
- 2.5" ID RING SAMPLE
- B BULK SAMPLE
- ★ SAMPLE NOT RECOVERED

GROUND WATER
- SEAL
- DATE
- WATER LEVEL AT TIME OF DRILLING ATD
- OBSERVATION WELL TIP

LABORATORY TESTS
- ● % WATER CONTENT
- NP NON PLASTIC
- LIQUID LIMIT
- NATURAL WATER CONTENT
- PLASTIC LIMIT
- ● CHEMICAL ANALYSIS

am test inc.
14603 N.E. 87th St. • REDMOND, WASHINGTON 98052 • 206/885-1664

Table 1

ANALYSIS REPORT

CLIENT: Rittenhouse - Zeman & Associates
DATE RECEIVED: 1/6/88

REPORT TO: Jim Dransfield
1400 - 140th Avenue NE
Bellevue, WA 98005
DATE REPORTED: 1/11/88
PROJECT NO.: 5435

Laboratory Sample Numbers	Client Identification	Total Oil & Grease (ug/g)	Petroleum Hydrocarbons (ug/g)	Total Solids (%)	Total Lead* (ug/g)
718248	B-1, S-2	<5.0	<5.0	88.2	0.079
718249	B-1, S-4	36.5	<5.0	69.9	0.097
718250	B-1, S-7	11.5	<5.0	72.7	0.083
718251	B-2, S-1	<5.0 <5.0]	<5.0	93.9	0.083
718252	B-2, S-4	180.	94.0	65.0	0.082
718253	B-2, S-6	<5.0	<5.0	77.1	0.052
718254	B-3, S-2	36.5	27.5	85.8 86.6]	0.308
718255	B-3, S-3	117.	18.0	68.1	0.079
718256	B-3, S-6	<5.0	<5.0	80.5	0.032
718257	B-4, S-1	50.0	10.0	75.2	0.070
718258	B-4, S-3	<5.0	<5.0	68.1	0.085 0.060]
718259	B-4, S-5	<5.0	<5.0	80.9 80.2]	0.023

*Results expressed on a dry weight basis.

Continued . . . .

Table 2

CLIENT: Rittenhouse - Zeman & Associates
REPORT TO: Jim Dransfield

DATE RECEIVED: 1/6/88
DATE REPORTED: 1/11/88
PROJECT NO.: 5435

BTEX BY EPA METHOD 8020

Laboratory Sample Nos.	Client Identification	Benzene	Toluene	m+p- Xylene	o- Xylene	Ethyl Benzene
718248	B-1, S-2	ND	ND	ND	ND	ND
718249	B-1, S-4	ND	ND	ND	ND	ND
718250	B-1, S-7	ND	ND	ND	ND	ND
718251	B-2, S-1	ND	ND	ND	ND	ND
718252	B-2, S-4	16.5	14.1	ND	ND	ND
718253	B-2, S-6	ND	ND	ND	ND	ND
718254	B-3, S-2	ND	ND	ND	ND	ND
718255	B-3, S-3	11.6	14.4	ND	ND	ND
718256	B-3, S-6	ND	ND	ND	ND	ND
718257	B-4, S-1	ND	ND	11.1	ND	ND
718258	B-4, S-3	ND	ND	ND	ND	ND
718259	B-4, S-5	ND	ND	ND	ND	ND
718259 Spike Recovery (%)		94.	103.	110.	110.	109.
DETECTION LIMIT		5.	5.	10.	5.	5.

All results are in ug/kg.
ND = Not Detected.

JTD/pb

REPORTED BY John T. Dailey
John T. Dailey

CLIENT: Rittenhouse - Zeman & Associates, Inc.

REPORT TO: Jim Dransfield

DATE RECEIVED: 11/6/87

DATE REPORTED: 11/23/87

JOB NO.: W 5435

OIL & GREASE/PETROLEUM HYDROCARBONS

Laboratory Sample Nos.	Client Identification	Total Oil & Grease (ug/g)	Petroleum Hydrocarbons (ug/g)
715234	B1, S-3	77.0	25.0
715235	B1, S-4	87.0	70.0
715236	B1, S-5	222.	210.

KP/pb

REPORTED BY

Kenneth Pang