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DRAFT
Supplemental Site Investigation Report
WA DOT Signals Maintenance Site
Seattle, Washington

16 January 2019

Prepared for

Washington State
Department of Ecology
3190 160th Avenue SE
Bellevue, WA 98008

K/J Project No. 1696059.00

Supplemental Site Investigation Report

Report Version: Draft

Site Name:	WA DOT Signals Maintenance Site
Site Address:	3700 9th Ave S Seattle, WA 98134
Alternate Location Info:	Tax Parcel 567950-0270 Section 9, Township 23N, Range 8E
Ecology Facility Site ID No.:	60549963
Cleanup Site ID:	9862
UST Site ID:	12240

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Licensure stamp goes here.

Reminder: Geologic, Engineering, or Hydrogeologic work must be performed under the seal of an appropriately licensed professional, as required by Chapters 18.43 and 18.220, Revised Code of Washington (RCW).

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List of Acronyms

^oC	degrees Celsius
µg/L	micrograms per liter
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and total xylenes
COC	contaminant/chemical of concern
CSID	Clean Up Site Identification number
CUL	cleanup level
DRO	diesel-range organics
Ecology	Washington State Department of Ecology
EDR	Environmental Data Resources, Inc.
EPA	United States Environmental Protection Agency
ERTS	Environmental Report Tracking System
ESC	ESC Lab Sciences
FSID	Facility Site Identification number
GRO	gasoline-range organics
I-5	Interstate 5
IDW	investigation-derived waste
LDW	Lower Duwamish Waterway
LUST	leaking underground storage tank
mg/kg	milligrams per kilogram
MTCA	Model Toxics Control Act
NFA	No Further Action
NWTPH-Dx	Northwest Total Petroleum Hydrocarbons as Diesel and Oil Extended
NWTPH-Gx	Northwest Total Petroleum Hydrocarbons as Gasoline Extended
ORO	oil-range organics
PCB	polychlorinated biphenyl
PCSM	preliminary conceptual site exposure model
PID	photoionization detector
ppm	parts per million
PVC	polyvinyl chloride
QAPP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act
RCU	Reported Cleaned Up
SAP	Sampling and Analysis Plan
SGC	silica gel cleanup
SHA	Site Hazard Assessment
SIM	selective ion monitoring
SVOC	semivolatile organic compound
TEE	Terrestrial Ecological Evaluation

TEF	Transportation Equipment Fund
TPH	total petroleum hydrocarbon
UST	underground storage tank
VOC	volatile organic compound
WAC	Washington State Administrative Code
WA DOT	Washington State Department of Transportation
WSDOT	Washington State Department of Transportation

Executive Summary

Kennedy/Jenks Consultants has prepared this Supplemental Site Investigation report on behalf of the Washington State Department of Ecology (Ecology) for the Washington State Department of Transportation (WA DOT) Signals Maintenance Property located at 3700 9th Avenue South in Seattle, Washington (Property). Supplemental site investigations were performed to 1) understand current environmental site conditions, 2) develop adequate information to rank the Property using Ecology's Site Hazard Assessment (SHA) process, and 3) ultimately evaluate whether the Property may pose a contributing source of contaminants to the Lower Duwamish Waterway (LDW). This report summarizes the results of both historical environmental activities and current supplemental activities conducted at on-property portions of the site to characterize the current environmental conditions and evaluate whether they may contribute to contamination in the LDW. Off-property assessment was not performed as part of this investigation.

In January and February 1991, petroleum-impacted soil was encountered during upgrading of the diesel and gasoline underground storage tanks (USTs) and the fuel island at the Property. The site was then reported to Ecology and placed on the Leaking Underground Storage Tank (LUST) list. The release was suspected to have been due to leaking gaskets, overfills, and a piping leak near the dispenser. The USTs included two (2) 5,000-gallon gasoline tanks and one (1) 5,000-gallon diesel tank. Approximately 250 cubic yards of soil were excavated and stockpiled at the Property prior to offsite disposal and confirmation soil samples were collected for analysis of oil and grease. Concentrations of oil were detected up to 770 milligrams per kilogram (mg/kg), which is below the current Model Toxics Control Act (MTCA) Method A cleanup level. The tanks were upgraded and left in-place and the petroleum-impacted soil was removed for disposal.

In 2015, the three USTs were decommissioned and removed, along with the associated piping and fueling pump island. During decommissioning, petroleum-impacted soil was observed in the excavation. The release was expected to have been from the tank piping. Approximately 562 tons of impacted soil was excavated and removed from the Property, and five confirmation soil samples were collected from the excavation limits. Low levels of petroleum hydrocarbon constituents were detected in confirmation soil samples, all at concentrations less than applicable MTCA Method A or B cleanup levels. Based on an Ecology Environmental Report Tracking System (ERTS) report (No. 657540), residual soil impacts may have been left beneath utilities on the southern side of the Property. No additional remedial actions were performed by WA DOT at the time.

In 2017, a Supplemental Site Investigation was conducted on behalf of Ecology to assess current Property conditions and provide information for SHA scoring. Four soil borings were advanced and one temporary groundwater monitoring well was installed for reconnaissance groundwater sample collection. Attempts made to advance additional borings encountered subsurface refusal. Selected soil samples and a reconnaissance groundwater sample were submitted for chemical analysis of petroleum hydrocarbons (including fuel additives) and metals. Based on the soil and groundwater analytical results, low levels of petroleum hydrocarbons are present; however, no petroleum hydrocarbons or related compounds were reported above MTCA cleanup levels (CULs) for unrestricted land use (soil) and groundwater. Based on the results of the Supplemental Site Investigations, residual hydrocarbon impacts were not encountered in soil or groundwater at the Property at concentrations exceeding CULs.

Because the Site appears to meet the provisions of Model Remedy 1 in Ecology's Draft *Model Remedies for Sites with Petroleum Impacts to Groundwater* guidance document (Ecology 2017), it is recommended the Site be considered for No Further Action.

Section 1: Introduction

Kennedy/Jenks Consultants has prepared this Supplemental Site Investigation report on behalf of the Washington State Department of Ecology (Ecology) for the Washington State Department of Transportation (WA DOT or WSDOT) Signals Maintenance site located at 3700 9th Avenue South in Seattle, Washington (Property). Supplemental Site Investigations were performed to 1) understand current environmental conditions, 2) develop adequate information to rank the Property using Ecology's Site Hazard Assessment (SHA) process, and 3) ultimately evaluate whether the Property may pose a contributing source of contaminants to the Lower Duwamish Waterway (LDW).

This report summarizes the results of both historical environmental activities and current supplemental activities conducted at on-property portions of the site to characterize the current environmental conditions and evaluate whether they may contribute to contamination in the LDW. Off-property assessment of impacts resulting from the site were not performed as part of this investigation. [Note: Per Washington State Administrative Code (WAC) 173-340-200, the term site is defined as where a hazardous substance has come to be located.]

1.1 General Site Information

The Property has been assigned the following Cleanup Identifications by Ecology:

- Ecology Site Name: WA DOT Signals Maintenance Site
- Facility Site Identification Number (FSID): 60549963
- Cleanup Site Identification Number (CSID): 9862
- UST Site ID Number: 12240
- LUST ID Number: 707
- Historical Release ID: 1966

The Property is located at 3700 9th Avenue South, along the eastern side of 9th Avenue South, just south of the West Seattle Bridge. Interstate 5 is located to the east of the Property (see Figure 1). The former underground storage tanks (USTs) and pump island were located to the south of the 1.9-acre parcel associated with the Property address (see Figure 2).

According to the *Underground Storage Tank Removal and Site Characterization Report* (UST Removal Report) [WSDOT 2015], the Property was associated with the Transportation Equipment Fund (TEF) Fueling Site at the Northwest (NW) Region Signal Maintenance Facility. A copy of the UST Removal Report is included in Appendix A. Several names have been used to identify the site, including:

- "Signals DOT Facility" and "WDOT-Signals Maintenance" were used in Ecology's records of the 1991 release (WSDOT 1991).

- "WA DOT Signals Branch 7HDQ Site" was used in Ecology's *Re: Status Update Letter* sent to the Property Owner at the Site address (i.e., WA DOT) regarding Reported Cleaned Up (RCU) sites (Ecology 2013).

- "WA DOT Signals Maintenance" was used in a letter from Ecology to WA DOT titled *Site Hazard Assessment – WA DOT Signals Maintenance Ecology FS ID: 60549963 / CS ID: 9862* (Ecology 2014) and in the *Site Hazard Assessment Report* dated 21 August 2015 (Ecology 2015).

- "Washington State Department of Transportation (WSDOT) Northwest Region Headquarters Signals Fuel Branch 7HDQ Site" was used in the UST Removal Report (WSDOT 2015).

- The UST Removal Report also referred to the Site as "WSDOT Signal Fuels Site - TEF" and as "WSDOT TEF Fueling Facility" (WSDOT 2015).

Throughout the reviewed background documents, various acronyms including the Washington DOT, WA DOT, and WSDOT are used to indicate the Washington State Department of Transportation. For the purposes of this Supplemental Site Investigation Report, WA DOT Signals Maintenance site is used when referencing the Property.

The Property is located in the SW ¼ of Section 17, Township 24 North, Range 4 East, on tax parcel 567950-0270. The legal description of the parcel is as follows:

> **MOSS J J 1ST ADD TO S SEATTLE BLK 35 & POR VAC STS & ALLEY, PLAT BLOCK 35.**

The Property and surrounding area to the north, west, and south is zoned for industrial use (zoning code IG2 U/85). To the east of the Property, east of Interstate 5 (I-5), land is zoned for residential use. The Property is located approximately 6,200 feet to the east of the LDW. Adjacent properties include another parcel owned and operated by WA DOT to the south, a plumbing company to the west, and a warehouse to the southwest.

Water and sewer for the Property is supplied by the municipal district. According to Ecology's water resources map, there are no known water supply wells in proximity to the Property.

The contact information for this report is as follows:

<u>Project Consultant:</u>	<u>Property/Facility Owner:</u>	<u>Ecology Project Manager:</u>
	WSDOT (WA DOT)	
Kennedy/Jenks Consultants	Attn: Norm Payton	Department of Ecology
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Federal Way, WA 98001	Seattle, WA 98134	Bellevue, WA 98008
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1.2 Property History

The Property is currently used as a WSDOT Signal Maintenance Facility. The Property was formerly used as a refueling station for WSDOT transportation vehicles. The former USTs fueling pump island were located in the southeastern side of the Property behind the main facility building, between I-5 and 9th Avenue South.

A Title Search was performed in 2017 by Chicago Title Search Company of Seattle, Washington, and a table summary of the results is presented in Appendix B. On 12 March 1947, multiple individuals with the ‘Houlahan’ last name granted ownership of the Property to the Houlahan Realty Company. On 28 August 1958, ownership was granted to the Builders Brick Company. On 29 October 1964, the State of Washington acquired ownership of the Property from the Builders Brick Company.

A Certified Sanborn® Map Report was obtained from Environmental Data Resources, Inc. (EDR) in March 2017 for the Property address. Sanborn maps were available for the following years: 1893, 1904, 1917, 1929, 1949, 1950, and 1967. The Sanborn Map Report is included in Appendix B. The 1904 map indicates that the area in the vicinity of the USTs, along the western portion of the Property address, was used as a brick yard called “Hoolihan’s Brick Yard”. The 1917 map indicates expansion of the brick yard to the north and that the business name had changed to “Builders Brick Co.” at some point between 1904 and 1917. As shown on the 1967 Sanborn map, the footprint of the business remained approximately the same into 1967. However, a note on the 1967 Sanborn map indicates that the buildings associated with the Builders Brick Co. (located in block number 746) had been demolished for a “Highway Site”. Maps presenting a series of historical photographs of the Property location are also included in Appendix B. As shown in the 1965 and 1970 aerial photographs (Figures B-2 and B-3 in Appendix B), the buildings associated with the Builders Brick Company were still present in 1965 but not in 1970.

Available information regarding the Property and past releases was summarized in correspondence between WA DOT and Ecology in 1991 following discovery of contaminated soil during UST and fueling island upgrades in 1991, and in the UST Removal Report (WA DOT 2016) documenting the decommissioning and closure of the three tanks performed in June 2015. Based on information contained in these reports and the Ecology UST Site / Tank Status Summary (dated 10 August 2010), the following three USTs (that were no longer in service) were removed from the Property in June 2015:

- Tank Name 66A02007 (site name UST1-Gx) – a 5,000-gallon steel single-walled UST used for storage of unleaded gasoline,
- Tank Name 66A02008 (site name UST3-Gx) – a 5,000-gallon steel single-walled UST used for storage of unleaded gasoline.
- Tank Name 66A02009 (site name UST2-Dx) – a 5,000-gallon steel single-walled UST used for storage of diesel fuel.

WA DOT (2015) reported that each of the three USTs were 5,000-gallon steel double-walled tanks, while the Ecology UST summary sheet identified each tank as single-walled. All three tanks were installed on 1 May 1983.

The approximate locations of the former USTs are shown on Figure 2. Petroleum hydrocarbon-impacted soil was discovered during the tank removal process (see Section 2). It is unknown when or how much fuel product was historically released to the surrounding soil from these three USTs.

Ecology requested additional soil and groundwater sampling be conducted in the vicinity of the former USTs to assess current conditions at the Property. This work was performed in 2017.

1.3 Current Property Use

The Property is currently a WA DOT Signal Maintenance Facility. Two buildings are present on the Property, both of which are used as office space for WA DOT staff. A parking area to the east of the building, partially located beneath I-5, is used for staging and parking of WA DOT signals maintenance trucks. The parking lot to the west of the building is used for employee and visitor parking. Access to the eastern parking lot is through a locked gate. A hazardous materials storage shed is also present within the eastern parking area.

Section 2: Previous Property Investigations

2.1 1991 Fuel USTs Upgrades

On 31 January 1991, WA DOT and its contractor Stokes Construction, Inc. of Seattle, Washington, began fuel tank and fuel island upgrades, including installation of overfill/spill prevention devices on all three USTs and replacing all fuel piping from the USTs to the fuel island. On 4 February 1991, petroleum-impacted soil was encountered while excavating soil to expose the tops of the fuel tanks. The contamination reportedly resulted from leaking gaskets at tank access manholes, overfills, and a pipe leak at a dispenser (WSDOT 1991).

Approximately 75 cubic yards of soil was excavated from around the tops and sides of the tanks but the tanks were left in place. Additional soil excavation was performed on 5 and 6 February 1991. Some suspected petroleum-impacted soil was reportedly not removed as the USTs were still present. Excavated soil was stockpiled directly on the asphalt pavement surface without berms and with straw bales placed along the low side of the stockpile. Ecology reportedly informed WA DOT that the excavated soil should be stockpiled on Visqueen with a berm to prevent runoff, and noted that soils need to be covered to protect against rainfall.

Five soil samples were collected from the excavation pit on 6 February 1991 and submitted to Laucks Testing Laboratories, Inc. of Seattle, Washington, for analysis of total petroleum hydrocarbons (TPH) Oil and Grease. The analytical method was not reported on the laboratory result form. Ecology noted that none of the soil samples were analyzed for gasoline range organics or for benzene, toluene, ethylbenzene, and total xylenes (BTEX) constituents, even though contamination had been observed in the vicinity of the gasoline USTs. Two soil samples were collected from the northern face of the excavation at depths of 7 feet (SIG-100) and 6 feet (SIG-101), one sample (SIG-102) was collected from below the fuel island, one sample (SIG-103) from the southern side of the excavation at a depth of 5 feet, and one composite sample (SIG-104) from various points on both sides of the contaminated stockpile. A concentration of 102 parts per million (ppm) was reported for sample SIG-102, collected beneath the fuel island, and a concentration of 770 ppm TPH was reported for the composite sample (SIG-104). TPH was not detected (reporting limit of 20 ppm TPH) in samples from SIG-100, SIG-101, and SIG-103. Soil sample results are summarized in Table 1.

Approximately 250 cubic yards of stockpiled soil was reportedly removed from the Property by Stowe Trucking on 5 March 1991 and hauled for future landfarming to a WA DOT Property known as Totem Lake.

Water was observed within the excavation, reportedly with sheen in some areas (Ecology 1991). Ecology informed WA DOT that the limits of soil contamination needed to be defined and that monitoring wells would need to be installed to determine whether groundwater had been impacted. WA DOT reportedly indicated that they would defer remediation of the remaining contamination when the USTs were removed the USTs in 3 years (Ecology 1991). [Note: The USTs were not removed until 2015.] On 25 August 2000, the Property was reported as cleaned up (RCU) as the soil conditions would have met Model Toxics Control Act (MTCA) Method B cleanup levels (CULs).

2.2 2015 USTs Decommissioning and Closure

In June 2015, the three USTs at the Property were decommissioned and removed, along with the associated piping and fueling pump island. During decommissioning, petroleum hydrocarbon-impacted soil was observed in the excavation around and underneath the USTs. The release was expected to have been from the fuel piping that lead from the fueling pump island to the USTs. Visual evidence of petroleum impacted soil was observed at depths between 2.5 and 8.5 feet below ground surface (bgs) beneath the pump island, and approximately 11.5 to 12.5 feet bgs below the former USTs. WA DOT reported a confirmed leaking UST (LUST) at the Property to Ecology, and Ecology issued an Environmental Report Tracking System (ERTS, No. 657540) for the confirmed release.

According to the WA DOT UST Removal Report, the three USTs appeared to be in “excellent condition” with no visible holes or evidence of compromised structural integrity. A total of approximately 400 gallons of product, sludge, water, and rinsate was pumped from the three USTs. The USTs were inerted and triple rinsed, and subsequently cleared by the King County Fire Marshal for removal. The USTs were transported offsite by Marine Vacuum Services Inc. to their facility for disposal (WSDOT 2015).

Approximately 562 tons of impacted soil were excavated and removed from the Property and hauled to Waste Management, located at 70 South Alaska Street, Seattle, Washington, for disposal. Five discrete grab confirmation soil samples were collected from the excavation limits (see Figure 3). One sample (SFS-B1) was collected from the base of the UST excavation at approximately 12 to 13 feet bgs between the concrete anchoring slabs of UST2-Dx (diesel) and UST3-Gx (gasoline). One sidewall sample was collected from each sidewall of the excavation (SFS-N, SFS-E, SFS-S, and SFS-W), at depths of approximately 12 feet bgs, except SFS-E which was collected at approximately 10 feet bgs. Three stockpile soil samples (SFS-SP1, SFS-SP2, and SFS-SP3) were also collected for waste disposal profiling.

The five confirmation soil samples and three stockpile soil samples were analyzed by OnSite Environmental Inc., in Redmond, Washington, for the following analyses: Ecology Northwest Total Petroleum Hydrocarbons-Gasoline Extended (NWTPH-Gx); NWTPH-Diesel Extended (NWTPH-Dx); volatile organic compounds (VOCs) by U.S. Environmental Protection Agency (EPA) Method 8260B; semivolatile organic compounds (SVOCs) by EPA Method 8270; Resource Conservation and Recovery Act (RCRA) 8 Metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver); and polychlorinated biphenyls (PCBs) using EPA Method 8082.

Confirmation and stockpile soil sample analytical results are summarized in Table 2.

Confirmation soil sample results indicate the following:

- Diesel-range organics (DRO) were detected in two confirmation samples (SFS-B1 and SFS-S) and oil-range organics (ORO) were detected in one confirmation sample (SFS-W), all at concentrations below the MTCA Method A CULs.

- Benzene, toluene, and xylenes were detected in one sample (SFS-B1) at concentrations below respective MTCA Method A CULs. Several other VOCs and SVOCs were also detected in one or more of the confirmation soil samples, with all reported concentrations below respective applicable MTCA CULs.

- PCBs were not detected in any of the confirmation soil samples.

- Barium and chromium were detected in each of the five confirmation soil samples at concentrations below respective MTCA CULs. Lead was detected in two of the five soil samples at concentrations below its MTCA CULs.

Stockpile soil sample results indicate the following:

- DRO were detected in all three stockpile samples at concentrations above the MTCA Method A cleanup level of 2,000 milligrams per kilogram (mg/kg). ORO were detected above the MTCA Method A cleanup level of 2,000 mg/kg in one stockpile sample.

- Ethylbenzene and xylenes were detected in one sample (SFS-SP1) at concentrations below respective MTCA Method A CULs. Several other VOCs and SVOCs were also detected in one or more of the stockpile soil samples, with all reported concentrations below respective applicable MTCA CULs.

- PCBs were not detected in any of the stockpile soil samples.

- Barium and chromium were detected in each of the three stockpile soil samples at concentrations below respective MTCA CULs.

Groundwater was observed infiltrating from the bottom of the excavation at depths from 8.5 feet bgs to 12-13 feet bgs. Approximately 400 gallons of suspected contaminated water were reportedly pumped from the bottom of the excavation.

The ERTS report for the 2015 release notes that there are utilities in the area, and that not all of the soil along the southern side of the excavation was able to be removed. However, the WSDOT UST Removal Report (2015) does not mention residual impacted soil at the Property, and the confirmation soil sample collected along the southern side of the excavation contained concentrations of diesel that were below the MTCA Method A cleanup level.

Section 3: February 2017 Supplemental Site Investigation

A Supplemental Site Investigation was performed in February 2017 by Kennedy/Jenks Consultants on behalf of Ecology to identify current Property conditions and the residual concentrations of petroleum hydrocarbons in soil and groundwater at the Property, if any, as a result of the former LUSTs and associated piping. Photographs showing Property features and sampling activities are presented in Appendix C.

Prior to the start of field activities, a combined Sampling and Analysis Plan and Quality Assurance Project Plan (SAP/QAPP) (Kennedy/Jenks Consultants 2017) was prepared which outlined the investigation objectives, field data collection protocols and procedures, and analytical and data reporting requirements. A site-specific SAP Addendum (Kennedy/Jenks Consultants 2017) was also prepared for the WA DOT Signals Maintenance site. The SAP/QAPP and SAP Addendum are included in Appendix D.

3.1 Objectives

Specific objectives of this investigation are as follows:

- Investigate residual concentrations of contaminants of concern (COCs), if any, in Property soil in proximity to the former LUSTs and fueling pump island.

- Investigate whether groundwater is currently impacted with COCs released from the former LUSTs and associated piping.

- If appropriate, document the absence of COCs above their current MTCA Method A CULs that may lead to a No Further Action (NFA) determination under Ecology's *Model Remedies for Sites with Petroleum Contaminated Soils* (Ecology 2016).

- Characterize the physical site properties to develop a preliminary conceptual site model if COCs are identified in soil and/or groundwater above the current applicable MTCA Method A CULs.

3.2 Field Activities

Up to 12 potential soil boring locations were pre-selected in the SAP Addendum. At each of these locations, depending on field conditions, soil borings would be advanced for soil sample collection with the potential for installation of temporary monitoring wells for reconnaissance groundwater sample collection. Boring locations were selected to provide information on potential impacts near the historical sources (LUSTs), as well as the extent to which COCs may have migrated at the Property.

Prior to performing invasive field activities, the following underground utility clearance activities were performed to clear the proposed boring and groundwater monitoring well locations:

- Reviewed utility information provided by the Property owner and available online.

- Requested a One-Call utility locate to identify public utilities (Ticket #17022306).
- Conducted a private utility survey using surface detection methods.
- Advanced the upper 5 feet of soil boring using air-knife techniques to assess possible underground utilities.

During the initial Property visit on 22 December 2016, an assessment of the former UST area was conducted to identify evidence of the former UST and fueling island removals. The former UST area was identified by area of fresh asphalt pavement installed after the USTs and fueling island had been removed.

3.2.1 Direct-Push Soil Borings

Holt Services, Inc. of Edgewood, Washington, was subcontracted to advance the soil borings and collect reconnaissance groundwater samples on 17 February 2017. Borings were advanced to total depths of 10 feet bgs (B-01), 15 feet bgs (B-02 and B-08), and 17.5 feet bgs (B-03) using direct-push drilling techniques. Based on field conditions and multiple shallow obstructions encountered during advancing the probes, only of four borings (B-01, B-02, B-03, and B-08) could be advanced at the Property (see Figure 2). Air-knifing was attempted at other locations but was unsuccessful in achieving the target depth of at least 5 feet bgs due to subsurface obstructions encountered.

Groundwater was encountered at boring location B-03 at a depth of 5 feet bgs. As part of the assessment activities, boring location B-03 was completed as a temporary groundwater monitoring well in order to collect a reconnaissance groundwater sample.

Continuous soil cores were field screened to assist in selection of soil samples for chemical analyses. Field screening included using a photoionization detector (PID) to monitor organic vapors (if any), conducting a field sheen test, and documenting visual (staining) and olfactory (odor) indicators of petroleum hydrocarbon impacts, as recorded on the soil boring logs. Copies of the Boring Logs are included in Appendix E. Sheens, staining, or petroleum-like odors or other indications of residual petroleum impacts were not observed in any of the borings.

Soil and groundwater samples selected for chemical analysis were placed in laboratory-supplied sample containers, labeled, and packaged in a cooler with enough ice to maintain the sample temperature at approximately 4 degrees Celsius (^{o}C) ± 2 ^{o}C for the duration of sample storage and shipment to the analytical laboratory. Sampling personnel documented each sample number/location, the date and time of collection, and required analyses on the chain-of-custody form and submitted the samples to ESC Lab Sciences of Mount Juliet, Tennessee (ESC), for one or more of the following analyses in accordance with the SAP Addendum (Appendix D):

- TPH using NWTPH Methods NWTPH-Gx and NWTPH-Dx. NWTPH-Dx was performed without silica gel cleanup (SGC) preparation.
- BTEX using EPA Method 8260.
- VOCs using EPA Method 8260.

- SVOCs using EPA Method 8270 with selective ion monitoring (SIM).
- RCRA 8 metals using EPA Methods 6010 and 7471 (mercury).

Soil samples collected from borings B-01 (B-01 5-6), B-02 (B-02 5-6), and B-03 (B-3 5-6 and B-3 6-7) were analyzed for NWTPH-Gx, NWTPH-Dx, and BTEX only. Soil sample B-08-5-7 and a field duplicate sample (DUP-1) were analyzed by NWTPH-Gx, NWTPH-Dx, VOCs, SVOCs, and RCRA 8 metals.

One reconnaissance (grab) groundwater sample was collected from boring location B-03. A temporary well was constructed using ¾-inch schedule 40 polyvinyl chloride (PVC) with 5 feet of screen. A reconnaissance groundwater sample was collected using a peristaltic pump and new tubing. The temporary well was purged briefly prior to collection of the reconnaissance groundwater sample. The reconnaissance groundwater sample was collected in laboratory-supplied sample containers for the intended analyses and handled as described above. The reconnaissance groundwater sample and a laboratory-prepared trip blank sample were shipped under chain-of-custody protocol to ESC for the following analyses in accordance with the SAP Addendum (Appendix D):

- TPH using NWTPH Methods NWTPH-Gx and NWTPH-Dx (without SGC).
- BTEX using EPA Method 8260.
- VOCs including fuel additives using EPA Method 8260.
- SVOCs using EPA Method 8270-SIM.
- Total and dissolved RCRA 8 metals using EPA Methods 6010 and 7470 (mercury).

Dissolved metals samples were filtered by the analytical laboratory. Laboratory analytical reports are included in Appendix F and data validation reports are included in Appendix G.

3.2.2 Investigation-Derived Waste

Investigation-derived waste (IDW) generated during the characterization activities included soil cuttings, equipment decontamination water, temporary well development water, purge water, and other non-indigenous waste. Soil and water IDW were contained onsite in two labeled 55-gallon steel drums (one soil, one water) pending profiling and disposal. Soil and groundwater analytical data were provided to Cascade – IDW of Woodinville, Washington, to obtain a waste profile for disposal at an appropriately permitted offsite non-hazardous waste disposal facility. The IDW drums were removed from the Property on 1 June 2017 for offsite disposal. Documents pertaining to management of IDW drums are included in Appendix H.

3.3 Property Geology/Hydrogeology

3.3.1 Property Geology

The Property is located near the Duwamish River floodplain. The Property and surrounding area are underlain by unconsolidated Holocene-age soils overlying Quaternary-age glacial deposits.

The Holocene soils are present to a depth of up to approximately 200 feet bgs and include fill material, estuarine silt and clay, and alluvial and beach-deposited sand and silt. The underlying Quaternary glacial deposits consists of till and glaciolacustrine silt and clay (WSDOT 2015). The surficial geology of the Property has likely been modified as a result of anthropogenic activities such as buildings, UST backfill (disturbed soil), and re-pavement of the parking areas of the Property.

3.3.2 Property Soils

Boring logs from the investigation indicate soils consist primarily of sand and gravel mixture to 5 feet bgs, with sandy silt with gravel from approximately 5 to 17.5 feet bgs, occasionally with silty clay inclusions. Additional information regarding Property soils is provided in the Boring Logs included in Appendix E. An interpretive geologic cross section based on the 2017 soil borings is presented on Figure 4.

3.3.3 Property Hydrogeology

This section describes the shallow groundwater conditions encountered at the Site from the 1991 soil excavation, 2015 UST decommissioning, and the 2017 investigation. During the 1991 tank and piping upgrades, groundwater was reportedly observed in the excavation; however, the depth was not reported. During the UST removals in 2015, groundwater was observed at depths ranging from 8.5 to up to 13 feet bgs in the excavation pit.

During performance of the investigation activities in 2017, groundwater was encountered at a depth of approximately 5 feet bgs in boring location B-03 (see Appendix E). A static water level was not measured in the temporary well. No permanent groundwater monitoring wells were installed at the Property. Because of the shallow depth to groundwater in relation to nearby storm drains and catch basin depths, it is possible that groundwater could infiltrate to the stormwater conveyance system at times of seasonal high groundwater elevation and be conveyed off-property to surface water.

The nearest surface water body to the Property is the LDW, which is located approximately 6,200 feet to the west of the Property. Shallow groundwater flow in the vicinity of the Property is assumed to be generally towards the west, in the direction of the LDW.

3.4 Sampling/Analytical Results

Soil and groundwater sample analytical results from the 2017 investigation are summarized in Tables 3 and 4, respectively. Soil sample analytical results are reported on a dry-weight basis, and results for DRO and ORO are reported without silica-gel cleanup methods applied.

3.4.1 Analytical Results

Soil and groundwater sample analytical results are summarized in Tables 3 and 4, respectively, and depicted on Figures 5 and 6, respectively. The analytical data tables include the current (2013) MTCA CULs.

3.4.1.1 Soil

GRO, DRO, ORO, BTEX constituents, VOCs, and SVOCs were not detected in any of the February 2017 soil samples (Table 3).

Total arsenic, barium, chromium, lead, and mercury were detected in the soil sample collected from boring location B-08, at a depth interval of 5 to 7 feet bgs. Detected concentrations of the metals were below applicable current MTCA Method A CULs for unrestricted land use (arsenic, lead and mercury) or MTCA Method B Non-Cancer CULs (barium).

3.4.1.2 Groundwater

A reconnaissance (grab) groundwater sample was collected from the temporary well construction in borehole B-03 in February 2017. Laboratory analytical results for the sample are summarized in Table 4.

Gasoline-range organics (GRO) were reported in the reconnaissance groundwater sample collected from boring B-03 at an estimated (J qualified) concentration of 75.2 J micrograms per liter (µg/L), which is below the MTCA Method A CUL for groundwater of 1,000 µg/L (without benzene present). DRO and ORO were reported in the sample at estimated concentrations of 125 J µg/L and 211 J µg/L, respectively, below the MTCA Method A CULs for DRO and ORO in groundwater of 500 µg/L.

BTEX and VOCs were not detected in the groundwater sample. Four SVOCs, including 1-methylnaphthalene, 2-methylnaphthalene, fluorene, and phenanthrene, were each detected in the groundwater sample; all reported concentrations were less than applicable MTCA Method B Cancer (1-methylnaphthalene) and Non-Cancer (2-methylnaphthalene and fluorene) CULs. There is no current MTCA CUL for phenanthrene in groundwater.

Total arsenic, cadmium, chromium, and lead were reported at concentrations above the MTCA Method A CULs for each metal. [Note: Reconnaissance groundwater samples contain high concentrations of suspended solids which commonly result in biased (high) total metals concentrations. Therefore, these results are not be appropriate for making regulatory decisions.] Dissolved arsenic, cadmium, chromium, and lead were not detected above the respective laboratory reporting limits for each metal. Dissolved and total barium were reported at concentrations of 22.0 µg/L and 2,650 µg/L, respectively; however, both results were less than the MTCA Method B Non Cancer CUL of 3,200 µg/L for barium.

3.5 Quality Analyses

A SAP/QAPP dated 9 February 2017 was prepared for LDW investigation and a specific SAP Addendum was prepared for the WA DOT Signals Maintenance Site (Appendix D). The appropriate field and laboratory quality control measures, analytical procedures, data management protocols, and laboratory report validation described in the QAPP were followed during the investigation activities. All samples selected for potential laboratory analysis were submitted, under chain-of-custody procedures, to ESC. Overall, the findings of our data validations indicate the analytical data are appropriate for their intended use. The data validation documentation is provided in Appendix G.

3.6 Terrestrial Ecological Evaluation

The primary purpose of a Terrestrial Ecological Evaluation (TEE) is to evaluate whether a release of hazardous chemicals may cause potential adverse effects to terrestrial ecological receptors. A TEE was conducted for the Property, in accordance with regulations published in WAC 173-340-7490 through 173-340-7494.

The first step in the TEE process evaluates whether the Property qualifies for a primary exclusion under WAC 173-340-7941. If the Property does not qualify for a primary exclusion, the next steps in the tiered approach are used to evaluate whether the Property qualifies for a simplified TEE under WAC 173-340-7942 or requires additional evaluation and a site-specific TEE under WAC 173-240-7943.

3.6.1 TEE Exclusion

The Property was evaluated for the potential to pose a threat to terrestrial ecological receptors. To qualify for exclusion from a TEE, the Property must meet one of the four criteria below as described in WAC 173-340-7491:

1. **Point of Compliance.** 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.

2. **Barriers to Exposure.** 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. (Note: To rely on this criterion, a deed restriction may be required.)

3. **Undeveloped Land.** There is less than 1.5 acres of contiguous undeveloped land on or within 500 feet of any area of the site.

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

Based on an evaluation of the site information and current and historical analytical data, the following four conclusions are made regarding each criterion:

1. **Point of Compliance.** During various phases of investigation in 2015 and 2017, petroleum hydrocarbon-impacted soil has not been observed within 6 feet of the ground surface at concentrations above MTCA Method A or B cleanup levels. During the 2015 UST removal, all reported concentrations of petroleum hydrocarbons and related compounds were below MTCA Method A or B cleanup levels. No TPH, BTEX, VOCs, or SVOCs were detected in the 2017 investigation soil samples. Readily identifiable indications of significant hydrocarbon impacts were not identified or noted in the boring logs during the 2017 investigation, either based on PID readings or based on physical evidence (odors or sheen tests). Therefore, it is expected that soil in the upper 6 feet of soil is not impacted.

2. **Barriers to Exposure.** The majority of the Property is covered by asphalt pavement, including the area of the former USTs and fueling pump island, and slab-on-grade buildings that prevent exposure to plants and wildlife. A plant bed area, approximately 0.1 acre in size, is located immediately to the northwest of the former USTs location (Figure 2). Given that petroleum hydrocarbon-impacted soil was not observed within the upper 6 feet of soil in the former USTs location, it is expected that the soil in this plant bed area would also not be impacted, and therefore, potential exposure to plants and wildlife by impacted soil would be unlikely.

3. **Undeveloped Land.** There are approximately 0.9 acre of undeveloped land located approximately 100 feet to the south of the former USTs and approximately 2 to 3 acres of undeveloped land located within 500 feet of the site to the east of I-5. This combined area is more than the criteria of 1.5 acres or more within 500 feet of any part of the Property. Therefore, the Undeveloped Land criterion is not met.

4. **Background Concentrations.** Since petroleum hydrocarbons have been detected in soil and groundwater samples collected at the Property, the Background Concentrations criterion has not been met.

Based on this analysis, the Property could qualify for an exclusion from a TEE based on meeting criteria 1 for Point of Compliance. It is also expected that the Property should qualify for an exclusion from a TEE based on meeting criteria 2 for Barriers to Exposure (which may require an institutional control to maintain the asphalt cover into the future). However, ultimate approval for a TEE exemption must come from Ecology.

Section 4: Preliminary Conceptual Site Model

A preliminary conceptual site exposure model (PCSM) was developed for the Property based on analytical results of soil and groundwater samples collected during the 2017 Supplemental Site Investigation, and the current understanding of Property geology and hydrogeology. The PCSM is presented on Figure 7.

Historical release(s) of petroleum hydrocarbons, potentially gasoline and/or diesel fuel, reportedly resulted from leaking gaskets at UST access manholes, overfills, and a piping leak at a dispenser. The dates, volumes, and mechanisms of the petroleum hydrocarbon release(s) are unknown. Previous soil excavation and removal actions in 1991 and 2015, along with decommissioning and removal of the three USTs, fuel system piping, and fuel pumping island, in 2015, have resulted in removal of source material, as evidenced by low level reported concentrations below MTCA CULs of petroleum hydrocarbons, VOCs and SVOCs in excavation confirmation soil samples, as well as no reported detected concentrations of petroleum hydrocarbons in the 2017 investigation soil samples.

Because the Property is entirely paved, runoff is not a transport mechanism for soil contaminants. The downward migration of subsurface soil contaminants (i.e., petroleum hydrocarbons) towards groundwater, leaching to groundwater, and/or volatilization were the primary potential transport mechanisms for subsurface soil contaminants in the past, but are now substantially mitigated by the presence of low permeability cover over the Property. Once transported to groundwater, soluble contaminants (if any) could be transported by advection, diffusion, and partitioning into soil gas (i.e., volatilization).

The groundwater pathway is not expected to be complete for nearby residents, businesses, or onsite workers due to the low concentrations of COCs and lack of an exposure mechanism. According to Ecology Water Resources Explorer, no wells within a 1-mile radius of the Property are used for drinking water or irrigation.

Construction workers at the Property who are involved with excavation deeper than 6 feet bgs may come into incidental contact with soil and groundwater. However, there were no reported concentrations for petroleum hydrocarbons, VOCs, and SVOCs in soil and groundwater samples collected in 2015 and/or 2017 were above applicable MTCA CULs. Total arsenic, cadmium, chromium, and lead were reported at concentrations above the MTCA Method A CULs for each metal; however, reconnaissance groundwater samples typically contain high concentrations of suspended solids which commonly result in biased high total metals concentrations. Dissolved arsenic, cadmium, chromium, and lead were not detected above the respective laboratory reporting limits for each metal. This exposure pathway is considered incomplete.

No reported concentrations for BTEX or other VOCs were above MTCA CULs in soil and groundwater samples collected at the Property. Therefore, exposure through the inhalation of soil pathway is not expected to be complete for potential onsite or offsite receptors.

Section 5: Proposed Cleanup Standards

The proposed cleanup standards have been selected based on the current and potential future use of the. This Property is located within the City of Seattle and has the potential for exposing onsite workers, pedestrians/residents, soil biota, plants, and animals that have access to the Property. The proposed CULs for soil and groundwater include:

- Soil - MTCA Method A CUL for unrestricted land use. If a Method A standard is not available then MTCA Method B CUL will be used.

- Groundwater – MTCA Method A CUL for groundwater. If a Method A standard is not available then MTCA Method B CUL will be used.

These standards are protective of direct contact human exposure and potable groundwater supplies. The proposed CULs are provided in the analytical data summary tables for each matrix (Tables 1, 2, and 3 for soil and Table 4 for groundwater).

Section 6: Summary, Conclusions, and Recommendations

6.1 Summary and Conclusions

Petroleum hydrocarbons and metals concentrations in soil and groundwater were below the applicable MTCA Method A or B CULs with the exception of total arsenic, cadmium, chromium, and lead in the reconnaissance groundwater sample collected. The exceedances of total arsenic, cadmium, chromium, and lead in the reconnaissance groundwater sample is not considered representative of actual groundwater conditions at the Property and is likely the result of soil particulates included in the sample, as dissolved arsenic, cadmium, chromium, and lead were not detected in the sample. Given that dissolved metals concentrations were either not detected or reported at concentrations less than applicable MTCA Method A or B CULs in the reconnaissance groundwater sample, metals impacts are not expected. Furthermore, the investigation findings indicate that while low levels of residual petroleum hydrocarbons (and associated compounds) are present, they are at concentrations below current MTCA Method A CULs. Consequently, detected COC concentrations are not expected to pose an adverse chemical risk to the identified potential receptors: site workers, construction workers, residents/pedestrians, nearby businesses, soil biota, plants, and animals.

6.2 Recommendations

An NFA decision is recommended based on the findings of the Supplemental Site Investigation. This Property meets the provisions of Model Remedy 1 in Ecology's Draft *Model Remedies for Sites with Petroleum Impacts to Groundwater* guidance document (Ecology 2017). These provisions include meeting the Method A CULs for groundwater and the Method A CULs for unrestricted land use throughout the Property. It is noted that the total arsenic, cadmium, chromium, and lead concentrations in reconnaissance groundwater samples were above the MTCA Method A CUL. The exceedances of the respective CULs by these metals are not believed to be representative of actual groundwater total metals concentrations due to the presence of suspended sediments resulting from high turbidity in the sample.

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Tables

TABLE 1

1991 UST SOIL EXCAVATION SAMPLE ANALYTICAL RESULTS
WA DOT Signals Maintenance Site
Seattle, Washington

		Sample ID	**SIG-100**	**SIG-101**	**SIG-102**	**SIG-103**	**SIG-104**
		Date Sampled	**2/6/1991**	**2/6/1991**	**2/6/1991**	**2/6/1991**	**2/6/1991**
		Sample Description	**Tank #1**	**Tank #2&3**	**Fuel Isl.**	**Tank #1&2**	**Stockpile, composite**
		Sample Depth (bgs)	**7 ft**	**6 ft**	**--**	**5 ft**	**--**
Chemical	**Units**	**MTCA A CUL**	**--**	**--**	**--**	**--**	**--**
TPH Oil & Grease	**mg/kg**	**2000**	< 20	< 20	**120**	< 20	**770**

###	Detected concentrations above the cleanup level are shaded yellow and bolded.
120	Detected concentrations are shown in bold.
< #.##	Non-detect values above the cleanup level are shaded gray and italicized.

Notes:

Sample depth not available for SIG-103.

Abbreviations and Symbols

" - -" denotes not measured, not available, or not applicable.

" < " denotes not detected at or above the indicated method reporting limit.

bgs = below ground surface

ft = feet

mg/kg = milligrams per kilogram

Cleanup Levels (CULs)

Cleanup level values based on Model Toxics Control Act (MTCA) Method A values for unrestricted land use (Method A) based on Washington State Administrative Code (WAC) 173-340-740 Table 740-1.

TABLE 2

2015 UST REMOVAL SOIL SAMPLE ANALYTICAL RESULTS
WA DOT Signals Maintenance Site
Seattle, Washington

Chemical	CAS Number	Units	TEF	MTCA Method A then B CUL		SFS-B1	SFS-E	SFS-N	SFS-W	SFS-S	SFS-SP1	SFS-SP2	SFS-SP3
					Date Collected	6/22/2015	6/23/2015	6/18/2015	6/18/2015	6/18/2015	6/17/2015	6/17/2015	6/17/2015
					Sample Type	Confirmation Soil	Confirmation Soil	Confirmation Soil	Confirmation Soil	Confirmation Soil	Stockpile	Stockpile	Stockpile
					Sample Depth (bgs)	12 ft	10 ft	12 ft	12 ft	12 ft	--	--	--
Total Petroleum Hydrocarbons													
Gasoline-Range Organics		mg/kg		30/100	Method A	< 5.7	< 5.1	< 4.6	< 6.4	< 9.6	< 9.4	< 8.7	< 6.5
Diesel-Range Organics		mg/kg		2000	Method A	**50**	< 30	< 31	< 30	**340**	**2700**	**4500**	**2600**
Oil-Range Organics		mg/kg		2000	Method A	< 82	< 60	< 62	**75**	< 57	< 150	**4900**	< 92
BTEX													
Benzene	71-43-2	mg/kg		0.03	Method A	**0.0025**	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	*< 0.038*	*< 0.087*
Toluene	108-88-3	mg/kg		7	Method A	**0.013**	< 0.0062	< 0.0034	< 0.0057	< 0.0043	< 0.0031	< 0.19	< 0.43
Ethylbenzene	100-41-4	mg/kg		6	Method A	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	**0.00077**	< 0.038	< 0.087
Xylene, m+p	108-38-3/ 106-42-3	mg/kg		9	Method A	**0.0024**	< 0.0025	< 0.0014	< 0.0023	< 0.0017	< 0.0013	< 0.038	**< 0.17**
Xylene, o	95-47-6	mg/kg		9	B Non Cancer	**0.0012**	< 0.0012	< 0.00069	< 0.0011	< 0.00086	**0.00086**	< 0.038	< 0.087
Volatile Organic Compounds													
1,1,1,2-Tetrachloroethane	630-20-6	mg/kg		38.5	B Cancer	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
1,1,1-Trichloroethane	71-55-6	mg/kg		2	Method A	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
1,1,2,2-Tetrachloroethane	79-34-5	mg/kg		5.00	B Cancer	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
1,1,2-Trichloroethane	79-00-5	mg/kg		17.5	B Cancer	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
1,1-Dichloroethane	75-34-3	mg/kg		175	B Cancer	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
1,1-Dichloroethene	75-35-4	mg/kg		4000	B Non Cancer	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
1,1-Dichloropropene	248-134-0	mg/kg				< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
1,2,3-Trichlorobenzene	87-61-6	mg/kg				< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.0063	< 0.038	< 0.087
1,2,3-Trichloropropane	96-18-4	mg/kg		0.0333	B Cancer	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	*< 0.038*	*< 0.087*
1,2,4-Trichlorobenzene	120-82-1	mg/kg		34.5	B Cancer	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
1,2,4-Trimethylbenzene	95-63-6	mg/kg				< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	**0.061**	< 0.087
1,2-Dibromo-3-Chloropropane (DBCP)	96-12-8	mg/kg		1.25	B Cancer	< 0.0048	< 0.0062	< 0.0034	< 0.0057	< 0.0043	< 0.0031	< 0.19	< 0.43
1,2-Dibromoethane (EDB)	106-93-4	mg/kg		0.005	Method A	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
1,2-Dichlorobenzene	95-50-1	mg/kg		7200	B Non Cancer	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
1,2-Dichloroethane (EDC)	107-06-2	mg/kg		11.0	B Cancer	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
1,2-Dichloropropane	78-87-5	mg/kg		27.8	B Cancer	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
1,3-Dichlorobenzene	541-73-1	mg/kg				< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
1,3-Dichloropropane	142-28-9	mg/kg				< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
1,4-Dichlorobenzene	106-37-6	mg/kg		800	B Non Cancer	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
2,2-Dichloropropane	5940-20-7	mg/kg				< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
2-Butanone	78-93-3	mg/kg		48000	B Non Cancer	< 0.0048	< 0.0062	< 0.0034	< 0.0057	< 0.0043	< 0.0031	< 0.19	< 0.43
2-Chloroethyl vinyl ether		mg/kg				< 0.0048	< 0.0062	< 0.0034	< 0.0057	< 0.0043	< 0.0031	< 0.19	< 0.43
2-Chlorotoluene	95-49-8	mg/kg		1600	B Non Cancer	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
2-Hexanone	591-78-6	mg/kg				< 0.0048	< 0.0062	< 0.0034	< 0.0057	< 0.0043	< 0.0031	< 0.19	< 0.43
4-Chlorotoluene	106-43-4	mg/kg				< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
Acetone	67-64-1	mg/kg		72000	B Non Cancer	< 0.0096	**0.02**	**0.0084**	**0.012**	< 0.0086	< 0.0063	< 0.38	< 0.87
Bromobenzene	108-86-1	mg/kg				< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
Bromochloromethane	74-97-5	mg/kg				< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
Bromodichloromethane	75-27-4	mg/kg		16.1	B Cancer	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
Bromoform	75-25-2	mg/kg		127	B Cancer	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
Bromomethane	74-83-9	mg/kg		112	B Non Cancer	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
Carbon Disulfide	75-15-0	mg/kg		8000	B Non Cancer	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	**0.00065**	< 0.038	< 0.087
Carbon Tetrachloride	56-23-5	mg/kg		14.3	B Cancer	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
Chlorobenzene	108-90-7	mg/kg		1600	B Non Cancer	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
Chloroethane	75-00-3	mg/kg				< 0.0048	< 0.0062	< 0.0034	< 0.0057	< 0.0043	< 0.0031	< 0.19	< 0.43
Chloroform	67-66-3	mg/kg		32.3	B Cancer	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
Chloromethane	74-87-3	mg/kg				< 0.0048	< 0.0062	< 0.0034	< 0.0057	< 0.0043	< 0.0031	< 0.19	< 0.43
cis-1,2-Dichloroethene	156-59-2	mg/kg		160	B Non Cancer	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
cis-1,3-Dichloropropene	10061-01-5	mg/kg		10.0	B Cancer	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.028	< 0.087
Dibromochloromethane	124-48-1	mg/kg		11.9	B Cancer	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
Dibromomethane	74-95-3	mg/kg		800	B Non Cancer	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
Dichlorodifluoromethane	75-71-8	mg/kg		16000	B Non Cancer	< 0.0013	< 0.0016	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
Hexachlorobutadiene	87-68-3	mg/kg		12.8	B Cancer	< 0.0048	< 0.0062	< 0.0034	< 0.0057	< 0.0043	< 0.0031	< 0.19	< 0.43
Iodomethane	74-88-4	mg/kg				< 0.0048	< 0.0062	< 0.0034	< 0.0057	< 0.0043	< 0.0031	< 0.19	< 0.43
Isopropylbenzene	98-82-8	mg/kg		8000	B Non Cancer	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	**0.032**	**0.12**	**0.44**
Methyl Isobutyl Ketone	108-10-1	mg/kg		6400	B Non Cancer	< 0.0048	< 0.0062	< 0.0034	< 0.0057	< 0.0043	< 0.0031	< 0.19	< 0.43
Methyl tert-butyl ether	1634-04-4	mg/kg		0.1	Method A	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
Methylene Chloride	75-09-2	mg/kg		0.02	Method A	< 0.0048	< 0.0062	< 0.0034	< 0.0057	< 0.0043	< 0.0031	*< 0.19*	*< 0.43*
Naphthalene	91-20-3	mg/kg		5	Method A	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.0063	**0.086**	< 0.087
n-Butylbenzene	104-51-8	mg/kg		4000	B Non Cancer	**0.0028**	< 0.0012	< 0.00069	< 0.0011	< 0.00086	**0.068**	**0.44**	**1.8**
n-Propylbenzene	103-65-1	mg/kg		8000	B Non Cancer	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	**0.084**	**0.26**	**1**
p-Isopropyltoluene	99-87-6	mg/kg				< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
sec-Butylbenzene	135-98-8	mg/kg		8000	B Non Cancer	**0.003**	< 0.0012	< 0.00069	< 0.0011	< 0.00086	**0.11**	**0.41**	**1.8**
Styrene	100-42-5	mg/kg		16000	B Non Cancer	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
tert-Butylbenzene	98-06-6	mg/kg		8000	B Non Cancer	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	**0.0021**	< 0.038	< 0.087
Tetrachloroethene	127-18-4	mg/kg		0.05	Method A	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	*< 0.087*
trans-1,2-Dichloroethene	156-60-5	mg/kg		1600	B Non Cancer	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
trans-1,3-Dichloropropene	10061-02-6	mg/kg		10.0	B Cancer	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
Trichloroethene	79-01-6	mg/kg		0.03	Method A	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	*< 0.038*	*< 0.087*
Trichlorofluoromethane	75-69-4	mg/kg		24000	B Non Cancer	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087
Vinyl Acetate	108-05-4	mg/kg		80000	B Non Cancer	< 0.0048	< 0.0062	< 0.0034	< 0.0057	< 0.0043	< 0.0031	< 0.19	< 0.43
Vinyl Chloride	75-01-4	mg/kg		0.670	B Cancer	< 0.00096	< 0.0012	< 0.00069	< 0.0011	< 0.00086	< 0.00063	< 0.038	< 0.087

2015 UST REMOVAL SOIL SAMPLE ANALYTICAL RESULTS
WA DOT Signals Maintenance Site
Seattle, Washington

Chemical	CAS Number	Units	TEF	MTCA Method A then B CUL	Sample ID	SFS-B1	SFS-E	SFS-N	SFS-W	SFS-S	SFS-SP1	SFS-SP2	SFS-SP3
					Date Collected	6/22/2015	6/23/2015	6/18/2015	6/18/2015	6/18/2015	6/17/2015	6/17/2015	6/17/2015
					Sample Type	Confirmation Soil	Confirmation Soil	Confirmation Soil	Confirmation Soil	Confirmation Soil	Stockpile	Stockpile	Stockpile
					Sample Depth (bgs)	12 ft	10 ft	12 ft	12 ft	12 ft	--	--	--
Semi Volatile Organic Compounds													
1,2,4-Trichlorobenzene	120-82-1	mg/kg		34.5	B Cancer	< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
1,2-Dichlorobenzene	95-50-1	mg/kg		7200	B Non Cancer	< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
1,2-Dinitrobenzene	528-29-0	mg/kg		8	B Non Cancer	< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
1,2-Diphenylhydrazine	122-66-7	mg/kg		1.25	B Cancer	< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
1,3-Dichlorobenzene	541-73-1	mg/kg				< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
1,3-Dinitrobenzene	99-65-0	mg/kg		8	B Non Cancer	< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
1,4-Dichlorobenzene	106-46-7	mg/kg		185	B Cancer	< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
1,4-Dinitrobenzene	100-25-4	mg/kg		8	B Non Cancer	< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
1-Methylnaphthalene	90-12-0	mg/kg		34.5	B Cancer	< 0.0083	< 0.0080	< 0.0083	**0.014**	< 0.0075	**0.43**	**2.8**	**1.8**
2,3,4,6-Tetrachlorophenol	58-90-2	mg/kg		2400	B Non Cancer	< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
2,3,5,6-Tetrachlorophenol		mg/kg				< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
2,3-Dichloroaniline	608-27-5	mg/kg				< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
2,4,5-Trichlorphenol	95-95-4	mg/kg		8000	B Non Cancer	< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
2,4,6-Trichlorophenol	88-06-2	mg/kg		90.9	B Cancer	< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
2,4-Dichlorophenol	120-83-2	mg/kg		240	B Non Cancer	< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
2,4-Dimethylphenol	105-67-9	mg/kg		1600	B Non Cancer	< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
2,4-Dinitrophenol	51-28-5	mg/kg		160	B Non Cancer	< 0.21	< 0.20	< 0.21	< 0.20	< 0.19	< 0.90	< 0.90	< 0.91
2,4-Dinitrotoluene	121-14-2	mg/kg		3.22	B Cancer	< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
2-Chloronaphthalene	91-58-7	mg/kg		6400	B Non Cancer	< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
2-Chlorphenol	95-57-8	mg/kg		400	B Non Cancer	< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
2-Methylnaphthalene	91-57-6	mg/kg		320	B Non Cancer	< 0.0083	< 0.0080	< 0.0083	**0.019**	< 0.0075	**0.022**	**3.6**	**1.6**
2-Methylphenol	95-48-7	mg/kg		4000	B Non Cancer	< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
2-Nitroaniline	88-74-4	mg/kg		800	B Non Cancer	< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
2-Nitrophenol	88-75-5	mg/kg				< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
3,3'-Dichlorobenzidine	91-94-1	mg/kg		2.22	B Cancer	< 0.21	< 0.20	< 0.21	< 0.20	< 0.19	< 0.90	< 0.90	< 0.91
3+4-Methylphenol	108-39-4/ 106-44-5	mg/kg		4000/8000	B Non Cancer	< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
3-Nitroaniline	99-09-2	mg/kg				< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
4,6-Dinitro-2-methylphenol	497-56-3	mg/kg				< 0.21	< 0.20	< 0.21	< 0.20	< 0.19	< 0.90	< 0.90	< 0.91
4-Bromophenyl-phenylether	101-55-3	mg/kg				< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
4-Chloro-3-methylphenol	59-50-7	mg/kg				< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
4-Chloroaniline	106-47-8	mg/kg		5	B Cancer	< 0.21	< 0.20	< 0.21	< 0.20	< 0.19	< 0.90	< 0.90	< 0.91
4-Chlorophenyl-phenylether	7005-72-3	mg/kg				< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
4-Nitroaniline	100-01-6	mg/kg				< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
4-Nitrophenol	100-02-7	mg/kg				< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
Acenaphthene	83-32-9	mg/kg		4800	B Non Cancer	< 0.0083	< 0.0080	< 0.0083	< 0.0080	< 0.0075	**0.29**	**0.4**	**0.24**
Acenaphthylene	208-96-8	mg/kg				< 0.0083	< 0.0080	< 0.0083	< 0.040	< 0.038	**0.031**	**0.052**	**0.041**
Aniline	62-53-3	mg/kg		175	B Cancer	< 0.21	< 0.20	< 0.21	< 0.20	< 0.19	< 0.90	< 0.90	< 0.91
Anthracene	120-12-7	mg/kg		24000	B Non Cancer	< 0.0083	< 0.0080	< 0.0083	< 0.0080	**0.015**	**0.26**	**0.18**	**0.11**
Benzidine	92-87-5	mg/kg		0.004	B Cancer	*< 0.41*	*< 0.40*	*< 0.41*	*< 0.40*	*< 0.28*	*< 1.8*	*< 1.8*	*< 1.8*
Benzo(j,k)fluoranthene		mg/kg		13.7	B Cancer	< 0.0083	< 0.0080	< 0.0083	< 0.0080	< 0.0075	< 0.0072	**0.1**	< 0.0073
Benzo(a)anthracene	56-55-3	mg/kg	0.1	1.37	B Cancer	< 0.0083	< 0.0080	< 0.0083	< 0.0080	< 0.0075	**0.016**	**0.28**	**0.017**
Benzo(a)pyrene	50-32-8	mg/kg	1	0.1	Method A	< 0.0083	< 0.0080	< 0.0083	< 0.0080	< 0.0075	< 0.0072	**0.28**	**0.0093**
Benzo(b)fluoranthene	205-99-2	mg/kg	0.1	1.37	B Cancer	< 0.0083	< 0.0080	< 0.0083	**0.0091**	< 0.0075	**0.0087**	**0.38**	**0.015**
Benzo(g,h,i)perylene	191-24-2	mg/kg				< 0.0083	< 0.0080	< 0.0083	< 0.0080	< 0.0075	< 0.0072	**0.17**	**0.0073**
Benzyl alcohol	100-51-6	mg/kg		8000	B Non Cancer	< 0.21	< 0.20	< 0.21	< 0.20	< 0.19	< 0.90	< 0.90	< 0.91
bis(2-Chloroethoxy)methane	111-91-1	mg/kg				< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
bis(2-Chloroethyl)ether	111-44-4	mg/kg		0.909	B Cancer	< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
bis(2-Chloroisopropyl)ether	108-60-1	mg/kg		14.3	B Cancer	< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
bis(2-Ethylhexyl)phthalate	117-81-7	mg/kg		71.4	B Cancer	< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
bis(2-Ethylhexyl)adipate	103-23-1	mg/kg		833	B Cancer	< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
Butylbenzylphthalate	85-68-7	mg/kg		526	B Cancer	< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
Carbazole	86-74-8	mg/kg				< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
Chrysene	218-01-9	mg/kg	0.01	137	B Cancer	< 0.0083	< 0.0080	< 0.0083	**0.0082**	< 0.0075	**0.032**	**0.34**	**0.026**
Dibenz(a,h)anthracene	53-70-3	mg/kg	0.1	0.137	B Cancer	< 0.0083	< 0.0080	< 0.0083	< 0.0080	< 0.0075	< 0.0072	**0.041**	< 0.0073
Dibenzofuran	132-64-9	mg/kg		80	B Non Cancer	< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	**0.32**	**0.53**	**0.38**
Diethylphthalate	84-66-2	mg/kg				< 0.21	< 0.20	< 0.21	< 0.20	< 0.19	< 0.90	< 0.90	< 0.91
Dimethyphthalate	131-11-3	mg/kg				< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
Di-n-butylphthalate	84-74-2	mg/kg		8000	B Non Cancer	< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
Di-n-octylphthalate	117-84-0	mg/kg		800	B Non Cancer	< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
Fluoranthene	206-44-0	mg/kg		3200	B Non Cancer	< 0.0083	< 0.0080	< 0.0083	**0.011**	< 0.0075	**0.042**	**0.8**	**0.062**
Fluorene	86-73-7	mg/kg		3200	B Non Cancer	< 0.0083	< 0.0080	< 0.0083	< 0.0080	< 0.0075	**1**	**1.3**	**0.88**
Hexachlorobenzene	118-74-1	mg/kg		0.625	B Cancer	< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
Hexachlorobutadiene	87-68-3	mg/kg		12.8	B Cancer	< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
Hexachlorocyclopentadiene	77-47-4	mg/kg		480	B Non Cancer	< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
Hexachloroethane	67-72-1	mg/kg		25	B Cancer	< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
Indeno(1,2,3-cd)pyrene	193-39-5	mg/kg	0.1	1.37	B Cancer	< 0.0083	< 0.0080	< 0.0083	< 0.0080	< 0.0075	< 0.0072	**0.14**	< 0.0073
Isophorone	78-59-1	mg/kg		1053	B Cancer	< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
Naphthalene	91-20-3	mg/kg		5	Method A	< 0.0083	< 0.0080	< 0.0083	**0.01**	< 0.0075	**0.18**	**0.42**	**0.31**
Nitrobenzene	98-95-3	mg/kg		160	B Non Cancer	< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
n-Nitrosodimethylamine	65-75-9	mg/kg		0.02	B Cancer	*< 0.041*	*< 0.040*	*< 0.041*	*< 0.040*	*< 0.038*	*< 0.18*	*< 0.18*	*< 0.18*
n-Nitroso-di-n-propylamine	621-64-7	mg/kg		0.143	B Cancer	< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	*< 0.18*	*< 0.18*	*< 0.18*
n-Nitrosodiphenylamine	86-30-6	mg/kg		204	B Cancer	< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
Pentachlorophenol	87-86-5	mg/kg		2.5	B Cancer	< 0.21	< 0.20	< 0.21	< 0.20	< 0.19	< 0.90	< 0.90	< 0.91
Phenanthrene	85-01-8	mg/kg				< 0.0083	< 0.0080	< 0.0083	**0.018**	< 0.0075	**0.039**	**2.4**	**1.1**
Phenol	108-95-2	mg/kg		24000	B Non Cancer	< 0.041	< 0.040	< 0.041	< 0.040	< 0.038	< 0.18	< 0.18	< 0.18
Pyrene	129-00-0	mg/kg		2400	B Non Cancer	< 0.0083	< 0.0080	< 0.0083	**0.013**	**0.012**	**0.19**	**0.75**	**0.19**
Pyridine	110-86-1	mg/kg		80	B Non Cancer	< 0.41	< 0.40	< 0.41	< 0.40	< 0.38	< 1.8	< 1.8	< 1.8
Total cPAHs (HalfDL)		mg/kg	1	0.1	Method A	< 0.00585	< 0.00564	< 0.00585	0.00619	< 0.00529	0.00711	**0.368**	0.0135
Total cPAHs (HitsOnly)		mg/kg	1	0.1	Method A	< 0.00	< 0.00	< 0.00	0.000992	< 0.00	0.00279	**0.368**	0.0128

2015 UST REMOVAL SOIL SAMPLE ANALYTICAL RESULTS
WA DOT Signals Maintenance Site
Seattle, Washington

					Sample ID	SFS-B1	SFS-E	SFS-N	SFS-W	SFS-S	SFS-SP1	SFS-SP2	SFS-SP3
					Date Collected	6/22/2015	6/23/2015	6/18/2015	6/18/2015	6/18/2015	6/17/2015	6/17/2015	6/17/2015
					Sample Type	Confirmation Soil	Confirmation Soil	Confirmation Soil	Confirmation Soil	Confirmation Soil	Stockpile	Stockpile	Stockpile
					Sample Depth (bgs)	12 ft	10 ft	12 ft	12 ft	12 ft	--	--	--
Chemical	**CAS Number**	**Units**	**TEF**	**MTCA Method A then B CUL**									
Polychlorinated Biphenyls													
Aroclor 1016	12674-11-2	mg/kg		14.3	B Cancer	< 0.062	< 0.060	< 0.062	< 0.060	< 0.056	< 0.054	< 0.054	< 0.054
Aroclor 1221	11104-28-2	mg/kg				< 0.062	< 0.060	< 0.062	< 0.060	< 0.056	< 0.054	< 0.054	< 0.054
Aroclor 1232	11141-16-5	mg/kg				< 0.062	< 0.060	< 0.062	< 0.060	< 0.056	< 0.054	< 0.054	< 0.054
Aroclor 1242	53469-21-9	mg/kg				< 0.062	< 0.060	< 0.062	< 0.060	< 0.056	< 0.054	< 0.054	< 0.054
Aroclor 1248	12672-29-6	mg/kg				< 0.062	< 0.060	< 0.062	< 0.060	< 0.056	< 0.054	< 0.054	< 0.054
Aroclor 1254	11097-69-1	mg/kg		0.5	B Cancer	< 0.062	< 0.060	< 0.062	< 0.060	< 0.056	< 0.054	< 0.054	< 0.054
Aroclor 1260	11096-82-5	mg/kg		0.5	B Cancer	< 0.062	< 0.060	< 0.062	< 0.060	< 0.056	< 0.054	< 0.054	< 0.054
Total PCBs (HalfDL)						< 0.217	< 0.210	< 0.217	< 0.210	< 0.196	< 0.189	< 0.189	< 0.189
Total PCBs (HitsOnly)						< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
Metals													
Arsenic	7440-38-2	mg/kg		20	Method A	< 12	< 12	< 12	< 12	< 11	< 11	< 11	< 11
Barium	7440-39-3	mg/kg		16000	B Non Cancer	**33**	**110**	**59**	**120**	**27**	**28**	**27**	**30**
Cadmium	7440-43-9	mg/kg		2	Method A	< 0.62	< 0.60	< 0.62	< 0.60	< 0.56	< 0.54	< 0.54	< 0.54
Chromium		mg/kg				**39**	**62**	**37**	**69**	**14**	**21**	**23**	**23**
Lead	7439-92-1	mg/kg		250	Method A	< 6.2	**10**	< 6.2	**6.2**	< 5.6	< 5.4	< 5.4	< 5.4
Mercury	7439-97-6	mg/kg		2	Method A	< 0.31	< 0.30	< 0.31	< 0.30	< 0.28	< 0.27	< 0.27	< 0.27
Selenium	7782-49-2	mg/kg		400	B Non Cancer	< 12	< 12	< 12	< 12	< 11	< 11	< 11	< 11
Silver	7440-22-4	mg/kg		400	B Non Cancer	< 1.2	< 1.2	< 1.2	< 1.2	< 1.1	< 1.1	< 1.1	< 1.1

2700	Detected concentrations above the cleanup level are shaded yellow and bolded.
< 0.038	Non-detect values above the cleanup level are shaded gray and italicized.
50	Detected concentrations at or above the method reporting limit are shown in bold.

Abbreviations and Symbols

" - -" denotes not measured, not available, or not applicable.

" < " denotes not detected at or above the indicated method reporting limit.

Total cPAHs (HitsOnly) = Possible total cPAHs are based on the relative toxicity of each cPAH to benzo(a)pyrene and were calculated by multiplying the individual detected cPAH concentrations by a toxicity equivalency factor (TEF) and summing the adjusted concentrations.

Total cPAHs (HalfDL) = Possible total cPAHs are based on the relative toxicity of each cPAH to benzo(a)pyrene and were calculated by multiplying the individual detected cPAH concentrations by a toxicity equivalency factor (TEF) and summing the adjusted concentrations. If an individual cPAH was not detected, a value of one half the method reporting limit was used in the calculation.

Total PCBs (HitsOnly) = Total PCB concentration based on the sum of individual aroclor concentrations detected.

Total PCBs (HalfDL) = Total PCB concentration based on the sum of individual aroclor concentrations detected. If an individual PCB aroclor was not detected, a value of one half the method reporting limit was used in the calculation.

bgs = below ground surface.

ft = feet

mg/kg = milligrams per kilogram

Cleanup Levels (CULs)

Cleanup level values based on Model Toxics Control Act (MTCA) Method A values for unrestricted land use (Method A) based on Washington State Administrative Code (WAC) 173-340-740 Table 740-1. Where MTCA Method A values are not available, the lowest of MTCA Method B values (B Cancer or B Non Cancer) from Cleanup Levels and Risk Calculation (CLARC) tables have been used (Accessed January 2017).

Methods

Samples analyzed for gasoline-range organics (GRO) using Northwest Total Petroleum Hydrocarbon (NWTPH)-Gx and diesel- and oil-range organics (DRO and ORO) using NWTPH-Dx.

Samples analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX) and Volatile Organic Compounds using EPA Method 8260.

Samples analyzed for metals using EPA Method 6010 with the exception of mercury which was analyzed by EPA Method 7471.

Samples analyzed for Semivolatile Organic Compound using EPA Method 8270 with selective ion monitoring (SIM).

Samples analyzed for Polychlorinated Biphenyls using EPA Method 8082.

2017 INVESTIGATION SOIL SAMPLE ANALYTICAL RESULTS
80 S Hudson Expanded Site
Seattle, Washington

				Location	B-01	B-01	B-02	B-02	B-03	B-03	B-04	B-04	B-05	B-05	B-06	B-06	MW-01	MW-01	MW-02	MW-02	MW-03	MW-03
				Sample ID	B-01 (11.0-12.0)	B-01 (19.0-20.0)	B-02 (12.0-12.5)	B-02 (19.0-20.0)	B-03 (11.0-12.0)	B-03 (19.0-20.0)	B-04 (12.0-13.0)	B-04 (19.0-20.0)	B-05 (11.0-12.0)	B-05 (19.0-20.0)	B-06 (11.0-12.0)	B-06 (19.0-20.0)	MW-01 (10.0-11.0)	MW-01 (19.0-20.0)	MW-02 (11.0-12.0)	MW-02 (19.0-20.0)	MW-03 (12.5-13.5)	DUP-02-20170306
				Date	3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/7/2017	3/7/2017	3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/6/2017
				Parent Sample ID																		MW-03 (12.5-13.5)
				Sample Depths	11.0-12.0 ft	19.0-20.0 ft	12.0-12.5 ft	19.0-20.0 ft	11.0-12.0 ft	19.0-20.0 ft	12.0-13.0 ft	19.0-20.0 ft	11.0-12.0 ft	19.0-20.0 ft	11.0-12.0 ft	19.0-20.0 ft	10.0-11.0 ft	19.0-20.0 ft	11.0-12.0 ft	19.0-20.0 ft	12.5-13.5 ft	12.5-13.5 ft
				Note																		
Chemical	**Unit**	**TEF**	**MTCA A then Lowest B CUL**																			
Total Petroleum Hydrocarbons																						
Gasoline-Range Organics	mg/kg		30/100	Method A	< 0.124	< 0.120	< 0.122	< 0.126	< 0.125	< 0.124	< 0.133	< 0.170	< 0.128	< 0.126	< 0.129	< 0.126	< 0.128	< 0.124	< 0.121	< 0.138	**409**	**151**
Oil-Range Organics	mg/kg		2000	Method A	< 12.4	< 12.0	< 12.2	< 12.6	< 12.5	< 12.4	< 13.3	< 13.8	< 12.8	< 12.6	< 12.9	< 12.6	< 12.8	< 12.4	< 12.1	< 13.8	**309**	**106**
Diesel-Range Organics	mg/kg		2000	Method A	< 4.96	< 4.82	< 4.89	< 5.02	< 4.98	< 4.97	< 5.34	< 5.52	< 5.11	< 5.03	< 5.16	< 5.03	< 5.12	< 4.95	< 4.82	< 5.53	**3270**	**1080**
BTEX																						
Benzene	mg/kg		0.03	Method A	< 0.00124	< 0.00120	< 0.00122	< 0.00126	< 0.00125	< 0.00124	< 0.00136	< 0.00138	< 0.00128	< 0.00126	< 0.00129	< 0.00126	< 0.00128	< 0.00124	< 0.00121	< 0.00138	*< 0.0913*	< 0.00124
Toluene	mg/kg		7	Method A	< 0.00620	< 0.00602	< 0.00611	< 0.00628	< 0.00623	< 0.00621	< 0.00681	< 0.00689	< 0.00638	< 0.00628	< 0.00645	< 0.00628	< 0.00640	< 0.00618	< 0.00603	< 0.00692	< 0.456	< 0.00621
Ethylbenzene	mg/kg		6	Method A	< 0.00124	< 0.00120	< 0.00122	< 0.00126	< 0.00125	< 0.00124	< 0.00136	< 0.00138	< 0.00128	< 0.00126	< 0.00129	< 0.00126	< 0.00128	< 0.00124	< 0.00121	< 0.00138	< 0.0913	**0.00128**
Xylene, total	mg/kg		9	Method A	< 0.00372	< 0.00361	< 0.00367	< 0.00377	< 0.00374	< 0.00373	< 0.00408	< 0.00414	< 0.00383	< 0.00377	< 0.00387	< 0.00377	< 0.00384	< 0.00371	< 0.00362	< 0.00415	< 0.274	**0.00933**
Polychlorinated Biphenyls																						
PCB-1016 (Aroclor 1016)	mg/kg		5.6	B Non Cancer	--	--	< 0.0208	--	--	--	< 0.0227	--	< 0.0217	--	< 0.0219	--	< 0.0218	--	< 0.0205	--	< 0.0213	--
PCB-1221 (Aroclor 1221)	mg/kg				--	--	< 0.0208	--	--	--	< 0.0227	--	< 0.0217	--	< 0.0219	--	< 0.0218	--	< 0.0205	--	< 0.0213	--
PCB-1232 (Aroclor 1232)	mg/kg				--	--	< 0.0208	--	--	--	< 0.0227	--	< 0.0217	--	< 0.0219	--	< 0.0218	--	< 0.0205	--	< 0.0213	--
PCB-1242 (Aroclor 1242)	mg/kg				--	--	< 0.0208	--	--	--	< 0.0227	--	< 0.0217	--	< 0.0219	--	< 0.0218	--	< 0.0205	--	< 0.0213	--
PCB-1248 (Aroclor 1248)	mg/kg				--	--	< 0.0208	--	--	--	< 0.0227	--	< 0.0217	--	< 0.0219	--	< 0.0218	--	< 0.0205	--	< 0.0213	--
PCB-1254 (Aroclor 1254)	mg/kg		0.500	B Cancer	--	--	< 0.0208	--	--	--	< 0.0227	--	< 0.0217	--	< 0.0219	--	< 0.0218	--	< 0.0205	--	< 0.0213	--
PCB-1260 (Aroclor 1260)	mg/kg		0.500	B Cancer	--	--	< 0.0208	--	--	--	< 0.0227	--	< 0.0217	--	< 0.0219	--	< 0.0218	--	< 0.0205	--	< 0.0213	--
Total PCBs (HalfDL)	mg/kg		1	Method A	--	--	< 0.0728	--	--	--	< 0.0795	--	< 0.0760	--	< 0.0767	--	< 0.0763	--	< 0.0718	--	< 0.0746	--
Total PCBs (HitsOnly)	mg/kg		1	Method A	--	--	< 0.00	--	--	--	< 0.00	--	< 0.00	--	< 0.00	--	< 0.00	--	< 0.00	--	< 0.00	--
Semi Volatile Organic Compounds using SIM																						
1,2,4-Trichlorobenzene	mg/kg		34.5	B Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,2'-oxybis(1-Chloro)propane	mg/kg		14.3	B Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4,6-Trichlorophenol	mg/kg		80	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4-Dichlorophenol	mg/kg		240	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4-Dimethylphenol	mg/kg		1600	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4-Dinitrophenol	mg/kg		160	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,4-Dinitrotoluene	mg/kg		3.23	B Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2,6-Dinitrotoluene	mg/kg		0.667	B Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Chlorophenol	mg/kg		400	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Nitrophenol	mg/kg				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
3,3'-Dichlorobenzidine	mg/kg		2.22	B Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4,6-Dinitro-2-Methylphenol	mg/kg				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Bromophenyl phenyl ether	mg/kg				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Chloro-3-Methylphenol	mg/kg				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Chlorophenyl phenyl ether	mg/kg				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Nitrophenol	mg/kg				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzidine	mg/kg		0.00435	B Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzyl butyl phthalate	mg/kg		526	B Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
bis(2-Chloroethoxy) methane	mg/kg				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
bis(2-Chloroethyl) ether	mg/kg		0.909	B Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
bis(2-Ethylhexyl) phthalate	mg/kg		71.4	B Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Diethyl phthalate	mg/kg		64000	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dimethyl phthalate	mg/kg				--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Di-n-butyl phthalate	mg/kg		8000	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Di-n-Octyl phthalate	mg/kg		800	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hexachlorobenzene	mg/kg		0.625	B Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hexachlorobutadiene	mg/kg		12.8	B Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hexachlorocyclopentadiene	mg/kg		480	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Hexachloroethane	mg/kg		25.0	B Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Isophorone	mg/kg		1050	B Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nitrobenzene	mg/kg		160	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
n-Nitrosodimethylamine	mg/kg		0.0196	B Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
n-Nitrosodi-n-Propylamine	mg/kg		0.143	B Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
n-Nitrosodiphenylamine	mg/kg		204	B Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Pentachlorophenol	mg/kg		2.50	B Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Phenol	mg/kg		24000	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1-Methylnaphthalene	mg/kg		34.5	B Cancer	< 0.0248	--	< 0.0244	--	--	< 0.0248	< 0.0267	--	< 0.0255	--	< 0.0258	--	< 0.0256	--	< 0.0241	--	**4.72**	**3.39**
2-Chloronaphthalene	mg/kg		6400	B Non Cancer	< 0.0248	--	< 0.0244	--	--	< 0.0248	< 0.0267	--	< 0.0255	--	< 0.0258	--	< 0.0256	--	< 0.0241	--	< 0.250	< 0.0248
2-Methylnaphthalene	mg/kg		320	B Non Cancer	< 0.0248	--	< 0.0244	--	--	< 0.0248	< 0.0267	--	< 0.0255	--	< 0.0258	--	< 0.0256	--	< 0.0241	--	< 0.250	< 0.0248
Acenaphthene	mg/kg		4800	B Non Cancer	< 0.00744	--	< 0.00733	--	--	< 0.00745	< 0.00801	--	< 0.00766	--	< 0.00774	--	< 0.00768	--	< 0.00723	--	**0.631**	**0.181**
Acenaphthylene	mg/kg				< 0.00744	--	< 0.00733	--	--	< 0.00745	< 0.00801	--	< 0.00766	--	< 0.00774	--	< 0.00768	--	< 0.00723	--	**0.162**	**0.0477**
Anthracene	mg/kg		24000	B Non Cancer	< 0.00744	--	< 0.00733	--	--	< 0.00745	< 0.00801	--	< 0.00766	--	< 0.00774	--	< 0.00768	--	< 0.00723	--	**0.344**	**0.184**

2017 INVESTIGATION SOIL SAMPLE ANALYTICAL RESULTS
80 S Hudson Expanded Site
Seattle, Washington

				Location	B-01	B-01	B-02	B-02	B-03	B-03	B-04	B-04	B-05	B-05	B-06	B-06	MW-01	MW-01	MW-02	MW-02	MW-03	MW-03
				Sample ID	B-01 (11.0-12.0)	B-01 (19.0-20.0)	B-02 (12.0-12.5)	B-02 (19.0-20.0)	B-03 (11.0-12.0)	B-03 (19.0-20.0)	B-04 (12.0-13.0)	B-04 (19.0-20.0)	B-05 (11.0-12.0)	B-05 (19.0-20.0)	B-06 (11.0-12.0)	B-06 (19.0-20.0)	MW-01 (10.0-11.0)	MW-01 (19.0-20.0)	MW-02 (11.0-12.0)	MW-02 (19.0-20.0)	MW-03 (12.5-13.5)	DUP-02-20170306
				Date	3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/7/2017	3/7/2017	3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/6/2017
				Parent Sample ID																		MW-03 (12.5-13.5)
				Sample Depths	11.0-12.0 ft	19.0-20.0 ft	12.0-12.5 ft	19.0-20.0 ft	11.0-12.0 ft	19.0-20.0 ft	12.0-13.0 ft	19.0-20.0 ft	11.0-12.0 ft	19.0-20.0 ft	11.0-12.0 ft	19.0-20.0 ft	10.0-11.0 ft	19.0-20.0 ft	11.0-12.0 ft	19.0-20.0 ft	12.5-13.5 ft	12.5-13.5 ft
				Note																		
Chemical	Unit	TEF	MTCA A then Lowest B CUL																			
Benzo(a)anthracene	mg/kg	0.1	1.37	B Cancer	< 0.00744	--	< 0.00733	--	--	< 0.00745	< 0.00801	--	< 0.00766	--	< 0.00774	--	< 0.00768	--	< 0.00723	--	**0.0196**	**0.00768**
Benzo(a)pyrene	mg/kg	1	0.1	Method A	< 0.00744	--	< 0.00733	--	--	< 0.00745	< 0.00801	--	< 0.00766	--	< 0.00774	--	< 0.00768	--	< 0.00723	--	< 0.00750	< 0.00745
Benzo(b)Fluoranthene	mg/kg	0.1	1.37	B Cancer	< 0.00744	--	< 0.00733	--	--	< 0.00745	< 0.00801	--	< 0.00766	--	< 0.00774	--	< 0.00768	--	< 0.00723	--	**0.00972**	< 0.00745
Benzo(g,h,i)Perylene	mg/kg				< 0.00744	--	< 0.00733	--	--	< 0.00745	< 0.00801	--	< 0.00766	--	< 0.00774	--	< 0.00768	--	< 0.00723	--	< 0.00750	< 0.00745
Benzo(k)Fluoranthene	mg/kg	0.1	13.7	B Cancer	< 0.00744	--	< 0.00733	--	--	< 0.00745	< 0.00801	--	< 0.00766	--	< 0.00774	--	< 0.00768	--	< 0.00723	--	< 0.00750	< 0.00745
Chrysene	mg/kg	0.01	137	B Cancer	< 0.00744	--	< 0.00733	--	--	< 0.00745	< 0.00801	--	< 0.00766	--	< 0.00774	--	< 0.00768	--	< 0.00723	--	**0.0639**	**0.0290**
Dibenz(a,h)Anthracene	mg/kg	0.1	0.137	B Cancer	< 0.00744	--	< 0.00733	--	--	< 0.00745	< 0.00801	--	< 0.00766	--	< 0.00774	--	< 0.00768	--	< 0.00723	--	< 0.00750	< 0.00745
Fluoranthene	mg/kg		3200	B Non Cancer	< 0.00744	--	< 0.00733	--	--	< 0.00745	< 0.00801	--	< 0.00766	--	< 0.00774	--	< 0.00768	--	< 0.00723	--	**0.0257**	**0.0105**
Fluorene	mg/kg		3200	B Non Cancer	< 0.00744	--	< 0.00733	--	--	< 0.00745	< 0.00801	--	< 0.00766	--	< 0.00774	--	< 0.00768	--	< 0.00723	--	**1.22**	**0.422**
Indeno(1,2,3-c,d)Pyrene	mg/kg	0.1	1.37	B Cancer	< 0.00744	--	< 0.00733	--	--	< 0.00745	< 0.00801	--	< 0.00766	--	< 0.00774	--	< 0.00768	--	< 0.00723	--	< 0.00750	< 0.00745
Naphthalene	mg/kg		5	Method A	< 0.0248	--	< 0.0244	--	--	< 0.0248	< 0.0267	--	< 0.0255	--	< 0.0258	--	< 0.0256	--	< 0.0241	--	**0.677**	**0.142**
Phenanthrene	mg/kg				< 0.00744	--	< 0.00733	--	--	< 0.00745	< 0.00801	--	< 0.00766	--	< 0.00774	--	< 0.00768	--	< 0.00723	--	**1.62**	**0.822**
Pyrene	mg/kg		2400	B Non Cancer	< 0.00744	--	< 0.00733	--	--	< 0.00745	< 0.00801	--	< 0.00766	--	< 0.00774	--	< 0.00768	--	< 0.00723	--	**0.195**	**0.0779**
Total cPAHs (HalfDL)	mg/kg		0.1	Method A	< 0.00562	--	< 0.00553	--	--	< 0.00562	< 0.00605	--	< 0.00578	--	< 0.00584	--	< 0.00580	--	< 0.00546	--	**0.00845**	**0.00627**
Total cPAHs (HitsOnly)	mg/kg		0.1	Method A	< 0.00	--	< 0.00	--	--	< 0.00	< 0.00	--	< 0.00	--	< 0.00	--	< 0.00	--	< 0.00	--	**0.00357**	**0.00106**
Volatile Organic Compounds																						
1,1,1,2-Tetrachloroethane	mg/kg		38.5	B Cancer	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
1,1,1-Trichloroethane	mg/kg		2	Method A	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
1,1,2,2-Tetrachloroethane	mg/kg		5.00	B Cancer	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
1,1,2-Trichloroethane	mg/kg		17.5	B Cancer	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
1,1-Dichloroethane	mg/kg		175	B Cancer	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
1,1-Dichloroethene	mg/kg		4000	B Non Cancer	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
1,1-Dichloropropene	mg/kg				--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
1,2,3-Trichlorobenzene	mg/kg				--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
1,2,3-Trichloropropane	mg/kg		0.0333	B Cancer	--	--	< 0.00305	--	--	--	< 0.00340	--	< 0.00319	--	< 0.00322	--	< 0.00320	--	< 0.00301	--	*< 0.228*	--
1,2,3-Trimethylbenzene	mg/kg				--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
1,2,4-Trichlorobenzene	mg/kg		34.5	B Cancer	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
1,2,4-Trimethylbenzene	mg/kg				--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
1,2-Dibromo-3-Chloropropane (DBCP)	mg/kg		1.25	B Cancer	--	--	< 0.00611	--	--	--	< 0.00681	--	< 0.00638	--	< 0.00645	--	< 0.00640	--	< 0.00603	--	< 0.456	--
1,2-Dibromoethane (EDB)	mg/kg		0.005	Method A	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	*< 0.0913*	--
1,2-Dichlorobenzene	mg/kg		7200	B Non Cancer	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
1,2-Dichloroethane (EDC)	mg/kg		11.0	B Cancer	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
1,2-Dichloropropane	mg/kg		27.8	B Cancer	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
1,3,5-Trimethylbenzene	mg/kg		800	B Non Cancer	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
1,3-Dichlorobenzene	mg/kg				--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
1,3-Dichloropropane	mg/kg				--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
1,4-Dichlorobenzene	mg/kg		185	B Cancer	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
2,2-Dichloropropane	mg/kg				--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
2-Chlorotoluene	mg/kg		1600	B Non Cancer	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
4-Chlorotoluene	mg/kg				--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
Acetone	mg/kg		72000	B Non Cancer	--	--	< 0.0611	--	--	--	< 0.0681	--	< 0.0638	--	< 0.0645	--	< 0.0640	--	< 0.0603	--	< 4.56	--
Acrylonitrile	mg/kg		1.85	B Cancer	--	--	< 0.0122	--	--	--	< 0.0136	--	< 0.0128	--	< 0.0129	--	< 0.0128	--	< 0.0121	--	< 0.913	--
Bromobenzene	mg/kg				--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
Bromodichloromethane	mg/kg		16.1	B Cancer	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
Bromoform	mg/kg		127	B Cancer	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
Bromomethane	mg/kg		112	B Non Cancer	--	--	< 0.00611	--	--	--	< 0.00681	--	< 0.00638	--	< 0.00645	--	< 0.00640	--	< 0.00603	--	< 0.456	--
Carbon Tetrachloride	mg/kg		14.3	B Cancer	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
Chlorobenzene	mg/kg		1600	B Non Cancer	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
Chloroethane	mg/kg				--	--	< 0.00611	--	--	--	< 0.00681	--	< 0.00638	--	< 0.00645	--	< 0.00640	--	< 0.00603	--	< 0.456	--
Chloroform	mg/kg		32.3	B Cancer	--	--	< 0.00611	--	--	--	< 0.00681	--	< 0.00638	--	< 0.00645	--	< 0.00640	--	< 0.00603	--	< 0.456	--
Chloromethane	mg/kg				--	--	< 0.00305	--	--	--	< 0.00340	--	< 0.00319	--	< 0.00322	--	< 0.00320	--	< 0.00301	--	< 0.228	--
cis-1,2-Dichloroethene	mg/kg		160	B Non Cancer	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
cis-1,3-Dichloropropene	mg/kg		10.0	B Cancer	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
Cymene (p-Isopropyltoluene)	mg/kg				--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
Dibromochloromethane	mg/kg		11.9	B Cancer	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
Dibromomethane	mg/kg		800	B Non Cancer	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
Dichlorodifluoromethane	mg/kg		16000	B Non Cancer	--	--	< 0.00611	--	--	--	< 0.00681	--	< 0.00638	--	< 0.00645	--	< 0.00640	--	< 0.00603	--	< 0.456	--
Di-Isopropyl ether (DIPE)	mg/kg				--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
Freon 113	mg/kg		2400000	B Non Cancer	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
Hexachlorobutadiene	mg/kg		12.8	B Cancer	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
Isopropylbenzene	mg/kg		8000	B Non Cancer	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	**0.226**	--

2017 INVESTIGATION SOIL SAMPLE ANALYTICAL RESULTS
80 S Hudson Expanded Site
Seattle, Washington

				Location	B-01	B-01	B-02	B-02	B-03	B-03	B-04	B-04	B-05	B-05	B-06	B-06	MW-01	MW-01	MW-02	MW-02	MW-03	MW-03
				Sample ID	B-01 (11.0-12.0)	B-01 (19.0-20.0)	B-02 (12.0-12.5)	B-02 (19.0-20.0)	B-03 (11.0-12.0)	B-03 (19.0-20.0)	B-04 (12.0-13.0)	B-04 (19.0-20.0)	B-05 (11.0-12.0)	B-05 (19.0-20.0)	B-06 (11.0-12.0)	B-06 (19.0-20.0)	MW-01 (10.0-11.0)	MW-01 (19.0-20.0)	MW-02 (11.0-12.0)	MW-02 (19.0-20.0)	MW-03 (12.5-13.5)	DUP-02-20170306
				Date	3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/7/2017	3/7/2017	3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/6/2017
				Parent Sample ID																		MW-03 (12.5-13.5)
				Sample Depths	11.0-12.0 ft	19.0-20.0 ft	12.0-12.5 ft	19.0-20.0 ft	11.0-12.0 ft	19.0-20.0 ft	12.0-13.0 ft	19.0-20.0 ft	11.0-12.0 ft	19.0-20.0 ft	11.0-12.0 ft	19.0-20.0 ft	10.0-11.0 ft	19.0-20.0 ft	11.0-12.0 ft	19.0-20.0 ft	12.5-13.5 ft	12.5-13.5 ft
				Note																		
Chemical	**Unit**	**TEF**	**MTCA A then Lowest B CUL**																			
Methyl ethyl ketone (2-Butanone)	mg/kg		48000	B Non Cancer	--	--	< 0.0122	--	--	--	< 0.0136	--	< 0.0128	--	< 0.0129	--	< 0.0128	--	< 0.0121	--	< 0.913	--
Methyl Isobutyl Ketone (MIBK)	mg/kg		6400	B Non Cancer	--	--	< 0.0122	--	--	--	< 0.0136	--	< 0.0128	--	< 0.0129	--	< 0.0128	--	< 0.0121	--	< 0.913	--
Methyl tert-Butyl ether	mg/kg		0.1	Method A	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
Methylene Chloride	mg/kg		0.02	Method A	--	--	< 0.00611	--	--	--	< 0.00681	--	< 0.00638	--	< 0.00645	--	< 0.00640	--	< 0.00603	--	*< 0.456*	--
Naphthalene	mg/kg		5	Method A	--	--	< 0.00611	--	--	--	< 0.00681	--	< 0.00638	--	< 0.00645	--	< 0.00640	--	< 0.00603	--	< 0.456	--
n-Butylbenzene	mg/kg		4000	B Non Cancer	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	**0.389**	--
n-Propylbenzene	mg/kg		8000	B Non Cancer	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	**0.378**	--
Sec-Butylbenzene	mg/kg		8000	B Non Cancer	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	**0.283**	--
Styrene	mg/kg		16000	B Non Cancer	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
Tert-Butylbenzene	mg/kg		8000	B Non Cancer	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
Tetrachloroethene (PCE)	mg/kg		0.05	Method A	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	*< 0.0913*	--
trans-1,2-Dichloroethene	mg/kg		1600	B Non Cancer	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
trans-1,3-Dichloropropene	mg/kg		10.0	B Cancer	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
Trichloroethene (TCE)	mg/kg		0.03	Method A	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	*< 0.0913*	--
Trichlorofluoromethane	mg/kg		24000	B Non Cancer	--	--	< 0.00611	--	--	--	< 0.00681	--	< 0.00638	--	< 0.00645	--	< 0.00640	--	< 0.00603	--	< 0.456	--
Vinyl Chloride	mg/kg		0.670	B Cancer	--	--	< 0.00122	--	--	--	< 0.00136	--	< 0.00128	--	< 0.00129	--	< 0.00128	--	< 0.00121	--	< 0.0913	--
Metals																						
Arsenic	mg/kg		20	Method A	--	--	< 2.44	--	--	--	< 2.67	--	< 2.55	--	< 2.58	--	< 2.56	--	< 2.41	--	< 2.50	--
Barium	mg/kg		16000	B Non Cancer	--	--	**13.6**	--	--	--	**12.5**	--	**6.92**	--	**11.9**	--	**22.8**	--	**14.8**	--	**24.0**	--
Cadmium	mg/kg		2	Method A	--	--	< 0.611	--	--	--	< 0.667	--	< 0.638	--	< 0.645	--	< 0.640	--	< 0.603	--	< 0.625	--
Chromium, total	mg/kg				--	--	**4.45**	--	--	--	**6.85**	--	**3.50**	--	**5.82**	--	**13.6**	--	**9.47**	--	**8.44**	--
Lead	mg/kg		250	Method A	--	--	**0.961**	--	--	--	< 1.42 U	--	< 1.14 U	--	**1.42**	--	**2.05**	--	**3.48**	--	**1.55**	--
Mercury	mg/kg		2	Method A	--	--	< 0.0244	--	--	--	< 0.0267	--	< 0.0255	--	< 0.0258	--	< 0.0256	--	< 0.0241	--	< 0.0250	--
Selenium	mg/kg		400	B Non Cancer	--	--	< 2.44	--	--	--	< 2.67	--	< 2.55	--	< 2.58	--	< 2.56	--	< 2.41	--	< 2.50	--
Silver	mg/kg		400	B Non Cancer	--	--	< 1.22	--	--	--	< 1.33	--	< 1.28	--	< 1.29	--	< 1.28	--	< 1.21	--	< 1.25	--

2017 INVESTIGATION SOIL SAMPLE ANALYTICAL RESULTS
80 S Hudson Expanded Site
Seattle, Washington

				Location	MW-03	MW-04	MW-04	MW-05	MW-05	MW-06	MW-06	MW-06	MW-07	MW-07	MW-08	MW-08	MW-09	MW-09	MW-10	MW-10
				Sample ID	MW-03 (19.0-20.0)	MW-04 (12.0-13.0)	MW-04 (19.0-20.0)	MW-05 (10.5-11.0)	MW-05 (19.0-20.0)	MW-06 (11.0-12.0)	DUP-03-20170307	MW-06 (19.0-20.0)	MW-07 (12.0-13.0)	MW-07 (19.0-20.0)	MW-08 (12.0-13.0)	MW-08 (19.0-20.0)	MW-09 (12.5-13.0)	MW-09 (19.0-20.0)	MW-10 (9.5-10.0)	MW-10 (19.0-20.0)
				Date	3/6/2017	3/6/2017	3/6/2017	3/7/2017	3/7/2017	3/6/2017	3/7/2017	3/7/2017	3/7/2017	3/7/2017	3/7/2017	3/7/2017	3/8/2017	3/8/2017	3/8/2017	3/8/2017
				Parent Sample ID							MW-06 (11.0-12.0)									
				Sample Depths	19.0-20.0 ft	12.0-13.0 ft	19.0-20.0 ft	10.5-11.0 ft	19.0-20.0 ft	11.0-12.0 ft	11.0-12.0 ft	19.0-20.0 ft	12.0-13.0 ft	19.0-20.0 ft	12.0-13.0 ft	19.0-20.0 ft	12.5-13.0 ft	19.0-20.0 ft	9.5-10.0 ft	19.0-20.0 ft
				Note																
Chemical	Unit	TEF	MTCA A then Lowest B CUL															SVOCs by 8270 without SIM	SVOCs by 8270 without SIM	
Total Petroleum Hydrocarbons																				
Gasoline-Range Organics	mg/kg		30/100	Method A	< 0.136	< 0.136	< 0.140	< 0.125	< 0.120	**0.682 J**	< 0.132	< 0.122	< 0.125	< 0.133	< 0.139	< 0.126	< 0.137	< 0.128	< 0.121	< 0.130
Oil-Range Organics	mg/kg		2000	Method A	< 13.6	< 12.3	< 14.0	< 12.5	< 12.0	< 13.2	< 13.2 J	< 12.2	< 12.5	< 13.3	< 12.5	< 12.6	< 12.8	< 12.8	< 12.1	< 13.0
Diesel-Range Organics	mg/kg		2000	Method A	**6.35**	< 4.93	< 5.61	< 5.01	< 4.81	< 5.28	< 5.28 J	< 4.88	< 5.00	< 5.32	< 4.99	< 5.06	< 5.11	< 5.11	< 4.84	< 5.20
BTEX																				
Benzene	mg/kg		0.03	Method A	< 0.00136	< 0.00129	< 0.00140	< 0.00157	< 0.00120	< 0.00132	< 0.00132	< 0.00122	< 0.00125	< 0.00133	< 0.00125	< 0.00126	< 0.00130	< 0.00128	< 0.00121	< 0.00130
Toluene	mg/kg		7	Method A	< 0.00682	< 0.00647	< 0.00701	< 0.00783	< 0.00601	< 0.00660	< 0.00660	< 0.00610	< 0.00626	< 0.00665	< 0.00624	< 0.00632	< 0.00651	< 0.00638	< 0.00605	< 0.00650
Ethylbenzene	mg/kg		6	Method A	< 0.00136	< 0.00129	< 0.00140	< 0.00157	< 0.00120	< 0.00132	< 0.00132	< 0.00122	< 0.00125	< 0.00133	< 0.00125	< 0.00126	< 0.00130	< 0.00128	< 0.00121	< 0.00130
Xylene, total	mg/kg		9	Method A	< 0.00409	< 0.00388	< 0.00420	< 0.00470	< 0.00361	< 0.00396	< 0.00396	< 0.00366	< 0.00375	< 0.00399	< 0.00374	< 0.00379	< 0.00391	< 0.00383	< 0.00363	< 0.00390
Polychlorinated Biphenyls																				
PCB-1016 (Aroclor 1016)	mg/kg		5.6	B Non Cancer	--	< 0.0210	--	< 0.0213	--	< 0.0225	--	--	--	< 0.0226	--	< 0.0215	< 0.0217	--	--	< 0.0221
PCB-1221 (Aroclor 1221)	mg/kg				--	< 0.0210	--	< 0.0213	--	< 0.0225	--	--	--	< 0.0226	--	< 0.0215	< 0.0217	--	--	< 0.0221
PCB-1232 (Aroclor 1232)	mg/kg				--	< 0.0210	--	< 0.0213	--	< 0.0225	--	--	--	< 0.0226	--	< 0.0215	< 0.0217	--	--	< 0.0221
PCB-1242 (Aroclor 1242)	mg/kg				--	< 0.0210	--	< 0.0213	--	< 0.0225	--	--	--	< 0.0226	--	< 0.0215	< 0.0217	--	--	< 0.0221
PCB-1248 (Aroclor 1248)	mg/kg				--	< 0.0210	--	< 0.0213	--	< 0.0225	--	--	--	< 0.0226	--	< 0.0215	< 0.0217	--	--	< 0.0221
PCB-1254 (Aroclor 1254)	mg/kg		0.500	B Cancer	--	< 0.0210	--	< 0.0213	--	< 0.0225	--	--	--	< 0.0226	--	< 0.0215	< 0.0217	--	--	< 0.0221
PCB-1260 (Aroclor 1260)	mg/kg		0.500	B Cancer	--	< 0.0210	--	< 0.0213	--	< 0.0225	--	--	--	< 0.0226	--	< 0.0215	< 0.0217	--	--	< 0.0221
Total PCBs (HalfDL)	mg/kg		1	Method A	--	< 0.0735	--	< 0.0746	--	< 0.0788	--	--	--	< 0.0791	--	< 0.0753	< 0.0760	--	--	< 0.0774
Total PCBs (HitsOnly)	mg/kg		1	Method A	--	< 0.00	--	< 0.00	--	< 0.00	--	--	--	< 0.00	--	< 0.00	< 0.00	--	--	< 0.00
Semi Volatile Organic Compounds using SIM																				
1,2,4-Trichlorobenzene	mg/kg		34.5	B Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.425	< 0.403	--
2,2'-oxybis(1-Chloro)propane	mg/kg		14.3	B Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.425	< 0.403	--
2,4,6-Trichlorophenol	mg/kg		80	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.425	< 0.403	--
2,4-Dichlorophenol	mg/kg		240	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.425	< 0.403	--
2,4-Dimethylphenol	mg/kg		1600	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.425	< 0.403	--
2,4-Dinitrophenol	mg/kg		160	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.425	< 0.403	--
2,4-Dinitrotoluene	mg/kg		3.23	B Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.425	< 0.403	--
2,6-Dinitrotoluene	mg/kg		0.667	B Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.425	< 0.403	--
2-Chlorophenol	mg/kg		400	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.425	< 0.403	--
2-Nitrophenol	mg/kg				--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.425	< 0.403	--
3,3'-Dichlorobenzidine	mg/kg		2.22	B Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.425	< 0.403	--
4,6-Dinitro-2-Methylphenol	mg/kg				--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.425	< 0.403	--
4-Bromophenyl phenyl ether	mg/kg				--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.425	< 0.403	--
4-Chloro-3-Methylphenol	mg/kg				--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.425	< 0.403	--
4-Chlorophenyl phenyl ether	mg/kg				--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.425	< 0.403	--
4-Nitrophenol	mg/kg				--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.425	< 0.403	--
Benzidine	mg/kg		0.00435	B Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	*< 0.425*	*< 0.403*	--
Benzyl butyl phthalate	mg/kg		526	B Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.425	< 0.403	--
bis(2-Chloroethoxy) methane	mg/kg				--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.425	< 0.403	--
bis(2-Chloroethyl) ether	mg/kg		0.909	B Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.425	< 0.403	--
bis(2-Ethylhexyl) phthalate	mg/kg		71.4	B Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.425	< 0.403	--
Diethyl phthalate	mg/kg		64000	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.425	< 0.403	--
Dimethyl phthalate	mg/kg				--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.425	< 0.403	--
Di-n-butyl phthalate	mg/kg		8000	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.425	< 0.403	--
Di-n-Octyl phthalate	mg/kg		800	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.425	< 0.403	--
Hexachlorobenzene	mg/kg		0.625	B Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.425	< 0.403	--
Hexachlorobutadiene	mg/kg		12.8	B Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.425	< 0.403	--
Hexachlorocyclopentadiene	mg/kg		480	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.425	< 0.403	--
Hexachloroethane	mg/kg		25.0	B Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.425	< 0.403	--
Isophorone	mg/kg		1050	B Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.425	< 0.403	--
Nitrobenzene	mg/kg		160	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.425	< 0.403	--
n-Nitrosodimethylamine	mg/kg		0.0196	B Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	*< 0.425*	*< 0.403*	--
n-Nitrosodi-n-Propylamine	mg/kg		0.143	B Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	*< 0.425*	*< 0.403*	--
n-Nitrosodiphenylamine	mg/kg		204	B Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.425	< 0.403	--
Pentachlorophenol	mg/kg		2.50	B Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.425	< 0.403	--
Phenol	mg/kg		24000	B Non Cancer	--	--	--	--	--	--	--	--	--	--	--	--	--	< 0.425	< 0.403	--
1-Methylnaphthalene	mg/kg		34.5	B Cancer	--	< 0.0247	--	< 0.0250	< 0.0241	< 0.0264	< 0.0264	--	--	< 0.0266	--	< 0.0253	< 0.0255	--	--	< 0.0260
2-Chloronaphthalene	mg/kg		6400	B Non Cancer	--	< 0.0247	--	< 0.0250	< 0.0241	< 0.0264	< 0.0264	--	--	< 0.0266	--	< 0.0253	< 0.0255	< 0.0421	< 0.0399	< 0.0260
2-Methylnaphthalene	mg/kg		320	B Non Cancer	--	< 0.0247	--	< 0.0250	< 0.0241	< 0.0264	< 0.0264	--	--	< 0.0266	--	< 0.0253	< 0.0255	--	--	< 0.0260
Acenaphthene	mg/kg		4800	B Non Cancer	--	< 0.00740	--	< 0.00751	< 0.00722	< 0.00793	< 0.00792	--	--	< 0.00798	--	< 0.00759	< 0.00766	< 0.0421	< 0.0399	< 0.00780
Acenaphthylene	mg/kg				--	< 0.00740	--	< 0.00751	< 0.00722	< 0.00793	< 0.00792	--	--	< 0.00798	--	< 0.00759	< 0.00766	< 0.0421	< 0.0399	< 0.00780
Anthracene	mg/kg		24000	B Non Cancer	--	< 0.00740	--	< 0.00751	< 0.00722	< 0.00793	< 0.00792	--	--	< 0.00798	--	< 0.00759	< 0.00766	< 0.0421	< 0.0399	< 0.00780

2017 INVESTIGATION SOIL SAMPLE ANALYTICAL RESULTS
80 S Hudson Expanded Site
Seattle, Washington

				Location	MW-03	MW-04	MW-04	MW-05	MW-05	MW-06	MW-06	MW-06	MW-07	MW-07	MW-08	MW-08	MW-09	MW-09	MW-10	MW-10
				Sample ID	MW-03 (19.0-20.0)	MW-04 (12.0-13.0)	MW-04 (19.0-20.0)	MW-05 (10.5-11.0)	MW-05 (19.0-20.0)	MW-06 (11.0-12.0)	DUP-03-20170307	MW-06 (19.0-20.0)	MW-07 (12.0-13.0)	MW-07 (19.0-20.0)	MW-08 (12.0-13.0)	MW-08 (19.0-20.0)	MW-09 (12.5-13.0)	MW-09 (19.0-20.0)	MW-10 (9.5-10.0)	MW-10 (19.0-20.0)
				Date	3/6/2017	3/6/2017	3/6/2017	3/7/2017	3/7/2017	3/6/2017	3/7/2017	3/7/2017	3/7/2017	3/7/2017	3/7/2017	3/7/2017	3/8/2017	3/8/2017	3/8/2017	3/8/2017
				Parent Sample ID							MW-06 (11.0-12.0)									
				Sample Depths	19.0-20.0 ft	12.0-13.0 ft	19.0-20.0 ft	10.5-11.0 ft	19.0-20.0 ft	11.0-12.0 ft	11.0-12.0 ft	19.0-20.0 ft	12.0-13.0 ft	19.0-20.0 ft	12.0-13.0 ft	19.0-20.0 ft	12.5-13.0 ft	19.0-20.0 ft	9.5-10.0 ft	19.0-20.0 ft
				Note																
Chemical	**Unit**	**TEF**	**MTCA A then Lowest B CUL**															SVOCs by 8270 without SIM	SVOCs by 8270 without SIM	
Benzo(a)anthracene	mg/kg	0.1	1.37	B Cancer	--	< 0.00740	--	< 0.00751	**0.0880**	< 0.00793	< 0.00792	--	--	< 0.00798	--	< 0.00759	< 0.00766	< 0.0421	< 0.0399	< 0.00780
Benzo(a)pyrene	mg/kg	1	0.1	Method A	--	< 0.00740	--	< 0.00751	**0.0435**	< 0.00793	**0.0229**	--	--	< 0.00798	--	< 0.00759	< 0.00766	< 0.0421	< 0.0399	< 0.00780
Benzo(b)Fluoranthene	mg/kg	0.1	1.37	B Cancer	--	< 0.00740	--	< 0.00751	**0.0618**	< 0.00793	< 0.00792	--	--	< 0.00798	--	< 0.00759	< 0.00766	< 0.0421	< 0.0399	< 0.00780
Benzo(g,h,i)Perylene	mg/kg				--	< 0.00740	--	< 0.00751	**0.0228**	< 0.00793	< 0.00792	--	--	< 0.00798	--	< 0.00759	< 0.00766	< 0.0421	< 0.0399	< 0.00780
Benzo(k)Fluoranthene	mg/kg	0.1	13.7	B Cancer	--	< 0.00740	--	< 0.00751	**0.0228**	< 0.00793	< 0.00792	--	--	< 0.00798	--	< 0.00759	< 0.00766	< 0.0421	< 0.0399	< 0.00780
Chrysene	mg/kg	0.01	137	B Cancer	--	< 0.00740	--	< 0.00751	**0.0887**	< 0.00793	< 0.00792	--	--	< 0.00798	--	< 0.00759	< 0.00766	< 0.0421	< 0.0399	< 0.00780
Dibenz(a,h)Anthracene	mg/kg	0.1	0.137	B Cancer	--	< 0.00740	--	< 0.00751	**0.00754**	< 0.00793	< 0.00792	--	--	< 0.00798	--	< 0.00759	< 0.00766	< 0.0421	< 0.0399	< 0.00780
Fluoranthene	mg/kg		3200	B Non Cancer	--	< 0.00740	--	< 0.00751	**0.191**	< 0.00793	< 0.00792	--	--	< 0.00798	--	< 0.00759	< 0.00766	< 0.0421	< 0.0399	< 0.00780
Fluorene	mg/kg		3200	B Non Cancer	--	< 0.00740	--	< 0.00751	< 0.00722	< 0.00793	< 0.00792	--	--	< 0.00798	--	< 0.00759	< 0.00766	< 0.0421	< 0.0399	< 0.00780
Indeno(1,2,3-c,d)Pyrene	mg/kg	0.1	1.37	B Cancer	--	< 0.00740	--	< 0.00751	**0.0223**	< 0.00793	< 0.00792	--	--	< 0.00798	--	< 0.00759	< 0.00766	< 0.0421	< 0.0399	< 0.00780
Naphthalene	mg/kg		5	Method A	--	< 0.0247	--	< 0.0250	< 0.0241	< 0.0264	< 0.0264	--	--	< 0.0266	--	< 0.0253	< 0.0255	< 0.0421	< 0.0399	< 0.0260
Phenanthrene	mg/kg				--	< 0.00740	--	< 0.00751	< 0.00722	< 0.00793	< 0.00792	--	--	< 0.00798	--	< 0.00759	< 0.00766	< 0.0421	< 0.0399	< 0.00780
Pyrene	mg/kg		2400	B Non Cancer	--	< 0.00740	--	< 0.00751	**0.191**	< 0.00793	< 0.00792	--	--	< 0.00798	--	< 0.00759	< 0.00766	< 0.0421	< 0.0399	< 0.00780
Total cPAHs (HalfDL)	mg/kg		0.1	Method A	--	< 0.00559	--	< 0.00567	**0.0646**	< 0.00599	**0.0249**	--	--	< 0.00602	--	< 0.00573	< 0.00578	< 0.0318	< 0.0301	< 0.00589
Total cPAHs (HitsOnly)	mg/kg		0.1	Method A	--	< 0.00	--	< 0.00	**0.0646**	< 0.00	**0.0229**	--	--	< 0.00	--	< 0.00	< 0.00	< 0.00	< 0.00	< 0.00
Volatile Organic Compounds																				
1,1,1,2-Tetrachloroethane	mg/kg		38.5	B Cancer	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
1,1,1-Trichloroethane	mg/kg		2	Method A	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
1,1,2,2-Tetrachloroethane	mg/kg		5.00	B Cancer	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
1,1,2-Trichloroethane	mg/kg		17.5	B Cancer	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
1,1-Dichloroethane	mg/kg		175	B Cancer	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
1,1-Dichloroethene	mg/kg		4000	B Non Cancer	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
1,1-Dichloropropene	mg/kg				--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
1,2,3-Trichlorobenzene	mg/kg				--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
1,2,3-Trichloropropane	mg/kg		0.0333	B Cancer	--	< 0.00324	--	< 0.00391	--	< 0.00330	--	--	--	< 0.00332	--	< 0.00316	< 0.00326	--	--	< 0.00325
1,2,3-Trimethylbenzene	mg/kg				--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
1,2,4-Trichlorobenzene	mg/kg		34.5	B Cancer	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
1,2,4-Trimethylbenzene	mg/kg				--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
1,2-Dibromo-3-Chloropropane (DBCP)	mg/kg		1.25	B Cancer	--	< 0.00647	--	< 0.00783	--	< 0.00660	--	--	--	< 0.00665	--	< 0.00632	< 0.00651	--	--	< 0.00650
1,2-Dibromoethane (EDB)	mg/kg		0.005	Method A	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
1,2-Dichlorobenzene	mg/kg		7200	B Non Cancer	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
1,2-Dichloroethane (EDC)	mg/kg		11.0	B Cancer	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
1,2-Dichloropropane	mg/kg		27.8	B Cancer	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
1,3,5-Trimethylbenzene	mg/kg		800	B Non Cancer	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
1,3-Dichlorobenzene	mg/kg				--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
1,3-Dichloropropane	mg/kg				--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
1,4-Dichlorobenzene	mg/kg		185	B Cancer	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
2,2-Dichloropropane	mg/kg				--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
2-Chlorotoluene	mg/kg		1600	B Non Cancer	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
4-Chlorotoluene	mg/kg				--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
Acetone	mg/kg		72000	B Non Cancer	--	< 0.0647	--	< 0.0783	--	< 0.0660	--	--	--	< 0.0665	--	< 0.0632	< 0.0651	--	--	< 0.0650
Acrylonitrile	mg/kg		1.85	B Cancer	--	< 0.0129	--	< 0.0157	--	< 0.0132	--	--	--	< 0.0133	--	< 0.0126	< 0.0130	--	--	< 0.0130
Bromobenzene	mg/kg				--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
Bromodichloromethane	mg/kg		16.1	B Cancer	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
Bromoform	mg/kg		127	B Cancer	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
Bromomethane	mg/kg		112	B Non Cancer	--	< 0.00647	--	< 0.00783	--	< 0.00660	--	--	--	< 0.00665	--	< 0.00632	< 0.00651	--	--	< 0.00650
Carbon Tetrachloride	mg/kg		14.3	B Cancer	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
Chlorobenzene	mg/kg		1600	B Non Cancer	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
Chloroethane	mg/kg				--	< 0.00647	--	< 0.00783	--	< 0.00660	--	--	--	< 0.00665	--	< 0.00632	< 0.00651	--	--	< 0.00650
Chloroform	mg/kg		32.3	B Cancer	--	< 0.00647	--	< 0.00783	--	< 0.00660	--	--	--	< 0.00665	--	< 0.00632	< 0.00651	--	--	< 0.00650
Chloromethane	mg/kg				--	< 0.00324	--	< 0.00391	--	< 0.00330	--	--	--	< 0.00332	--	< 0.00316	< 0.00326	--	--	< 0.00325
cis-1,2-Dichloroethene	mg/kg		160	B Non Cancer	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
cis-1,3-Dichloropropene	mg/kg		10.0	B Cancer	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
Cymene (p-Isopropyltoluene)	mg/kg				--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
Dibromochloromethane	mg/kg		11.9	B Cancer	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
Dibromomethane	mg/kg		800	B Non Cancer	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
Dichlorodifluoromethane	mg/kg		16000	B Non Cancer	--	< 0.00647	--	< 0.00783	--	< 0.00660	--	--	--	< 0.00665	--	< 0.00632	< 0.00651	--	--	< 0.00650
Di-Isopropyl ether (DIPE)	mg/kg				--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
Freon 113	mg/kg		2400000	B Non Cancer	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
Hexachlorobutadiene	mg/kg		12.8	B Cancer	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
Isopropylbenzene	mg/kg		8000	B Non Cancer	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130

2017 INVESTIGATION SOIL SAMPLE ANALYTICAL RESULTS
80 S Hudson Expanded Site
Seattle, Washington

				Location	MW-03	MW-04	MW-04	MW-05	MW-05	MW-06	MW-06	MW-06	MW-07	MW-07	MW-08	MW-08	MW-09	MW-09	MW-10	MW-10
				Sample ID	MW-03 (19.0-20.0)	MW-04 (12.0-13.0)	MW-04 (19.0-20.0)	MW-05 (10.5-11.0)	MW-05 (19.0-20.0)	MW-06 (11.0-12.0)	DUP-03-20170307	MW-06 (19.0-20.0)	MW-07 (12.0-13.0)	MW-07 (19.0-20.0)	MW-08 (12.0-13.0)	MW-08 (19.0-20.0)	MW-09 (12.5-13.0)	MW-09 (19.0-20.0)	MW-10 (9.5-10.0)	MW-10 (19.0-20.0)
				Date	3/6/2017	3/6/2017	3/6/2017	3/7/2017	3/7/2017	3/6/2017	3/7/2017	3/7/2017	3/7/2017	3/7/2017	3/7/2017	3/7/2017	3/8/2017	3/8/2017	3/8/2017	3/8/2017
				Parent Sample ID							MW-06 (11.0-12.0)									
				Sample Depths	19.0-20.0 ft	12.0-13.0 ft	19.0-20.0 ft	10.5-11.0 ft	19.0-20.0 ft	11.0-12.0 ft	11.0-12.0 ft	19.0-20.0 ft	12.0-13.0 ft	19.0-20.0 ft	12.0-13.0 ft	19.0-20.0 ft	12.5-13.0 ft	19.0-20.0 ft	9.5-10.0 ft	19.0-20.0 ft
				Note														SVOCs by 8270 without SIM	SVOCs by 8270 without SIM	
Chemical	**Unit**	**TEF**	**MTCA A then Lowest B CUL**																	
Methyl ethyl ketone (2-Butanone)	mg/kg		48000	B Non Cancer	--	< 0.0129	--	< 0.0157	--	< 0.0132	--	--	--	< 0.0133	--	< 0.0126	< 0.0130	--	--	< 0.0130
Methyl Isobutyl Ketone (MIBK)	mg/kg		6400	B Non Cancer	--	< 0.0129	--	< 0.0157	--	< 0.0132	--	--	--	< 0.0133	--	< 0.0126	< 0.0130	--	--	< 0.0130
Methyl tert-Butyl ether	mg/kg		0.1	Method A	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
Methylene Chloride	mg/kg		0.02	Method A	--	< 0.00647	--	< 0.00783	--	< 0.00660	--	--	--	< 0.00665	--	< 0.00632	< 0.00651	--	--	< 0.00650
Naphthalene	mg/kg		5	Method A	--	< 0.00647	--	< 0.00783	--	< 0.00660	--	--	--	< 0.00665	--	< 0.00632	< 0.00651	--	--	< 0.00650
n-Butylbenzene	mg/kg		4000	B Non Cancer	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
n-Propylbenzene	mg/kg		8000	B Non Cancer	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
Sec-Butylbenzene	mg/kg		8000	B Non Cancer	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
Styrene	mg/kg		16000	B Non Cancer	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
Tert-Butylbenzene	mg/kg		8000	B Non Cancer	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
Tetrachloroethene (PCE)	mg/kg		0.05	Method A	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
trans-1,2-Dichloroethene	mg/kg		1600	B Non Cancer	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
trans-1,3-Dichloropropene	mg/kg		10.0	B Cancer	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
Trichloroethene (TCE)	mg/kg		0.03	Method A	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
Trichlorofluoromethane	mg/kg		24000	B Non Cancer	--	< 0.00647	--	< 0.00783	--	< 0.00660	--	--	--	< 0.00665	--	< 0.00632	< 0.00651	--	--	< 0.00650
Vinyl Chloride	mg/kg		0.670	B Cancer	--	< 0.00129	--	< 0.00157	--	< 0.00132	--	--	--	< 0.00133	--	< 0.00126	< 0.00130	--	--	< 0.00130
Metals																				
Arsenic	mg/kg		20	Method A	--	< 2.47	--	< 2.50	--	< 2.64	--	--	--	< 2.66	--	< 2.53	< 2.55	--	--	< 2.60
Barium	mg/kg		16000	B Non Cancer	--	**8.17**	--	**10.0**	--	**21.0**	--	--	--	**8.41**	--	**6.29**	**12.7**	--	--	**10.2**
Cadmium	mg/kg		2	Method A	--	< 0.617	--	< 0.626	--	< 0.660	--	--	--	< 0.665	--	< 0.632	< 0.638	--	--	< 0.650
Chromium, total	mg/kg				--	**4.34**	--	**7.58**	--	**8.35**	--	--	--	**6.60**	--	**5.52**	**5.17**	--	--	**5.30**
Lead	mg/kg		250	Method A	--	< 1.33 U	--	< 0.864 U	--	< 1.59 U	--	--	--	< 1.27 U	--	< 0.773 U	< 1.19 U	--	--	< 1.20 U
Mercury	mg/kg		2	Method A	--	< 0.0247	--	< 0.0250	--	< 0.0264	--	--	--	< 0.0266	--	< 0.0253	< 0.0255	--	--	< 0.0260
Selenium	mg/kg		400	B Non Cancer	--	< 2.47	--	< 2.50	--	< 2.64	--	--	--	< 2.66	--	< 2.53	< 2.55	--	--	< 2.60
Silver	mg/kg		400	B Non Cancer	--	< 1.23	--	< 1.25	--	< 1.32	--	--	--	< 1.33	--	< 1.26	< 1.28	--	--	< 1.30

409	Detected concentrations above the cleanup level are shaded yellow and bolded.
< 0.0913	Non-detect values above the cleanup level are shaded gray and italicized.
0.682 J	Detected concentrations at or above the method reporting limit are shown in bold.

Abbreviations and Symbols

" - -" denotes not measured, not available, or not applicable.
" < " denotes not detected at or above the indicated method reporting limit.
"DUP" denotes a field duplicate sample. Primary sample ID is provided beneath the duplicate sample ID.
"J" indicates an estimated concentration based on either the being less than the laboratory reporting limit or data validation findings.
"U" denotes that the value has been qualified as undetected (at the detected concentration if above the method reporting limit) due to blank contamination.
Total cPAHs (HitsOnly) = Possible total cPAHs are based on the relative toxicity of each cPAH to benzo(a)pyrene and were calculated by multiplying the individual detected cPAH concentrations by a toxicity equivalency factor (TEF) and summing the adjusted concentrations.
Total cPAHs (HalfDL) = Possible total cPAHs are based on the relative toxicity of each cPAH to benzo(a)pyrene and were calculated by multiplying the individual detected cPAH concentrations by a toxicity equivalency factor (TEF) and summing the adjusted concentrations. If an individual cPAH was not detected, a value of one half the method reporting limit was used in the calculation.
Total PCBs (HitsOnly) = Total PCB concentration based on the sum of individual aroclor concentrations detected.
Total PCBs (HalfDL) = Total PCB concentration based on the sum of individual aroclor concentrations detected. If an individual PCB aroclor was not detected, a value of one half the method reporting limit was used in the calculation.
bgs = below ground surface
ft = feet
mg/kg = milligrams per kilogram

Cleanup Levels (CUL)

Cleanup level values based on Model Toxics Control Act (MTCA) Method A values for unrestricted land use (Method A) based on Washington State Administrative Code (WAC) 173-340-740 Table 740-1. Where MTCA Method A values are not available, the lowest of MTCA Method B values (B Cancer or B Non Cancer) from Cleanup Levels and Risk Calculation (CLARC) tables have been used (Accessed January 2017).

Methods

Samples analyzed for gasoline-range organics (GRO) using Northwest Total Petroleum Hydrocarbon (NWTPH)-Gx and diesel- and oil-range organics (DRO and ORO) using NWTPH-Dx (without silica gel cleanup).
Samples analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX) and Volatile Organic Compounds using EPA Method 8260.
Samples analyzed for metals using EPA Method 6010 except mercury which was analyzed by EPA Method 7471.
Samples analyzed for Semivolatile Organic Compound using EPA Method 8270 with selective ion monitoring (SIM). In cases where SIM was not used it is noted in the notes row.
Samples analyzed for Polychlorinated Biphenyls using EPA Method 8082.

2017 INVESTIGATION RECONNAISSANCE GROUNDWATER SAMPLE ANALYTICAL RESULTS
80 S Hudson Expanded Site
Seattle, Washington

				Location	B-01	B-02	B-02	B-03	B-04	B-05	B-06	MW-01	MW-02	MW-02	MW-03	MW-04	MW-05	MW-06	MW-07	MW-08	MW-09	MW-10
				Date	3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/7/2017	4/7/2017	4/11/2017	4/11/2017	4/13/2017	4/11/2017	4/11/2017	4/13/2017	4/13/2017	4/11/2017	4/7/2017	4/7/2017
				Sample ID	B-01	B-02	DUP-01-20170306	B-03	B-04	B-05	B-06	MW-1-20170407	MW-2-20170411	D-1-20170411	MW-3-20170413	MW-4-20170411	MW-5-20170411	MW-6-20170413	MW-7-20170413	MW-8-20170411	MW-9-20170407	MW-10-20170407
				Duplicate Parent Sample			B-02							MW-2-20170411								
				Depth to water (btoc)	Recon Well	Recon Well	Recon Well	Recon Well	Recon Well	Recon Well	Recon Well	7.0 ft	6.9 ft	6.9 ft	7.8 ft	7.9 ft	7.8 ft	6.9 ft	6.9 ft	6.8 ft	7.1 ft	7.5 ft
				Screen Interval (bgs)	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft
				Note					Arsenic by 6020	Arsenic by 6020	Arsenic by 6020	SVOCs by 8270 without SIM, Arsenic by 6020	Metals by 6020	Metals by 6020	Metals by 6020	Metals by 6020	Metals by 6020	Metals by 6020	Metals by 6020	Metals by 6020	SVOCs by 8270 without SIM, Arsenic by 6020	SVOCs by 8270 without SIM, Arsenic by 6020
Chemical	**Unit**	**TEF**	**MTCA A Then Lowest B CUL**																			
Total Petroleum Hydrocarbons																						
Gasoline-Range Organics	µg/L		800/1000	Method A	**53.2 J**	**46.2 J**	**47.4 J**	**33.3 J**	< 31.6	< 31.6	**33.2 J**	< 31.6	< 31.6	< 31.6	**124**	< 31.6	< 31.6	< 31.6	< 31.6	< 31.6	< 31.6	< 31.6
Oil-Range Organics	µg/L		500	Method A	**331 J**	**982**	**1120**	< 165	< 165	< 165	**187 J**	**230 J**	**185 J**	**232 J**	**1040**	< 165	< 165	**282 J**	**282 J**	< 165	< 165	< 165
Diesel-Range Organics	µg/L		500	Method A	**103 J**	**3150**	**3580**	< 82.5	< 82.5	< 82.5	**171 J**	**1110**	**86.1 J**	**102 J**	**2860**	< 82.5	**109 J**	**123 J**	**136 J**	< 82.5	< 82.5	< 82.5
BTEX																						
Benzene	µg/L		5	Method A	< 0.331	< 0.331	--	< 0.331	< 0.331	< 0.331	< 0.331	< 0.331	< 0.331	< 0.331	< 0.331	< 0.331	< 0.331	< 0.331	< 0.331	< 0.331	< 0.331	< 0.331
Toluene	µg/L		1000	Method A	< 0.412	< 0.412	--	< 0.412	< 0.412	< 0.412	< 0.412	< 0.412	< 0.412	< 0.412	< 0.412	< 0.412	< 0.412	< 0.412	< 0.412	< 0.412	< 0.412	< 0.412
Ethylbenzene	µg/L		700	Method A	< 0.384	< 0.384	--	< 0.384	< 0.384	< 0.384	< 0.384	< 0.384	< 0.384	< 0.384	< 0.384	< 0.384	< 0.384	< 0.384	< 0.384	< 0.384	< 0.384	< 0.384
Xylene, m,p-	µg/L				--	--	--	--	--	--	--	--	< 0.719	< 0.719	**1.05 J**	< 0.719	< 0.719	< 0.719	< 0.719	< 0.719	--	--
Xylene, o-	µg/L		1600	B Non Cancer	--	--	--	--	--	--	--	--	< 0.341	< 0.341	< 0.341	< 0.341	< 0.341	< 0.341	< 0.341	< 0.341	--	--
Xylene, total	µg/L		1000	Method A	< 1.06	< 1.06	--	< 1.06	< 1.06	< 1.06	< 1.06	< 1.06	--	--	--	--	--	--	--	--	< 1.06	< 1.06
Polychlorinated Biphenyls																						
PCB-1016 (Aroclor 1016)	µg/L		1.12	B Non Cancer	--	--	--	--	--	--	--	--	< 0.111	< 0.133	< 0.100	< 0.167	< 0.125	< 0.143	< 0.125	< 0.111	--	--
PCB-1221 (Aroclor 1221)	µg/L				--	--	--	--	--	--	--	--	< 0.0810	< 0.0971	< 0.0730	< 0.122	< 0.0912	< 0.104	< 0.0912	< 0.0810	--	--
PCB-1232 (Aroclor 1232)	µg/L				--	--	--	--	--	--	--	--	< 0.0466	< 0.0559	< 0.0420	< 0.0701	< 0.0525	< 0.0601	< 0.0525	< 0.0466	--	--
PCB-1242 (Aroclor 1242)	µg/L				--	--	--	--	--	--	--	--	< 0.0522	< 0.0625	< 0.0470	< 0.0785	< 0.0588	< 0.0672	< 0.0588	< 0.0522	--	--
PCB-1248 (Aroclor 1248)	µg/L				--	--	--	--	--	--	--	--	< 0.0955	< 0.114	< 0.0860	< 0.144	< 0.108	< 0.123	< 0.108	< 0.0955	--	--
PCB-1254 (Aroclor 1254)	µg/L		0.0438	B Cancer	--	--	--	--	--	--	--	--	*< 0.0522*	*< 0.0625*	*< 0.0470*	*< 0.0785*	*< 0.0588*	*< 0.0672*	*< 0.0588*	*< 0.0522*	--	--
PCB-1260 (Aroclor 1260)	µg/L		0.0438	B Cancer	--	--	--	--	--	--	--	--	*< 0.133*	*< 0.160*	*< 0.120*	*< 0.200*	*< 0.150*	*< 0.172*	*< 0.150*	*< 0.133*	--	--
Total PCBs (HalfDL)	µg/L		0.1	Method A	--	--	--	--	--	--	--	--	*< 0.286*	*< 0.343*	*< 0.258*	*< 0.430*	*< 0.322*	*< 0.368*	*< 0.322*	*< 0.286*	--	--
Total PCBs (HitsOnly)	µg/L		0.1	Method A	--	--	--	--	--	--	--	--	*< 0.00*	*< 0.00*	*< 0.00*	*< 0.00*	*< 0.00*	*< 0.00*	*< 0.00*	*< 0.00*	--	--
Semi Volatile Organic Compounds using SIM																						
1,2,4-Trichlorobenzene	µg/L		1.51	B Cancer	--	--	--	--	--	--	--	< 0.323	--	--	--	--	--	--	--	--	< 0.323	< 0.323
2,2'-oxybis(1-Chloro)propane	µg/L		0.625	B Cancer	--	--	--	--	--	--	--	< 0.405	--	--	--	--	--	--	--	--	< 0.405	< 0.405
2,4,6-Trichlorophenol	µg/L		3.98	B Cancer	--	--	--	--	--	--	--	< 0.270	--	--	--	--	--	--	--	--	< 0.270	< 0.270
2,4-Dichlorophenol	µg/L		24	B Non Cancer	--	--	--	--	--	--	--	< 0.258	--	--	--	--	--	--	--	--	< 0.258	< 0.258
2,4-Dimethylphenol	µg/L		160	B Non Cancer	--	--	--	--	--	--	--	< 0.568	--	--	--	--	--	--	--	--	< 0.568	< 0.568
2,4-Dinitrophenol	µg/L		32	B Non Cancer	--	--	--	--	--	--	--	< 2.96	--	--	--	--	--	--	--	--	< 2.96	< 2.96
2,4-Dinitrotoluene	µg/L		0.282	B Cancer	--	--	--	--	--	--	--	*< 1.50*	--	--	--	--	--	--	--	--	*< 1.50*	*< 1.50*
2,6-Dinitrotoluene	µg/L		0.0583	B Cancer	--	--	--	--	--	--	--	*< 0.254*	--	--	--	--	--	--	--	--	*< 0.254*	*< 0.254*
2-Chlorophenol	µg/L		40	B Non Cancer	--	--	--	--	--	--	--	< 0.258	--	--	--	--	--	--	--	--	< 0.258	< 0.258
2-Nitrophenol	µg/L				--	--	--	--	--	--	--	< 0.291	--	--	--	--	--	--	--	--	< 0.291	< 0.291
3,3'-Dichlorobenzidine	µg/L		0.194	B Cancer	--	--	--	--	--	--	--	*< 1.84*	--	--	--	--	--	--	--	--	*< 1.84*	*< 1.84*
4,6-Dinitro-2-Methylphenol	µg/L				--	--	--	--	--	--	--	< 2.38	--	--	--	--	--	--	--	--	< 2.38	< 2.38
4-Bromophenyl phenyl ether	µg/L				--	--	--	--	--	--	--	< 0.305	--	--	--	--	--	--	--	--	< 0.305	< 0.305
4-Chloro-3-Methylphenol	µg/L				--	--	--	--	--	--	--	< 0.239	--	--	--	--	--	--	--	--	< 0.239	< 0.239
4-Chlorophenyl phenyl ether	µg/L				--	--	--	--	--	--	--	< 0.276	--	--	--	--	--	--	--	--	< 0.276	< 0.276
4-Nitrophenol	µg/L				--	--	--	--	--	--	--	< 1.83	--	--	--	--	--	--	--	--	< 1.83	< 1.83
Benzidine	µg/L		0.000380	B Cancer	--	--	--	--	--	--	--	*< 3.93*	--	--	--	--	--	--	--	--	*< 3.93*	*< 3.93*
Benzyl butyl phthalate	µg/L		46.1	B Cancer	--	--	--	--	--	--	--	< 0.250	--	--	--	--	--	--	--	--	< 0.250	< 0.250
bis(2-Chloroethoxy) methane	µg/L				--	--	--	--	--	--	--	< 0.299	--	--	--	--	--	--	--	--	< 0.299	< 0.299
bis(2-Chloroethyl) ether	µg/L		0.0398	B Cancer	--	--	--	--	--	--	--	*< 1.47*	--	--	--	--	--	--	--	--	*< 1.47*	*< 1.47*
bis(2-Ethylhexyl) phthalate	µg/L		6.25	B Cancer	--	--	--	--	--	--	--	**0.859 J**	--	--	--	--	--	--	--	--	< 0.645	< 0.645
Diethyl phthalate	µg/L		12800	B Non Cancer	--	--	--	--	--	--	--	< 0.597 U	--	--	--	--	--	--	--	--	< 0.257	< 0.257
Dimethyl phthalate	µg/L				--	--	--	--	--	--	--	< 0.258	--	--	--	--	--	--	--	--	< 0.258	< 0.258
Di-n-butyl phthalate	µg/L		1600	B Non Cancer	--	--	--	--	--	--	--	< 0.242	--	--	--	--	--	--	--	--	< 0.242	< 0.242
Di-n-Octyl phthalate	µg/L		160	B Non Cancer	--	--	--	--	--	--	--	< 0.253	--	--	--	--	--	--	--	--	< 0.253	< 0.253
Hexachlorobenzene	µg/L		0.0547	B Cancer	--	--	--	--	--	--	--	*< 0.310*	--	--	--	--	--	--	--	--	*< 0.310*	*< 0.310*
Hexachlorobutadiene	µg/L		0.561	B Cancer	--	--	--	--	--	--	--	< 0.299	--	--	--	--	--	--	--	--	< 0.299	< 0.299
Hexachlorocyclopentadiene	µg/L		48	B Non Cancer	--	--	--	--	--	--	--	< 2.12	--	--	--	--	--	--	--	--	< 2.12	< 2.12
Hexachloroethane	µg/L		1.09	B Cancer	--	--	--	--	--	--	--	< 0.332	--	--	--	--	--	--	--	--	< 0.332	< 0.332
Isophorone	µg/L		46.1	B Cancer	--	--	--	--	--	--	--	< 0.248	--	--	--	--	--	--	--	--	< 0.248	< 0.248
Nitrobenzene	µg/L		16	B Non Cancer	--	--	--	--	--	--	--	< 0.334	--	--	--	--	--	--	--	--	< 0.334	< 0.334
n-Nitrosodimethylamine	µg/L		0.000858	B Cancer	--	--	--	--	--	--	--	*< 1.15*	--	--	--	--	--	--	--	--	*< 1.15*	*< 1.15*
n-Nitrosodi-n-Propylamine	µg/L		0.0125	B Cancer	--	--	--	--	--	--	--	*< 0.367*	--	--	--	--	--	--	--	--	*< 0.367*	*< 0.367*
n-Nitrosodiphenylamine	µg/L		17.9	B Cancer	--	--	--	--	--	--	--	< 0.277	--	--	--	--	--	--	--	--	< 0.277	< 0.277
Pentachlorophenol	µg/L		0.219	B Cancer	--	--	--	--	--	--	--	*< 0.285*	--	--	--	--	--	--	--	--	*< 0.285*	*< 0.285*
Phenol	µg/L		2400	B Non Cancer	--	--	--	--	--	--	--	< 0.304	--	--	--	--	--	--	--	--	< 0.304	< 0.304
1-Methylnaphthalene	µg/L		1.51	B Cancer	**0.0103 J**	**0.0275 J**	--	**0.0810 J**	**0.0488 J**	< 0.00821	< 0.00821	--	**0.0464 J**	**0.0239 J**	**9.16**	**0.00999 J**	**0.00876 J**	**0.0151 J**	**0.0168 J**	**0.0161 J**	--	--
2-Chloronaphthalene	µg/L		640	B Non Cancer	< 0.00647	< 0.00647	--	< 0.00647	< 0.00647	< 0.00647	< 0.00647	< 0.300	< 0.00647	< 0.00647	< 0.00647	< 0.00647	< 0.00647	< 0.00647	< 0.00647	< 0.00647	--	--
2-Methylnaphthalene	µg/L		32	B Non Cancer	**0.0134 J**	**0.0220 J**	--	**0.142 J**	**0.0769 J**	**0.0107 J**	< 0.00902	--	**0.0577 J**	< 0.0339 U	**1.10**	< 0.0155 U	< 0.0137 U	< 0.0247 U	< 0.0243 U	< 0.0227 U	--	--
Acenaphthene	µg/L		960	B Non Cancer	< 0.0100	**0.174**	--	< 0.0100	< 0.0100	< 0.0100	< 0.0100	< 0.288	< 0.0100	< 0.0100	**1.52**	< 0.0100	< 0.0100	< 0.0100	**0.902**	< 0.0100	--	--
Acenaphthylene	µg/L				< 0.0120	**0.0466 J**	--	< 0.0120	< 0.0120	< 0.0120	< 0.0120	< 0.281	< 0.0120	< 0.0120	**0.120**	< 0.0120	< 0.0120	< 0.0120	< 0.0120	< 0.0120	--	--
Anthracene	µg/L		4800	B Non Cancer	< 0.0140	< 0.0140	--	< 0.0140	< 0.0140	< 0.0140	< 0.0140	< 0.265	**0.0163 J**	< 0.0140	**0.195**	< 0.0140	< 0.0140	< 0.0140	**0.0155 J**	**0.0212 J**	--	--

2017 INVESTIGATION RECONNAISSANCE GROUNDWATER SAMPLE ANALYTICAL RESULTS
80 S Hudson Expanded Site
Seattle, Washington

Location					B-01	B-02	B-02	B-03	B-04	B-05	B-06	MW-01	MW-02	MW-02	MW-03	MW-04	MW-05	MW-06	MW-07	MW-08	MW-09	MW-10
Date					3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/7/2017	4/7/2017	4/11/2017	4/11/2017	4/13/2017	4/11/2017	4/11/2017	4/13/2017	4/13/2017	4/11/2017	4/7/2017	4/7/2017
Sample ID					B-01	B-02	DUP-01-20170306	B-03	B-04	B-05	B-06	MW-1-20170407	MW-2-20170411	D-1-20170411	MW-3-20170413	MW-4-20170411	MW-5-20170411	MW-6-20170413	MW-7-20170413	MW-8-20170411	MW-9-20170407	MW-10-20170407
Duplicate Parent Sample							B-02							MW-2-20170411								
Depth to water (btoc)					Recon Well	Recon Well	Recon Well	Recon Well	Recon Well	Recon Well	Recon Well	7.0 ft	6.9 ft	6.9 ft	7.8 ft	7.9 ft	7.8 ft	6.9 ft	6.9 ft	6.8 ft	7.1 ft	7.5 ft
Screen Interval (bgs)					10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft
Note									Arsenic by 6020	Arsenic by 6020	Arsenic by 6020	SVOCs by 8270 without SIM, Arsenic by 6020	Metals by 6020	Metals by 6020	Metals by 6020	Metals by 6020	Metals by 6020	Metals by 6020	Metals by 6020	Metals by 6020	SVOCs by 8270 without SIM, Arsenic by 6020	SVOCs by 8270 without SIM, Arsenic by 6020
Chemical	**Unit**	**TEF**	**MTCA A Then Lowest B CUL**																			
Benzo(a)anthracene	µg/L	0.1	0.120	B Cancer	< 0.00410	< 0.00410	--	< 0.00410	< 0.00410	< 0.00410	< 0.00410	< 0.0887	< 0.00410	< 0.00410	**0.00647 J**	< 0.00410	< 0.00410	< 0.00410	< 0.00410	**0.0195 J**	--	--
Benzo(a)pyrene	µg/L	1	0.1	Method A	< 0.0116	< 0.0116	--	< 0.0116	< 0.0116	< 0.0116	< 0.0116	< 0.309	< 0.0116	< 0.0116	< 0.0116	< 0.0116	< 0.0116	< 0.0116	< 0.0116	**0.0179 J**	--	--
Benzo(b)Fluoranthene	µg/L	0.1	0.120	B Cancer	< 0.00234 U	< 0.00681 U	--	< 0.00294 U	< 0.00338 U	< 0.00230 U	< 0.0133 U	< 0.0815	**0.00403 J**	**0.00432 J**	< 0.00212	**0.00436 J**	**0.00323 J**	**0.00378 J**	< 0.00212	**0.0295 J**	--	--
Benzo(g,h,i)Perylene	µg/L				< 0.00344 U	< 0.00468 U	--	< 0.00266 U	< 0.00497 U	< 0.00734 U	< 0.00861 U	< 0.146	< 0.00227	< 0.00227	< 0.00421 U	< 0.00265 U	< 0.00227	< 0.00376 U	< 0.00227	**0.0195 J**	--	--
Benzo(k)Fluoranthene	µg/L	0.1	1.20	B Cancer	< 0.0136	< 0.0136	--	< 0.0136	< 0.0136	< 0.0136	< 0.0136	< 0.323	< 0.0136	< 0.0136	< 0.0136	< 0.0136	< 0.0136	< 0.0136	< 0.0136	**0.0141 J**	--	--
Chrysene	µg/L	0.01	12.0	B Cancer	< 0.0108	< 0.0108	--	< 0.0108	< 0.0108	< 0.0108	**0.0139 J**	< 0.302	< 0.0108	< 0.0108	< 0.0108	< 0.0108	< 0.0108	< 0.0108	< 0.0108	**0.0273 J**	--	--
Dibenz(a,h)Anthracene	µg/L	0.1	0.0120	B Cancer	< 0.00396	< 0.00396	--	< 0.00396	< 0.00396	< 0.00396	< 0.00396	< 0.254	< 0.00396	< 0.00396	< 0.00396	< 0.00396	< 0.00396	< 0.00396	< 0.00396	< 0.00396	--	--
Fluoranthene	µg/L		640	B Non Cancer	< 0.0157	**0.0274 J**	--	< 0.0157	< 0.0157	< 0.0157	**0.0276 J**	< 0.282	< 0.0157	< 0.0157	**0.0387 J**	< 0.0157	< 0.0157	**0.0276 J**	**0.0167 J**	**0.0690**	--	--
Fluorene	µg/L		640	B Non Cancer	< 0.00850	< 0.00850	--	< 0.00850	< 0.00850	< 0.00850	< 0.00850	< 0.294	< 0.00850	< 0.00850	**1.93**	< 0.00850	< 0.00850	< 0.00850	< 0.00850	**0.0109 J**	--	--
Indeno(1,2,3-c,d)Pyrene	µg/L	0.1	0.120	B Cancer	< 0.0148	< 0.0148	--	< 0.0148	< 0.0148	< 0.0148	< 0.0148	< 0.254	< 0.0148	< 0.0148	< 0.0148	< 0.0148	< 0.0148	< 0.0148	< 0.0148	**0.0166 J**	--	--
Naphthalene	µg/L		160	Method A	< 0.0315 U	< 0.0794 U	--	**0.283**	< 0.139 U	< 0.0242 U	< 0.0236 U	< 0.338	< 0.0931 U	< 0.0597 U	**16.1**	< 0.0778 U	< 0.0447 U	< 0.0780 U	< 0.0633 U	< 0.0812 U	--	--
Phenanthrene	µg/L				< 0.00820	**0.0229 J**	--	< 0.00820	< 0.00820	< 0.00820	**0.0197 J**	< 0.333	< 0.0172 U	< 0.0240 U	**0.290**	< 0.0146 U	< 0.0208 U	< 0.0327 U	< 0.0239 U	< 0.0573 U	--	--
Pyrene	µg/L		480	B Non Cancer	< 0.0117	**0.0141 J**	--	< 0.0117	< 0.0117	< 0.0117	**0.0276 J**	< 0.300	< 0.0117	< 0.0117	**0.0737**	**0.0140 J**	< 0.0117	**0.0188 J**	**0.0118 J**	**0.0426 J**	--	--
Total cPAHs (HalfDL)	µg/L		0.1	Method A	< 0.00779	< 0.00802	--	< 0.00782	< 0.00785	< 0.00779	**0.00843**	< 0.206	**0.00808**	**0.00811**	**0.00823**	**0.00811**	**0.00800**	**0.00806**	< 0.00778	**0.0263**	< 0.206	< 0.206
Total cPAHs (HitsOnly)	µg/L		0.1	Method A	< 0.00	< 0.00	--	< 0.00	< 0.00	< 0.00	**0.000139**	< 0.00	**0.000403**	**0.000432**	**0.000647**	**0.000436**	**0.000323**	**0.000378**	< 0.00	**0.0261**	< 0.00	< 0.00
Volatile Organic Compounds																						
1,1,1,2-Tetrachloroethane	µg/L		1.68	B Cancer	< 0.385	< 0.385	--	< 0.385	< 0.385	< 0.385	< 0.385	< 0.385	< 0.385	< 0.385	< 0.385	< 0.385	< 0.385	< 0.385	< 0.385	< 0.385	< 0.385	< 0.385
1,1,1-Trichloroethane	µg/L		200	Method A	< 0.319	< 0.319	--	< 0.319	< 0.319	< 0.319	< 0.319	< 0.319	< 0.319	< 0.319	< 0.319	< 0.319	< 0.319	< 0.319	< 0.319	< 0.319	< 0.319	< 0.319
1,1,2,2-Tetrachloroethane	µg/L		0.219	B Cancer	< 0.130	< 0.130	--	< 0.130	< 0.130	< 0.130	< 0.130	< 0.130	< 0.130	< 0.130	< 0.130	< 0.130	< 0.130	< 0.130	< 0.130	< 0.130	< 0.130	< 0.130
1,1,2-Trichloroethane	µg/L		0.768	B Cancer	< 0.383	< 0.383	--	< 0.383	< 0.383	< 0.383	< 0.383	< 0.383	< 0.383	< 0.383	< 0.383	< 0.383	< 0.383	< 0.383	< 0.383	< 0.383	< 0.383	< 0.383
1,1-Dichloroethane	µg/L		7.68	B Cancer	< 0.259	**0.465 J**	--	< 0.259	< 0.259	< 0.259	< 0.259	**0.943 J**	< 0.259	< 0.259	< 0.259	< 0.259	**0.264 J**	< 0.259	< 0.259	< 0.259	< 0.259	< 0.259
1,1-Dichloroethene	µg/L		400	B Non Cancer	< 0.398	< 0.398	--	< 0.398	< 0.398	< 0.398	< 0.398	< 0.398	< 0.398	< 0.398	< 0.398	< 0.398	< 0.398	< 0.398	< 0.398	< 0.398	< 0.398	< 0.398
1,1-Dichloropropene	µg/L				< 0.352	< 0.352	--	< 0.352	< 0.352	< 0.352	< 0.352	< 0.352	< 0.352	< 0.352	< 0.352	< 0.352	< 0.352	< 0.352	< 0.352	< 0.352	< 0.352	< 0.352
1,2,3-Trichlorobenzene	µg/L				< 0.230	< 0.230	--	< 0.230	< 0.230	< 0.230	< 0.230	< 0.230	< 0.230 J	< 0.230	< 0.230	< 0.230 J	< 0.230 J	< 0.230 J	< 0.230 J	< 0.230 J	< 0.230	< 0.230
1,2,3-Trichloropropane	µg/L		0.00146	B Cancer	< 0.807	< 0.807	--	< 0.807	< 0.807	< 0.807	< 0.807	< 0.807	< 0.807	< 0.807	< 0.807	< 0.807	< 0.807	< 0.807	< 0.807	< 0.807	< 0.807	< 0.807
1,2,3-Trimethylbenzene	µg/L				< 0.321	< 0.321	--	< 0.321	< 0.321	< 0.321	< 0.321	< 0.321	< 0.321	< 0.321	**1.19**	< 0.321	< 0.321	< 0.321	< 0.321	< 0.321	< 0.321	< 0.321
1,2,4-Trichlorobenzene	µg/L		1.51	B Cancer	< 0.355	< 0.355	--	< 0.355	< 0.355	< 0.355	< 0.355	< 0.355	< 0.355 J	< 0.355	< 0.355	< 0.355 J	< 0.355 J	< 0.355 J	< 0.355 J	< 0.355 J	< 0.355	< 0.355
1,2,4-Trimethylbenzene	µg/L				< 0.373	< 0.373	--	< 0.373	< 0.373	< 0.373	< 0.373	< 0.373	< 0.373	< 0.373	**1.12**	< 0.373	< 0.373	< 0.373	< 0.373	< 0.373	< 0.373	< 0.373
1,2-Dibromo-3-Chloropropane (DBCP)	µg/L		0.0547	B Cancer	< 1.33	< 1.33	--	< 1.33	< 1.33	< 1.33	< 1.33	< 1.33	< 1.33	< 1.33	< 1.33	< 1.33	< 1.33	< 1.33	< 1.33	< 1.33	< 1.33	< 1.33
1,2-Dibromoethane (EDB)	µg/L		0.01	Method A	< 0.381	< 0.381	--	< 0.381	< 0.381	< 0.381	< 0.381	< 0.381	< 0.381	< 0.381	< 0.381	< 0.381	< 0.381	< 0.381	< 0.381	< 0.381	< 0.381	< 0.381
1,2-Dichlorobenzene	µg/L		720	B Non Cancer	< 0.349	< 0.349	--	< 0.349	< 0.349	< 0.349	< 0.349	< 0.349	< 0.349	< 0.349	< 0.349	< 0.349	< 0.349	< 0.349	< 0.349	< 0.349	< 0.349	< 0.349
1,2-Dichloroethane (EDC)	µg/L		0.481	B Cancer	< 0.361	< 0.361	--	< 0.361	< 0.361	< 0.361	< 0.361	< 0.361	< 0.361	< 0.361 J	< 0.361	< 0.361	< 0.361	< 0.361	< 0.361	< 0.361	< 0.361	< 0.361
1,2-Dichloropropane	µg/L		1.22	B Cancer	< 0.306	< 0.306	--	< 0.306	< 0.306	< 0.306	< 0.306	< 0.306	< 0.306	< 0.306	< 0.306	< 0.306	< 0.306	< 0.306	< 0.306	< 0.306	< 0.306	< 0.306
1,3,5-Trimethylbenzene	µg/L		80	B Non Cancer	< 0.387	< 0.387	--	< 0.387	< 0.387	< 0.387	< 0.387	< 0.387	< 0.387	< 0.387	**3.08**	< 0.387	< 0.387	< 0.387	< 0.387	< 0.387	< 0.387	< 0.387
1,3-Dichlorobenzene	µg/L				< 0.220	< 0.220	--	< 0.220	< 0.220	< 0.220	< 0.220	< 0.220	< 0.220	< 0.220	< 0.220	< 0.220	< 0.220	< 0.220	< 0.220	< 0.220	< 0.220	< 0.220
1,3-Dichloropropane	µg/L				< 0.366	< 0.366	--	< 0.366	< 0.366	< 0.366	< 0.366	< 0.366	< 0.366	< 0.366	< 0.366	< 0.366	< 0.366	< 0.366	< 0.366	< 0.366	< 0.366	< 0.366
1,4-Dichlorobenzene	µg/L		8.10	B Cancer	< 0.274	< 0.274	--	< 0.274	< 0.274	< 0.274	< 0.274	< 0.274	< 0.274	< 0.274	< 0.274	< 0.274	< 0.274	< 0.274	< 0.274	< 0.274	< 0.274	< 0.274
2,2-Dichloropropane	µg/L				< 0.321	< 0.321	--	< 0.321	< 0.321	< 0.321	< 0.321	< 0.321	< 0.321	< 0.321	< 0.321	< 0.321	< 0.321	< 0.321	< 0.321	< 0.321	< 0.321	< 0.321
2-Chlorotoluene	µg/L		160	B Non Cancer	< 0.375	< 0.375	--	< 0.375	< 0.375	< 0.375	< 0.375	< 0.375	< 0.375	< 0.375	< 0.375	< 0.375	< 0.375	< 0.375	< 0.375	< 0.375	< 0.375	< 0.375
4-Chlorotoluene	µg/L				< 0.351	< 0.351	--	< 0.351	< 0.351	< 0.351	< 0.351	< 0.351	< 0.351	< 0.351	< 0.351	< 0.351	< 0.351	< 0.351	< 0.351	< 0.351	< 0.351	< 0.351
Acetone	µg/L		7200	B Non Cancer	< 10.0	< 10.0	--	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0	< 10.0
Acrolein	µg/L		4	B Non Cancer	< 8.87	**20.7 J**	--	< 8.87	< 8.87	**20.5 J**	**20.2 J**	< 8.87	< 8.87	< 8.87	< 8.87	< 8.87	< 8.87	< 8.87	< 8.87 J	< 8.87	< 8.87	< 8.87
Acrylonitrile	µg/L		0.0810	B Cancer	< 1.87	< 1.87	--	< 1.87	< 1.87	< 1.87	< 1.87	< 1.87	< 1.87	< 1.87	< 1.87	< 1.87	< 1.87	< 1.87	< 1.87	< 1.87	< 1.87	< 1.87
Bromobenzene	µg/L				< 0.352	< 0.352	--	< 0.352	< 0.352	< 0.352	< 0.352	< 0.352	< 0.352	< 0.352	< 0.352	< 0.352	< 0.352	< 0.352	< 0.352	< 0.352	< 0.352	< 0.352
Bromodichloromethane	µg/L		0.706	B Cancer	< 0.380	< 0.380	--	< 0.380	< 0.380	< 0.380	< 0.380	< 0.380	< 0.380	< 0.380	< 0.380	< 0.380	< 0.380	< 0.380	< 0.380	< 0.380	< 0.380	**0.428 J**
Bromoform	µg/L		5.54	B Cancer	< 0.469	< 0.469	--	< 0.469	< 0.469	< 0.469	< 0.469	< 0.469	< 0.469	< 0.469	< 0.469	< 0.469	< 0.469	< 0.469	< 0.469	< 0.469	< 0.469	< 0.469
Bromomethane	µg/L		11.2	B Non Cancer	< 0.866	< 0.866	--	< 0.866	< 0.866	< 0.866	< 0.866	< 0.866	< 0.866	< 0.866 J	< 0.866	< 0.866	< 0.866	< 0.866	< 0.866	< 0.866	< 0.866	< 0.866
Carbon Tetrachloride	µg/L		0.625	B Cancer	< 0.379	< 0.379	--	< 0.379	< 0.379	< 0.379	< 0.379	< 0.379	< 0.379	< 0.379 J	< 0.379	< 0.379	< 0.379	< 0.379	< 0.379	< 0.379	< 0.379	< 0.379
Chlorobenzene	µg/L		160	B Non Cancer	< 0.348	< 0.348	--	< 0.348	< 0.348	< 0.348	< 0.348	< 0.348	< 0.348	< 0.348	< 0.348	< 0.348	< 0.348	< 0.348	< 0.348	< 0.348	< 0.348	< 0.348
Chloroethane	µg/L				< 0.453	< 0.453	--	< 0.453	< 0.453	< 0.453	< 0.453	< 0.453	< 0.453	< 0.453	< 0.453	< 0.453	< 0.453	< 0.453	< 0.453	< 0.453	< 0.453	< 0.453
Chloroform	µg/L		1.41	B Cancer	< 0.324	< 0.324	--	< 0.324	< 0.324	< 0.324	< 0.324	< 0.324	< 0.324	< 0.324	< 0.324	< 0.324	< 0.324	< 0.324	< 0.324	< 0.324	< 0.324	**11.5**
Chloromethane	µg/L				< 0.276	< 0.276	--	< 0.276	< 0.276	< 0.276	< 0.276	< 0.276	< 0.276	< 0.276	**0.442 J**	< 0.276	< 0.276	< 0.276	< 0.276	< 0.276	< 0.276	< 0.276
cis-1,2-Dichloroethene	µg/L		16	B Non Cancer	< 0.260	< 0.260	--	< 0.260	< 0.260	< 0.260	< 0.260	< 0.260	< 0.260	< 0.260	< 0.260	< 0.260	< 0.260	< 0.260	< 0.260	< 0.260	< 0.260	< 0.260
cis-1,3-Dichloropropene	µg/L		0.438	B Cancer	< 0.418	< 0.418	--	< 0.418	< 0.418	< 0.418	< 0.418	< 0.418	< 0.418	< 0.418	< 0.418	< 0.418	< 0.418	< 0.418	< 0.418	< 0.418	< 0.418	< 0.418
Cymene (p-Isopropyltoluene)	µg/L				< 0.350	< 0.350	--	< 0.350	< 0.350	< 0.350	< 0.350	< 0.350	< 0.350 J	< 0.350	**1.07**	< 0.350 J	< 0.350 J	< 0.350 J	< 0.350 J	< 0.350 J	< 0.350	< 0.350
Dibromochloromethane	µg/L		0.521	B Cancer	< 0.327	< 0.327	--	< 0.327	< 0.327	< 0.327	< 0.327	< 0.327	< 0.327	< 0.327	< 0.327	< 0.327	< 0.327	< 0.327	< 0.327	< 0.327	< 0.327	< 0.327
Dibromomethane	µg/L		80	B Non Cancer	< 0.346	< 0.346	--	< 0.346	< 0.346	< 0.346	< 0.346	< 0.346	< 0.346	< 0.346	< 0.346	< 0.346	< 0.346	< 0.346	< 0.346	< 0.346	< 0.346	< 0.346
Dichlorodifluoromethane	µg/L		1600	B Non Cancer	< 0.551	< 0.551	--	< 0.551	< 0.551	< 0.551	< 0.551	< 0.551	< 0.551	< 0.551	< 0.551	< 0.551	< 0.551	< 0.551	< 0.551	< 0.551	< 0.551	< 0.551
Di-Isopropyl ether (DIPE)	µg/L				< 0.320	< 0.320	--	< 0.320	< 0.320	< 0.320	< 0.320	< 0.320	< 0.320	< 0.320	< 0.320	< 0.320	< 0.320	< 0.320	< 0.320	< 0.320	< 0.320	< 0.320
Freon 113	µg/L		240000	B Non Cancer	< 0.303	< 0.303	--	< 0.303	< 0.303	< 0.303	< 0.303	< 0.303	< 0.303	< 0.303	< 0.303	< 0.303	< 0.303	< 0.303	< 0.303	< 0.303	< 0.303	< 0.303
Hexachlorobutadiene	µg/L		0.561	B Cancer	< 0.256	< 0.256	--	< 0.256	< 0.256	< 0.256	< 0.256	< 0.256	< 0.256 J	< 0.256	< 0.256	< 0.256 J	< 0.256 J	< 0.256 J	< 0.256 J	< 0.256	< 0.256	< 0.256
Isopropylbenzene	µg/L		800	B Non Cancer	< 0.326	< 0.326	--	< 0.326	< 0.326	< 0.326	< 0.326	< 0.326	< 0.326	< 0.326	**1.11**	< 0.326	< 0.326	< 0.326	< 0.326	< 0.326	< 0.326	< 0.326
Methyl ethyl ketone (2-Butanone)	µg/L		4800	B Non Cancer	< 3.93	< 3.93	--	< 3.93	< 3.93	< 3.93	< 3.93	< 3.93	< 3.93	< 3.93	< 3.93	< 3.93	< 3.93	< 3.93	< 3.93	< 3.93	< 3.93	< 3.93
Methyl Isobutyl Ketone (MIBK)	µg/L		640	B Non Cancer	< 2.14	< 2.14	--	< 2.14	< 2.14	< 2.14	< 2.14	< 2.14	< 2.14	< 2.14	< 2.14	< 2.14	< 2.14	< 2.14	< 2.14	< 2.14	< 2.14	< 2.14
Methyl tert-Butyl ether	µg/L		20	Method A	< 0.367	< 0.367	--	< 0.367	< 0.367	< 0.367	< 0.367	**0.487 J**	< 0.367	< 0.367	< 0.367	< 0.367	< 0.367	< 0.367	< 0.367	< 0.367	< 0.367	< 0.367

2017 INVESTIGATION RECONNAISSANCE GROUNDWATER SAMPLE ANALYTICAL RESULTS
80 S Hudson Expanded Site
Seattle, Washington

Location					B-01	B-02	B-02	B-03	B-04	B-05	B-06	MW-01	MW-02	MW-02	MW-03	MW-04	MW-05	MW-06	MW-07	MW-08	MW-09	MW-10
Date					3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/6/2017	3/7/2017	4/7/2017	4/11/2017	4/11/2017	4/13/2017	4/11/2017	4/11/2017	4/13/2017	4/13/2017	4/11/2017	4/7/2017	4/7/2017
Sample ID					B-01	B-02	DUP-01-20170306	B-03	B-04	B-05	B-06	MW-1-20170407	MW-2-20170411	D-1-20170411	MW-3-20170413	MW-4-20170411	MW-5-20170411	MW-6-20170413	MW-7-20170413	MW-8-20170411	MW-9-20170407	MW-10-20170407
Duplicate Parent Sample							B-02							MW-2-20170411								
Depth to water (btoc)					Recon Well	Recon Well	Recon Well	Recon Well	Recon Well	Recon Well	Recon Well	7.0 ft	6.9 ft	6.9 ft	7.8 ft	7.9 ft	7.8 ft	6.9 ft	6.9 ft	6.8 ft	7.1 ft	7.5 ft
Screen Interval (bgs)					10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft	10-20 ft
Note									Arsenic by 6020	Arsenic by 6020	Arsenic by 6020	SVOCs by 8270 without SIM, Arsenic by 6020	Metals by 6020	Metals by 6020	Metals by 6020	Metals by 6020	Metals by 6020	Metals by 6020	Metals by 6020	Metals by 6020	SVOCs by 8270 without SIM, Arsenic by 6020	SVOCs by 8270 without SIM, Arsenic by 6020
Chemical	**Unit**	**TEF**	**MTCA A Then Lowest B CUL**																			
Methylene Chloride	µg/L		5	Method A	< 1.00	< 1.00	--	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
Naphthalene	µg/L		160	Method A	< 1.00	< 1.00	--	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00 J	< 1.00	**18.3**	< 1.00 J	< 1.00 J	< 1.00 J	< 1.00 J	< 1.00 J	< 1.00	< 1.00
n-Butylbenzene	µg/L		400	B Non Cancer	< 0.361	< 0.361	--	< 0.361	< 0.361	< 0.361	< 0.361	< 0.361	< 0.361	< 0.361	< 0.361	< 0.361	< 0.361	< 0.361	< 0.361	< 0.361	< 0.361	< 0.361
n-Propylbenzene	µg/L		800	B Non Cancer	< 0.349	< 0.349	--	< 0.349	< 0.349	< 0.349	< 0.349	< 0.349	< 0.349	< 0.349	**1.58**	< 0.349	< 0.349	< 0.349	< 0.349	< 0.349	< 0.349	< 0.349
Sec-Butylbenzene	µg/L		800	B Non Cancer	< 0.365	< 0.365	--	< 0.365	< 0.365	< 0.365	< 0.365	< 0.365	< 0.365	< 0.365	**0.399 J**	< 0.365	< 0.365	< 0.365	< 0.365	< 0.365	< 0.365	< 0.365
Styrene	µg/L		1600	B Non Cancer	< 0.307	< 0.307	--	< 0.307	< 0.307	< 0.307	< 0.307	< 0.307	< 0.307	< 0.307	< 0.307	< 0.307	< 0.307	< 0.307	< 0.307	< 0.307	< 0.307	< 0.307
Tert-Butylbenzene	µg/L		800	B Non Cancer	< 0.399	< 0.399	--	< 0.399	< 0.399	< 0.399	< 0.399	< 0.399	< 0.399 J	< 0.399	< 0.399	< 0.399 J	< 0.399 J	< 0.399 J	< 0.399 J	< 0.399 J	< 0.399	< 0.399
Tetrachloroethene (PCE)	µg/L		5	Method A	< 0.372	< 0.372	--	< 0.372	< 0.372	< 0.372	< 0.372	< 0.372	< 0.372	< 0.372	< 0.372	**0.476 J**	< 0.372	< 0.372	< 0.372	< 0.372	< 0.372	< 0.372
trans-1,2-Dichloroethene	µg/L		160	B Non Cancer	< 0.396	< 0.396	--	< 0.396	< 0.396	< 0.396	< 0.396	< 0.396	< 0.396	< 0.396	< 0.396	< 0.396	< 0.396	< 0.396	< 0.396	< 0.396	< 0.396	< 0.396
trans-1,3-Dichloropropene	µg/L		0.438	B Cancer	< 0.419	< 0.419	--	< 0.419	< 0.419	< 0.419	< 0.419	< 0.419	< 0.419	< 0.419	< 0.419	< 0.419	< 0.419	< 0.419	< 0.419	< 0.419	< 0.419	< 0.419
Trichloroethene (TCE)	µg/L		5	Method A	< 0.398	< 0.398	--	< 0.398	< 0.398	< 0.398	< 0.398	< 0.398	< 0.398	< 0.398	< 0.398	< 0.398	< 0.398	< 0.398	< 0.398	< 0.398	< 0.398	< 0.398
Trichlorofluoromethane	µg/L		2400	B Non Cancer	< 1.20	< 1.20	--	< 1.20	< 1.20	< 1.20	< 1.20	< 1.20	< 1.20	< 1.20	< 1.20	< 1.20	< 1.20	< 1.20	< 1.20	< 1.20	< 1.20	< 1.20
Vinyl Chloride	µg/L		0.2	Method A	*< 0.259*	*< 0.259*	--	*< 0.259*	*< 0.259*	*< 0.259*	*< 0.259*	*< 0.259*	*< 0.259*	*< 0.259*	*< 0.259*	*< 0.259*	*< 0.259*	*< 0.259*	*< 0.259*	*< 0.259*	*< 0.259*	*< 0.259*
Metals																						
Arsenic, Dissolved	µg/L		5	Method A	--	--	--	--	--	--	--	**0.722 J**	**10.1**	**9.78**	**6.49**	**0.282 J**	< 0.250	**4.39**	**1.55 J**	**0.343 J**	**0.361 J**	**0.276 J**
Arsenic, Total	µg/L		5	Method A	--	--	--	--	**58.9**	**18.5**	**50.9**	**0.833 J**	**9.91**	**10.6**	**8.05**	**0.347 J**	**0.379 J**	**4.70**	**1.78 J**	**0.402 J**	**0.528 J**	**0.275 J**
Barium, Dissolved	µg/L		3200	B Non Cancer	--	--	--	--	--	--	--	**5.23**	**2.17 J**	**1.92 J**	**2.24 J**	**1.20 J**	**2.92 J**	**6.27**	**6.86**	**0.695 J**	< 1.70	**3.00 J**
Barium, Total	µg/L		3200	B Non Cancer	--	--	--	--	**398**	**129**	**204**	**5.82**	**2.37 J**	**2.46 J**	**3.26 J**	**2.35 J**	**2.85 J**	**7.65**	**9.10**	**2.61 J**	**1.82 J**	**2.81 J**
Cadmium, Dissolved	µg/L		5	Method A	--	--	--	--	--	--	--	< 0.700	< 0.160	< 0.160	< 0.160	< 0.160	< 0.160	< 0.160	< 0.160	< 0.160	< 0.700	< 0.700
Cadmium, Total	µg/L		5	Method A	--	--	--	--	**2.31**	< 0.700	**0.729 J**	< 0.700	< 0.160	< 0.160	< 0.160	< 0.160	< 0.160	< 0.160	< 0.160	< 0.160	< 0.700	< 0.700
Chromium, Dissolved	µg/L		50	Method A	--	--	--	--	--	--	--	< 1.40	< 0.540	< 0.540	< 0.540	< 0.540	< 0.540	< 0.540	**1.75 J**	< 0.540	**3.40 J**	< 1.40
Chromium, Total	µg/L		50	Method A	--	--	--	--	**144**	**52.9**	**46.9**	**1.48 J**	< 0.540	< 0.540	**0.932 J**	< 0.540	< 0.540	< 0.540	**2.40**	< 0.540	**4.77 J**	< 1.40
Lead, Dissolved	µg/L		15	Method A	--	--	--	--	--	--	--	< 1.90	< 0.240	< 0.240	< 0.240	< 0.240	< 0.240	< 0.240	< 0.240	< 0.240	< 1.90	< 1.90
Lead, Total	µg/L		15	Method A	--	--	--	--	**452**	**48.8**	**105**	**2.03 J**	< 0.240	< 0.240	**0.786 J**	< 0.240	< 0.240	**0.262 J**	< 0.240	< 0.240	< 1.90	**2.22 J**
Mercury, Dissolved	µg/L		2	Method A	--	--	--	--	--	--	--	< 0.0490	< 0.0490	< 0.0490	< 0.0490	< 0.0490	< 0.0490	< 0.0490	< 0.0490	< 0.0490	< 0.0490	< 0.0490
Mercury, Total	µg/L		2	Method A	--	--	--	--	**0.251**	**0.0549 J**	< 0.281 U	< 0.0490	< 0.0490	< 0.0490	< 0.0490	< 0.0490	< 0.0490	< 0.0490	< 0.0490	< 0.0490	< 0.0490	< 0.0490
Selenium, Dissolved	µg/L		80	B Non Cancer	--	--	--	--	--	--	--	< 7.40	< 0.380	< 0.380	< 0.380	< 0.380	< 0.380	< 0.380	< 0.380	< 0.380	< 7.40	< 7.40
Selenium, Total	µg/L		80	B Non Cancer	--	--	--	--	< 7.40	< 7.40	< 7.40	< 7.40	< 0.380	< 0.380	< 0.380	< 0.380	< 0.380	< 0.380	< 0.380	< 0.380	< 7.40	< 7.40
Silver, Dissolved	µg/L		80	B Non Cancer	--	--	--	--	--	--	--	< 2.80	< 0.310	< 0.310	< 0.310	< 0.310	< 0.310	< 0.310	< 0.310	< 0.310	< 2.80	< 2.80
Silver, Total	µg/L		80	B Non Cancer	--	--	--	--	< 2.80	< 2.80	< 2.80	< 2.80	< 0.310	< 0.310	< 0.310	< 0.310	< 0.310	< 0.310	< 0.310	< 0.310	< 2.80	< 2.80

10.1	Detected concentrations above the cleanup level are shaded yellow and bolded.
< 0.0522	Non-detect values above the cleanup level are shaded gray and italicized.
53.2 J	Detected concentrations at or above the method detection limit are shown in bold.

Abbreviations and Symbols

" - -" denotes not measured, not available, or not applicable.

" < " denotes not detected at or above the indicated method detection limit.

"DUP" denotes a field duplicate sample. Primary sample ID is provided beneath the duplicate sample ID.

"J" indicates an estimated concentration based on either the being less than the laboratory reporting limit or data validation findings.

"U" denotes that the value has been qualified as undetected (at the detected concentration if above the method detection limit) due to blank contamination.

Total cPAHs (HitsOnly) = Possible total cPAHs are based on the relative toxicity of each cPAH to benzo(a)pyrene and were calculated by multiplying the individual detected cPAH concentrations by a toxicity equivalency factor (TEF) and summing the adjusted concentrations.

Total cPAHs (HalfDL) = Possible total cPAHs are based on the relative toxicity of each cPAH to benzo(a)pyrene and were calculated by multiplying the individual detected cPAH concentrations by a toxicity equivalency factor (TEF) and summing the adjusted concentrations. If an individual cPAH was not detected, a value of one half the method detection limit was used in the calculation.

Total PCBs (HitsOnly) = Total PCB concentration based on the sum of individual aroclor concentrations detected.

Total PCBs (HalfDL) = Total PCB concentration based on the sum of individual aroclor concentrations detected. If an individual PCB aroclor was not detected, a value of one half the method reporting limit was used in the calculation.

Recon Well = Reconnaissance groundwater sample. The groundwater sample was collected directly from the soil boring from a temporary well with a screen interval as specified. A depth to water was not provided due to the temporary nature of the reconnaissance groundwater sample.

bgs = below ground surface

btoc = below top of casing

ft = feet

µg/L = micrograms per liter

Cleanup Levels (CUL)

Cleanup level values based on Model Toxics Control Act (MTCA) Method A values for groundwater (Method A) based on Washington State Administrative Code (WAC) 173-340-740 Table 720-1. Where MTCA Method A values are not available, the lowest of MTCA Method B values (B Cancer or B Non Cancer) from Cleanup Levels and Risk Calculation (CLARC) tables have been used (Accessed January 2017).

Methods

Samples analyzed for gasoline-range organics (GRO) using Northwest Total Petroleum Hydrocarbon (NWTPH)-Gx and diesel- and oil-range organics (DRO and ORO) using NWTPH-Dx (without silica gel cleanup).

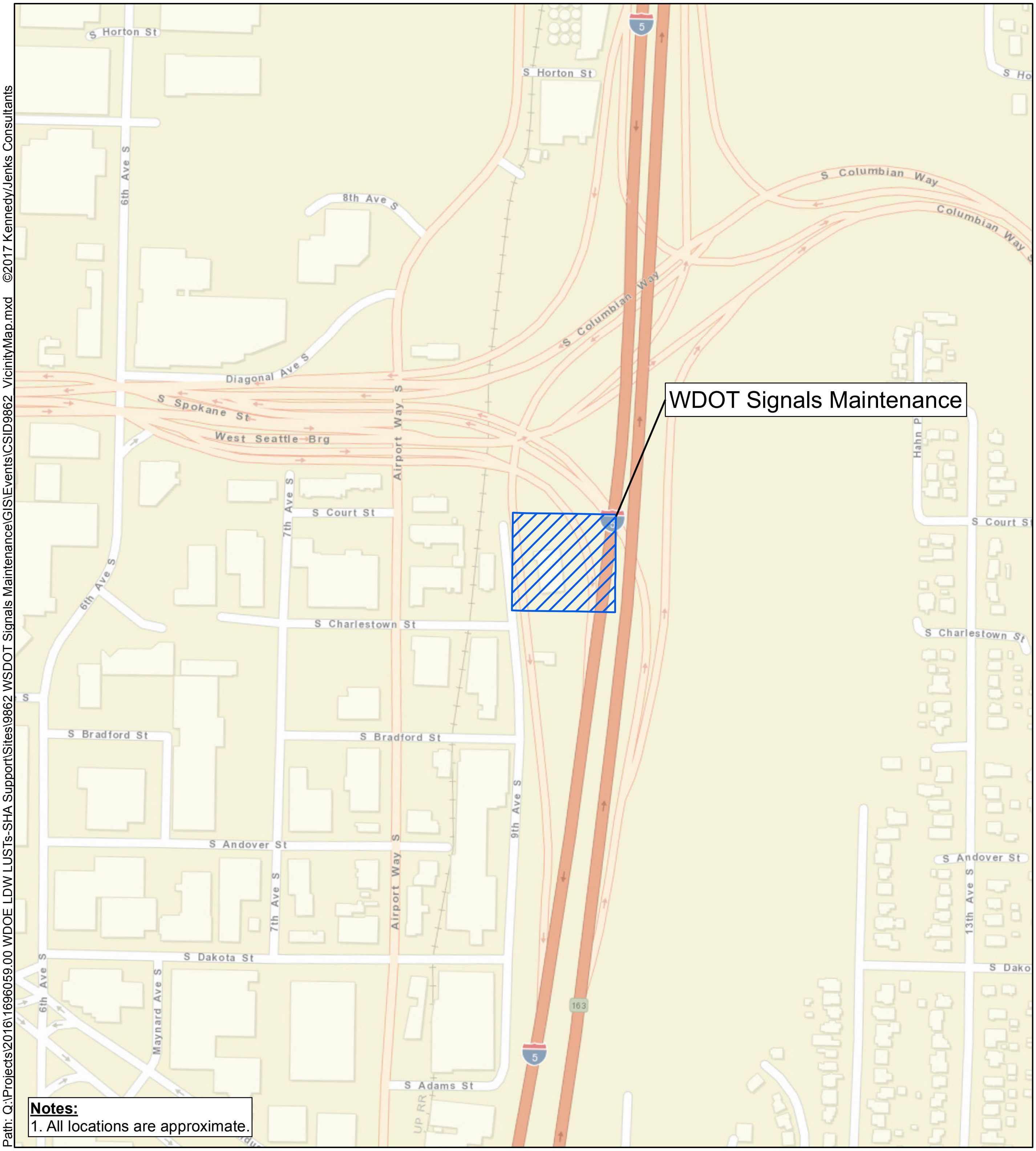
Samples analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX) and Volatile Organic Compounds using EPA Method 8260.

Samples analyzed for metals using EPA Method 6010 except mercury which was analyzed using EPA Method 7470 and arsenic where specified in the notes row using EPA Method 6020.

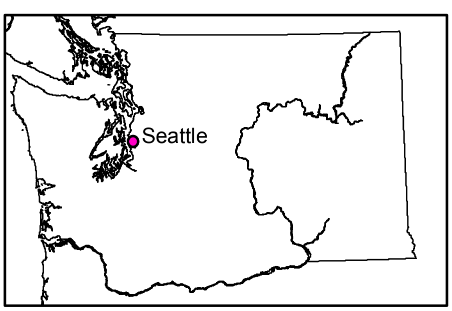
Samples analyzed for Semivolatile Organic Compound using EPA Method 8270 with selective ion monitoring (SIM). In cases where SIM was not used it is noted in the notes row.

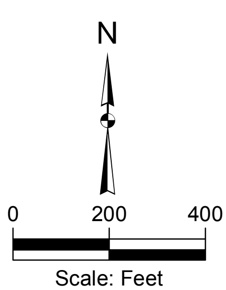
Samples analyzed for Polychlorinated Biphenyls using EPA Method 8082.

Figures



Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap





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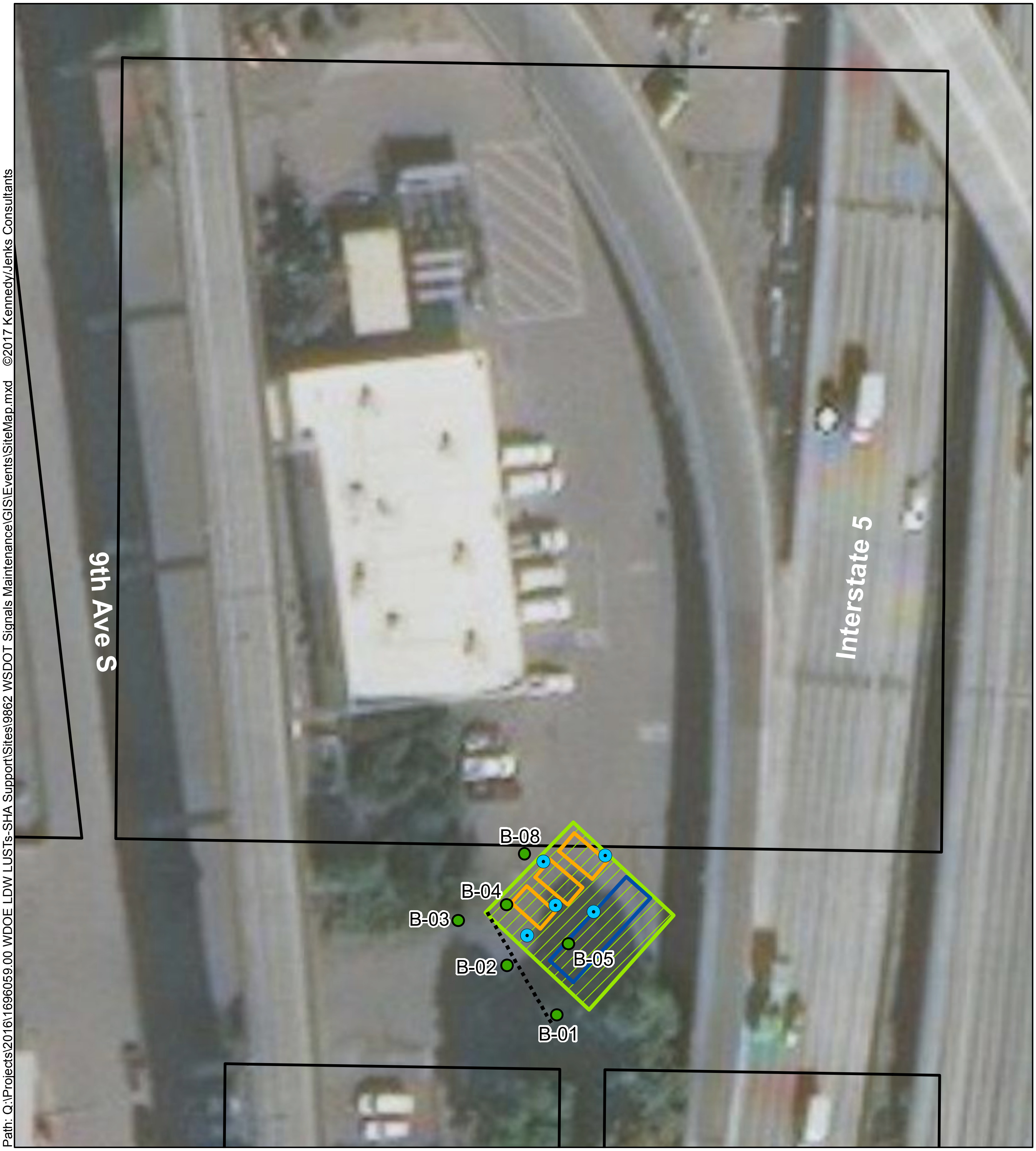
WA DOT Signals Maintenance Site
Seattle, Washington

Vicinity Map

1696059*00

Figure 1



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Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- 2015 Soil Sample
- 2017 Boring
- Utility Corridor
- Pump Island
- Former UST
- Excavation Area
- Parcel

Notes:
1. All locations are approximate.

N

0 25 50

Scale: Feet

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WA DOT Signals Maintenance Site
Seattle, Washington

Site Map

1696059*00

Figure 2

Path: Q:\Projects\2016\1696059.00 WDOE LDW LUSTs-SHA Support\Sites\9862 WSDOT Signals Maintenance\GIS\Events\2015Excavation.mxd ©2017 Kennedy/Jenks Consultants

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- 2015 Soil Sample
- Parcel
- Utility Corridor
- Pump Island
- Former UST
- Excavation Area

Notes:
1. All locations are approximate.

N

0 25 50

Scale: Feet

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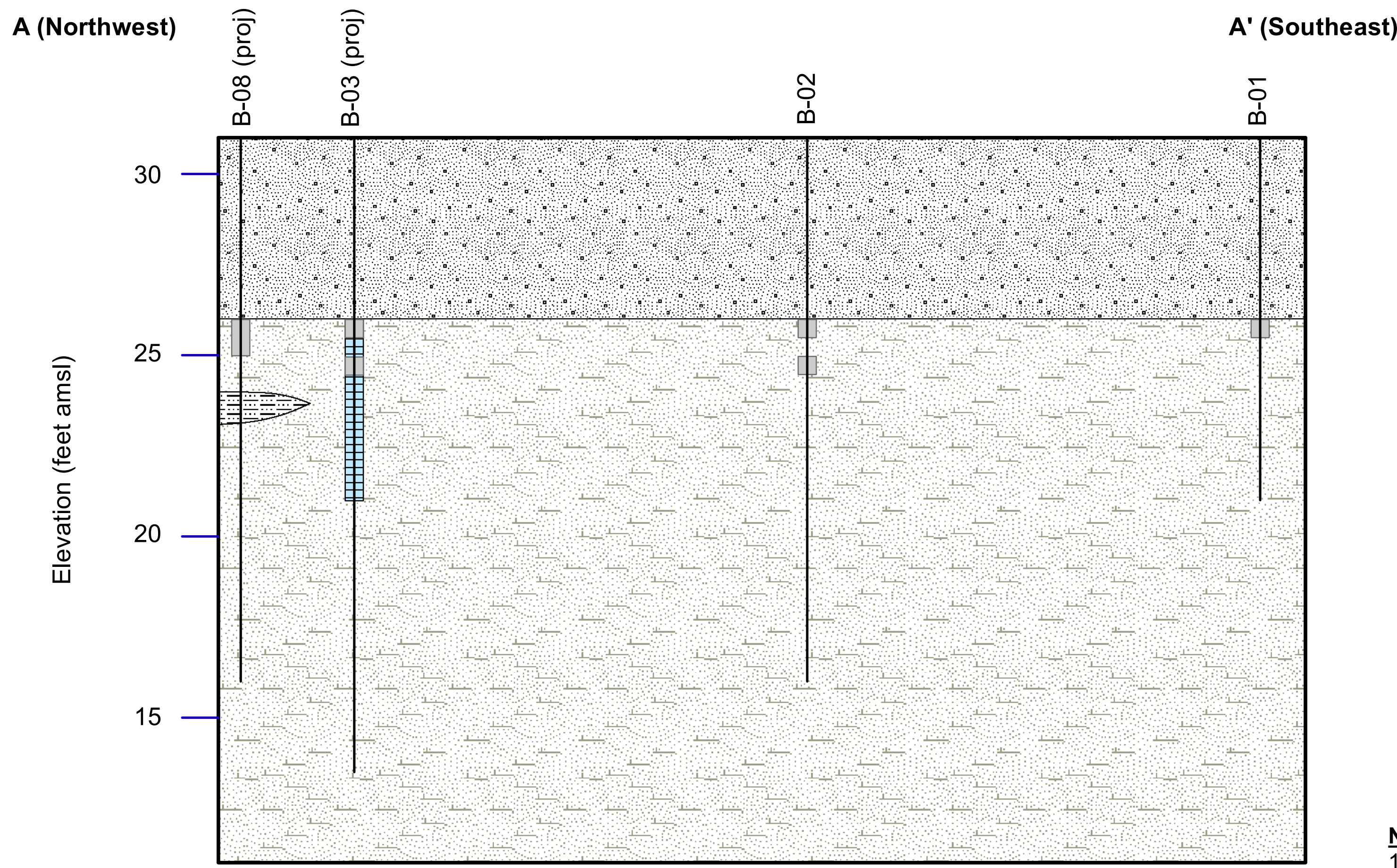
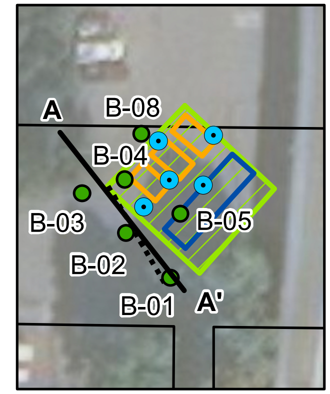
WA DOT Signals Maintenance Site
Seattle, Washington

2015 Excavation

1696059*00

Figure 3





Notes:
1. Locations are approximate.
2. amsl = above mean sea level.
3. GRO = Gasoline-Range Organics;
   DRO = Diesel-Range Organics.

Path: Q:\Projects\2016\1696059.00 WDOE LDW LUSTs-SHA Support\Sites\9862 WSDOT Signals Maintenance\GIS\Events\CrossSection.mxd

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Screened interval of temporary well
- Soil sample with GRO/DRO concentrations below MTCA Method A cleanup levels
- Well graded sand and gravel (fill)
- Greenish gray sandy silt with gravel
- Silty clay

Feet
0
2.5
5

Vertical Exaggeration = 2x

0 5 10 Feet

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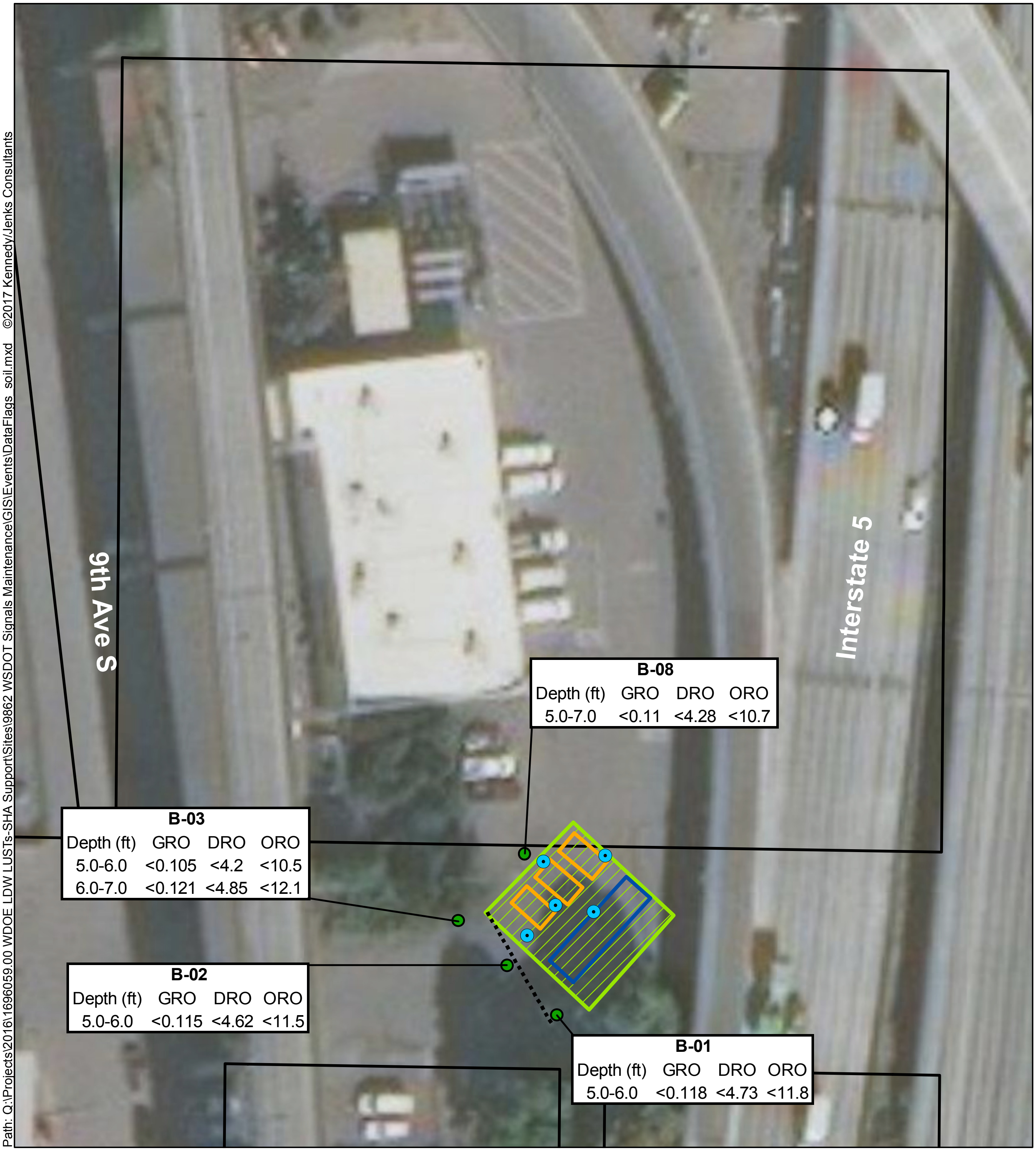
WA DOT Signals Maintenance Site
Seattle, Washington

Interpretive Geologic Cross Section A-A'

1696059*00

Figure 4



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- 2015 Soil Sample
- 2017 Soil Sample
- Utility Corridor
- Pump Island
- Former UST
- Excavation
- Parcel

Notes:
1. All locations are approximate.
2. All concentrations in mg/kg.
3. GRO = Gasoline-range organics
   DRO = Diesel-range organics
   ORO = Oil-range organics
3. Duplicate sample collected from B-08; GRO, DRO, and ORO were not detected.
4. No samples results were above applicable MTCA Method A cleanup levels.
5. < = Not detected at the reporting limit shown.

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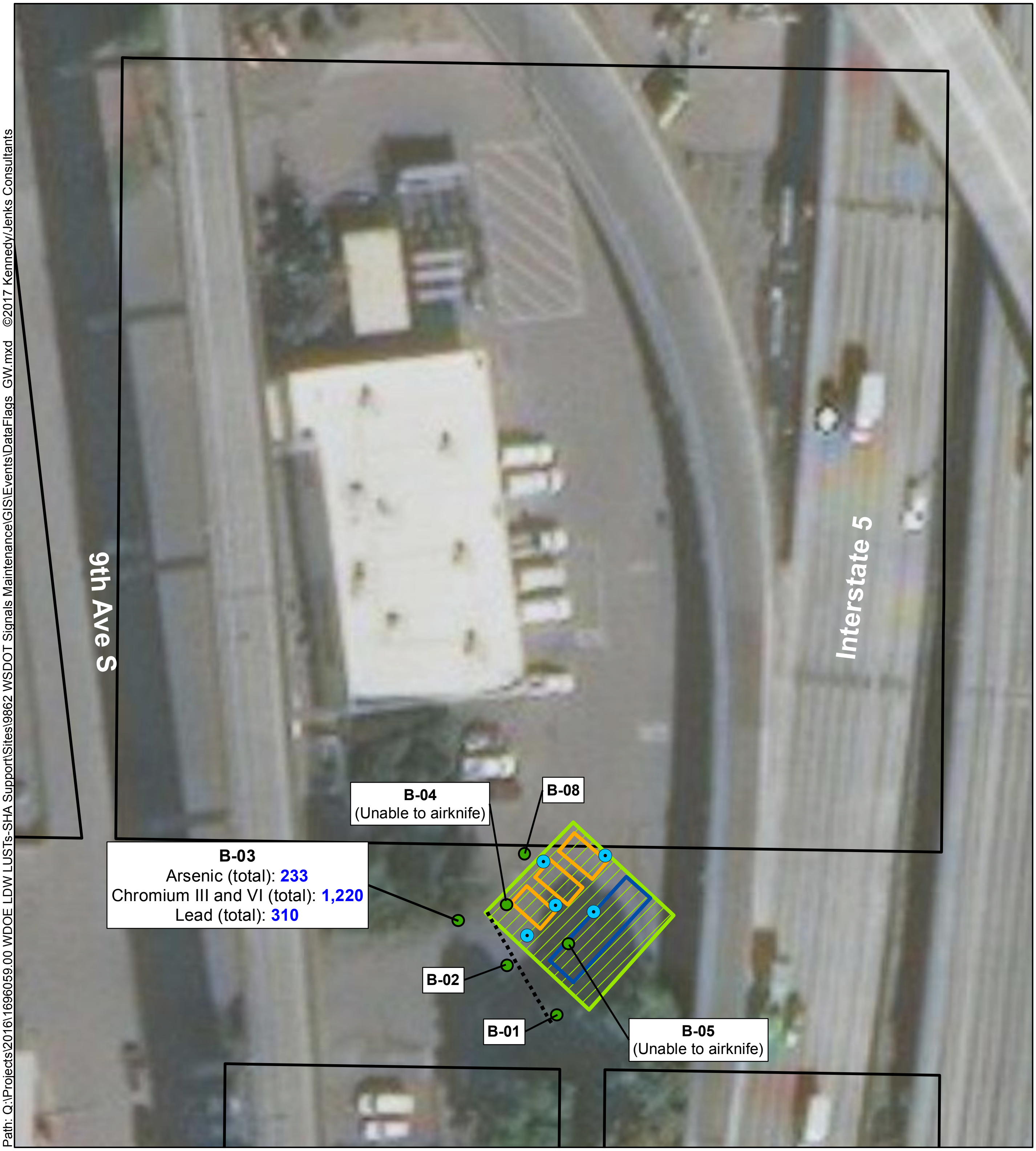
WA DOT Signals Maintenance Site
Seattle, Washington

Gasoline-, Diesel-, and Oil-Range Organics in Soil

1696059*00

Figure 5



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Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- 2015 Soil Sample
- Parcel
- 2017 Boring
- Utility Corridor
- Pump Island
- Former UST
- Excavation

Notes:

1. All locations are approximate.
2. All concentrations in µg/l.
3. Only concentrations greater than MTCA Method A cleanup level shown on map.

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WA DOT Signals Maintenance Site
Seattle, Washington

N

Detected Concentrations of Contaminants in Groundwater

0 25 50

Scale: Feet

1696059*00

Figure 6

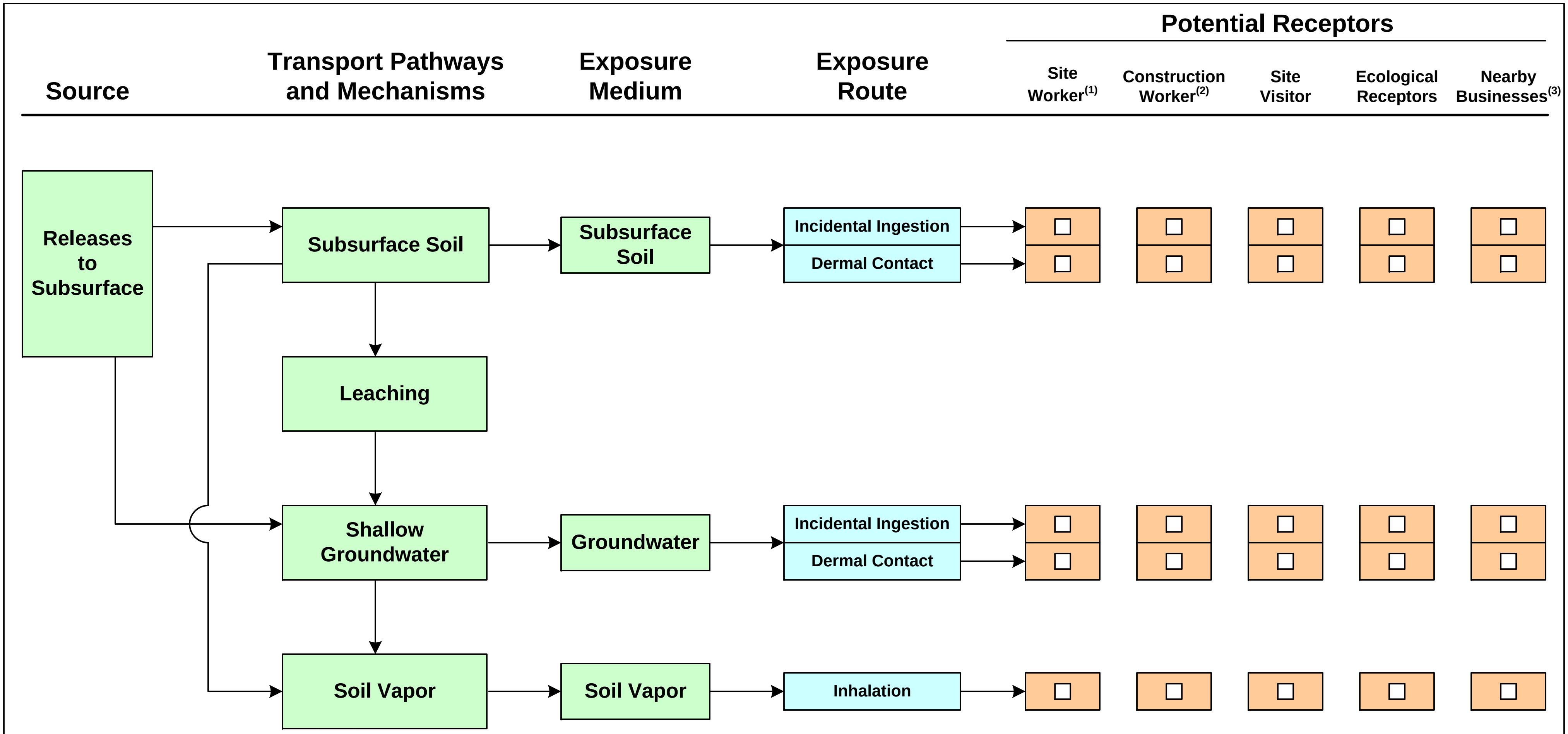

Figure depicts a preliminary assessment of potential exposure pathways.

Legend:

- Complete exposure pathway.
- Incomplete exposure pathway.
- Potentially complete exposure pathway or insufficient information.

Notes:

1. On site WA DOT employees.
2. On site construction and/or industrial workers performing invasive activities.
3. Assumes no contact with shallow groundwater as businesses are connected to City water service.

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WA DOT Signals Maintenance Site
Seattle, WA

Preliminary Conceptual Site Model

K/J 1696059*00

Figure 7

Appendix A

Historical Reference Documents

Department of Ecology - Environmental Report Tracking System

ERTS # 657540

Initial Report

External Reference #

Caller Information

	First	Last
Name	TRENT	ENSMINGER

Busines Name WSDOT

Street Address

Other Address

City State WA Zip

E-mail Confidential_FL ☐

Phone	Ext	Type
(360) 584-8814		Mobile

Where did it happen

Berth Anchorage

Location Name

Street Address 3700 9TH AVE S

Other Address

City/Place SEATTLE State WA Zip 98134

County - Region KING NWRO FS ID

WIRA #

Waterway Type

Latitude Longitude

Topo Quad 1:24:000 SEATTLE

Direction/Landmark (mile post, cross roads, township/range)

What happened

Spills Program Oil Spill? N

Incident Date 6/17/2015 Received Date 6/18/2015 10:41

Medium SOIL

Material PETROLEUM - OIL OTHER

Quantity	Unit
3	OTHER

Source UNDERGROUND STORAGE TANK

Cause OTHER

Activity ROUTINE/NORMAL OPERATIONS

Impact SOIL CONTAMINATION

Vessel Name

Hull Number

Primary Potentially Responsible Party Information

	First	Last
Name		

Business Name WSDOT

Street Address

Other Address

City State WA Zip

Phone Ext Type

E-mail

Additional Contact Information

Name	Phone	Ext	Type

More Information

UST RELEASE

DECOMMISSIONING THREE (3) TANKS

ONE (1) 5,000 GALLON DIESEL TANK, TWO (2) 5,000 GALLON GASOLINE TANKS

UNDERNEATH ALL 3 TANKS THERE IS CONTAMINATION. THE TANKS ARE IN GREAT SHAPE DOES NOT THINK IT WAS FROM THE TANKS, SUSPECTS IT IS FROM THE PIPING. THERE WERE NO HOLES OR RUST IN THE TANKS, THE TANKS WERE PERFECT

STARTED DOING CLEAN-UP, DID A FEW CONFIRMATION SAMPLES

HAVE PROFILED SOME OF THE CONTAMINATED DIRT AND WILL START DISPOSING OF THE DIRT THROUGH WASTE MANAGEMENT ON MONDAY

RUNNING UNDER SOME UTILITIES, SO WILL NOT BE ABLE TO DO A FULL CLEAN-UP (SOUTH SIDE OF THE SITE)

DISCOVERED LATE LAST NIGHT

Entry Person SACAYANAN, TAMARA Entry Date 6/18/2015

ERTS # **657540**

Referral

Referral #	195520
Primary	☐

Referral Method

- ○ E-mail ERTS number
- ● E-mail attachment
- ○ Print
- ○ Telephone

Person Referred to	MUSA TCP, DONNA
Phone	(425) 649-7136
Fax	(425) 649-7098
E-mail	DMUS461@ECY.WA.GOV
Program/Organization	TOXICS CLEANUP
Address	3190 160th AVE SE
City	Bellevue WA 98008-5452
Region/Location	NWRO
Referral Date	6/18/2015

ERTS # **657540**

Followup

Inspector Information

Followup #1

Referral # 195520

☑ Lead Inspector MUSA TCP, DONNA

Program/Organization TOXICS CLEANUP

* Region/Location NWRO

# of Ecology Staff 1 Overtime ☐

Action

	Start Date	End Date
E-MAIL	6/18/2015	6/18/2015

What happened

Spills Program Oil Spill? N

Incident Date 6/17/2015

Medium

SOIL

Material

PETROLEUM - OIL OTHER

Quantity	Unit	Est
3	OTHER	☐

Source Regulated? ☐

UNDERGROUND STORAGE TANK

Cause

OTHER

Activity

ROUTINE/NORMAL OPERATIONS

Impact

SOIL CONTAMINATION

Vessel

Where did it happen

Berth Anchorage

Location Name

Street Address 3700 9TH AVE S

Other Address

City/Place SEATTLE State WA Zip 98134-

County KING Region NWRO FS ID

Waterway Type

WRIA #

Latitude Longitude

Topo Quad 1:24,000 SEATTLE

Direction/Landmark (mile post, cross roads, township/range)

Potentially Responsible Party Information

Check if the primary PRP provided notice to Ecology ☐

Primary ☑ First Last

Name

Business Name WSDOT

Street Address

Other Address

City State WA Zip

Phone Ext Type

E-mail

Narrative

From: Musa, Donna K. (ECY)
Sent: Thursday, June 18, 2015 12:06 PM
To: 'Ensminger, Trent M.'
Subject: ERTS 657540 (3700 9th Ave S)

Hi Trent!

Just wanted to let you know I got this one.

Since there is gasoline contamination (not JUST heating oil/diesel) I will keep this one and not refer to PLIA.

I'll be out starting Monday through June, back July 1. Feel free to send follow up while I'm gone.

Is there anything we need to discuss today or tomorrow?

Thanks!

Donna Musa

==========================

From: Ensminger, Trent M. [mailto:ensmint@wsdot.wa.gov]
Sent: Wednesday, August 12, 2015 12:58 PM
To: Musa, Donna K. (ECY)
Subject: WSDOT Signal Fuel Site – UST Removal and Site Characterization Report

Hello Donna,

ERTS # 657540

Please find the attached WSDOT Signal Fuel Site – UST Removal and Site Characterization Report. Please contact me with any questions or concerns.

Thank you,

Trent Ensminger
WSDOT HQ Hazardous Materials and Solid Waste Program
360.570.2587

Vessel Emergency ☐ Entry Person: MUSA TCP, DONNA Entry Date 6/18/2015

LUST 1966
WDOT Signals Maint
Seattle.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

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

March 4, 2013

CERTIFIED MAIL
7011 0470 0003 3820 3371

PROPERTY OWNER
3700 9TH AVE S
SEATTLE WA 98134

Re: Status Update Letter
- **Site Name:** WA DOT Signals Branch 7HDQ Site
- **Site Address:** 3700 9th Ave S, Seattle, WA 98134
- **Facility/Site No.:** 60549963
- **Cleanup ID:** 9862

Dear Property Owner:

Your site is part of a group of historical sites previously designated as Reported Cleaned Up (RCU). These are sites where cleanup reports and or other documentation was submitted to Ecology by owners or consultants indicating to us they had "reportedly cleaned up the site" but did not enter the former Independent Remedial Action Program (IRAP) or current Voluntary Cleanup Program (VCP) to achieve closure.

The Washington State Cleanup law (Model Toxics Control Act), requires Ecology to maintain a list of known or suspected contaminated sites (Hazardous Sites List). Based on available information in the department's files, the site above is listed as a contaminated site and is included on the Hazardous Sites List (HSL).

Please note that inclusion on the HSL **does not** mean that Ecology has determined you to be a potentially liable person responsible for cleanup under MTCA. However, this letter is a notification that an area(s) of **contamination exists** at this property. Further investigation or cleanup action is required to comply with Washington State laws and regulations. The specific issues at the site are:

1. Soil contamination above State regulations remained along conveyance piping excavations. Although groundwater was encountered, it was not assessed.

Because of considerable potential liability, please be advised to carefully consider any investigation or cleanup actions and to carefully document steps taken independent of Ecology's involvement. Guidance documents to help conduct an independent cleanup are available if you are interested in this option. In proceeding with an independent cleanup, please be aware there are requirements in State law which must be met. Some of these requirements are addressed in WAC 173-340-120(8)(B) and -300(4). Ecology will use the appropriate requirements contained throughout MTCA in its evaluation of the adequacy of any independent remedial (cleanup) actions performed.

entered
CP
2-27-13

Ecology has a strong commitment to work cooperatively with individuals to accomplish prompt and effective investigations and site cleanups. Your cooperation in planning or conducting a cleanup action is not an admission of guilt or liability.

If an independent cleanup action is undertaken, and a formal review of the work is desired, a report may be submitted to Ecology through the VCP. This program was established in response to the public's need for Ecology to more rapidly review cleanup actions. A fee has been established to support this review process. Guidance documents to help conduct an independent cleanup are available if you are interested in this option.

As a government agency you may be eligible for an independent remedial action grant. The VCP is one of several options for cleaning up a hazardous waste site under the state's cleanup law. Upon receiving an NFA opinion from Ecology for independent cleanup work submitted through the VCP, local governments may apply for an independent remedial action grant from Ecology to help offset their cleanup costs. Grants range from 200K – 300K. For more information, visit our website at:

www.ecy.wa.gov/programs/swfa/grants/rag.html.

We want to work with you to develop a cleanup strategy for your site. Please contact us to evaluate the options for the remediation of the site.

Should you have any questions regarding this letter or if you would like a copy of Chapter 70.105D RCW (The Model Toxics Control Act), the implementing regulations, Chapter 173-340 WAC, that detail these requirements, or a guidance document, please contact me at (425) 649-7038 or rols461@ecy.ea.gov. Thank you in advance for your cooperation.

Sincerely,

Russell E Olsen

Russell E. Olsen, MPA
Voluntary Cleanup Unit Supervisor
Northwest Regional Office
Toxics Cleanup Program

SF:sf

WASHINGTON STATE DEPARTMENT OF ECOLOGY

INITIAL INVESTIGATION FIELD REPORT

LUST ID: 1966 **FS ID:** 60549963 **Site ID:** 12240

SITE NAME WA DOT Signals Branch 7HDQ Site

SITE LOCATION INFORMATION

Contact Person Name *Title* *Phone Number*

Mailing Address *City* *Zip + 4*

3700 9th Ave S Seattle 98134

Site Location *Closest City* *County*

3700 9th Ave S Seattle

Quarter-Quarter *Section* *Township* *Range*

Latitude: *Degree* *Minute* *Second*

Longitude: *Degree* *Minute* *Second*

INSPECTION INFORMATION

Inspection Date *Inspection Time* *Type of Entry Notice*

Photographs *Yes* *No* *Weather:* *Clear* *Partly Cloudy* *Overcast*

Videotape *Yes* *No* *Precipitation* *Temperature*

Samples *Yes* *No* *Wind Direction* *Wind Speed*

RECOMMENDATION

No Further Action:

No. Soil remediation was never completed and GW monitoring was never done.

Δ Status 7/12/11

Release or threatened release does not pose a threat *Site Hazard Assessment*

No release or threatened release *Interim Action*

Educational Mailing *Emergency Action Plan*

Refer to another program/agency *Independent Cleanup Action*

In Progress *Completed*

CONTAMINANT(S) (See Page 3 for details)

Soil Yes

Groundwater Unknown

Gas, BTEX, Diesel

DEPARTMENT REVIEW

Investigator *Date*

Approved by

Unit Supervisor *Date*

Section Manager *Date*

COMMENTS

Contaminated soil was discovered during upgrading of diesel & gas USTs at this site in 1991. The contamination was apparently a result of leaking gaskets, overfills, & a piping leak. Tanks were not replaced. On March 5, 1991, approx 250 cy of overexcavated PCS was taken to another DOT site and stockpiled with visqueen over & under. Prior to this, the stockpiles had been sitting unprotected at the original site since Jan. 31, 1991. GW was never sampled, even though it was encountered. BTEX was never analyzed in any of the soil samples taken. The limits of soil contamination were never actually

INITIAL INVESTIGATION FIELD REPORT

LUST ID: 1966 **FS ID:** 60549963 **Site ID:** 12240

SITE NAME WA DOT Signals Branch 7HDQ Site

defined. WSDOT said they would backfill and remediate when they remove the tanks in 3 years. This site seems very sketchy and it is not at all clear that the contamination has been cleaned up. Ecology needs to find out if these tanks were ever removed and if so, was soil remediation done then. Also, GW needs to be monitored.

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)

For delivery information visit our website at www.usps.com®

OFFICIAL USE

7011 0470 0003 3820 3371

Postage	$	Postmark Here
Certified Fee		
Return Receipt Fee (Endorsement Required)		
Restricted Delivery Fee (Endorsement Required)		
Total Postage & Fees	$	

Sent To: PROPERTY OWNER
Street, Apt. No.; or PO Box No.: 3700 9TH AVE S
City, State, ZIP+4: SEATTLE WA 98134

PS Form 3800, August 2006 — See Reverse for Instructions

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

TCP - Pederson

1. Article Addressed to:

PROPERTY OWNER
3700 9TH AVE S
SEATTLE WA 98134

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X Sharon Carley ☒ Agent ☐ Addressee

B. Received by (Printed Name): Sharon Carley
C. Date of Delivery: 3/6/13

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? *(Extra Fee)* ☐ Yes

2. 7011 0470 0003 3820 3371

PS Form 3811, February 2004 — Domestic Return Receipt — 102595-02-M-1540

12240/1966

SR
11/14/91
CW #1966

INTERIM
SOIL
JS

Release # 1966
SIGNALS MAINTENANCE
SEATTLE.

WASHINGTON STATE
DEPARTMENT OF TRANSPORTATION
P. O. Box 1709
4200 Main Street
Vancouver, WA 98663

Cleanup Action
for the WSDOT Property at

SIGNALS

3700 9th Avenue, S.
Seattle, Washington 98134

Fuel Tank Replacement
Phase 3 1990
June 24, 1991

Signals DOT Facility
3700 9th Avenue, South
Seattle, WA 98134

On January 31, 1991, Washington State Department of Transportation (DOT) and its contractor, Stokes Construction, Inc. of Seattle, began updating the fuel tanks and fuel island at the Signal facility. Work included replacing all fuel piping but the 1983 STI-P3 tanks were not replaced.

On Monday, February 4, 1991, the contractor was excavating dirt to expose the top of the fuel tanks and encountered soil contaminated with gas and diesel. The contamination was a result of leaking gaskets at tank access manholes, overfills, and a piping leak at a dispenser.

Excavation of the contaminated soil was continued on February 5th and 6th. This soil was stockpiled on site and straw bales were placed around the low side of the stockpile.

Five soil samples were taken on February 6th. One of these was at 120 ppm TPH and was taken from under the unleaded fuel pump. A reading of 770 ppm TPH was obtained from a sample taken from the stockpile of contaminated soil. The remaining three samples, which were taken from around the tanks, all had less than 20 ppm TPH.

On March 5, 1991, Stowe Trucking hauled the contaminated soil to DOT property known as Totem Lake which is located adjacent to I-405 at Mile Post 21.5 in the north bound lanes. There was about 250 c.y. of contaminated soil that was placed into a stockpile at this location. Visqueen was placed under and over the stockpile.

Mr. Jim Gunderson, DOT Facilities Engineer for District 1, is in charge of the soil remediation program for this location.

WDOT SIGNALS

REPAL. ;D PIPING BUT NOT TANKS. JAN 31, 1991.

FOUND CONTAM TO

TPH - 770 ppm ✓

EXCAVATED SOIL. CONTAM. REMAINING IN UNLEADED GAS TANK AREA

TPH - 120 ppm

NO BETX SAMPLES TAKEN.

EXCAVATED SOIL TAKEN TO DOT TOTEM LAKE FOR REMEDIATION

INTERIM SOIL

CLEAN UP ONGOING

Laucks 82
Testing Laboratories, Inc.
940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063

Chemistry, Microbiology, and Technical Services

CLIENT: Wa. Dept. Of Transportation
6431 Corson Ave. S.
Seattle, WA. 98108

ATTN : Jim Shaw/Oryan Johnson

Work ID : -
Taken By : Client
Transported by: Hand Delivered
Type : Soil

Certificate of Analysis

Work Order# : 91-02-093
DATE RECEIVED : 02/07/91
DATE OF REPORT: 02/13/91

SAMPLE IDENTIFICATION:

	Sample Description	Collection Date		Sample Description	Collection Date
01	SIG-100 Tank #1	02/06/91 16:15	04	SIG-103 Tank #1&2	02/06/91 16:30
02	SIG-101 Tank #2&3	02/06/91 16:20	05	SIG-104 Stockpile	02/06/91 16:35
03	SIG-102 Fuel Isl.	02/06/91 16:25	06	Method Blank	N/A

The flag "U" indicates the analyte of interest was not detected, to the limit of detection indicated.

Unless otherwise instructed all samples will be discarded on 04/04/91

Respectfully submitted,
Laucks Testing Laboratories, Inc.

J. M. Owens

LAUCKS Testing Laboratories, Inc.

940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063

Chemistry, Microbiology, and Technical Services

CLIENT : Wa. Dept. Of Transportation

Certificate of Analysis

Work Order # 91-02-093

TESTS PERFORMED AND RESULTS:

Analyte	Units	01	02	03	04
TPH Oil & Grease	mg/kg DB	20. U	20. U	120.	20. U
Total Solids	%	89.0	87.3	93.6	91.9

Analyte	Units	05
TPH Oil & Grease	mg/kg DB	770.
Total Solids	%	90.7

SIG-100 From the excavation face at the north end of the east tank about 7 ft. down. The material is blue sand & gravel.
SIG-101 From the excavation face at the north end between the middle and west tank about 6 ft. down.
SIG-102 Taken below the fuel island under the unleaded fuel pump.
SIG-103 Taken from between the east and middle tank at the south end about 5 ft. down. Soil is blue sand and gravel.
SIG-104 Taken from the contaminated stockpile at various points on both sides. This is a composite sample.

ECOLOGY
WASHINGTON STATE DEPARTMENT OF

Telephone Report ✓✓

Call From: A. Petrie Date: 3/12/91

Time: 11:30 am pm

Phone No.: sc. 493-5714

Call To: Rex Endicott

Subject: WDOT Signals Maintenance

Summary: At this site are 2 gas tanks and 1 diesel tank. Why were only 418.1 tests run? I told him if gasoline at a site, they would need to run 8020-BETX and 8015 mod for gas. I will fax him the required analysis to run and mail him draft guidance. Why wasn't GW sampled? I told him when GW was encountered, he should have sampled it. He said only interim action taken - 100cy of contaminated soil removed and leaks fixed (line & manway gasket).

Signature: A. Petrie Date: 3/12/91

Remediation will be started again 3 yrs, from now when they remove these tanks.

Comments: No BETX run; no GW sampled; 100cy removed.

Status: Delayed

Laucks 82
Testing Laboratories, Inc.
940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063
Chemistry, Microbiology, and Technical Services

✓

CLIENT: Wa. Dept. Of Transportation
6431 Corson Ave. S.
Seattle, WA. 98108

ATTN : Jim Shaw/Oryan Johnson

Certificate of Analysis

Work Order# : 91-02-093
DATE RECEIVED : 02/07/91
DATE OF REPORT: 02/13/91

Work ID : -
Taken By : Client
Transported by: Hand Delivered
Type : Soil

SIGNALS

SAMPLE IDENTIFICATION:

	Sample Description	Collection Date		Sample Description	Collection Date
01	SIG-100 Tank #1	02/06/91 16:15	04	SIG-103 Tank #1&2	02/06/91 16:30
02	SIG-101 Tank #2&3	02/06/91 16:20	05	SIG-104 Stockpile	02/06/91 16:35
03	SIG-102 Fuel Isl.	02/06/91 16:25	06	Method Blank	N/A

The flag "U" indicates the analyte of interest was not detected, to the limit of detection indicated.

Unless otherwise instructed all samples will be discarded on 04/04/91

Respectfully submitted,
Laucks Testing Laboratories, Inc.

J. M. Owens

Laucks 82
Testing Laboratories, Inc.
940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063
Chemistry, Microbiology and Technical Services

CLIENT : Wa. Dept. Of Transportation

Certificate of Analysis

Work Order # 91-02-093

TESTS PERFORMED AND RESULTS:

Analyte	Units	01	02	03	04
TPH Oil & Grease	mg/kg DB	20. U	20. U	120.	20. U
Total Solids	%	89.0	87.3	93.6	91.9

Analyte	Units	05
TPH Oil & Grease	mg/kg DB	770.
Total Solids	%	90.7

SIG-100 From the excavation face at the north end of the east tank about 7 ft. down. The material is blue sand & gravel.
SIG-101 From the excavation face at the north end between the middle and west tank about 6 ft. down.
SIG-102 Taken below the fuel island under the unleaded fuel pump.
SIG-103 Taken from between the east and middle tank at the south end about 5 ft. down. Soil is blue sand and gravel.
SIG-104 Taken from the contaminated stockpile at various points on both sides. This is a composite sample.

Department of Ecology-NWRO

Underground Storage Tank
Notice of Confirmed Release

Complaint received by J. Hickey Date 2-13-91
Reporter name Mickey Eakman / DOT Dist. 1
address 6431 Corson Ave S. Seattle WA 98118
phone no. (SC 493) - 768-5822

Site name WDOT Signals Shop (Fuel Site) 3700 9th Ave S. site phone no.
address 3700 9th Ave South
city Seattle county King zip 98108

Site owner see reporter info. owner's phone
owner's address
city zip

Consultant company
name phone no.

Other contact ç phone no.
contact affiliation Stokes construction

Description of Incident

Material	# Tanks	Status/Date
gasoline	2	in use
diesel	1	"
waste oil		
heat fuel		

Total number tanks: 3 Cleanup Status on-going

Comments planning to landfarm soil - stockpiled now 2-13-91. Soil was Moved to Totem Lake site as of 2-15-91.

Date inspected Investigator Referred to

DUANE BERENTSON
Secretary

STATE OF WASHINGTON
DEPARTMENT OF TRANSPORTATION

RECEIVED
FEB 13 1991
DEPT. OF ECOLOGY

February 8, 1991

Mr. Joseph Hickey
Dept. of Ecology
4350 - 150th Ave. NE
Redmond, Wa. 98052 - 5301

Dear Mr. Hickey:

This is to inform your office of soil contamination found at our fuel site located at 3700 9th Avenue South., Seattle, Washington 98108.

The contamination appears to be automotive fuel; testing is being done to determine the extend of clean up necessary. All material removed will be stockpiled on site until land farming can be accomplished.

Sincerely,

Mickey Eakman

Mickey Eakman, Equip. Supervisor
DOT District 1
6431 Corson Ave. S.
Seattle, Wa. 98118
Phone (Scan 493) 768-5822

ME:lfc

cc: file

INITIAL INVESTIGATION
INSPECTION

Date: 2/8/91
Insp. ~~Annette~~ Petrie

Report # ________ Site Name: WDOT-Signals Maintenance

County: King Site Location: 3700-9th Ave S., Seattle

Contact: Larry Deskins

SITE INFORMATION
Slope: towards SSE
Wind: ________
Soil type: ________
Rainfall: ________
Vegetation/Cover: ________

Surface water/drainage: ________

Groundwater discharges: well ______ septic sys. ______ UST ______
AST ______ other: ________

RELEASE/CONTAMINATION INFORMATION Confirmed? no _ yes

Substance	Location	Amount
Gas/Diesel		unknown

Control/containment removed some of soil

Potential Releases: ________

Targets: ________

Narrative

Apparently there was no gasket around manway of diesel tank, so when it was topped off diesel leaked. Gasoline lines appeared to have had leakage problems. They removed contaminated soil from the tops & sides of tanks (See Picture #13). They were retrofitting all three tanks (2 Gas, 1 Diesel) with overfill/spill prevention devices. They installed new fiberglass piping from tanks to pump islands.

I informed Mr. Deskins they would need to define the limits of soil contamination and install MWs to determine if GW has been affected. The water in the hole had a sheen in some areas, and areas which had a mousse-like frothing (picture 13).

The stockpiled contaminated soils were placed directly on pavement with hay bales along one side. I recommended placing on visqueen in future with berm under visquine to prevent run-off. Soils need to be covered - to protect against rainfall.

PHOTO No. 23

DATE: 2/8/91

TIME:

TAKEN BY: Annette Petrie

WITNESS:

FILM:

CAMERA:

DESCRIPTION: limit of excavation of soil; during tank upgrading

COMMENTS: Site Name: WDOT Signals Maintenance

PHOTO No. 24

DATE: 2/8/91

TIME:

TAKEN BY: Annette Petrie

WITNESS:

FILM:

CAMERA:

DESCRIPTION: Contaminated soils stockpile.

COMMENTS:

PHOTO No. 15

DATE: 2/8/91

TIME:

TAKEN BY: Annette Petrie

WITNESS:

FILM:

CAMERA:

DESCRIPTION:

Retrofitting gasoline tanks

COMMENTS:

PHOTO No. 16

DATE: 2/8/91

TIME:

TAKEN BY: Annette Petrie

WITNESS:

FILM:

CAMERA:

DESCRIPTION:

Diesel tank at southern limit of excavation

COMMENTS:

Department of Ecology-NWRO

Underground Storage Tank
Notice of Confirmed Release

Complaint received by A. Petrie Date 2/7/91
Reporter name Anonymous ~~[illegible]~~ M. Eakman called 2/8/91
address
phone no.

012240
Inc# 1966
Signals Branch 7HDQ Site

Site name WDOT-Signals Maintenance site phone no.
address 3700 9th Ave S. (below Spokane St. bridge)
city Seattle county King zip

Site owner WDOT owner's phone SC. 234-6015
owner's address Contact Larry Deskins
city zip

Consultant company
name phone no.

Other contact Stokes Construction Contractor phone no.
contact affiliation

Description of Incident

Material	# Tanks	Status/Date
gasoline	2	in-place - retrofitting
diesel	1	in-place - retrofitting
waste oil		
heat fuel		

5K gal.

Total number tanks: 3 Cleanup Status ~~[illegible]~~ on-going

Comments All 3 tanks failed tightness testing. Tanks were uncovered on Monday to start retrofitting to upgrade tanks and correct leakage problem. When unearthing tanks extensive soil contamination surrounded tanks. About 75 cy of soil was removed. A lot more contamination remaining. Soil removed was placed on asphalt; no visquine under or covering; no berming. Storm drains downgradient. WDOT allegedly said can't afford visquine or berming, or removal of contaminated soil still in ground. 2 MWs were put in, ~~[illegible]~~. There was no gasket around manway of diesel tank, so diesel released when tank topped off. Rex Endicott (WDOT) sampled hole & soil stockpile. Allegedly WDOT said they will backfill and not remediate, they will remove tanks 3 yrs. from now.

13' deep

Date inspected 2/8/91 Investigator Petrie Referred to

WASHINGTON STATE
DEPARTMENT OF
ECOLOGY

TELEPHONE REPORT

Call From: A. Petrie

Date: 2/7/91

Time: 2:30 am-pm
(circle)

Phone No.: SC. 234-6015

Call To: Larry Deskins

Subject: WDOT-Signals Maintenance

Summary: I informed Mr. Deskins we had recieved an anonymous phone call that this site had contamination discovered on 2/4/91. Mr Deskins replied that Ed Hannus of WDOT usually reports contamination to Joe Hickey. Possibly he was awaiting lab results before calling. I informed him if there is obvious visual & olfactory evidence of a release, they need to call Ecology within 24 hrs.

Also, I explained the stockpiled soils need to be on visqueen & bermed to prevent any potential release to the environment.

He will meet me on-site tomorrow, to address any concerns Ecology has about the site. Mr. Deskins said when they found contamination they wanted to immediately remove the tanks, remove all the contaminated soils &

Signature A Petrie

ECY 010-46(a)

Date 2/7/91

install new tanks. However, the permit process with the city of Seattle takes 3-6 mos. to install new tanks. They cannot have their fueling station shut-down for that long.

So they decided to upgrade & retrofit existing tanks (put gaskets on manways to stop source of leak). They removed about 75 cy of contaminated soil. They cannot remove all soil with tanks in the ground.

LUST CLEANUP REPORT REVIEW

LUST # 1966 **UST #** 12240 **Site Name** WDOT - SIGNALS

Change in Status ~~of Release~~ & Date (Awaiting Cleanup) (Cleanup Started) (Monitoring) (Reported Cleaned Up) (No Further Action) (Unknown) **Date** 8/25/00

Cause of Release (Overfill) (Piping Failure) (Spill)(Tank Failure) (Unknown)
Remediation Technologies Used

Report Title ____________ **Report Date** ____________

Report Type (Interim) (Monitoring) (Final) (Site Characterization) (Unknown)

Date Received ____________ **Contractor** ____________

Comments RU2000. CHANGED TO RCU. WOULD HAVE MEET METHOD B

Fund Source (LUST Trust Fund) (PLIA) (Responsible Party) (State Fund)

VCP/IRAP Status (Requested) (Not Requested) (Complete) **Reviewed by** [signature]
Date 8/25/0

Nov. 4, 1999 (GG)

- Jim Gunderson - WDOT - Signals
UST#12240; LUST#1966
- Oil & Grease samples taken
Diesel
for Gas tank leak. No TPH-G Sample, No BETX
- STIP - 3 tanks 1983
- Rex Endicott - (360) 768-5714
- Micky Eakman - (360) 768-5822
★ - Needs samples GW & soil
Signals Shop - 3700 - 9th Aves.

Underground Storage Tank Removal and Site Characterization Report

Washington State Department of Transportation (WSDOT) Northwest
Region Headquarters Signals Fuel Branch 7HDQ Site
3700 9th Avenue South
Seattle, Washington 98134

Prepared for

Washington State Department of Transportation
HQ Transportation Equipment Fund

Prepared by

Hazardous Materials and Solid Waste Program
Environmental Services Office

Washington State Department of Transportation

August 7, 2015

Table of Contents

Acronyms and Abbreviations

BTEX .... Benzene, Toluene, Ethylbenzene, and Xylenes
CUL……………………………..Cleanup Level
Ecology .... Washington State Department of Ecology
ERTS…………………………….Environmental Report Tracking System
ft. bgs... Feet Below Ground Surface
HASP .... Health and Safety Plan
HazMat Program.......................... Hazardous Materials and Solid Waste Program
I-5………………………………..Interstate 5
LEL……………………………...Lower Explosive Limit
LUST…………………………….Leaking Underground Storage Tank
mg/kg……………………………Milligram Per Kilogram (parts per million)
MTCA.. Model Toxics Control Act
NWTPH-Dx .... Northwest Total Petroleum Hydrocarbons – Diesel Extended
cPAHs……………………………Carcinogenic Polycyclic Aromatic Hydrocarbons
PID .... Photo Ionization Detector
RCRA... Resource Conservation and Recovery Act
ROW .... Right-of-Way
SAP .... Sampling and Analysis Plan
Site .... 3700 9th Ave, Seattle, WA 98134
TEF……………………………...Transportation Equipment Fund
TEF……………………………...Toxicity Equivalency Factor
TTEC…………………………….Total Ttoxic Equivalent Concentration
USTs .... Underground Storage Tanks
VOC .... Volatile Organic Compound
WAC…………………………… Washington Administrative Code
WSDOT .... Washington State Department of Transportation

1.0 INTRODUCTION

This underground storage tank (UST) removal and site characterization report has been prepared on behalf of the Washington State Department of Transportation (WSDOT) Headquarters (HQ) Hazardous Materials and Solid Waste (HazMat) Program to provide a summary of information associated with the removal of two (2) double-walled 5,000-gallon gasoline underground storage tanks (USTs), one (1) double-walled 5,000-gallons diesel UST from within WSDOT right-of-way. The USTs are located at King County Parcel number 5679500270, 3700 9th Avenue South, Seattle, WA 98134 within Township 24 North, Range 4 East and Section 17 as shown in Figure 1 (Site Vicinity Map) and Figure 2 (UST and Sampling Location Map). The site was associated with the Transportation Equipment Fund (TEF) Fueling Site at the Northwest (NW) Region Signal Maintenance Facility (Site) and is listed on the Washington State Department of Ecology's (Ecology) UST database under facility site identification 60549963, and UST site identification 12240.

In accordance with Washington Administrative Code (WAC) 173-360-390, as part of the permanent closure process, a site assessment is required to determine if a release may have occurred. A site characterization was conducted on June 17, 2015 pursuant to WAC 173-360-399 and as required per Models Toxics Control Act (MTCA) Chapter 173-340-450 WAC following a confirmed release by the site assessment.

The UST removal activities involved: preparing a Sampling and Analysis Plan (SAP), Health and Safety Plan (HASP), hiring a certified UST decommissioner, collecting five confirmation soil samples; three stockpile samples for disposal purposes; review laboratory analytical data; and preparing this report. Summaries of these activities are provided below.

1.1 SITE INFORMATION

The following sections provide information pertaining to the background, physical, geological and hydrogeological setting of the site.

1.1.1 Physical Setting and Historical Background

The Site is currently a WSDOT Signal Maintenance Facility with a refueling station for transportation vehicles. The USTs resided in the south – southeastern side of the property behind the main facility between Interstate 5 (I-5) Highway and 9th Avenue South. Commercial and residential properties are located to the north, east, south and west of the Site. On June 23, 2015, WSDOT's Real Estate Maps, and Sanborn Maps were accessed to observe the historic surrounding land use. A 1962 Real Estate Map (obtained from WSDOT); and 1904 and 1929 Sanborn Maps (Sanborn Map Company obtained from the Seattle Public Library (https://seattle.bibliocommons.com) were obtainable and can be viewed in Appendix A. The 1904 Sanborn map indicates that around 1904 – 1929 the area in the vicinity of the USTs was previously a brick yard called "Hoolihan's Brick Yard". The 1929 Sanborn Map and the 1962 WSDOT Real Estate Map identifies the property with a new name "Builders Brick Company".

On January 31, 1991 petroleum contaminated soils were discovered at the Site during a routine retrofit of the existing USTs at the WSDOT TEF Fuel Facility behind the WSDOT Maintenance Building. Approximately 250 cubic yards of heavy oil-range contaminated material with a concentration of 770 mg/kg was excavated and stockpiled. A total of five (5) confirmation samples were collected which identified concentrations of heavy oil-range hydrocarbons with all below 20 mg/kg except one sample with a concentration of 120 mg/kg. On August 25, 2000 the Site was reported as cleaned up because the soil conditions would have met MTCA Method B cleanup levels (CULs). Copy of the "reported cleaned up" letter can be observed in Appendix B, and Photos of the 1991 investigation can be found in Appendix C.

1.2.1 Geologic and Hydrogeologic Setting

The city of Seattle lies in the central portion of the Puget Sound Lowland Basin, between the Olympic Mountain Range to the west and the Cascade Mountain Range on the east. Current site conditions have been influenced by repeated cycles of glacial scouring and deposition, tectonic activity, stream erosion and deposition, and human activities. The Duwamish River, which flows from the south to the north and lies west of the Site, was modified by channelization, dredging, and filling during the first part of the 20th Century (Troost and Booth, 2008).

The Site is located near the Duwamish River floodplain. The Site and surrounding area are underlain by unconsolidated Holocene-age soils overlying Quaternary-age glacial deposits. The Holocene soils are present to a depth of up to approximately 200 feet (ft.) below ground surface (bgs) and include fill material, estuarine silt and clay, and alluvial and beach-deposited sand and silt. The underlying Quaternary glacial deposits consists of till and glacioclacustrine silt and clay. Environmental investigations in the vicinity indicate that the local geology consists of 5 to 50 feet of sand and silt derived from dredging and other fill, and from natural sediment from the Duwamish River (Shannon&Wilson, 2006).

Soils encountered during the UST removal and site characterization in the north, west and southern side of the excavation consisted primarily of brown, poorly graded gravely sand with trace silts (SP), having none to very low consistency and plasticity, and dry to damp from approximately 6 inches below the concrete surface to approximately 8 ft. bgs, and wet from 8 ft. bgs to 13 ft.; and from 8 ft. bgs to approximately 12 - 13 ft. bgs on the northern and western side of the excavation consisted primarily of gray silt with clay. The eastern side of the excavation was brown, poorly graded gravely sand with trace silts (SP), having none to very low consistency and plasticity, and dry to damp from approximately 6 inches below the concrete surface to approximately 6 ft. bgs and then became a bluish-gray silt according to the Unified Soil Classification System. Soils in the vicinity of the eastern portion of the UST excavation pit were poorly graded silt with sand and gravels from approximately 5 ft. bgs to 9 ft. bgs the maximum depth of excavation in that area.

The general topography of the area is relatively flat with a slight downward slope from the east to west (Shannon&Wilson, 2006). Groundwater was observed infiltrating from the bottom of the excavation beginning at approximately 8.5 ft. bgs to the maximum depth of excavation of 12-13 ft. bgs.

2.0 BACKGROUND INFORMATION

2.1 Site Assessment

On June 17, 2015, a UST site assessment was conducted by WSDOT HazMat Specialist and Washington State Site Assessor (8274580, expiration July 17, 2016) Trent Ensminger, which identified petroleum impacted soils around and underneath the USTs. Based off of field screening techniques, soils where observed with obvious staining and omitted a strong petroleum odor. In general accordance with the April 2003, "Guidance for Site Checks and Site Assessments for Underground Storage Tanks" (Publication 90-52), published by Ecology, and WAC 173-360-399, if there is a confirmed release and the release is reported within 24 hours, no further site assessment is required; however, per WAC 173-340-450 a site characterization would be required. On June 17, 2015, during excavation of the pump island, it was observed that the piping system leading to the tanks had leaked at approximately 2.5 – 8.5 ft. bgs. The as-built diagram can be observed in Appendix D. In addition, contamination was discovered underneath the tanks during the decommissioning process at approximately 8 ft. bgs which originated from the leaking pipes. The Washington State Department of Ecology (Ecology) was contacted to report the confirmed leaking underground storage tanks (LUSTs) at the Site. Ecology issued an Environmental Report Tracking System (ERTS) # 657540 for the confirmed release.

On June 17, 2015, three stockpile samples collected from beneath the USTs were delivered to OnSite Environmental Inc. to determine the tank contents, concentration of the contaminants in the soils, and to obtain disposal approval for the tank contents following the decommissioning process. The initial analytical results confirmed that the soils were impacted with diesel-range and heavy oil-range hydrocarbons exceeding MTCA Method A Cleanup Levels (CULs).

3.0 UNDERGROUND STORAGE TANK DECOMMISSIONING AND CLOSURE

3.1 Notifications

Prior to removing the USTs from the Site, Trent Ensminger of WSDOT submitted a 30-Day Notice of Intent to Decommission UST(s) to Ecology, as required by WAC 173-360-385. A 30-day waiver was granted by Andrew Imke of Ecology to proceed with the decommissioning process prior to the 30 days.

3.2 UST Closure Method / Tank Information

On May 14, 2015, WSDOT retained Anderson Environmental Contracting (Anderson) to decommission the three (3) double-walled USTs, which began June 15, 2015. The UST closures were performed in general accordance with Chapter 173-360 WAC, "Underground Storage Tank Statue & Regulations", "Guidance for Site Checks and Site Assessments for Underground Storage Tanks" (Publication 90-52), April 2003 revision, published by Ecology, and MTCA Chapter 173-340 WAC.

The USTs were approximately 14.5 ft. in length and 7.9 ft. in diameter. The bottoms of all three tanks were approximately 8 ft. bgs. The USTs were in excellent condition with no visible holes or evidence of compromised structural integrity. The USTs were empty with the exception of residual product and sludge at the bottom of each tank. Approximately 400-gallons total product, sludge, water and rinsate were pumped from the USTs. The Marine Chemist, Joe Tevelt inserted carbon dioxide to inert the tanks. Air monitoring using a five-gas meter registered a lower explosive limit (LEL) of 0 parts per million (ppm) and oxygen level of less than 5%. The USTs were triple rinsed and all rinsate was pumped for disposal. After King County Fire Marshal, Al Devit verified the decommissioning process and cleared the tanks for removal; the USTs were transported by Marine Vacuum Services Inc. to their facility for disposal. Photographs of the decommissioning are shown in Appendix C and copies of UST closure and site assessment forms, certificates and receipts pertinent to the tank removal are provided in Appendix E.

4.0 FIELD INVESTIGATION FOR CHARACTERIZATION

4.1 Confirmation Soil Sampling

Routine field screening was conducted during the removal of the UST, including the use of visual (soil discoloration) observations and olfactory, and use of a photoionization detector (PID), and sheen testing. Field screening observations were used as the basis for identification of contamination during excavation that would be stockpiled for disposal, as well as for selection of appropriate confirmation sample locations for laboratory analysis as required. A target PID reading of 10 ppm was utilized to evaluate if excavated soils were considered impacted. Excavated soil with field screening results above 10 ppm or visual indications of contamination was segregated and temporarily stockpiled and placed on plastic and bermed.

A site-specific SAP was prepared by the HazMat Program for the scheduled field work activities. A copy of this document is held on file by the HazMat Program. All field screening, sampling, and transporting of samples were conducted in general accordance of WSDOT Quality Assurance Plan for Field Screening and Disposal Characterization for Petroleum Contamination (QAP) prepared by GeoEngineers on October 26, 2012 as referenced in Attachment F.

Field screening identified the extent of contamination to be approximately 11.5 – 12 ft. bgs to the extent of the concrete slabs used to anchor the USTs as shown in Appendix D. The excavator operator was instructed to over-excavate between the concrete slabs to approximately 12.5 - 13 ft. bgs to collect the bottom confirmation sample below the USTs. The approximate delineation size of the excavation pit was 45 ft. in length x 50 ft. wide. A total of five confirmation samples (SFS – UST – B1, SFS – UST – N, SFS – UST – E, SFS – UST – S, and SFS – UST – W) were collected at the base of the excavation approximately 12 ft. bgs, except SFS – UST – E which was collected at 10 ft. bgs. A sample was collected from bottom of the UST location between the south side of the concrete slabs of the UST2 - Dx and UST3 – Gx tanks known as B; and one sample from each of the sidewalls of the four (4) cardinal directions identified as north (N), east (E), south (S) and west (W). The samples henceforth will be identified as SFS-B1, SFS-N, SFS-E, SFS-S, and SFS-E. All samples were delivered to OnSite Environmental Inc, in Redmond, Washington via courier for analysis on June 18 and 23, 2015. The samples were analyzed for Ecology Method Northwest Total Petroleum Hydrocarbons—Gasoline Extended (NWTPH-Gx); NWTPH-Diesel Extended (Dx); Volatile Organics using Environmental Protection Act (EPA) Method 8260B; Semivolatile Organics using EPA Method 8270, Resource Conservation and Recovery Act (RCRA) 8 Metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver), and Polychlorinated Biphenyls using EPA Method 8082. All gasoline-range petroleum hydrocarbons and VOCs were collected using EPA Method 5035A, and analyzed with the appropriate methods as shown below.

4.2 Stockpile Sampling

During site cleanup activities, and as discussed above, excavated soils were segregated based on field screening results. Three stockpile samples (SFS – SP1, SFS – SP2, and SFS – SP3) were collected to obtain authorization for direct haul and disposal purposes. The samples were collected where field screening indicated the likelihood of encountering the highest concentration of contaminated soil approximately 6 – 12 inches beneath the surface of the stockpile. All gasoline-range petroleum hydrocarbons and VOCs were collected using EPA Method 5035A, and analyzed with the appropriate methods as shown below.

Stockpile samples were delivered to OnSite Environmental Inc., in Redmond, Washington on June 17, 2015 via courier. The samples were analyzed for NWTPH-Gx; NWTPH-Dx; VOCs using EPA Method 8260B; Semivolatile Organics using EPA Method 8270, and RCRA 8 Metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver).

4.3 Soil Disposal

Approximately 561.81 tons of suspected or confirmed contamination was stockpiled and hauled to Waste Management located at 70 South Alaska Street, Seattle, Washington. The waste disposal receipts and manifest are located in Appendix G.

4.4 Groundwater

Groundwater was observed infiltrating from the bottom of the excavation beginning at approximately 8.5 ft. bgs to the maximum depth of excavation of 12-13 ft. bgs. On June 22, 2015, Marine Vacuum Inc. pumped approximately 400 gallons of suspected contaminated water from the bottom of the excavation.

5.0 Laboratory Analytical Results

5.1 Analytical Results

All of the analytical data were deemed acceptable. Individual chemical constituents detected in each soil sample were evaluated against the MTCA Method A CULs for unrestricted land use (Ecology, 2007 [Revised 2013]) and WAC 173-303 Dangerous Waste Regulations (Ecology, 2009 [Revised 2014]) to characterize the soil for disposal. The detected constituents for the confirmation samples are summarized below. The analytical results for both the confirmation sampling and the stockpile sampling are in Table 1, and the analytical data report is presented in Appendix H.

5.2 Confirmation Samples

Gasoline-Range Petroleum Hydrocarbons

There were no detected concentrations of gasoline-range hydrocarbons in any of the confirmation samples.

BTEX

There were no detected concentrations of BTEX at or above CULs for any of the confirmation samples.

Diesel-Range and Lube Oil-Range Petroleum Hydrocarbons

There were no detected concentrations of diesel in any of the confirmation samples except samples SFS – B1 and SFS – S with a concentration of 50 mg/kg and 340 mg/kg, respectively, well below the CUL of 2,000 mg/kg. In addition, there were no detected concentrations of oil-range hydrocarbons except in sample SFS – W with a concentration of 75 mg/kg, well below the CUL of 2,000 mg/kg.

Semivolatile Organics

cPAHs and Naphthalenes

All confirmation samples were non-detect for cPAHs, and Naphthalenes except in sample SFS – W with a concentration of 0.0009 mg/kg and 0.043 mg/kg, respectively, well below the cPAH CUL of 0.1 mg/kg and the Naphthalene CUL of 5 mg/kg. The cPAH is calculated using the Total Toxic Equivalent Concentration (TTEC). TTEC is the sum of each individual cPAH concentration multiplied by its corresponding Toxicity Equivalency Factor (TEF).

RCRA 8 Metals

Barium, chromium and/or lead were detected in all soil samples at concentrations less than the MTCA Method A or B CULs, or near background levels found in the Puget Sound Area. All other metals were not detected.

6.0 SUMMARY AND CONCLUSIONS

Based on the findings of the site assessment and site characterization, it was confirmed that there was a release at the WSDOT TEF Fueling Facility located at King County Parcel number 5679500270, 3700 9th Avenue South, Seattle, WA 98134 within Township 24 North, Range 4 East and Section 17. The release appears to be the result of structural failure from the piping system leading from the pump island to the USTs. The USTs were in excellent condition with no signs of leaking or structural damage. In accordance with WAC 173-360-390, a site assessment was conducted to determine if a release had occurred as part of the permanent closure process. A site characterization was conducted pursuant to WAC 173-360-399 and as required per MTCA Chapter 173-340-450 WAC following the confirmed release by the site assessment.

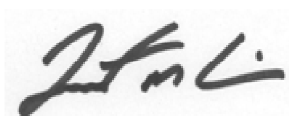
Approximately 561.81tons of suspected or confirmed contaminated soil was excavated, stockpiled and hauled to Waste Management located at 70 South Alaska Street, Seattle, Washington. The approximate delineation boundary of the UST excavation pit was 45 ft. in length and 50 ft. wide. A total of five (5) discreet grab samples were collected, one (1) from the base of the UST excavation approximately 12-13 ft. bgs between the concrete anchoring slabs of UST2-Dx and UST3-Gx identified as SFS – B1, one from the interface of each sidewall in the four (4) cardinal directions. All four (4) sidewall samples except SFS-E were collected at approximately 12 ft. bgs. Because the soils below 5 ft. bgs in the vicinity of SFS-E were classified as poorly graded silt, the contamination was confined to the upper depth, therefore, after over-excavating; a sample was collected at approximately 10 ft. bgs.

Based off of the analytical results and field screening, all analyses for the confirmation samples were either non-detect or well below MTCA Method A CULs. While groundwater was identified as shallow as 8.5 ft. bgs, the groundwater at the maximum depth of 12-13 ft. bgs is most likely not impacted above MTCA Method A CULs since the soils were shown to be clean or well below MTCA Method A CULs. On June 22, 2015, Marine Vacuum Inc. pumped approximately 400 gallons of suspected contaminated water from the bottom of the excavation. The tank removals and subsequent remedial work has removed the contaminated soil; thereby eliminating the source of the contamination associated with the USTs. The Site was backfilled with clean material and paved. There is no additional environmental investigation warranted at this time as there is no immediate threat to human health or the environment, and it is recommended that this site location be awarded a No Further Action.

LIMITATIONS

No other party is entitled to rely on the information, conclusions, and recommendations included in this report without the express written consent of the WSDOT HazMat Program. Further, the reuse of the information, conclusions, and recommendations provided herein for extensions of the project or for any other project without review and authorization by the WSDOT HazMat Program shall be at the user's sole risk. Questions regarding this report should be directed to Trent Ensminger at (360) 570-2587.

Thank you.



Trent Ensminger
WSDOT Hazardous Materials Specialist

REFERENCES

Shannon&Wilson, Inc. November 2006. *Phase I Environmental Site Assessment, Moss G. Milan and Poncho's Legacy Properties.*

Troost, K. G., Booth, D. B., Wisher, A. P., and Shimel, S. A., 2005, *The geologic map of Seattle - A progress report, 2005, U. S. Geological Survey Openfile report 2005-1252, scale 1:24,000*.

Figure 1. Site Vicinity Map

Tank Location

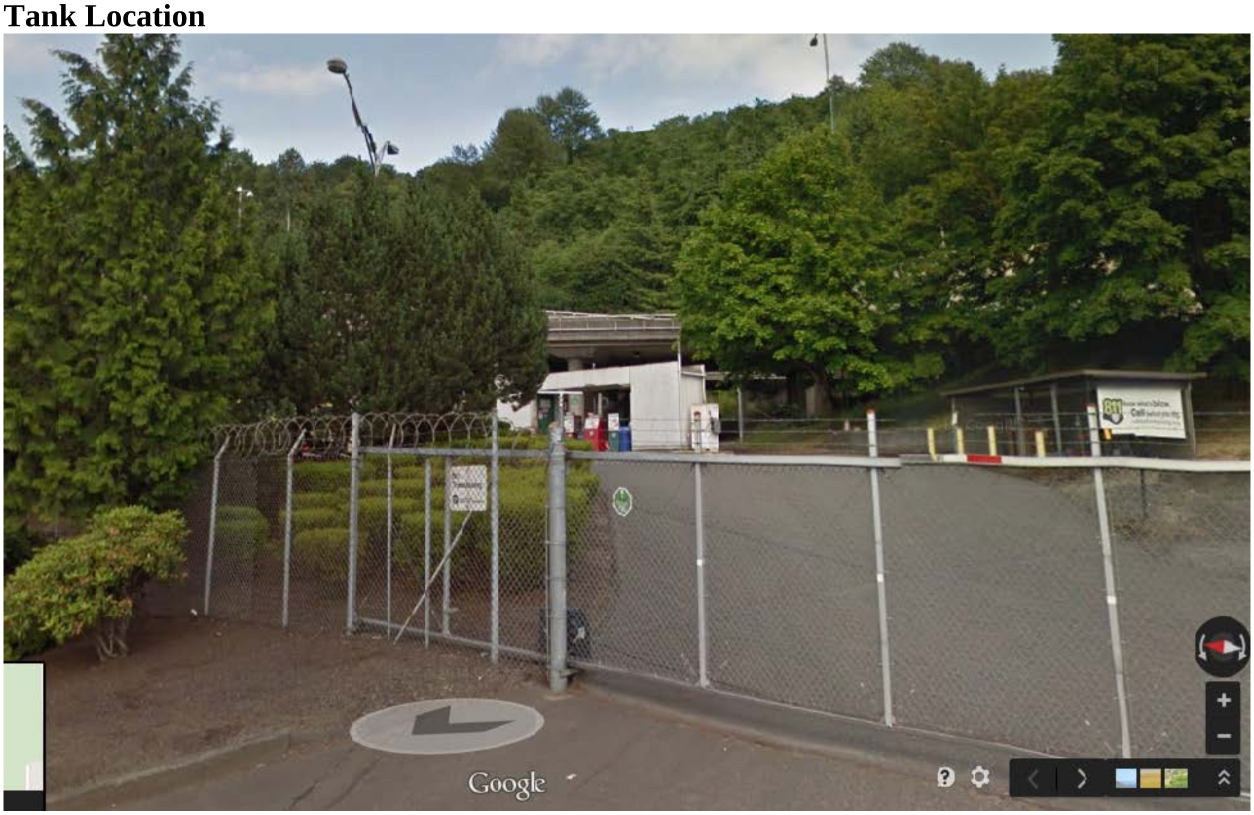
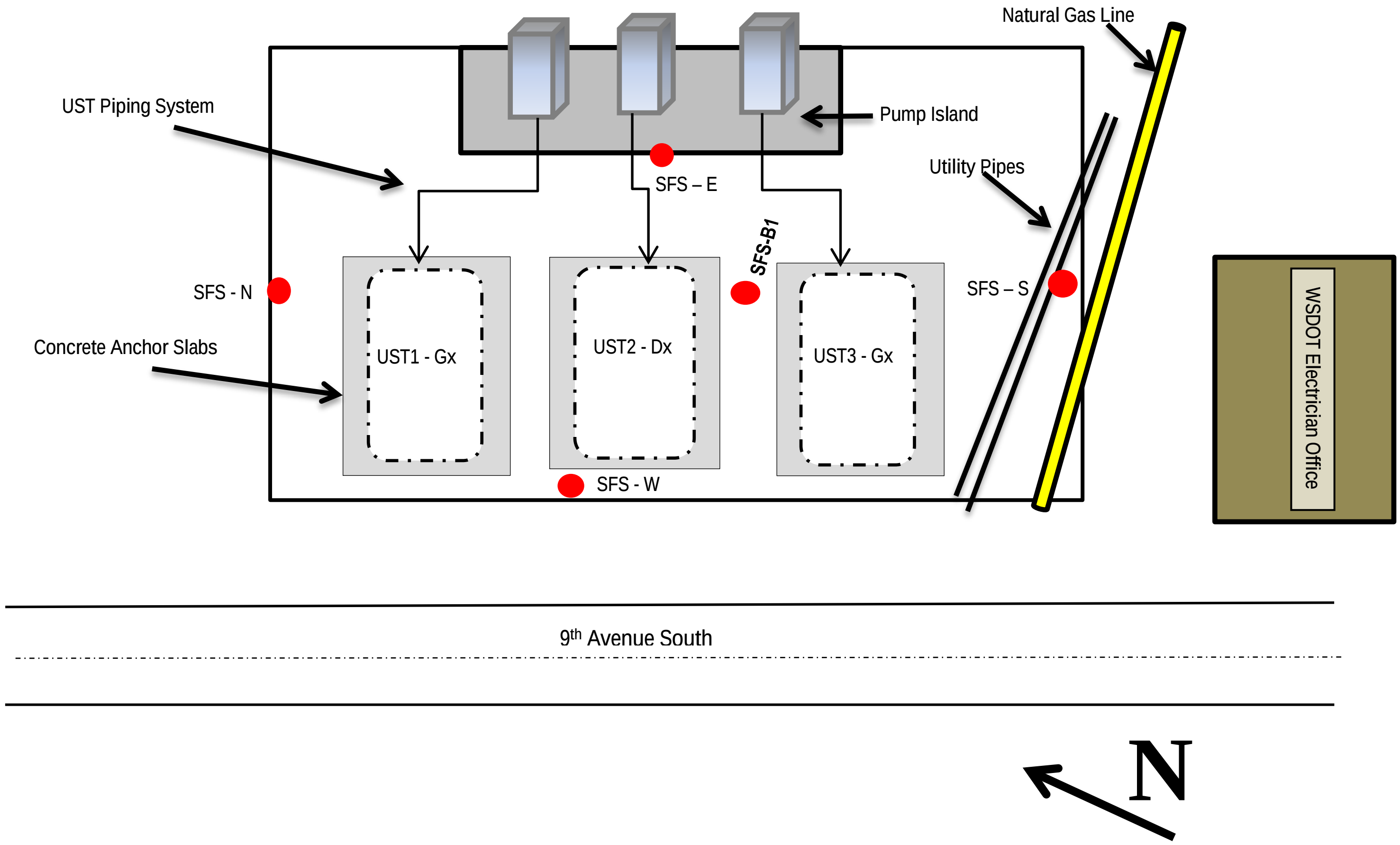


Figure 2. UST and Sampling Location Map

WSDOT Signal Fuel Site USTs Removal and Site Characterization – Field Map



Not to Scale

SFS – B1

Petroleum Hydrocarbons	RCRA 8 Metals
Gasoline - ND	Arsenic – ND
Diesel – 50	Barium – 33
Lube Oil - ND	Cadmium – ND
Benzene – 0.0025	Chromium – 39
Toluene – 0.013	Lead – ND
Ethyl Benzene - ND	Selenium – ND
Xylene – 0.0036	Silver – ND
	Mercury - ND

SFS – N

Petroleum Hydrocarbons	RCRA 8 Metals
Gasoline - ND	Arsenic – ND
Diesel - ND	Barium – 59
Lube Oil - ND	Cadmium – ND
Benzene - ND	Chromium – 37
Toluene - ND	Lead – ND
Ethyl Benzene - ND	Selenium – ND
Xylene - ND	Silver – ND
	Mercury – ND

SFS – E

Petroleum Hydrocarbons	RCRA 8 Metals
Gasoline - ND	Arsenic – ND
Diesel - ND	Barium – 110
Lube Oil - ND	Cadmium – ND
Benzene - ND	Chromium – 62
Toluene - ND	Lead – 10
Ethyl Benzene - ND	Selenium – ND
Xylene - ND	Silver – ND
	Mercury – ND

SFS – S

Petroleum Hydrocarbons	RCRA 8 Metals
Gasoline - ND	Arsenic – ND
Diesel - 340	Barium – 27
Lube Oil - ND	Cadmium – ND
Benzene - ND	Chromium – 14
Toluene - ND	Lead – ND
Ethyl Benzene - ND	Selenium – ND
Xylene – ND	Silver – ND
	Mercury - ND

SFS – W

Petroleum Hydrocarbons	RCRA 8 Metals
Gasoline - ND	Arsenic – ND
Diesel - ND	Barium – 120
Lube Oil - 75	Cadmium – ND
Benzene - ND	Chromium – 69
Toluene - ND	Lead – 6.2
Ethyl Benzene – ND	Selenium – ND
Xylene – ND	Silver – ND
	Mercury – ND
cPAHs – 0.0009	Naphthalene – 0.043

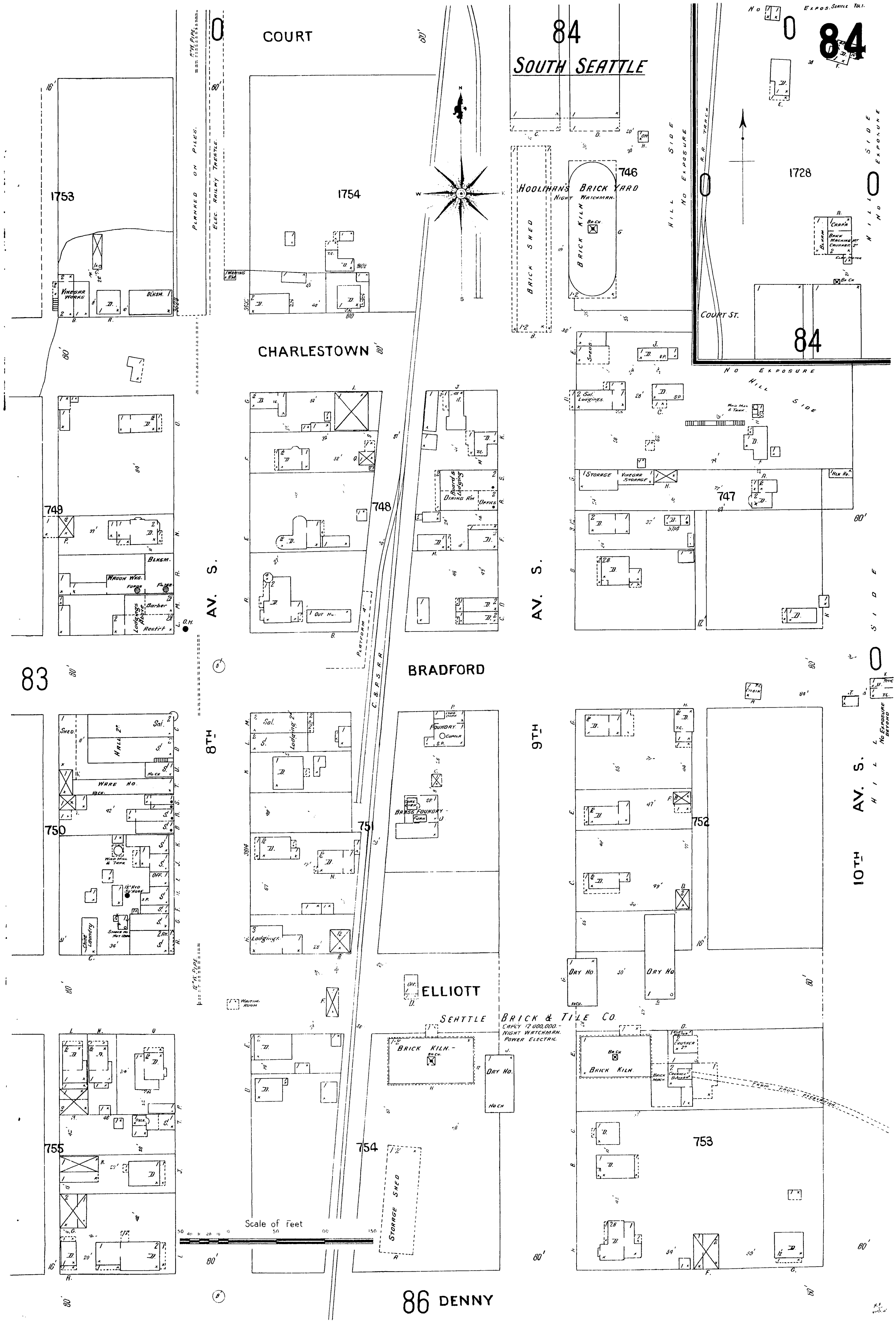
All Laboratory results are in milligram per kilogram (mg/kg)
MTCA – Model Toxics Control Act, WAC 173-340. All laboratory results were compared to MTCA Method A cleanup criteria for unrestricted land use.
All results that exceed MTCA Method A Cleanup Levels are highlighted in yellow

Table 1. WSDOT Signal Fuel – Summarized Analytical Data

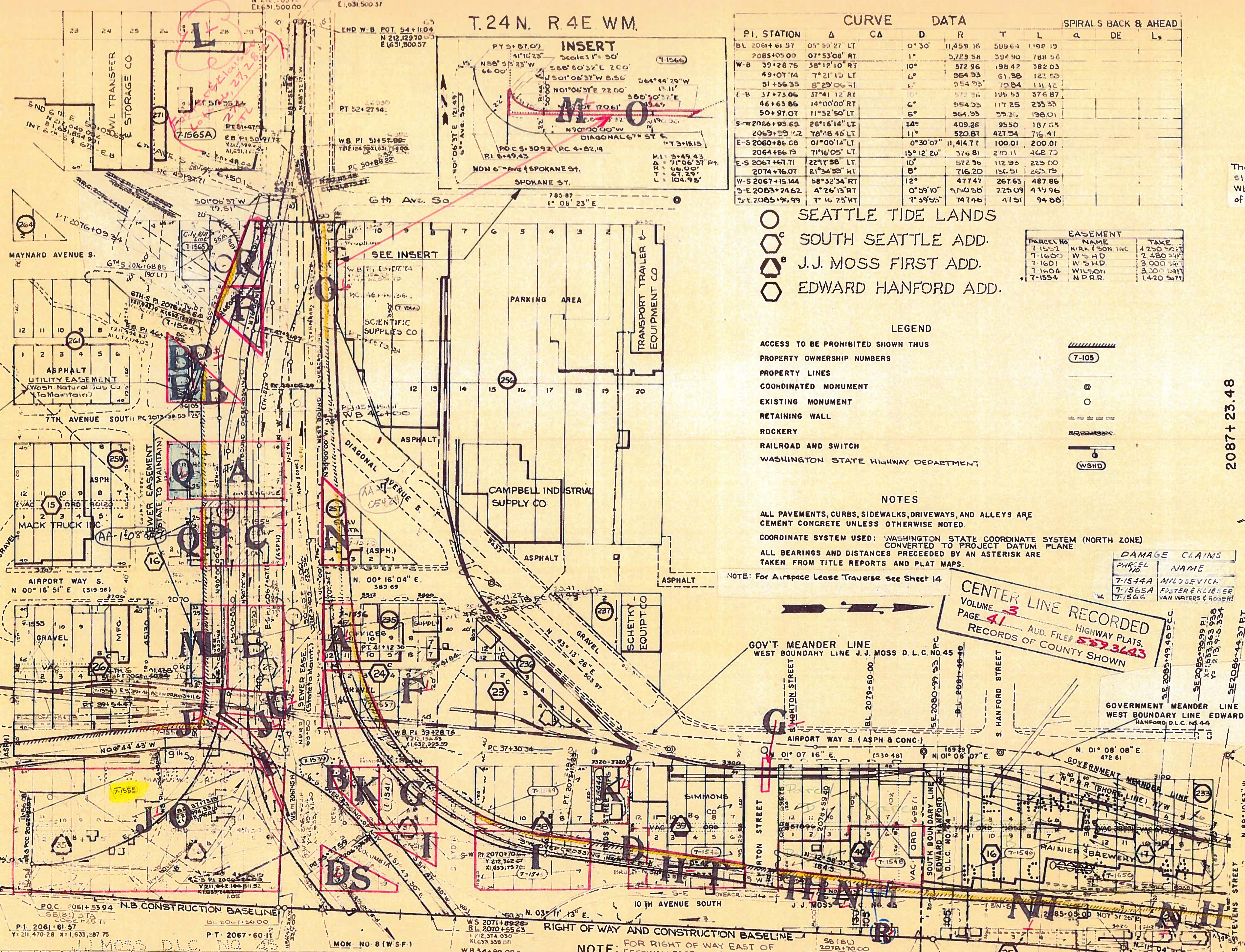
WSDOT Signals Fuel Site - Summarized Analytical Data												
		Cleanup Levels and Background Levels										
Analyte	**Units**	*MTCA Method A*	*Natural Back Ground Levels for Puget Sound*	**SFS - B1**	**SFS - N**	**SFS - E**	**SFS - S**	**SFS - W**	**SP1**	**SP2**	**SP3**
Total Petroleum Hydrocarbons											
Gasoline	(mg/kg)	30	N/A	ND	ND	ND	ND	ND	ND	ND	ND
Diesel Range Organics	(mg/kg)	2,000	N/A	**50**	ND	ND	**340**	ND	**2,700**	**4,500**	**2,600**
Lube Oil	(mg/kg)	2,000	N/A	ND	ND	ND	ND	**75**	ND	**4,800**	ND
RCRA 8 Metals											
Arsenic	(mg/kg)	20	6	ND	ND	ND	ND	ND	ND	ND	ND
Barium	(mg/kg)	N/A	2	**33**	**59**	**110**	**27**	**120**	**28**	**27**	**30**
Cadmium	(mg/kg)	2	1	ND	ND	ND	ND	ND	ND	ND	ND
Chromium	(mg/kg)	2,000	27	**39**	**37**	**62**	**14**	**69**	**21**	**23**	**23**
Lead	(mg/kg)	250	17	ND	ND	**10**	ND	**6.2**	ND	ND	ND
Selenium	(mg/kg)	N/A	N/A	ND	ND	ND	ND	ND	ND	ND	ND
Silver	(mg/kg)	N/A	N/A	ND	ND	ND	ND	ND	ND	ND	ND
Mercury	(mg/kg)	2	0	ND	ND	ND	ND	ND	ND	ND	ND
BTEX											
Benzene	(mg/kg)	0.03	N/A	**0.0025**	ND	ND	ND	ND	ND	ND	ND
Toluene	(mg/kg)	7	N/A	**0.013**	ND	ND	ND	ND	ND	ND	ND
Ethyl Benzene	(mg/kg)	6	N/A	ND	ND	ND	ND	ND	ND	ND	ND
Total Xylene	(mg/kg)	9	N/A	**0.0036**	ND	ND	ND	ND	ND	ND	ND
PCBs											
PCBs	(mg/kg)	1	N/A	ND	ND	ND	ND	ND	ND	ND	ND
Semivolatile Organics											
cPAHs	(mg/kg)	5	N/A	ND	ND	ND	ND	**0.0009**	**0.0027**	**0.3775**	**0.0127**
Napthalene	(mg/kg)	5	N/A	ND	ND	ND	ND	**0.043**	**0.632**	**6.82**	**3.71**

Notes -
*MTCA - Model Toxics Control Act, WAC 173-340. All laboratory results were compared to MTCA Method A cleanup levels for unrestricted land use.
*Highlighted cells indicate concentrations exceed Ecology's MTCA Method A Cleanup Levels.
* ND - not detected
*N/A - not applicable

Appendix A – Historical Real Estate and Sanborn Maps



84
SOUTH SEATTLE
COURT
CHARLESTOWN
BRADFORD
ELLIOTT
DENNY
8TH AV. S.
9TH AV. S.
10TH AV. S.
COURT ST.
HOOLIHAN'S BRICK YARD
NIGHT WATCHMAN.
BRICK KILN
BRICK SHED
SEATTLE BRICK & TILE CO.
CAPCY 12,000,000.-
NIGHT WATCHMAN.
POWER ELECTRIC.
PLANKED ON PILES.
ELEC. RAILWY TRESTLE.
C.B.P.S.R.R.
VINEGAR WORKS
WAGON MKG.
LODGINGS
BRASS FOUNDRY
FOUNDRY
STORAGE SHED
DRY HO.
CHINA LAUNDRY
WAITING ROOM
NO EXPOSURE HILL SIDE
Scale of Feet
83
86
1753
1754
746
1728
748
749
747
750
751
752
755
754
753



CURVE DATA

P.I. STATION	Δ	CΔ	D	R	T	L	SPIRALS BACK & AHEAD a	DE	Ls
BL 2061+61 57	05°59'27" LT		0°30'	11,459 16	599 64	1198 19			
2085+05 00	07°53'08" RT		1°	5,729 58	394 90	788 56			
W-B 39+28 76	38°12'10" RT		10°	572 96	198 42	382 03			
49+07 74	7°21'15" LT		6°	954 93	61.38	122 53			
51+56 35	8°29'06" RT		6°	954 93	70 84	141 42			
E-B 37+73.06	37°41'12" RT		10°	572 96	195 53	376 87			
46+63 86	14°00'00" RT		6°	954 93	117 25	233 33			
50+97.07	11°52'50" LT		6°	954.93	99.36	198.01			
S-W 2066+95.62	26°16'14" LT		14°	409.26	95 50	187 65			
2069+99.62	78°48'45" LT		11°	520.87	427.94	716.41			
E-S 2060+86 08	01°00'14" LT		0°30'07"	11,414.77	100.01	200.01			
2064+86 19	71°16'05" LT		15°12'20"	376 81	270 11	468 70			
E-S 2067+67.71	22°17'58" LT		10°	572 96	112 93	223 00			
2074+76.07	21°34'59" RT		8°	716.20	136.51	269.79			
W-S 2067+15.144	58°32'34" RT		12°	477 47	267.63	487 86			
S-E 2083+24.62	4°26'13" RT		0°59'10"	5,810 58	225 09	449 96			
S-E 2085+96.99	7°16'23" RT		7°59'55"	147 46	47 51	94 88			

SEATTLE TIDE LANDS
SOUTH SEATTLE ADD.
J.J. MOSS FIRST ADD.
EDWARD HANFORD ADD.

EASEMENT		
PARCEL NO	NAME	TAKE
7-1552	KIRK & SON INC	4,250 SQ FT
7-1600	W S H D	2,480 SQ FT
7-1601	W S H D	3,000 SQ FT
7-1604	WILSON	3,000 SQ FT
7-1554	N P R R	1,420 SQ FT

LEGEND

ACCESS TO BE PROHIBITED SHOWN THUS
PROPERTY OWNERSHIP NUMBERS (7-105)
PROPERTY LINES
COORDINATED MONUMENT
EXISTING MONUMENT
RETAINING WALL
ROCKERY
RAILROAD AND SWITCH
WASHINGTON STATE HIGHWAY DEPARTMENT (WSHD)

NOTES

ALL PAVEMENTS, CURBS, SIDEWALKS, DRIVEWAYS, AND ALLEYS ARE CEMENT CONCRETE UNLESS OTHERWISE NOTED.

COORDINATE SYSTEM USED: WASHINGTON STATE COORDINATE SYSTEM (NORTH ZONE) CONVERTED TO PROJECT DATUM PLANE

ALL BEARINGS AND DISTANCES PRECEEDED BY AN ASTERISK ARE TAKEN FROM TITLE REPORTS AND PLAT MAPS.

NOTE: For Airspace Lease Traverse see Sheet 14

DAMAGE CLAIMS	
PARCEL NO	NAME
7-1544A	MILOSEVICH
7-1565A	FOSTER & KLEISER
7-1566	VAN WATERS & ROGERS

CENTER LINE RECORDED
VOLUME 3 HIGHWAY PLATS, PAGE 41 AUD. FILE 5573683
RECORDS OF COUNTY SHOWN

The privilege of using the area underneath the highway structures of the Spokane Street Interchange between Stas. 2060+70 and 2068+15 will be permitted to the Dept. of Highways subject to the conditions of Agreement AA I-05921

The privilege of using the area underneath the highway structures between Stations 2085+28 and 2085+70 for a vehicular turn-around will be permitted to the Sicks' Rainier Brewery Company, subject to the conditions of Permit No 7462.

The privilege of using the area underneath the highway structures of the W-6th ramp and the W-B ramp between Stas. WB 43+00 and WB 50+00 on right will be permitted to the Dept of Highways, subject to the conditions of Agreement AA 7-05424

OWNERSHIPS		ALL AREAS TO NEAREST TEN SQ FT UNLESS OTHERWISE NOTED.			
PARCEL NO.	NAME	TOTAL AREA	TAKE	REMAINDER LT.	RT.
7-1538	NOT USED				
7-1539	CITY OF SEATTLE	2,620	2,620		
7-1540	MARSHALL	6,100	6,100		
7-1541	DEVONSHIRE-ESTATE	14,400	13,480		920
7-1542	N.P. RY. CO	4,410	4,410		
7-1543	COLMAN	8,400	8,400		
7-1544	N.P. RY. CO	28,800	600	28,200	
7-1545	"	28,780	27,070	1,710	
7-1546	STILLWELL	25,440	16,480	8,960	
7-1547	"	14,250	4,125	10,125	
7-1548	SEA BREW & MALT CO	33,320	1,500	31,820	
7-1549	"	ACCESS	ONLY		
7-1550	"	"	"		
7-1551	NOT USED				
7-1552	KIRK & SON INC	12,560	7,710		4,850
7-1553	SANDER ET AL	21,800	21,800		
7-1554	N P RY CO	38,000	14,400	23,600	
7-1555	BUILDERS BRICK CO	178,000	147,930	30,070	
7-1556	LUNSKI	14,400	7,600		6,800
7-1557	N P RY. CO	28,580	12,120		16,460
7-1558	NOT USED				
7-1559	STATE OF WASH DEPT OF NAT RES.	14,400	14,400		
7-1560	GEN PETRO CORP	18,180	7,890		10,290
7-1561	COSTELLO (WSHD)				
7-1562	NOT USED				
7-1563	FIELDCAMP (WSHD)				
7-1564	WILSON	9,270	8,290	980	
7-1565	WILLIAMS	15,400	8,400	7,000	
7-1566	Van Waters & Rogers	58,670	894		57,776
7-1600	WRAGGE (WSHD)				
7-1601	BRADY (WSHD)				
7-1602	NOT USED				
7-1604	WRAGGE	4,920	960	3,960	
7-1605	BRADY CONST CO	4,680	4,680		

ACCESS NOTE:
TRAFFIC MOVEMENT WILL BE PERMITTED BENEATH THE SPOKANE ST INTERCHANGE STRUCTURES ON
AIRPORT WAY SO
SO SPOKANE ST
NORTHERN PACIFIC RAILWAY

THE PRIVILEGE OF USING THE AIRSPACE ABOVE THE S-E LINE BETWEEN HES 2080+50 AND 2082+50 WILL BE PERMITTED TO THE SICKS' RAINIER BREWING COMPANY, SUBJECT TO THE CONDITIONS OF THE CORRECTED WARRANTY DEED, DATED MAY 15, 1967.

Letter 8-20-76	9-24-76	Added privilege of using area under structures of Spokane St. Interchange Sta 2060+70 to 2068+15 subject to conditions of Agreement AA I-05921
Letter 6-2-76	7-2-76	Added privilege of using area under structures Sta WB 43+00 to WB 50+00 on Rt. - Agreement AA 7-05424
AUTHORITY	DATE	SUBSEQUENT APPROVAL

NOTE: FOR RIGHT OF WAY EAST OF FREEWAY BASE LINE SEE SHEET NO 15

Note:
Approved Per State Highway Commission Order (Dec. 18, 1962)

EXHIBIT A
SEATTLE FREEWAY
PRIMARY STATE HIGHWAY NO. 1 (SP 5)
NORFOLK ST. TO BAYVIEW ST.
KING COUNTY
RIGHT OF WAY
STA 2061+53.94 to STA 2087+23.48
WASHINGTON STATE HIGHWAY COMMISSION
DEPARTMENT OF HIGHWAYS
OLYMPIA WASHINGTON

PW 1476
CS 1792

SHEET 16 OF 17 SHEETS

Appendix B – LUST Cleanup Report

LUST CLEANUP REPORT REVIEW

LUST # 1966 UST # 12240 Site Name UDOT - SIGNALS

Change in Status of Release & Date (Awaiting Cleanup) (Cleanup Started) (Monitoring) (Reported Cleaned Up) (No Further Action) (Unknown) Date 8/25/00

Cause of Release (Overfill) (Piping Failure) (Spill)(Tank Failure) (Unknown)

Remediation Technologies Used

Report Title ______ Report Date ______

Report Type (Interim) (Monitoring) (Final) (Site Characterization) (Unknown)

Date Received ______ Contractor ______

Comments RU2000. CHANGED TO "RCU". WOULD HAVE MEET METHOD B

Fund Source (LUST Trust Fund) (PLIA) (Responsible Party) (State Fund)

VCP/IRAP Status (Requested) (Not Requested) (Complete) Reviewed by [signature]

Date 8/25/00

Nov. 4, 1999 (GG)

Appendix C – Photographs

1991 UST Retrofit Photos


2 5 '91


MONITOR WELL
MONITOR


2 5 '91


2 5 '91


2 5 '91


GAS
GAS
MONITOR WELL


VENT PIPING


VENT
MONITOR


GAS


MONITOR
GAS
GAS


91 2 8


GAS
MONITOR


MONITOR
GAS
DIESEL
GAS


91 2 6


91 2 8


91 2 6


GAS
GAS


GAS
GAS
91 2 6


91 3 5


91 3 5

2015 UST Decommissioning Photos

Pump Island – Gx, Dx, Gx

Tank Location and Risers

WSDOT Electrician Office

WSDOT Signals Facility

Pump Island and eastern extent of UST excavation

Marine Vacuum Inc. Pumping and Rinsing Tanks; Marine Chemist Inerting Tanks

Piping system leading from island to tanks




sti-P3



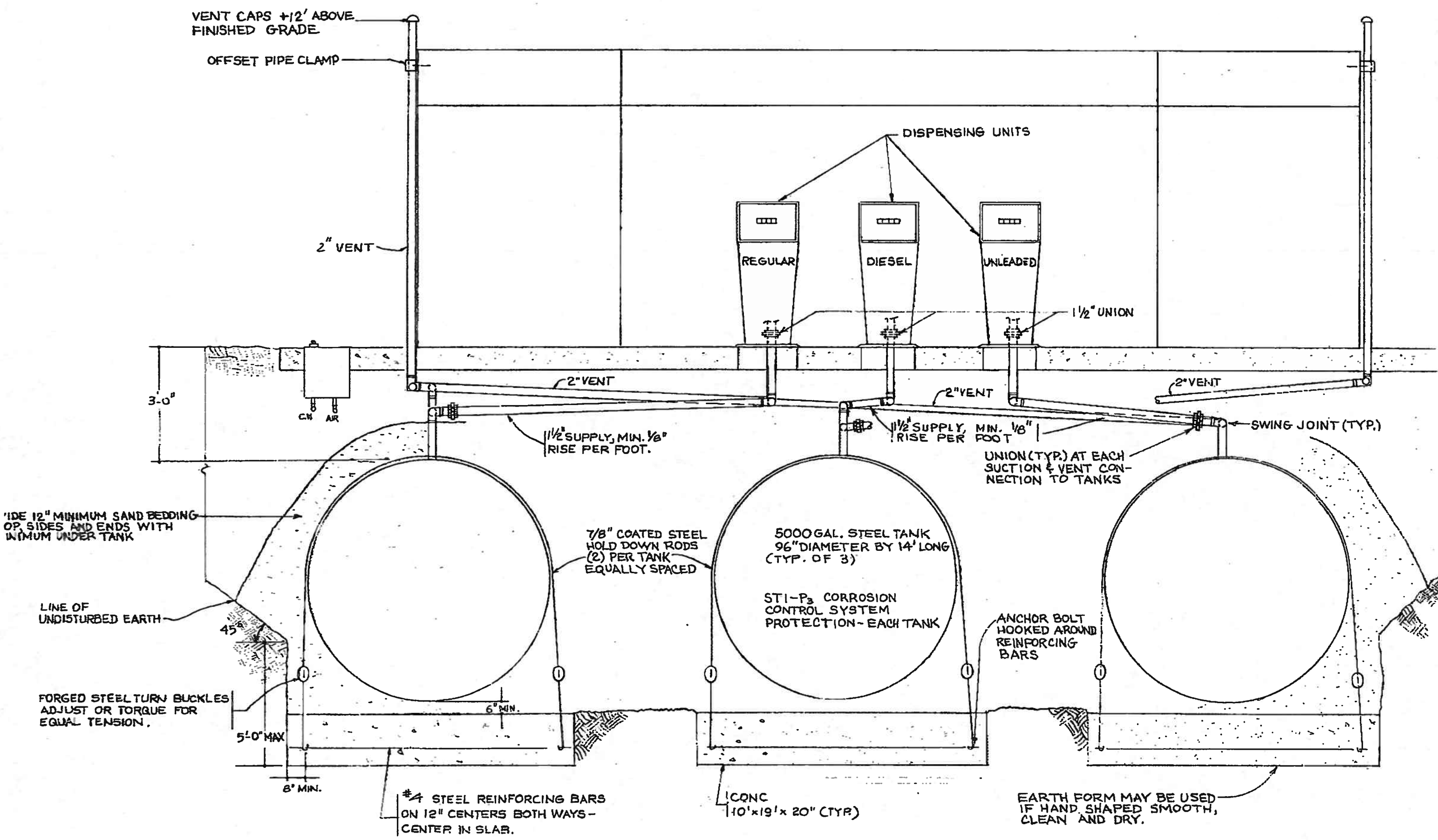
AEC



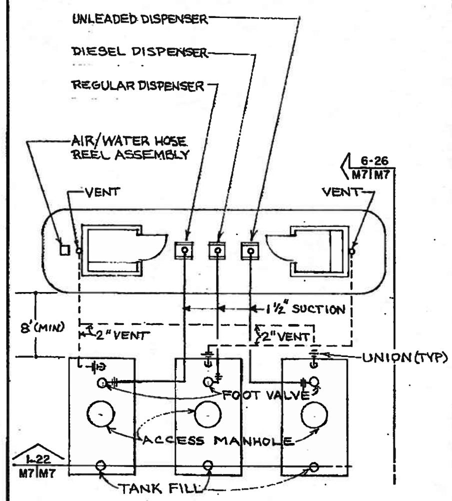



Appendix D – As-built of the UST Fuel System

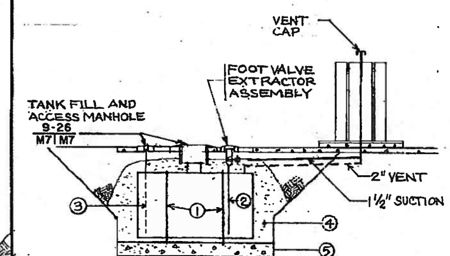
11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26



1-22 M7|M7 PUMP ISLAND ELEVATION NTS



1-26 M1|M7 PUMP ISLAND NTS

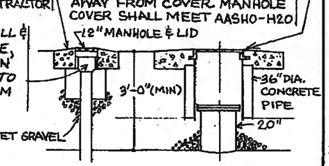


1. 7/8" COATED STEEL HOLD DOWN RODS, EQUALLY SPACED
2. 1½" SUCTION RISER W/ FOOT VALVE 4" ABOVE TANK BOTTOM.
3. 4" ALUMINUM DROP TUBE TO 6" ABOVE TANK BOTTOM.
4. SAND BEDDING, 12" MINIMUM TOP, SIDES & ENDS AND 6" MINIMUM UNDER TANK.
5. CONCRETE HOLD DOWN SLAB. SLOPE SLAB & TANK DOWN TO FILL END AT 2%.

6-26 M7|M7 FUEL TANK - SIDE ELEVATION NTS

PROVIDE 24"x24"x6" THICK CONCRETE PADS AROUND FILL BOX AND EXTRACTOR MANHOLES.

PROVIDE CONCRETE PAD AROUND MANHOLE, MIN. 6" THICK, SLOPED AWAY FROM COVER. MANHOLE COVER SHALL MEET AASHO-H20



9-26 M7|M7 TANK FILL & ACCESS MANHOLE NTS

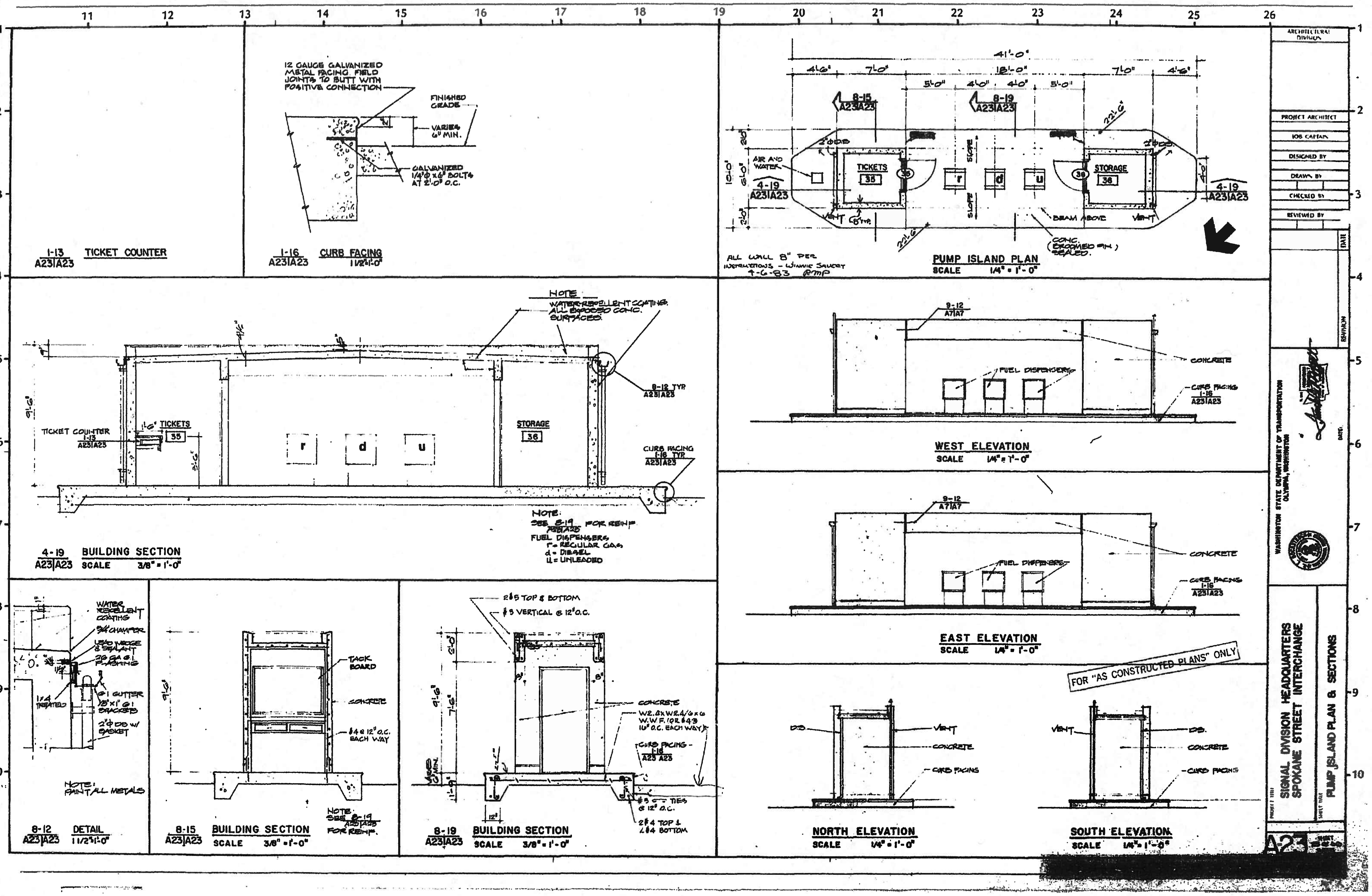
Contract 2357

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION OLYMPIA, WASHINGTON

SIGNAL DIVISION HEADQUARTERS SPOKANE STREET INTERCHANGE

M-

e-18/16 94



1-13 A23|A23 TICKET COUNTER
12 GAUGE GALVANIZED METAL FACING FIELD JOINTS TO BUTT WITH POSITIVE CONNECTION
FINISHED GRADE
VARIES 6" MIN.
GALVANIZED 1/4"Ø x 6" BOLTS AT 2'-0" O.C.
1-16 A23|A23 CURB FACING 1 1/2"=1'-0"
41'-0"
4'-6" 7'-0" 18'-0" 7'-0" 4'-6"
5'-0" 4'-0" 4'-0" 5'-0"
8-15 A23|A23
8-19 A23|A23
AIR AND WATER
TICKETS 35
STORAGE 36
SLOPE
BEAM ABOVE
VENT
CONC. (BROOMED FIN., SEALED)
4-19 A23|A23
ALL WALL 8" PER INSTRUCTIONS - Winnie Saucey 4-6-83 RMP
PUMP ISLAND PLAN
SCALE 1/4" = 1'-0"
NOTE
WATER REPELLENT COATING ALL EXPOSED CONC. SURFACES.
8-12 TYP A23|A23
TICKET COUNTER 1-13 A23|A23
TICKETS 35
STORAGE 36
CURB FACING 1-16 TYP A23|A23
NOTE: SEE 8-19 A23|A23 FOR REINF.
FUEL DISPENSERS: r = REGULAR GAS, d = DIESEL, u = UNLEADED
4-19 A23|A23 BUILDING SECTION SCALE 3/8" = 1'-0"
9-12 A7|A7
FUEL DISPENSERS
CONCRETE
CURB FACING 1-16 A23|A23
WEST ELEVATION
SCALE 1/4" = 1'-0"
EAST ELEVATION
SCALE 1/4" = 1'-0"
WATER REPELLENT COATING
3/4" CHAMFER
LEAD WEDGE & SEALANT
26 GA GI FLASHING
GI GUTTER
1/8" x 1" GI BRACKETS
1x4 TREATED
2" Ø DS W/ BASKET
NOTE: PAINT ALL METALS
8-12 A23|A23 DETAIL 1 1/2"=1'-0"
TACK BOARD
CONCRETE
#4 @ 12" O.C. EACH WAY
8-15 A23|A23 BUILDING SECTION SCALE 3/8" = 1'-0"
NOTE: SEE 8-19 A23|A23 FOR REINF.
2 #5 TOP & BOTTOM
#5 VERTICAL @ 12" O.C.
CONCRETE
W2.0 x W2.4/6x6 W.W.F. (OR #3 @ 16" O.C. EACH WAY)
CURB FACING 1-16 A23|A23
#5 TIES @ 12" O.C.
2 #4 TOP & 2 #4 BOTTOM
8-19 A23|A23 BUILDING SECTION SCALE 3/8" = 1'-0"
FOR "AS CONSTRUCTED PLANS" ONLY
DS
VENT
CONCRETE
CURB FACING
NORTH ELEVATION SCALE 1/4" = 1'-0"
SOUTH ELEVATION SCALE 1/4" = 1'-0"
ARCHITECTURAL DIVISION
PROJECT ARCHITECT
JOB CAPTAIN
DESIGNED BY
DRAWN BY
CHECKED BY
REVIEWED BY
DATE
REVISION
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION OLYMPIA, WASHINGTON
SIGNAL DIVISION HEADQUARTERS SPOKANE STREET INTERCHANGE
PUMP ISLAND PLAN & SECTIONS
A23

Appendix E – UST Closure and Decommissioning Documents

UST Site / Tank Data Summary

8/10/2015

Facility Name: SIGNALS BRANCH 7HDQ SITE Tag(s): A0363

SITE INFORMATION

SIGNALS BRANCH 7HDQ SITE	**RESP UNIT:** NORTHWEST	**COUNTY:** KING	**SITE IDs:**
3700 9TH AVE S	**UBI:** 601072110001004 9	**LAT:** 47.570332	UST: 12240
SEATTLE, WA 981342228	**PHONE:** (360) 705-7896	**LONG:** -122.320761	FS: 60549963

TANK INFORMATION

TANK NAME: 66A02007

STATUS: Operational	**STATUS DT:** 08/06/1996	**PERMANENTLY CLOSED DT:**
INSTALL DT: 05/01/1983	**UPGRADE DT:** 06/09/1998	**PERMIT EXPIRATION DT:** 06/30/2015

TANK	PIPING
MATERIAL: Dielectric Coated Steel	**MATERIAL:** Fiberglass
CONSTRUCTION: Single Wall Tank	**CONSTRUCTION:** Double Wall Pipe
CORROSION PROT: Sacrificial Anode	**CORROSION PROT:** Corrosion Resistant
MANIFOLDED TANK:	**SFC* at TANK:**
RELEASE DETECT: Vapor Monitoring	**SFC* at DISP/PUMP:**
TIGHTNESS TEST:	**1ST REL DETECT:** Safe Suction (No Leak Detection)
SPILL PREVENTION: Spill Bucket/Spill Box	**2ND REL DETECT:**
OVERFILL PREVENT: Automatic Shutoff (fill pipe)	**PUMPING SYSTEM:** Non-Safe Suction
ACTUAL CAPACITY:	
CAPACITY RANGE: 5,000 to 9,999 Gallons	

** SFC = Steel Flex Connector*

COMPARTMENT #	SUBSTANCE STORED	SUBSTANCE USED	CAPACITY
1	B Unleaded Gasoline	A Motor Fuel for Vehicles	

TANK NAME: 66A02008

STATUS: Operational	**STATUS DT:** 08/06/1996	**PERMANENTLY CLOSED DT:**
INSTALL DT: 05/01/1983	**UPGRADE DT:** 06/09/1998	**PERMIT EXPIRATION DT:** 06/30/2015

TANK	PIPING
MATERIAL: Dielectric Coated Steel	**MATERIAL:** Fiberglass
CONSTRUCTION: Single Wall Tank	**CONSTRUCTION:** Double Wall Pipe
CORROSION PROT: Sacrificial Anode	**CORROSION PROT:** Corrosion Resistant
MANIFOLDED TANK:	**SFC* at TANK:**
RELEASE DETECT: Automatic Tank Gauging	**SFC* at DISP/PUMP:**
TIGHTNESS TEST:	**1ST REL DETECT:** Safe Suction (No Leak Detection)
SPILL PREVENTION: Spill Bucket/Spill Box	**2ND REL DETECT:**
OVERFILL PREVENT: Automatic Shutoff (fill pipe)	**PUMPING SYSTEM:** Non-Safe Suction
ACTUAL CAPACITY:	
CAPACITY RANGE: 5,000 to 9,999 Gallons	

** SFC = Steel Flex Connector*

COMPARTMENT #	SUBSTANCE STORED	SUBSTANCE USED	CAPACITY
1	B Unleaded Gasoline	A Motor Fuel for Vehicles	

TANK NAME: 66A02009

STATUS: Operational	**STATUS DT:** 08/06/1996	**PERMANENTLY CLOSED DT:**
INSTALL DT: 05/01/1983	**UPGRADE DT:** 06/09/1998	**PERMIT EXPIRATION DT:** 06/30/2015

TANK	PIPING
MATERIAL: Dielectric Coated Steel	**MATERIAL:** Fiberglass
CONSTRUCTION: Single Wall Tank	**CONSTRUCTION:** Double Wall Pipe
CORROSION PROT: Sacrificial Anode	**CORROSION PROT:** Corrosion Resistant
MANIFOLDED TANK:	**SFC* at TANK:**

UST Site / Tank Data Summary

RELEASE DETECT: Automatic Tank Gauging	**SFC* at DISP/PUMP:**
TIGHTNESS TEST:	**1ST REL DETECT:** Safe Suction (No Leak Detection)
SPILL PREVENTION: Spill Bucket/Spill Box	**2ND REL DETECT:**
OVERFILL PREVENT: Automatic Shutoff (fill pipe)	**PUMPING SYSTEM:** Non-Safe Suction
ACTUAL CAPACITY:	
CAPACITY RANGE: 5,000 to 9,999 Gallons	

** SFC = Steel Flex Connector*

COMPARTMENT #	SUBSTANCE STORED	SUBSTANCE USED	CAPACITY
1	D Diesel	A Motor Fuel for Vehicles	

UST_SiteTankDataSmry2014

DEPARTMENT OF ECOLOGY
State of Washington

UNDERGROUND STORAGE TANK (UST)
30-DAY NOTICE

(See back of form for instructions)

NW
KWG

FOR OFFICE USE ONLY
Site ID # 12240
FS ID # 60549963

I authorize this UST site to be Decommissioned immediately.
[illegible]

Please ✓ the appropriate box: ☐ Intent to Install ☑ Intent to Close

HQ (360)407-7170 / Central (509)575-2490 / Eastern (509)329-3400 / Northwest (425)649-7000 / Southwest (360)407-6300

SITE INFORMATION	OWNER INFORMATION (this form will be returned to this address)
Tag or UBI number: UST Site ID#12240	UST Owner/Operator: WSDOT - Jeff Schroeder
Site Name: Signals Branch 7HDQ Site	Mailing Address/PO Box: 7345 Linderson Way SW
Site Physical Address: 3700 9th Ave. S	City: Tumwater Zip Code: 98501
City: Seattle Zip Code: 98134	Owner/Operator Phone Number: 360-705-7885
Site Phone Number: 360-705-7885	Owner/Operator Email Address: SchroeJ@wsdot.wa.gov

RECEIVED
APR 27 2015
Department of Ecology
Toxics Cleanup Program

TANK INFORMATION

Tank ID	Substance Stored	Capacity	Date Project Expected to Begin	Comments:
66A02007	unL gasoline	6,000	MAY 26, 2015	
66A02008	unL gasoline	6,000	"	
66A02009	Diesel	6,000	"	

1) SERVICE PROVIDER INFORMATION – check the appropriate boxes

PLEASE NOTE: INDIVIDUALS PERFORMING UST SERVICES MUST BE ICC CERTIFIED OR HAVE PASSED ANOTHER QUALIFYING EXAM APPROVED BY THE DEPARTMENT OF ECOLOGY.

☐ Installer ☐ Decommissioner ☑ Site Assessor

Service Provider Company Name: WSDOT	Contact Person: Trent Ensminger
Certified Service Provider Name: Trent Ensminger	Contact Phone Number: 360-570-2587
ICC Certification #: 827458C	Contact Email Address: ensmint@WSDOT.wa.gov

2) SERVICE PROVIDER INFORMATION (REQUIRED IF USING MORE THAN ONE PROVIDER) – check the appropriate boxes

☐ Installer ☑ Decommissioner ☐ Site Assessor (To be determined; based on bid selected contractor).

Service Provider Company Name:	Contact Person:
Certified Service Provider Name:	Contact Phone Number:
ICC Certification #:	Contact Email Address:

Imke, Andrew (ECY)

From:	Greenup, Sherri (ECY)
Sent:	Tuesday, April 28, 2015 9:29 AM
To:	Imke, Andrew (ECY)
Subject:	UST ID 12240 30 Day Notice
Attachments:	UST ID 12240 30 Day Notice.pdf

Drew,

HQ received this 30 Day Notice yesterday via fax. It appears like they may need a waiver. Can you take care of it please?

Thank you,

Sherri Greenup
Underground Storage Tanks
Permitting & Compliance
360-407-7466

UST ID #: ____________

County: ____________

SITE CHECK/SITE ASSESSMENT CHECKLIST

FOR UNDERGROUND STORAGE TANKS

DEPARTMENT OF ECOLOGY State of Washington

This checklist certifies that site check or site assessment activities were performed in accordance with Chapter 173-360 WAC. Instructions are found on the last page.

I. UST FACILITY	II. OWNER/OPERATOR INFORMATION
Facility Compliance Tag #: A0363	Owner/Operator Name: WSDOT-Jeff Schroeder
UST ID #: 12240	Business Name: WSDOT - TEF
Site Name: WSDOT Signal Branch 7HDQ site	Address: 7345 Linderson WAY SW
Site Address: 3700 9th Ave S	City: Tumwater State: WA Zip: 98501
City: Seattle	Phone: 360-705-6829
Phone:	Email: schroej@wsdot.wa.gov

III. CERTIFIED SITE ASSESSOR			
Service Provider Name: Trent Ensminger		Company Name: WSDOT	
Cell Phone: 360-584-8814	Email: ensmint@wsdot.wa.gov	Address: 2214 RW Johnson Blvd	
Certification #: 8274580	Exp. Date: 7/17/16	City: Tumwater	State: WA Zip: 98512

IV. TANK INFORMATION

TANK ID	TANK CAPACITY	LAST SUBSTANCE STORED	DATE SITE CHECK OR ASSESSMENT CONDUCTED
UST-1	5,000	un-gasoline	6/17/15
UST-2	5,000	Diesel	6/17/15
UST-3	5,000	un-gasoline	6/17/15

V. REASON FOR CONDUCTING SITE CHECK/SITE ASSESSMENT (check one)

☑ Release investigation following permanent UST system closure (i.e. tank removal or closure-in-place).

☐ Release investigation following a failed tank and/or line tightness test.

☐ Release investigation following discovery of contaminated soil and/or groundwater.

☐ Release investigation directed by Ecology to determine if the UST system is the source of offsite impacts.

☐ UST system is undergoing a "change-in-service", which is changing from storing a regulated substance (e.g. gasoline) to storing a non-regulated substance (e.g. water).

☐ Directed by Ecology for UST system permanently closed or abandoned before 12/22/1988.

☐ Other (describe):

VI. Checklist

The site assessor must check each of the following items and include it in the report. Sections referenced below can be found in the Ecology publication *Guidance for Site Checks and Site Assessments for Underground Storage Tanks*.	YES	NO
1. The location of the UST site is shown on a vicinity map.	☑	☐
2. A brief summary of information obtained during the site inspection is provided (Section 3.2)	☑	☐
3. A summary of UST system data is provided (Section 3.1)	☑	☐
4. The soils characteristics at the UST site are described. (Section 5.2)	☑	☐
5. Is there any apparent groundwater in the tank excavation?	☑	☐
6. A brief description of the surrounding land use is provided. (Section 3.1)	☑	☐
7. The name and address of the laboratory used to perform analyses is provided. The methods used to collect and analyze the samples, including the number and types of samples collected, are also documented in the report. The data from the laboratory is appended to the report.	☑	☐
8. The following items are provided in one or more sketches:		
• Location and ID number for all field samples collected	☑	☐
• If applicable, groundwater samples are distinguished from soil samples	☑	☐
• Location of samples collected from stockpiled excavated soil	☑	☐
• Tank and piping locations and limits of excavation pit	☑	☐
• Adjacent structures and streets	☑	☐
• Approximate locations of any on-site and nearby utilities	☑	☐
9. If sampling procedures are different from those specified in the guidance, has justification for using these alternative sampling procedures been provided? (Section 3.4)	☑	☐
10. A table is provided showing laboratory results for each sample collected including; sample ID number, constituents analyzed for and corresponding concentration, analytical method, and detection limit for that method. Any sample exceeding MTCA Method A cleanup standards are highlighted or bolded.	☑	☐
11. Any factors that may have compromised the quality of the data or validity of the results are described.	☑	☐
12. The results of this site check/site assessment indicate that a confirmed release of a regulated substance has occurred. The requirements for reporting confirmed releases can be found in WAC 173-360-372.	☑	☐

VII. Required Signatures

Signature acknowledges the Site Check or Site Assessment complies with UST regulations WAC 173-360-360 through -395.

Trent Ensminger	[signature]	6/30/15
Print or Type Name	Signature of Certified Site Assessor	Date

UST ID #:

County:

DEPARTMENT OF ECOLOGY State of Washington

PERMANENT CLOSURE NOTICE
FOR UNDERGROUND STORAGE TANKS

This notice certifies that permanent closure activities were performed and conducted in accordance with Chapter 173-360 WAC. Instructions are found on the back page.

I. UST FACILITY	II. OWNER/OPERATOR INFORMATION
Facility Compliance Tag #:	Owner/Operator Name: WSDOT – Jeff Schroeder
UST ID #: 12240	Business Name: WSDOT
Site Name: Signals Fuel Branch 7HDQ Site	Address: 7345 Linderson WAY SW
Site Address: 3700 9th Ave S	City: Tumwater State: WA Zip: 98501
City: Seattle	Phone: 360-705-7885
Phone: 360-705-7885	Email: schroeJ@wsdot.wa.gov

III. CERTIFIED UST DECOMMISSIONER	
Company Name: Anderson Environmental Contracting, LLC	Service Provider Name: Cory A Erskine
Address: 705 Colorado Street	Certification Type: ICC Decommissioning
City: Kelso State: WA Zip: 98626	Cert. No.: 5262014 Exp. Date: 5-9-16
Provider Phone: 360.577.9194	Provider Email: Cory@AECLLC.NET
Provider Signature: [signature]	*Date:* 7-27-15

IV. TANK INFORMATION

TANK ID	TANK CAPACITY	LAST SUBSTANCE STORED	CLOSURE METHOD: removal	closed-in-place	change-in-service	CLOSURE DATE
66A02007	5,000	gasoline	☑	☐	☐	6/17/15
66A02008	5,000	gasoline	☑	☐	☐	6/17/15
66A02009	5,000	Diesel	☑	☐	☐	6/17/15
			☐	☐	☐	
			☐	☐	☐	
			☐	☐	☐	

V. REQUIRED SIGNATURE

Signature acknowledges UST(s) comply with UST regulation WAC 173-360-380 Temporary Closure Requirements.

7/27/15 — Date

[signature] — Signature of Tank Owner/Operator or Authorized Representative

Trent Ensminger — Print or Type Name

WED 06/17/15
11AM SK

Your Seattle Fire Department

RECEIVED
JUN 04 2015
PERMIT SECTION

APPLICATION FOR TEMPORARY PERMIT

Code 7908 **Commercial Tank Removal/Decommissioning**

Permit Fee: $218.00

Date Issued: 6/17/15

Tank(s) must be removed from site on the same day as permit is issued!

TO BE COMPLETED BY PERMIT APPLICANT

FIRM NAME	ANDERSON ENVIRONMENTAL CONTRACTING
MAILING ADDRESS	705 COLORADO ST SUITE
CITY	KELSO STATE WA ZIP 98626
JOBSITE ADDRESS	3700 9TH AVE S.
CONTACT PERSON	JOHN SANDHOP PHONE NUMBER (360) 703 - 8476

Number of Tank(s): 3   Tank Size(s): 5,000   ☐ Aboveground tank

Product(s) Previously Contained: GAS & DIESEL   ☒ Underground tank

☒ Removal (Marine Chemist inspection and certificate required for all tanks regardless of size or contents)

☐ Abandonment-in-Place (Marine Chemist certificate required for tanks previously containing Class I flammable liquids and/or unknowns)

Hot work being conducted: ☒ No   ☐ Yes (If yes, a separate hot work permit is required)

Permit applications may be submitted in person weekdays from 8:00 a.m. to 5:00 p.m., or mailed to:

Seattle Fire Department
Fire Marshal's Office – Permits
220 Third Ave S, 2nd Floor
Seattle, WA 98104-2608

To pay with a Visa or Master Card: Fax or email this application
THEN CALL US TO CONFIRM RECEIPT AND MAKE PAYMENT
Tel: (206) 386-1450 / Fax: (206) 386-1348
E-mail: permits@seattle.gov

Call 386-1450, at least 24 hours prior to needed inspection time to arrange for an appointment.
TANKS MAY BE REMOVED/DECOMMISSIONED ONLY AFTER FIRE DEPARTMENT INSPECTION
NO HOT WORK IS ALLOWED ON A TANK SYSTEM PRIOR TO ISSUANCE OF THIS FIRE DEPARTMENT PERMIT!

Permission is hereby granted to remove or decommission the tank(s) identified in this permit in accordance with the attached conditions, all noted special conditions, and all applicable provisions of the Seattle Fire Code, federal, state and local regulations. **THIS PERMIT IS NULL AND VOID IF PERMIT CONDITIONS ARE NOT ATTACHED**

Special permit conditions: *Tank removal/decommissioning must be performed, or directly supervised, by an ICC certified individual (WAC 173-360-600)*

FMO USE:		**APPROVED BY:**	
~~Check~~ CC No.:	4674060415	Inspector:	NL Devitt SFD ID# 1321
Receipt No.:	5-247345	Name of Marine Chemist	Joe Tevett Certificate # 725
Application ID#:	101356	Date:	6/17/15

(01/15)

THE CITY OF SEATTLE

FIRE DEPARTMENT

Fire Marshal's Office

220 Third Ave South

Seattle, WA 98104-2608

(206) 386-1450

RECEIPT

5-247345

THIS IS NOT A BILL
PLEASE DO NOT PAY

When properly made out and signed this becomes a receipt for the amount and purposes as specified herein.

PAYOR: ANDERSON ENVIRONMENTAL CONTRACTING LLC
ADDRESS: 705 COLORADO ST
KELSO, WA 98626
ATTN:

DATE: 06/04/2015

AMOUNT: **$218.00**
JOB SITE: 3700 9 AV S
PAYMENT FOR: APPLICATION FEE
CC RECEIPT #: 00004674060415
INVOICE #:
PERMIT CODE(S): 7908
REMARK:

THIS IS NOT A PERMIT

Chief of the Fire Department

By SK

SOUND TESTING, INC.
206-932-0206
24 HOUR SERVICE

MARINE CHEMIST CERTIFICATE

SERIAL NO. O178498

Page 1 of 1

ANDERSON ENVIRONMENTAL CONTRACTING	ANDERSON ENVIRONMENTAL CO.	17 JUN 15
Survey Requested by	Vessel Owner or Agent	Date
UST	UST	8700 9th AVE S, Seattle
Vessel	Type of Vessel	Specific Location of Vessel
(DIESEL)x3, (GASOLINE)x3	VISUAL, O_2	1055 HRS
Last Three (3) Loadings	Tests Performed	Time Survey Completed

No 1 GASOLINE UST (~5,000 gal.)
No 2 GASOLINE UST (~5,000 gal.)
No 3 DIESEL UST (~5,000 gal.)

INERTED – WITH CO_2 (O_2 < 5%)

SAFE FOR EXCAVATION

SAFE FOR TRANSPORT

[METER: BW S/N SK313-000374/CAL: 0800 17 JUN 15]

In the event of physical or atmospheric changes affecting the STANDARD SAFETY DESIGNATIONS assigned to any of the above spaces, this certificate is voided; spaces not listed on the Certificate are not to be entered unless authorized on another Certificate and/or maintained in accordance with OSHA 29 CFR 1915; or if in any doubt, immediately stop all work and contact the undersigned Marine Chemist. Unless otherwise stated on the Certificate, all spaces and affected adjacent spaces are to be reinspected daily or more often as necessary by the competent person in support of work prior to entry or recommencement of work.

QUALIFICATIONS: Transfer of ballast, cargo, fuel, or manipulation of valves or closure equipment tending to alter conditions in pipelines, tanks, or compartments subject to gas accumulation, unless specifically approved on this Certificate, requires inspection and a new Certificate for spaces so affected. All lines, vents, heating coils, valves, and similar enclosed appurtenances shall be considered "not safe" unless otherwise specifically designated. Movement of the vessel from its specific location voids the Certificate unless shifting of the vessel within the facility has been specifically authorized on this Certificate.

STANDARD SAFETY DESIGNATIONS: (partial list, paraphrased from NFPA 306, Subsections 4.3.1 through 4.3.6).

ATMOSPHERE SAFE FOR WORKERS: In the compartment or space so designated (a) the oxygen content of the atmosphere is at least 19.5 percent and not greater than 22 percent by volume; (b) the concentration of flammable materials is below 10 percent of the lower explosive limit; (c) any toxic materials in the atmosphere associated with cargo, fuel, tank coatings, inerting mediums, or fumigants are within permissible concentrations at the time of the inspection.

NOT SAFE FOR WORKERS: In the compartment or space so designated, entry is not permitted.

ENTER WITH RESTRICTIONS: In the compartment or space so designated, entry for work is permitted only if conditions of proper protective equipment, or clothing, or time, or all of the aforementioned, as appropriate, are as specified.

SAFE FOR HOT WORK: In the compartment or space so designated (a) the oxygen content of the atmosphere is not greater than 22 percent by volume; (b) the concentration of flammable materials in the atmosphere is less than 10 percent of the lower explosive limit; (c) the residues, scale, or preservative coatings are cleaned sufficiently to prevent the spread of fire and are not capable of producing a higher concentration than permitted by (a) or (b); (d) all adjacent spaces, containing or having contained flammable or combustible materials shall be sufficiently cleaned of residues, scale, or preservative coatings to prevent the spread of fire, or they are inerted. Ship's fuel tanks, lube tanks, or engine room or fire room bilges, or other machinery spaces, are treated in accordance with the Marine Chemist's requirements.

SAFE FOR LIMITED HOT WORK: In the compartment or space so designated (a) portions of the space meet the requirements for Safe for Hot Work and Partial Cleaning, as applicable, or (b) the space is inerted, adjacent spaces meet the requirements for Safe for Hot Work, and hot work is restricted to specific locations; (c) portions of the space shall meet the requirements for Safe for Hot Work, as applicable, and the nature or type of hot work is limited or restricted.

NOT SAFE FOR HOT WORK: In the compartment or space so designated, hot work is not permitted.

CHEMISTS ENDORSEMENT. This is to certify that I have personally determined that all spaces in the foregoing list are in accordance with NFPA 306 Control of Gas Hazards on Vessels and have found the condition of each to be in accordance with its assigned designation.

"The undersigned acknowledges receipt of this Certificate under NFPA 306 and understands conditions and limitations under which it was issued, and the requirements for maintaining its validity."

This Certificate is based on conditions existing at the time the inpection herein set forth was completed and is issued subject to compliance with all qualifications and instructions.

Signed Cory A Erstein / ANDERSON ENVIRONMENTAL CONTRACTING / 17 JUN 15
Name / Company / Date

Signed [signature] #725
Marine Chemist / Certificate No.

SOUND TESTING, INC.
206-932-0206
24 HOUR SERVICE

POSTING COPY JOE – (206) 369-6409

Printed in U.S.A.

Marine Vacuum Service, Inc.

GENERAL CONTRACTOR

CONTRACTORS LICENSE # MARINVS097JA

P0. Box 24263 Seattle, Washington 98124

Telephone (206) 762-0240

FAX (206) 763-8084

1-800-540-7491

AST/UST STORAGE TANK PUMP & RINSE CERTIFICATE

Tank Size: (3) 5000 gal UST

Last Contents fuel

Tank Location: 3700 9th Ave. Seattle, WA

Marine Vacuum Service, Inc. certifies that the above mentioned tank(s) have been triple rinsed in accordance with the industry standard as outlined in 40 CFR PART 280.70, WAC 173-360-380(I), API 1604, API 2015 and that all residual product and rinsate has been disposed of in accordance with Federal, State and Local regulations. Tanks listed above are **NOT GAS FREE** or **NOT SAFE FOR HOT WORK**

Tank Owner: D.O.T.

Contractor: Andergen Construction

M.V.S. Representative: Kevin Daley

Date: 6/17/15

Notes:

Marine Vacuum **Service, *Inc.***

GENERAL CONTRACTOR

CONTRACTORS LICENSE # MARINVS097JA

P0. Box 24263 Seattle, Washington 98124

Telephone (206) 762-0240

FAX (206) 763-8084

1-800-540-7491

STORAGE TANK

CERTIFICATE OF DESTRUCTION

DATE: 6/23/15

TANK OWNER: WSDOT

TANK LOCATION: 3700 9th ave. Seattle

TANK DESCRIPTION: 3) 5,000 gal tanks

LAST CONTENTS HELD IN TANKS:

unknown

Marine Vacuum Service, Inc certifies that the tank mentioned above was pumped of all liquid materials and washed clean with a high-pressure washer and soap solution. The tank and contents therein have been disposed of according to all Local, State and Federal Regulations.

Thank you,

Marine Vacuum Service, Inc.

This Shipping Order must be legibly filled in, in Ink indelible Pencil, or in Carbon, and retained by the agent

Shipper No. 025203

Carrier No.

MARINE VACUUM SERVICE, INC

(Name of carrier) (SCAC)

Date 6 22 15

Page ______ of ______

On Collect on Delivery shipments, the letters "COD" must appear before consignee's name or as otherwise provided in Item 430, Sec.1.

TO:
Consignee MARINE VACUUM SERVICE INC
Street 1516 S. GRAHAM ST
City SEATTLE State WA Zip Code 98108

FROM:
Shipper Anderson Env.
Street 705 Colorado St.
City Kelso State WA Zip Code 98236
24 hr. Emergency Contact Tel. No. 800-540-7491

Route

Vehicle Number

No. of Units & Container Type	HM	BASIC DESCRIPTION UN or NA Number, Proper Shipping Name, Hazard Class, Packing Group	TOTAL QUANTITY (Weight, Volume, Gallons, etc.)	WEIGHT (Subject to Correction)	RATE	CHARGES (For Carrier Use Only)
T/T		NON REGULATED By D o T				
		WASTE WATER	400	Galls		

PLACARDS TENDERED: YES ☐ **NO** ☐

Note — (1) Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property, as follows: "The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding ______ per ______."
(2) Where the applicable tariff provisions specify a limitation of the carrier's liability absent a release or a value declaration by the shipper and the shipper does not release the carrier's liability or declare a value, the carrier's liability shall be limited to the extent provided by such provisions. See NMFC Item 172.
(3) Commodities requiring special or additional care or attention in handling or stowing must be so marked and packaged as to ensure safe transportation. See Section 2(e) of item 360, Bills of Lading, Freight Bills and Statements of Charges and Section 1(a) of the Contract Terms and Conditions for a list of such articles.

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Signature

REMIT C.O.D. TO: ADDRESS

COD Amt: $

C.O.D. FEE: PREPAID ☐ COLLECT ☐ $

TOTAL CHARGES $

Subject to Section 7 of the conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

(Signature of Consignor)

FREIGHT CHARGES
FREIGHT PREPAID except when box at right is checked
Check box if charges are to be collect ☐

RECEIVED, subject to the classifications and tariffs in effect on the date of the issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of, said property over all or any portion of said route to destination and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the bill of lading terms and conditions in the governing classification on the date of shipment.
Shipper hereby certifies that he is familiar with all the lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

SHIPPER
PER X [signature]
6 22 15

CARRIER MARINE VACUUM SERVICE, INC.
PER [signature]
DATE 6 22 15

2

Permanent post-office address of shipper.

Renton Concrete Recyclers
22121 17th Ave SE #117
Bothell, WA 98021

To Whom It May Concern,

With regards to the material disposed of at our facility

Please be advised that Renton Concrete Recyclers is a processor of broken concrete and asphalt into various aggregate products. 100% of the material delivered to our processing site is broken and crushed into WSDOT and/or SDOT spec aggregate.

Because of this and the types of projects where our material is used, we do not accept any contaminated or hazardous materials. Some examples of this would rubble containing lead based paint, arsenic, asbestos, oils and petroleum's, including any type of sealant painted or sprayed on the concrete or asphalt.

We ***certify*** that our material does not exceed the maximum value for any of the criteria stipulated in WAC 173-303. The material is sampled and tested in accordance with WAC 173-303. This material has been deemed non-toxic and is not classified as a Washington State Dangerous Waste. Our ongoing operations remain in compliance with WAC 173-350-040.

State Pit # RS-A-1 Washington Business ID# 601-089-745

If you have any questions or need any additional information, please do not hesitate to call me.

Sincerely,
Michael Dionne
Renton Concrete Recyclers
206-920-0731

Tech. Michael Dionne

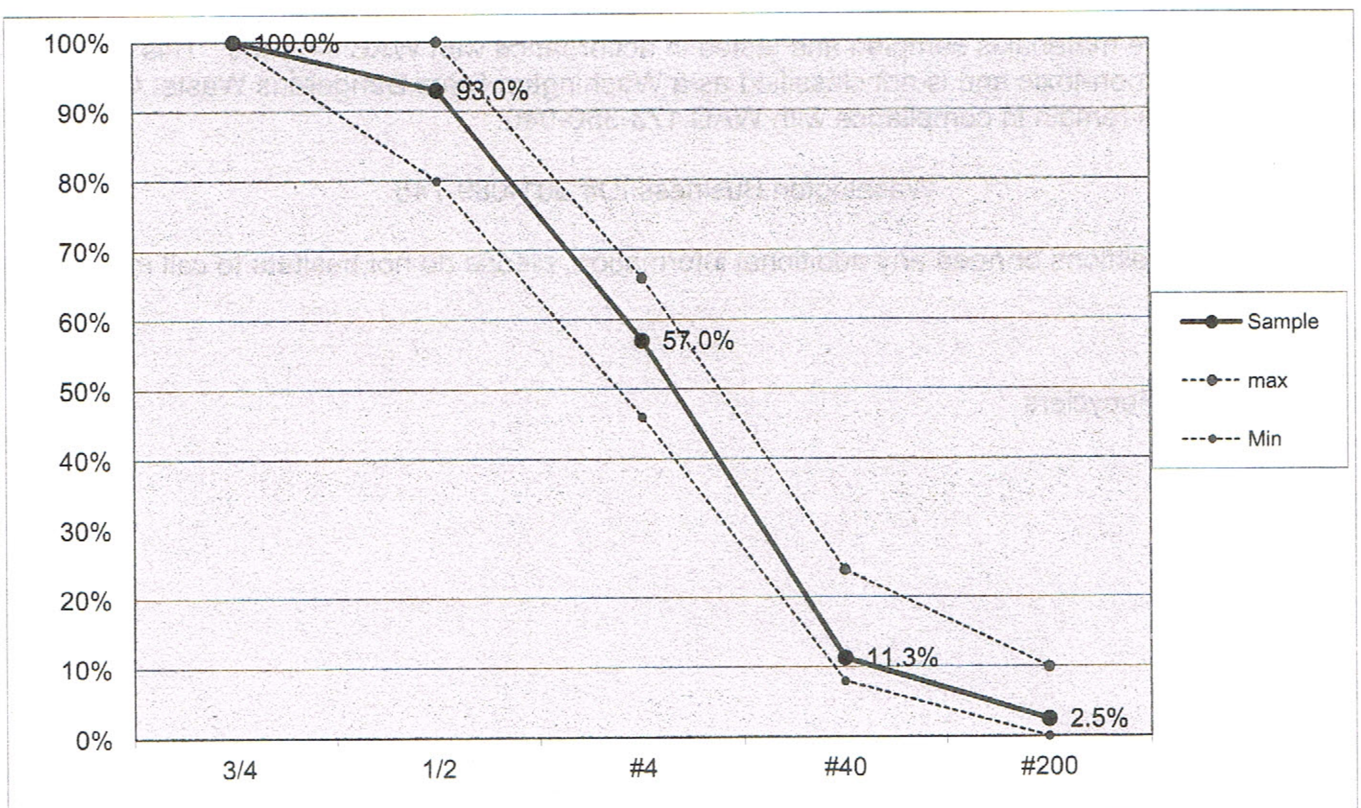
Job: Q.C.

Material: 3/4" Minus Recycle

Spec: 9-03.9(3) CSTC
City of Seattle type 1G, 1R
Test#1

Weight of Sample
8945

Sieve Size	Cum. Wt (g)	% retained	% passed	Spec. Passing
3/4	0	0.0%	100.0%	100% - 100%
1/2	622	7.0%	93.0%	80% - 100%
#4	3846	43.0%	57.0%	46% - 66%
#40	7932	88.7%	11.3%	8% - 24%
#200	8723	97.5%	2.5%	0% - 10%



Tech. Michael Dionne

Job: Q.C.

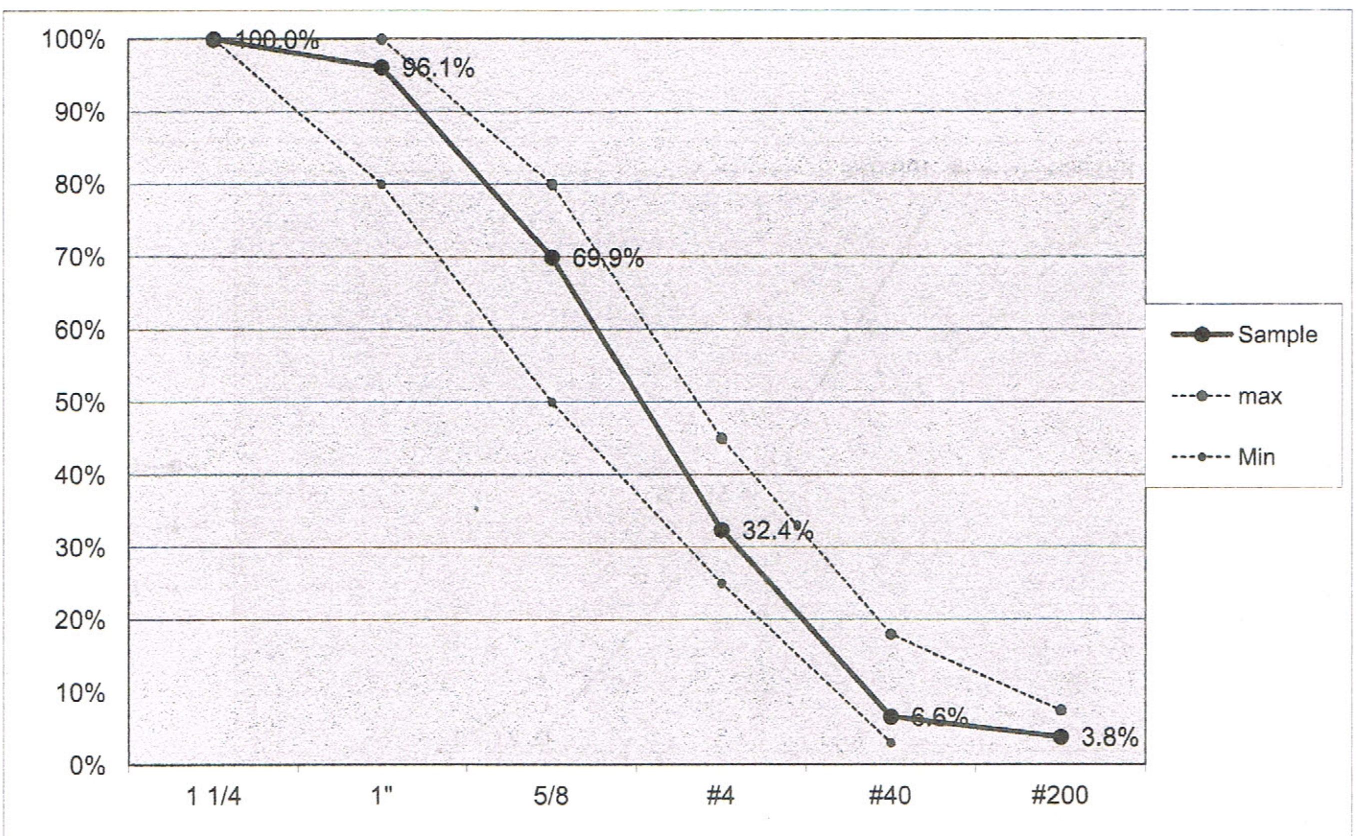
Material: 1 1/4" Minus Recycle

Spec: WSDOT-CSBC
SDOT-Type 2R, 2G,

Total Material Retained #4 and Larger Sieve	**6522**
Total HMA Material Removed from test Material	**362**
% HMA in material by weight	**6%**

Weight of Sample
9645

Sieve Size	Cum. Wt (g)	% retained	% passed	Spec. Passing
1 1/4	0	0.0%	100.0%	100% - 100%
1"	375	3.9%	96.1%	80% - 100%
5/8	2899	30.1%	69.9%	50% - 80%
#4	6522	67.6%	32.4%	25% - 45%
#40	9007	93.4%	6.6%	3% - 18%
#200	9278	96.2%	3.8%	0% 7.50%



Tech. M. Dionne

Job: QA

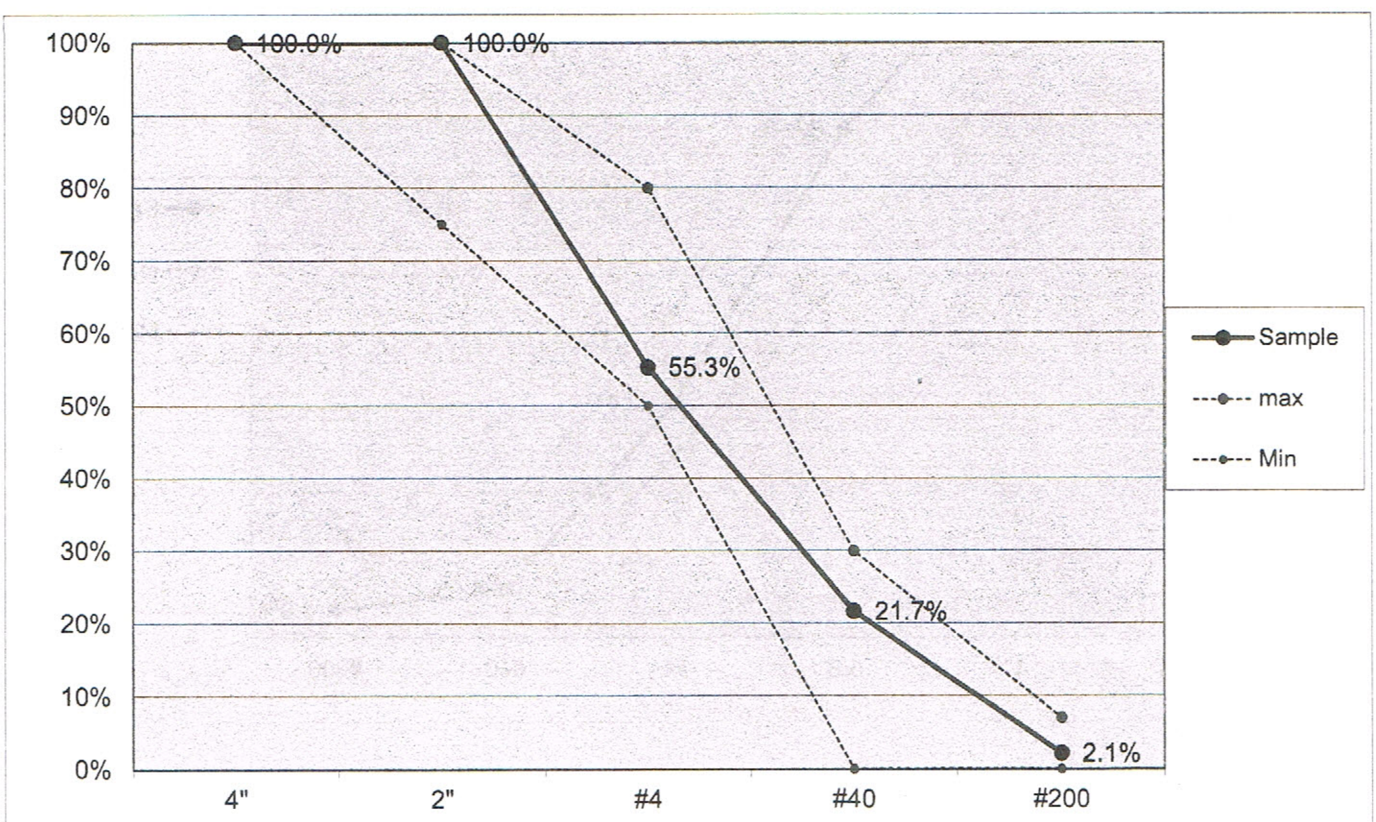
Material: 1 1/4" Minus Recycled Concrete/Asphalt

Spec:
WSDOT - 9-03.14(1) Gravel Borrow
SDOT - 9-03.16 Type 17

Total Material Retained #4 and Larger Sieve	**4521**
Total HMA Material Removed from test Material	**188**
% HMA in material by weight	**4%**

Weight of Sample
10115

Sieve Size	Cum. Wt (g)	% retained	% passed	Spec. Passing
4"	0	0.0%	100.0%	100% - 100%
2"	0	0.0%	100.0%	75% - 100%
#4	4521	44.7%	55.3%	50% - 80%
#40	7925	78.3%	21.7%	0% - 30%
#200	9902	97.9%	2.1%	0% - 7%



CERTIFICATE OF CALIBRATION

RAYS SCALE & CONSULTING

(206) 856-2389 • Fax (206) 768-6311
P.O. Box 46453, Seattle, WA 98146

CUSTOMER Renton Concrete Recyclers DATE 11/7/14

	1. MTS	2.	3.	4.
Make	RL Murphy			
Serial #	149965			
Capacity	60 ton			
Test	4,000 ø			
	10,000 ø			
Due	5/2015			

Listed scales have been tested using certified, traceable weights in accordance with NIST handbook 44 requirements by Registered Service Agent #A04718

Am Test Inc.
13600 NE 126TH PL
Suite C
Kirkland, WA 98034
(425) 885-1664
www.amtestlab.com

AMTEST LABORATORIES

Professional Analytical Services

ANALYSIS REPORT

Renton Concrete Recyclers
22121 17th Ave SE #117
Bothell, WA 98021
Attention: Michael Dionne
Project Name: QA
All results reported on an as received basis.

Date Received: 05/19/15
Date Reported: 5/28/15

AMTEST Identification Number **15-A007289**
Client Identification **Sample 1**
Sampling Date **05/19/15, 11:30**

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CG	05/26/15
Lead	12.4	ug/g		1.8	EPA 6010C	CG	05/27/15

TCLP-Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANLST	DATE	M.A.C.	EXCDS MAC
TCLP Arsenic	< 0.05	mg/l		0.05	EPA 1311	CG	05/21/15	5.0	NO
TCLP Barium	0.4	mg/l		0.2	EPA 1311	CG	05/21/15	100	NO
TCLP Cadmium	< 0.05	mg/l		0.05	EPA 1311	CG	05/21/15	1.0	NO
TCLP Chromium	< 0.05	mg/l		0.05	EPA 1311	CG	05/21/15	5.0	NO
TCLP Lead	< 0.1	mg/l		0.10	EPA 1311	CG	05/21/15	5.0	NO
TCLP Mercury	< 0.05	mg/l		0.01	EPA 1311	CG	05/21/15	0.20	NO
TCLP Selenium	< 0.05	mg/l		0.05	EPA 1311	CG	05/21/15	1.0	NO
TCLP Silver	< 0.05	mg/l		0.05	EPA 1311	CG	05/21/15	5.0	NO

AMTEST Identification Number **15-A007290**
Client Identification **Sample 2**
Sampling Date **05/19/15, 11:30**

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CG	05/26/15
Lead	10.2	ug/g		1.2	EPA 6010C	CG	05/27/15

AMTEST Identification Number **15-A007291**
Client Identification **Sample 3**
Sampling Date **05/19/15, 11:30**

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CG	05/26/15
Lead	13.9	ug/g		2.1	EPA 6010C	CG	05/27/15

AMTEST Identification Number **15-A007292**
Client Identification **Sample 4**
Sampling Date **05/19/15, 11:30**

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CG	05/26/15
Lead	9.58	ug/g		1.5	EPA 6010C	CG	05/27/15

AMTEST Identification Number **15-A007293**
Client Identification **Sample 5**
Sampling Date **05/19/15, 11:30**

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CG	05/26/15
Lead	12.9	ug/g		1.7	EPA 6010C	CG	05/27/15

Kathy Fugiel
Kathy Fugiel
President

Appendix F – Sampling Quality and Procedures (QAP)

Quality Assurance Plan for Field Screening and Disposal Characterization for Petroleum Contamination

for

Washington State Department of Transportation

October 26, 2012

GeoEngineers

1101 South Fawcett Avenue, Suite 200
Tacoma, Washington 98402
253.383.4940

Quality Assurance Plan for Field Screening and Disposal Characterization for Petroleum Contamination

0180-302-00, Task 100

October 26, 2012

Prepared for:

Washington State Department of Transportation
P.O. Box 47332
Olympia, Washington

Attention: Tanya Bird

Prepared by:

GeoEngineers, Inc.
1101 South Fawcett Street, Suite 200
Tacoma, Washington
253.383.4940

Tricia S. DeOme, LG
Environmental Geologist

Michael E. Hutchinson, LG, LHG
Principal

TSD:MEH:cn

GeoEngineers

Table of Contents

LIST OF TABLES

APPENDICES

INTRODUCTION

The purpose of this document is to provide guidance for Washington State Department of Transportation (WSDOT) staff on the typical soil and water sampling methodology to characterize soil for disposal and/or reuse at petroleum-contaminated sites.

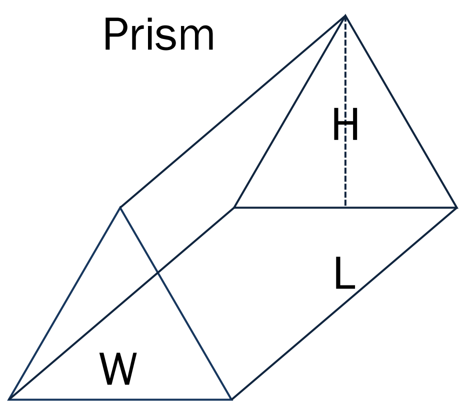
SOIL SAMPLING

Determining the Correct Number of Soil Samples

The number of samples necessary to characterize a soil pile will vary depending on site-specific conditions and the local health department or disposal site requirements. This section provides guidance for typical requirements. The hazardous materials specialist should contact the waste disposal facility prior to completing sampling to confirm sampling requirements.

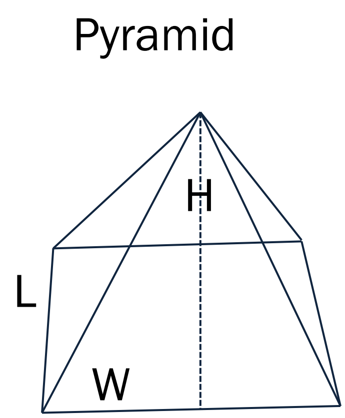
Soil Volume Calculation

The volume of soil can be calculated based on the configuration and size of the stockpile. Soil is generally stockpiled as a pyramid (point at top) or a prism (equal height across the top).



W = width
H = height
L = length

Volume of Prism = (L x W x H)/2



W = width
H = height
L = length

Volume of Pyramid = (L x W x H)/3

Number of Samples to Collect

The Washington State Department of Ecology (Ecology) provides recommendations for the number of samples to adequately characterize soil for disposal based on the volume of soil. The recommendations are summarized in Table 1.

TABLE 1. TYPICAL NUMBER OF SAMPLES TO ADEQUATELY CHARACTERIZE SOIL STOCKPILES

Cubic Yards of Soil	Number of Samples for Chemical Analysis
0 to 100	3
101 to 500	5
501 to 1,000	7
1,001 to 2,000	10
>2,000	10 + 1 for each additional 500 cubic yards

Source: https://fortress.wa.gov/ecy/publications/publications/1009057.pdf

Field Screening

Field screening results are used as a general guideline to assess areas of possible petroleum-related contamination. The field screening methods used include: 1) visual screening, 2) water sheen screening and 3) headspace vapor screening using a Photo Ionization Detector (PID) calibrated to isobutylene.

Field screening results are site specific. The effectiveness of field screening varies with temperature, moisture content, organic content, soil type and type and age of contaminant. The presence or absence of a sheen or headspace vapors does not necessarily indicate the presence or absence of petroleum hydrocarbons.

Visual

Visual screening consists of observing soil for stains indicative of petroleum-related contamination. Visual screening is generally more effective when contamination is related to heavy petroleum hydrocarbons or the hydrocarbon concentrations are high.

Sheen

Water sheen screening involves placing soil in a pan of water and observing the water surface for signs of sheen. Sheen screening may detect both volatile and nonvolatile petroleum hydrocarbons, but is more effective at detecting middle distillate (diesel) and heavy petroleum hydrocarbons. Sheens observed are classified as follows:

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

Note: False positive results may be generated by the presence of decaying organic matter and iron bacteria. These sheens, unlike oil sheens, can typically be broken up when agitated or disturbed.

Headspace Vapor Analysis

Headspace vapor screening targets volatile petroleum hydrocarbon compounds (gasoline). Headspace vapor screening involves placing a soil sample in a sealed container and measuring the vapors with an organic vapor detector. WSDOT typically uses a MiniRae 2000 PID for headspace vapor screening.

The process for measuring head space vapors consists of the following:

- Place approximately two cups of soil in a plastic bag.
- Seal the bag and shake the soil to volatilize the contaminants in the soil.
- Insert the probe of the instrument inside the back and measure the vapor concentration. Care should be taken to not let air escape from the bag while inserting the PID and during stabilization. The maximum PID measurement should be recorded.

CALIBRATION OF EQUIPMENT

Calibration and calibration checks facilitate accurate and reliable field measurements. At the start of the field day, the PID should be calibrated per manufacturer's instructions using isobutylene gas. The PID should be checked and recalibrated as necessary with isobutylene gas during field activities if anomalous results are occurring. The calibration instructions for the MiniRae 2000 PID are included in Appendix A. Water vapor and high humidity can suppress the response to organic vapors. If the PID is providing anomalous results and not calibrating correctly, it may assist the functioning of the equipment to place it in a running vehicle with the defrost running.

Calibration records specific to each item of equipment should be maintained. Calibration or operational checks should be documented in field or laboratory notebooks. The equipment serial number or other ID number should be included in all types of calibration records so that the calibration history can be readily followed.

Sampling Methodology

Sample Containers and Labeling

Required sample containers may be different from different laboratories. The typical containers required for petroleum-related constituents are summarized on Table 2. Confirmation of sample container requirements should be verified with the laboratory.

Soil stockpile(s) should be identified in consecutive order and describe the source of the material. An example identification system labels the first stockpile as "STK-A-Foundation-1", where STK- is stockpile and -A identifies alphabetically the consecutive order of the stockpile(s), –Foundation describes the location the soil was sourced, and -1 describes the first soil sample collected from stockpile A.

The hazardous material specialist shall keep documentation of the soil samples collected and approximate volume for future reference.

TABLE 2. TYPICAL SOIL SAMPLE CONTAINERS – ONSITE ENVIRONMENTAL, INC.

Analysis	Method	Holding Time	Containers Per One Soil Sample
Fuel Station Sites			
Gasoline Range Organics with BTEX	NWTPH-Gx/ EPA 8021B per Method 5035A	14 days	1 VOA vial (40mL)s Without stir bars, preserved with 5 mL of Methanol [1 & 2] 1 four ounce jar for dry weight
Diesel & Heavy Oil Range Organics	NWTPH-Dx	14 days	8 oz Jar
RCRA 8 or MTCA 5 Metals or Total Lead	EPA6020/7470 or EPA 6020	28 days	
Volatile Organic Compounds (includes napthalenes)	EPA 8260B	14 days	2 VOA vial (40mL)s Without stir bars, preserved with 5 mL Methanol [1 & 2] 2 VOA vial (40mL)s With stir bars, preserved with 5 mL Sodium bisulfate [1 & 2] 1 four ounce jar for dry weight[3]
Semi Volatile Organic Compounds (includes PAHs and naphthalenes) [3]	EPA8270 / SIM	14 days	
PCBs	EPA 8082	None	8 oz Jar
David Baumeister/dbaumeister@onsite-env.com/(425)883-3881			
Overnight Mail to: OnSite Environmental, Inc., 14648 NE 95th Street, Redmond, WA 98052			

Notes:

[1] Methanol preserved VOAs should not be stored longer than 6 months. Its good practice to recycle them every three months because eventually the preservative evaporates (depending on how they are stored) which can lead to results with higher concentrations. Samples do not have to be preserved with methanol if samples are submitted to the lab within 48 hours. However, we prefer to use methanol in order to extend the holding time from 48 hours to 14 days to allow for overnight mailing and/or extended field work.

[2] For 5 milliliters of methanol, collect 5 grams of soil. It is not critical to be 100% accurate, but it is preferred for soil to be at least 5 grams. Less than 4.5 grams or too greater than 6 grams soil can present issues during chemical analysis. The EPA Method 5035 sampling handle and syringe ensures that the proper amount of soil is collected.

[3] The 4 oz jar is necessary for dry weight analysis.

Sample Collection

The stockpile should be divided into equal sections based on the number of samples to be collected. Soil samples should be collected from the stockpiles at a frequency as described above or as specified by the potential end use disposal facility. Three-point composite grab samples should be collected with hand tools 6 to 12 inches beneath the surface of the stockpile. The material should be collected using a clean, stainless steel spoon/trowel or directly using a clean, gloved hand and placed in a clean stainless steel bowl or plastic bag. The samples should be placed in pre-cleaned, previously unused sample jars supplied by a subcontracted laboratory after the soil has been homogenized. The samples should be placed in a cooler on ice for transport to the laboratory.

SW-846 METHOD 5035A

The EPA document "Test Methods for Evaluating Solid Waste, SW-846," describes a closed-system purge-and-trap process for the collection, preparation and analysis of volatile organic compounds (VOCs) including gasoline-range petroleum hydrocarbon in soils, sediments, and solid waste. This closed-system purge-and-trap process is known as Method 5035A

Method 5035A provides details regarding the three options available for sample collection. Each option requires different sample containers and volume of soil. The individual laboratory may prefer a specific option. The WSDOT hazardous material specialist should coordinate with the individual laboratory to evaluate the preferred method for each site. The options are as follows:

- Option 1 - Lab Preservation

  Sample collection will require the following:

  - Two pre-weighed vials containing a small magnetic stir bar for low level analysis.
  - One pre-weighed vial for medium-high level analysis.
  - One 4-ounce jar for percent total solids determination.
  - Filled vials need to be frozen to between –7°C and –20°C within 48 hours of sample collection. Store samples at 4°C prior to initiating freezing.

- Option 2 – Field Preservation

  Sample collection and preservation in the field will require the following:

  - Two sodium bisulfate preserved, pre-weighed vials for low level analysis.
  - One methanol preserved, pre-weighed vial for medium level analysis.
  - One 4-ounce jar for percent total solids determination.
  - Methanol is flammable. If samples will be shipped to the laboratory via couriers such as, UPS or Federal Express, DOT labeling requirements must be met. Contact the lab for additional information concerning labeling requirements.

- Option 3 – EncoreTM Samplers

  Sample collection using EnCoreTM samplers will require:

  - Two EnCoreTM 5g samplers for low level analysis.

    One1 EnCoreTM 5g sampler for medium level analysis.
  - One 4-ounce jar for percent total solids determination.
  - T-handle for sampling.

WATER SAMPLING

Sampling Frequency

Water samples are typically collected from the first batch of water generated from a single location (i.e., foundation or trench). Additional water samples are typically not necessary unless conditions change or if required by the disposal facility.

Sampling Methodology

Sample Containers and Labeling

Required sample containers may be different from different laboratories. The typical containers required for petroleum-related constituents are summarized on Table 3. Confirmation of sample container requirements should be verified with the laboratory.

Water tanks should be identified in consecutive order and describe the source of the material. An example identification system labels the first tank as “W-A-Foundation”, where W is for water and -A identifies alphabetically the consecutive order of the tank(s) and –Foundation describes the location the water was sourced.

The hazardous material specialist shall keep documentation of the water samples collected and approximate volume for future reference.

TABLE 3. TYPICAL WATER SAMPLE CONTAINERS – ONSITE ENVIRONMENTAL, INC.

Analysis	Method	Holding Time	Containers Per One Water Sample
Fuel Station Sites			
Gasoline Range Organics with BTEX	NWTPH-Gx/ EPA 8021B	14 days	3 VOA vials (40mLs) HCL preserved
Diesel & Heavy Oil Range Organics	NWTPH-Dx	14 days	2 (0.5L Amber glass) with HCI
RCRA 8 or MTCA 5 Meals or Total Lead	EPA6020/7470 or EPA 6010	28 days = Mercury 6 months = other metals	Total Metals - 1 HDPE (0.5L poly) preserved with HNO3 and not filtered in the field Dissolved Metals - Field Filtered - 1 HDPE (0.5L poly) preserved with HNO3 Not field filtered - 1 HDPE (0.5L poly)
Volatile Organic Compounds	EPA 8260B	14 days	5 VOA vials (40mL)s HCL preserved
Semi Volatile Organic Compounds (includes PAHs and naphthalenes)	EPA8270 / SIM	7 days	2 (1L Amber glass) unpreserved
PCBs	EPA 8082	none	2 (1L Amber glass) unpreserved
[2] VOA containers should be filled carefully to minimize turbulence and aeration, and must be absolutely free of bubbles, with no headspace. Do not to overfill the container and loose preservative. Maintain in a cooler at 4o C for the duration of the sampling and transportation period.			
David Baumeister/dbaumeister@onsite-env.com/(425)883-3881			
Overnight Mail to: OnSite Environmental, Inc., 14648 NE 95th Street, Redmond, WA 98052			

Sample Collection

Water will likely be captured and stored in temporary storage tanks or other portable containment structures. A sample should be collected from a discharge port on the tank or from within the tank or containment structure using a bailer. The bailers should be dropped to within 1 foot of the bottom of the tank.

The samples should be placed in pre-cleaned, previously unused sample containers supplied by a subcontracted laboratory. The samples should be labeled and placed in a cooler on ice for transport to the laboratory. Sample handling should follow appropriate chain-of-custody (COC) procedures from sample collection through analysis.

VOCs/Gasoline-Range Petroleum Hydrocarbons

Water samples for VOCs and gasoline-range petroleum hydrocarbons are typically collected into 40-milliliter glass vials with a preservative. The following procedure should be followed for collecting volatile water samples to prevent the loss of VOCs.

- Open sample vial. Tip the vial slightly so that the water flows down the sidewall of the container.
- Bring vial to an upright position as it fills. Fill just to the point of overflowing; there should be a "reverse" meniscus, or a small dome of water just above the top of the bottle.
- Seal the vial so that no air bubbles are trapped. Make sure the Teflon side of the liner is in contact with the water. The Teflon side appears more white and shiny than the backside of the liner.
- Turn the vial upside down and gently tap the cap on a solid surface. If any bubbles are evident, open the vial and add few more drops of water. If bubbles are still evident, dispose of the vial and start the process again with a new clean bottle.

CHEMICAL ANALYSIS

The soil and water samples should be submitted for chemical analysis based on the chemicals of concern identified from previous historical and subsurface investigations. Table 4 describes typical petroleum related sources and chemical analysis required under MTCA rule Table 830-1. The chemical analysis shown in Table 4 is intended to cover the requirements for disposal at RCRA Subtitle D landfill, inert waste pit site or reuse on the project. Initial analysis may be required for disposal at a RCRA Subtitle D landfill if total concentrations exceed the values shown in Table 5. If the source of the potential contamination is unknown, the WSDOT hazardous materials specialist should coordinate with disposal facility to evaluate chemical analysis required for disposal. Ecology guidance regarding reuse of petroleum-impacted soil is included in Appendix B.

TABLE 4

CATEGORIES OF PETROLEUM PRODUCTS AND TYPICAL CHEMICAL ANALYSIS REQUIRED FOR DISPOSAL

QUALITY ASSURANCE PLAN FOR FIELD SCREENING AND DISPOSAL CHARACTERIZATION FOR PETROLEUM CONTAMINATION

	NWTPH-GXx	NWTPH-Dx	VOCs by EPA Method 8260 or 8021							PAHs by EPA Method 8270 Sim	Metals by EPA Method 6000/7000 Series		EPA Method 8082	Chemical Specific
Categories of Petroleum Products	Gasoline-Range Petroleum Hydrocarbons	Diesel- and Oil-Range Petroleum Hydrocarbons	BTEX	MTBE	EDB	EDC	Naphthalenes	HVOCS	Other Fuel Additives and Blending Compounds [1]	cPAHs	Lead[2]	Cadmium, Chromium, Nickel and Zinc	PCBs	Other Site Contaminants
Gasoline-Range Petroleum Hydrocarbons Automotive Gasoline Aviation Gasoline Automotive Racing Fuel Mineral Spirits Naptha Stoddard Solvents	X		X	X	X	X	X				X			X
Middle Distillates/Diesel-Range Petroleum Hydrocarbons Diesel No. 1 Kerosene Diesel No. 2 Diesel and Biodiesel Mixtures Home Heating Oil Jet Fuel Light Oil		X	X				X							X
Heavy Oil-Range Petroleum Hydrocarbons Bunker C No. 4 Fuel Oil No. 5 Fuel Oil No. 6 Fuel Oil Products included under waste oil prior to use		X	X				X			X			X	X
Mineral Oil (Subset of Heavy Oil That is Highly Refined) Insulating Oil		X											X	X
Waste Oil Engine Lubricating Oil Hydraulic Fluid Industrial Process Oils Metalworking Oils and Lubricants Refrigeration/Compressor Oil Transmission/Differential Oil	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Preferred Practical Quantitation Limit (mg/kg)	5	25	0.005 for each isomer	0.001	0.001	0.001	0.5 for each naphthalene	0.005 for each VOC	0.02	0.05 for each cPAH	0.1	0.1, 0.5, 0.1, 5 respectively	0.04	Chemical Specific

Note:

[1] Other fuel additives and blending compounds consist of Tertiary-butyl alcohol (TBA), tertiary-amyl methyl ether (TAME), ethyl tertieary-butyl ether (ETBE), methanol and ethanol.

[2] Only lead is required by Ecology MTCA rule, however the disposal facility will likely require RCRA Metals (arsenic, barium, cadmium, chromium, lead, mercury, silver and selenium) and follow-up TCLP if the total concentration is 20 times the WAC 173-303-100 Dangerous Waste Regulation Maximum Concentration of Contaminants for the Toxicity Characteristic.

VOCs = Volatile Organic Compounds
BTEX = Benzene, Toulene, Ethylbenzene, Xylenes
MTBE = Methyl tert-butyl ether
EDB = 1,2-Dibromoethane
EDC = 1,2-dichloroethane
HVOCs = Halogenated Volatile Organic Compounds
PAHs = Polycyclic Aromatic Hydrocarbons
cPAHs = carcinogenic Polycyclic Aromatic Hydrocarbons
PCBS = Polychlorinated Bienphyls

MTCA = Model Toxics Control Act
TCLP = Toxicity Characteristic Leaching Procedure
RCRA = Resource Conservation and Recovery Act
EPA = Environmental Protection Agency

TABLE 5. GUIDELINES FOR ANALYTICAL METHODS AND MAXIMUM ALLOWABLE LEVELS

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GUIDELINES FOR ANALYTICAL METHODS AND MAXIMUM ALLOWABLE LEVELS

PARAMETER	WASTE CODE	MAX. ALLOWABLE LEVELS TCLP (mg/L)	TOTAL* (mg/kg)	ANALYTICAL METHODS**
TCLP METALS				
Arsenic	D004	<5.0	100	SW-846-1311/SW-846-6010
Barium	D005	<100.00	2000	SW-846-1311/SW-846-6010
Cadmium	D006	<1.0	20	SW-846-1311/SW-846-6010
Chromium	D007	<5.0	100	SW-846-1311/SW-846-6010
Lead	D008	<5.0	100	SW-846-1311/SW-846-6010
Mercury	D009	<0.2	4	SW-846-1311/SW-846-7470
Selenium	D010	<1.0	20	SW-846-1311/SW-846-7740
Silver	D011	<5.0	100	SW-846-1311/SW-846-6010
TCLP VOLATILES				
Benzene	D018	<0.5	10	SW-846-1311/SW-846-8260
Carbon Tetrachloride	D019	<0.5	10	SW-846-1311/SW-846-8260
Chlorobenzene	D021	<100.0	2000	SW-846-1311/SW-846-8260
Chloroform	D022	<6.0	120	SW-846-1311/SW-846-8260
1,2-Dichloroethane	D028	<0.5	10	SW-846-1311/SW-846-8260
1,1-Dichloroethylene	D029	<0.7	14	SW-846-1311/SW-846-8260
Methyl Ethyl Ketone	D035	<200.0	4000	SW-846-1311/SW-846-8260
Tetrachloroethylene	D039	<0.7	14	SW-846-1311/SW-846-8260
Trichloroethylene	D040	<0.5	10	SW-846-1311/SW-846-8260
Vinyl Chloride	D043	<0.2	4	SW-846-1311/SW-846-8260
TCLP SEMI-VOLATILES (Base Neutrals)				
1,4 Dichlorobenzene	D027	<7.5	150	SW-846-1311/SW-846-8270
Hexachlorobenzene	D032	<0.13	2.6	SW-846-1311/SW-846-8270
Hexachlorobutadiene	D033	<0.5	10	SW-846-1311/SW-846-8270
Hexachloroethane	D034	<3.0	60	SW-846-1311/SW-846-8270
Nitrobenzene	D036	<2.0	40	SW-846-1311/SW-846-8270
Pyridine	D038	<5.0	100	SW-846-1311/SW-846-8270
2,4-Dinitrotoluene	D030	<0.13	2.6	SW-846-1311/SW-846-8270
TCLP SEMI-VOLATILES (Acid Compounds)				
o-Cresol	D023	<200.0	4000	SW-846-1311/SW-846-8270
m-Cresol	D024	<200.0	4000	SW-846-1311/SW-846-8270
p-Cresol	D025	<200.0	4000	SW-846-1311/SW-846-8270
Cresol, Total	D026	<200.0	4000	SW-846-1311/SW-846-8270
Pentachlorophenol	D037	<100.0	2000	SW-846-1311/SW-846-8270
2,4,5-Trichlorophenol	D041	<400.0	8000	SW-846-1311/SW-846-8270
2,4,6-Trichlorophenol	D042	<2.0	40	SW-846-1311/SW-846-8270
TCLP HERBICIDES				
2,4-D	D016	<10.0	200	SW-846-1311/SW-846-8080
2,4,5-TP (Silvex)	D017	<1.0	20	SW-846-1311/SW-846-8080
TCLP PESTICIDES				
Chlorodane	D020	<0.03	0.6	SW-846-1311/SW-846-8080
Endrin	D012	<0.02	0.4	SW-846-1311/SW-846-8080
Heptachlor	D031	<0.008	0.16	SW-846-1311/SW-846-8080
Lindane	D013	<0.4	8	SW-846-1311/SW-846-8080
Methyoxychlor	D014	<10.0	200	SW-846-1311/SW-846-8080
Toxaphene	D015	<0.5	10	SW-846-1311/SW-846/8080
GENERAL				
pH	D002	2.0 < x <12.5		SW-846-9045
Ignitability (Liquids Only)	D001	>140°F (60°C)		SW-846-C7
Free Liquids		NO FREE LIQUIDS		SW-846-9095
PCB's		<50 mg/kg or ppm		SW-846-8080
TPH		Varies by landfill		SW-846-8015, EPA 418.1 API-(GC/FID), ASTM-D3987-85/SW-846-

* If the TOTAL results are greater than 20 times the TCLP levels, than TCLP must be performed.
** These analytical methods are only suggested methods, other methods may be utilized.

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Provided by Allied Waste

QUALITY CONTROL AND QUALITY ASSURANCE SAMPLE STORAGE

Data Quality Objectives

The quality assurance objective for technical data is to collect environmental monitoring data of known, acceptable and documentable quality. The QA objectives established for the project are:

- Implement the procedures outlined herein for field sampling, sample custody, equipment operation and calibration, laboratory analysis, and data reporting that will facilitate consistency and thoroughness of data generated.
- Achieve the acceptable level of confidence and quality required so that data generated are scientifically valid and of known and documented quality. This will be performed by establishing criteria for precision, accuracy, representativeness, completeness and comparability, and by testing data against these criteria.

The sampling design, field procedures, laboratory procedures, and quality control (QC) procedures are set up to provide high-quality data. Specific data quality factors that may affect data usability include quantitative factors (detection limits, precision, and accuracy) and qualitative factors (comparability). The measurement quality objectives (MQO) associated with the data quality factors are discussed below.

Detection Limits

Analytical methods have quantitative limitations at a given statistical level of confidence that are often expressed as the method detection limit (MDL). Although results reported near the MDL provide insight to site conditions, quality assurance dictates that analytical methods achieve a consistently reliable level of detection known as the practical quantitation limit (PQL), which is typically demonstrated with the lowest point of a linear calibration. The contract laboratory will provide numerical results for all analytes and report them as detected above the PQL or undetected at the PQL.

The PQL for the target analytes are presented in Table 4 for soil. These reporting limits were obtained from Ecology's Guidance for Remediation of Petroleum Contaminated Sites (Publication No. 10-09-057). The PQLs in Table 4 that are considered target reporting limits (TRLs) because several factors may influence final reporting limits. First, moisture and other physical conditions of soil affect detection limits. Second, analytical procedures may require sample dilutions or other practices to accurately quantify a particular analyte at concentrations above the range of the instrument. The effect is that other analytes could be reported as undetected but at a value higher than a specified TRL. Data users must be aware that high non-detect values, although correctly reported, can bias statistical summaries and careful interpretation is required to correctly characterize site conditions.

Precision

Precision is the measure of mutual agreement among replicate or duplicate measurements of an analyte from the same sample and applies to field duplicate or split samples, replicate analyses, and duplicate spiked environmental samples (matrix spike duplicates). The closer the measured values are to each other, the more precise the measurement process. Precision error may affect data usefulness. Good precision is indicative of relative consistency and comparability between different samples. Precision will be expressed as the relative percent difference (RPD) for spike sample comparisons of various matrices and field duplicate comparisons.

This value is calculated by:

$$RPD\,(\%) = \frac{|D_1 - D_2|}{(D_1 + D_2)/2}\ X\ 100,$$

Where:

D_1 = Concentration of analyte in sample.

D_2 = Concentration of analyte in duplicate sample.

The calculation applies to split samples, replicate analyses, duplicate spiked environmental samples (matrix spike duplicates) and laboratory control duplicates. The RPD will be calculated for samples and compared to the applicable criteria. Precision can also be expressed as the percent difference (%D) between replicate analyses. Persons performing the evaluation must review the pertinent document (USEPA, 2004) that addresses criteria exceedances and courses of action. Project RPD goals for all analyses are 35 percent for water samples and 50 percent for soil samples, unless the primary and duplicate sample results are less than five times the MRL, in which case RPD goals will not apply for data quality assessment purposes.

Accuracy

Accuracy is a measure of bias in the analytic process. The closer the measurement value is to the true value, the greater the accuracy. This measure is defined as the difference between the reported values versus the actual value and is often measured with the addition of a known compound to a sample. The amount of known compound reported in the sample, or percent recovery, assists in determining the performance of the analytical system in correctly quantifying the compounds of interest. Since most environmental data collected represent one point spatially and temporally rather than an average of values, accuracy plays a greater role than precision in assessing the results. In general, if the percent recovery is low, non-detect results may indicate that compounds of interest are not present when in fact these compounds are present. Detected compounds may be biased low or reported at a value less than actual environmental conditions. The reverse is true when recoveries are high. Non-detect values are considered accurate while detected results may be higher than the true value.

For most accuracy will be expressed as the percent recovery of a known surrogate spike, matrix spike, or laboratory control sample (blank spike), concentration:

$$Recovery\,(\%) = \frac{Spiked\ Result - Unspiked\ Result}{Known\ Spike\ Concentration}\ X\ 100$$

Persons performing the evaluation must review the pertinent document (USEPA, 2004) that addresses criteria exceedances and courses of action.

Comparability

Comparability expresses the confidence with which one set of data can be compared to another. Although numeric goals do not exist for comparability, a statement on comparability will be prepared to determine overall usefulness of data sets, following the determination of both precision and accuracy.

Holding Times

Holding times are defined as the time between sample collection and extraction, sample collection and analysis, or sample extraction and analysis. Some analytical methods specify a holding time for analysis only. For many methods, holding times may be extended by sample preservation techniques in the field. If a sample exceeds a holding time, then the results may be biased low. Holding times are presented in Table 4.

Sample Handling and Custody

Sample Storage

Individual samples should be placed in a cooler with "blue ice" or double-bagged "wet ice" immediately after they are collected. The objective of the cold storage should be to attain a sample temperature of 4 degrees Celsius. Holding times should be observed during sample storage.

Sample Shipment

The samples should be transported and delivered to the analytical laboratory in coolers. Field personnel should transport and hand-deliver samples to the laboratory or to a laboratory courier for analysis.

Chain-Of-Custody Records

Field personnel are responsible for the security of samples from the time the samples are collected until the samples have been received by the laboratory or courier. A COC form should be completed at the end of the field day for samples being shipped to the laboratory. Information to be included on the COC form includes:

- Project name and number.
- Sample identification numbers.
- Date and time of sampling.
- Sample matrix and number of containers from each sampling point, including preservatives used.
- Analyses to be performed or samples to be archived.
- Names of sampling personnel and transfer of custody acknowledgment spaces.

Field personnel shall retain carbon copies and place the original and remaining copies in a plastic bag, placed within the cooler or taped to the inside lid of the cooler before sealing the container for transport. This record should accompany the samples during transit by the field team member or courier to the laboratory.

Laboratory Custody Procedures

The laboratory should follow their standard operating procedures (SOPs) to document sample handling from time of receipt (sample log-in) to reporting. Documentation should include at a minimum, the analysts name or initial, and the time and date of analysis.

Field Documentation

Field documentation provides important information about potential problems or special circumstances surrounding sample collection. Field personnel should maintain daily field logs while on site. Entries in the field logs and associated sample documentation forms should be made in waterproof ink on Rite-in-the-Rain paper, or waterproof ink on standard paper. Corrections should consist of line-out deletions that are initialed and dated. Individual logs should become part of the project files.

At a minimum, the following information should be recorded during the collection of each sample:

1. Sample location and description
2. Sampler’s name(s)
3. Date and time of sample collection
4. Type of sample
5. Type of sampling equipment used
6. Field instrument readings as appropriate
7. Field observations and details that are pertinent to the integrity/condition of the samples (e.g., weather conditions, performance of the sampling equipment, sample depth control, etc.)
8. Sample preservation

In addition to the sampling information, the following specific information also should be recorded in the field log for each day of sampling:

9. Names of team members
10. Time of Property arrival/departure
11. Other personnel present at the Property as appropriate
12. Summary of pertinent meetings or discussions with regulatory agency
13. Deviations from sampling plans, site safety plans and QAPP procedures
14. Changes in personnel and responsibilities with reasons for the changes
15. Levels of safety protection
16. Calibration readings for any equipment used and equipment model and serial number

Photographs

All photographs taken of field activities will be documented with the following information noted in the field notebook:

- Date, time and location of photograph taken;
- Description of photograph taken;
- Reasons photograph was taken;
- Sequential number of the photograph and the film roll number (if film is used); and
- Viewing direction.

Digital photographs will be reviewed in the field using the camera view screen to assess photographic quality and the need to retake the photograph.

SAMPLING EQUIPMENT DECONTAMINATION

Reusable sampling equipment (stainless steel bowls, etc.) that comes in contact with soil should be decontaminated before each use. Decontamination procedures for this equipment should consist of the following: 1) wash with non-phosphate detergent solution (Alconox and distilled water), 2) rinse with distilled water, and 3) second distilled water rinse. Field personnel should limit cross-contamination by changing gloves between sampling events or more frequently as needed. Wash water used to decontaminate the sampling equipment is expected to be de minimis and shall be disposed of onto the soil/water that is being characterized for disposal.

SPECIAL TRAINING AND CERTIFICATION

All personnel conducting sampling activities must have successfully completed the required Occupational Safety and Health Administration (OSHA) 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training program per 29 Code of Federal Regulations (CFR) 1910.120. Additionally, these individuals must have completed an annual eight-hour refresher training within the previous year.

Prior to starting field activities, all personnel working should be briefed on potential site hazards, health and safety procedures, and sampling procedures. After completion of this training, all personnel will be required to sign an acknowledgement form verifying that they have completed the task-specific training.

REFERENCES

U.S. Environmental Protection Agency (USEPA), "Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, OSWER 9240.1-45, EPA 540-R-04-004." October 2004.

Washington State Department of Ecology (Ecology), "Guidance for Remediation of Petroleum Contaminated Sites, Publication 10-09-057" dated September 2011.

Washington State Department of Ecology (Ecology), "Implementation Memorandum, #5, Collecting and Preparing Samples for VOC Analysis, Publication 04-09-087," dated June 2004.

APPENDIX A
MiniRae 2000 PID Manual

BOX 2

MiniRAE 2000

Portable VOC Monitor
PGM-7600

OPERATION AND MAINTENANCE MANUAL

(Document No.: 011-4001)
Revision D, June 2004

RAE SYSTEMS

ISO 9001 CERTIFIED

4.4 Calibrate and Select Gas

WARNINGS

The calibration of all newly purchased RAE Systems instruments should be tested by exposing the sensor(s) to known concentration calibration gas before the instrument is put into service for the first time.

For maximum safety, the accuracy of the MiniRAE 2000 should be checked by exposing it to known concentration calibration gas before each day's use.

In the first menu of the programming mode, the user can perform functions such as calibration of the MiniRAE 2000 Monitor, select default cal memories, and modify cal memories.

Calibrate/Select Gas Sub-Menu

Fresh Air Cal?

Span Cal?

Select Cal Memory?

Change Span Value?

Modify Cal Memory?

Change Correction Factor?

Calibrating the MiniRAE 2000 monitor is a two-point process using "fresh air " and the standard reference gas (also known as span gas). First a "Fresh air" calibration, which contains no detectable VOC (0.0 ppm), is used to set the zero point for the sensor. Then a standard reference gas that contains a known concentration of a given gas is used to set the second point of reference.

Note: The span value must be set prior to calibrating for fresh air or span.

The user can store calibrations for up to 8 different measurement gases. The default gas selections are as follows:

Cal Memory #0......Isobutylene

Cal Memory #1......Hexane

Cal Memory #2......Xylene

Cal Memory #3......Benzene

Cal Memory #4......Styrene

Cal Memory #5......Toluene

Cal Memory #6......Vinyl Chloride

Cal Memory #7......Custom?

Memory #0 functions differently than the other 7 memories. For Memory #0, isobutylene is always the calibration gas. When the gas is changed in Memory #0 to one of 100 other preprogrammed chemicals or to a user-defined custom gas, a correction factor is applied to all the readings. During calibration, the unit requests isobutylene gas and displays the isobutylene concentration immediately following calibration, but when the unit is returned to the normal reading mode, it displays the selected gas and applies the correction factor.

The other 7 cal memories require the same calibration gas as the measurement gas. These memories may also be modified to a preprogrammed chemical or to a user-defined custom gas. In the gas library, only the gases that can be detected by the installed UV lamp will actually be displayed. Note that although the correction factor for the new gas will be displayed and can be modified, this factor is not applied when Memories #1-7 are used. Therefore the factor will not affect the readings in these memories.

Once each of the memories has been calibrated, the user can switch between the calibrated gases by changing the cal memory without the need to recalibrate. Or the user can switch the measurement gas in Memory #0 and the appropriate correction factor will automatically be applied without the need to recalibrate. If the gas is changed in Memories #1-7, it is necessary to recalibrate.

To change a default gas from the list above to a library or custom gas, first go to Select Cal Memory (Section 4.4.3) and then proceed to Modify Cal Memory (Section 4.4.5) to enter the desired gas. If the desired compound does not appear in the preprogrammed library, the user can use the Custom_VOC entry in the library, or the name and correction factor of any of the existing compounds can be changed as described in Section 4.4.5. A list of some 300 correction factors is given in Technical Note 106, available at the website www.raesystems.com.

4.4.1 Fresh Air Calibration

This procedure determines the zero point of the sensor calibration curve. To perform a fresh air calibration, use the calibration adapter to connect the MiniRAE 2000 to a "fresh" air source such as from a cylinder or Tedlar bag (option accessory). The "fresh" air is clean dry air without any organic impurities. If such an air cylinder is not available, any clean ambient air without detectable contaminant or a charcoal filter can be used.

1. The first sub-menu shows: "Fresh air Cal?"
2. Make sure that the MiniRAE 2000 is connected to one of the "fresh" air sources described above.
3. Press the **[Y/+]** key, the display shows "zero in progress" followed by "wait.." and a countdown timer.

After about 15 seconds pause, the display will show the message "update data…zeroed… reading = X.X ppm…" Press any key or wait about 20 seconds, the monitor will return back to "Fresh air Calibration?" submenu.

4.4.2 Span Calibration

This procedure determines the second point of the sensor calibration curve for the sensor. A cylinder of standard reference gas (span gas) fitted with a 500 cc/min. flow-limiting regulator or a flow-matching regulator is the simplest way to perform this procedure. Choose the 500 cc/min. regulator only if the flow rate matches or slightly exceeds the flow rate of the instrument pump. Alternatively, the span gas can first be filled into a Tedlar Bag, or delivered through a demand-flow regulator. Connect the calibration adapter to the inlet port of the MiniRAE 2000 Monitor, and connect the tubing to the regulator or Tedlar bag.

Another alternative is to use a regulator with >500 cc/min flow but allow the excess flow to escape through a T or an open tube. In the latter method, the span gas flows out through an open tube slightly wider than the probe, and the probe is inserted into the calibration tube.

Before executing a span calibration, make sure the span value has been set correctly (see next sub-menu).

1. Make sure the monitor is connected to one of the span gas sources described above.
2. Press the **[Y/+]** key at the "Span Cal?" to start the calibration. The display shows the gas name and the span value of the corresponding gas.
3. The display shows "Apply gas now!" Turn on the valve of the span gas supply.

4. Display shows "wait.... 30" with a count down timer showing the number of remaining seconds while the monitor performs the calibration.
5. To abort the calibration, press any key during the count down. The display shows "Aborted!" and return to "Span Cal?" sub-menu.
6. When the count down timer reaches 0, the display shows the calibrated value.

   Note: The reading should be very close to the span gas value.
7. During calibration, the monitor waits for an increased signal before starting the countdown timer. If a minimal response is not obtained after 35 seconds, the monitor displays "No Gas!" Check the span gas valve is on and for lamp or sensor failure before trying again.
8. The calibration can be started manually by pressing any key while the "Apply gas now!" is displayed.
9. After a span calibration is completed, the display will show the message "Update Data Span Cal Done! Turn Off Gas."
10. Turn off the flow of gas. Disconnect the calibration adapter or Tedlar bag from the MiniRAE 2000 Monitor.
11. Press any key and it returns back to "Span Gas Cal?"

4.4.3 Select Cal Memory

This function allows the user to select one of eight different memories for gas calibration and measurement. For Memories #1-7, the calibration and measurement gas is the same and no correction factor is applied. For Memory #0, the calibration gas is always isobutylene and the measurement gas may be different, in which case the correction factor for that gas is automatically applied. The default gas selections are listed in Section 4.4

1. "Select Cal Memory?" is the third sub-menu item in the Calibration sub-menu. Pressing the **[Y/+]** key, the display will show "Gas =" gas name followed by "Mem # x?"
2. Press **[N/-]** to scroll through all the memory numbers and the gas selections respectively. Press **[Y/+]** to accept the displayed Cal Memory number.
3. After the **[Y/+]** key is pressed, the display shows "Save?" Press **[Y/+]** key to save and proceed. Press **[N/-]** to discard the entry and advance to the next sub-menu.
4. If the gas in a newly selected Cal Memory number is not calibrated, the display shows "CF= x.xx". A correction factor with the value "x.xx" will be applied.
5. If the gas of a newly selected cal memory number has been calibrated previously, the display shows "Last calibrated xx/xx/xx".

1. GENERAL INFORMATION

MiniRAE 2000 Portable VOC Monitor (Model PGM 7600) is a compact monitor designed as a broadband VOC gas monitor and datalogger for work in hazardous environments. It monitors Volatile Organic Compounds (VOC) using a Photo-Ionization Detector (PID) with a 9.8 eV, 10.6 eV, or 11.7 eV gas discharge lamp. Features are:

- **Lightweight and Compact**
  -Compact, light weight (19 oz.) and rugged design
  -Built-in sample draw pump

- **Dependable and Accurate**
  - Up to 10 hours of continuous monitoring with rechargeable battery pack
  - Designed to continuously monitor VOC vapor at ppm levels

- **User Friendly**
  -Preset alarm thresholds for STEL, TWA, low and high level peak values. Audio buzzer and flashing LED display are activated when the limits are exceeded.

- **Datalogging Capabilities**
  -15,000 point datalogging storage capacity for data download to PC

MiniRAE 2000 consists of a PID with associated microcomputer and electronic circuit. The unit is housed in a rugged ABS + PC case with a backlit 1 line by 8 character dot matrix LCD and 3 keys to provide easy user interface.

1.1 General Specifications

Table 1.1

Portable VOC Monitor Specification	
Size:	8.2"L x 3.0"W x 2.0"H
Weight:	19.5 oz with battery pack
Detector:	Photo-ionization sensor with 9.8, 10.6, or 11.7 eV UV lamp
Battery: A 4.8V /1250 mAH Rechargeable Nickel Metal Hydride battery	pack (snap in, field replaceable)
Battery Charging:	10 hours charge through built-in charger
Operating Hours:	Up to10 hours continuous operation
Display:	1 line by 8 characters 5x7 dot matrix LCD (0.4" character height) with LED back light automatically in dim light
Range, Resolution & Response time (t_{90}):	
Isobutylene (calibration gas)	
	0-99 ppm 0.1 ppm 2 sec
	100-1,999 ppm 1.0 ppm 2 sec
	2000-10,000 ppm 1.0 ppm 2 sec
Measurement Accuracy (Isobutylene):	
	0 – 2000 ppm: ± 2 ppm or 10% of reading.
	> 2000 ppm: ± 20% of reading
PID Detector:	Easy access to lamp and sensor for cleaning and replacement
Correction Factors:	Built-in 102 VOC gases
Calibration:	Two-point field calibration of zero and standard reference gas
Calibration Memory:	
	Store up to 8 separate calibration, alarm limits and span value
Inlet Probe:	Flexible 5" tubing
Keypad:	1 operation key and 2 programming keys

Direct Readout:	Instantaneous, average, STEL and peak value, battery voltage and elapsed time
Intrinsic Safety:	UL & cUL Class 1, Division I, Group A,B,C,D, Temperature Code T3C (US & Canada); CE 0575 Ex II 1G DEMKO 02 ATEX 0204759 Eex ia IIC T4 (Europe)
EM Interference:	No effect when exposed to 0.43 W/cm^2 RF interference (5 watt transmitter at 12 inches)
Alarm Setting:	Separate alarm limit settings for Low, High, STEL and TWA alarm
Operating Mode:	Survey or Hygiene mode
Alarm: 90 dB buzzer and	flashing red LEDs to indicate exceeded preset limits, low battery voltage, or sensor failure.
External Alarm:	Optional plug-in pen-size vibration alarm or remote alarm
Alarm Mode:	Latching or automatic reset
Real-time Clock:	Automatic date and time stamps on data logged information
Datalogging:	15,000 points with time stamp, serial number, user ID, site ID, etc.
Communication:	Upload data to PC and download instrument setup from PC through RS-232 port
Sampling Pump:	Internally integrated. Flow rate: 450-550 cc/min.
Temperature:	0° to 45°C (32° to 113°F)
Humidity:	0 % to 95 % relative humidity (non-condensing)
Housing:	ABS + PC, conductive coating, splash and dust proof, will withstand 1 meter drop test with rubber boot
Attachment:	Wrist strap, rubber boot and belt clip

APPENDIX B
Ecology Guidance Regarding Reuse of Petroleum-Impacted Soil

12.0 REUSE OF PETROLEUM-CONTAMINATED SOILS

Ecology recognizes that cleanup of petroleum-contaminated sites is expensive. Landfilling of contaminated soils and the associated transportation costs greatly increases cleanup costs and contribute to greenhouse gas production. Heavily contaminated soils, of course, must be properly treated or disposed of to ensure that human health and the environment remain protected. However, for moderately or lightly contaminated soils, or soils with most of the contamination removed by treatment, a number of alternatives exist.

Under Washington State's Solid Waste and Hazardous Waste laws, one of the highest priorities for managing waste is to recycle or reuse waste materials. MTCA also states that remedial actions should provide for permanent solutions to the maximum extent practical. Consistent with these statutory priorities, Ecology offers the guidelines for best management practices in this section to facilitate the productive reuse of petroleum-contaminated soils generated by petroleum contaminated site cleanups. Soils managed consistent with these guidelines will most likely be protective of human health and the environment based on Ecology's past experience. Soils with contaminants other than petroleum-related are not addressed by these guidelines and these guidelines should not be used for these soils.

Petroleum contaminated soils are considered solid waste and, as such, are regulated by local health departments/districts. Some local health departments/districts may require a permit for reuse of these soils or have more restrictive reuse regulations. Use of these soils in public rights of way or easements is typically controlled by the local public works department. Use of these soils may also be subject to local land use laws and shoreline regulations. These agencies should be consulted before reusing the soil in accordance with these guidelines.

Petroleum contaminated soils generated by the cleanup of regulated UST facilities are exempt from most of the dangerous waste management requirements under WAC 173-303-071(3)(t). But other types of petroleum contaminated soil are not exempt. While the values in this table are generally well below concentrations that are likely to trigger regulation of the soil as a hazardous waste, if the soil was classified as a hazardous waste prior to treatment, or contains a listed waste, it may still be a regulated hazardous waste even with low contaminant levels. If this is a potential concern at a site, the soil will likely need to be managed as hazardous waste. Consult with Ecology's Hazardous Waste & Toxics Reduction Program in these cases. For more information see: http://www.ecy.wa.gov/programs/hwtr/index.html.

The general guidance in this section should not be construed as an endorsement of the reuse of any particular soils or a guarantee that any particular soils can be safely reused. All reuse decisions need to be made in the context of the individual site in compliance with all applicable laws. This section is not in any way intended to substitute for best professional judgment or override state or local regulatory requirements. Furthermore, reuse of petroleum-contaminated soils consistent with this section does not relieve any party of any resulting liability, including but not limited to MTCA liability, common law liability for nuisance conditions or a reduction in property value caused by aesthetic issues like odors, should a subsequent problem arise.

Persons may propose another site-specific basis for the reuse of petroleum-contaminated soil. This will require detailed site-specific characterization of the soil composition and variability (including testing for equivalent carbon fractions) and bioassays. A risk assessment evaluating all potential exposure pathways would also need to be conducted. This information will need to be submitted to Ecology's Waste to Resources Program and the local Health Department/District.

12.1 Factors Considered in the Development of Soil Re-use Categories

Table 12.1 provides recommended categories for reuse of petroleum contaminated soils. These values are based on evaluation of multiple potential exposure pathways and other considerations. Several values in Table 12.1 are more stringent than the Method A MTCA soil cleanup levels. There are several reasons for this:

- The solid waste handling standards, Chapter 173-350 WAC, apply to soils containing "harmful substances" removed during a cleanup. As noted below, petroleum-contaminated soils can cause harm in ways not considered under the MTCA Method A cleanup levels.
- For a variety of reasons, the Method A table values do not consider all potential exposure pathways and assume exposure conditions that may not be protective at all sites. For example, under Method A the soil is assumed to not impact surface water and terrestrial ecological risk is addressed separately. Under MTCA, Ecology has the authority to require more stringent cleanup levels than the Method A values on a site-specific basis. It is not practical to apply that level of site-specific judgment to reuse.
- Cleanup sites are typically cleaned to concentrations below the Method A cleanup levels to ensure the cleanup levels are met. However, the reuse categories set <u>maximum</u> not to exceed concentrations. Thus, for a given concentration, a soil reused under these guidelines is likely to have a higher TPH concentration than soil remaining after cleanup.
- At cleanup sites, it is possible to find out if the site was once contaminated through a site assessment or review of historical uses and cleanup records. However, because soil meeting these reuse categories can be reused on uncontaminated properties, property owners and workers will most likely not have similar information available and thus are unlikely to take any precautions regarding exposure.
- There is no state-wide permitting process controlling where soils meeting the reuse categories are used or requiring institutional controls to limit exposures.
- More data is available now than was available when the Method A soil cleanup levels were developed. This data indicates there is considerable product variability and this variability has been taken into account in developing these reuse categories.
- PCB-contaminated soils are not recommended for any reuse because of the persistence, toxicity and bioaccumulation potential of these compounds. This is consistent with Ecology's approach to regulation of these chemical mixtures under other authorities.

12.2 How to Determine Compliance with Soil Re-use Categories

Soils proposed for reuse should be tested for the parameters specified in Table 12.1, consistent with Table 7.2 for the product being cleaned up. The frequency of testing should be consistent with Table 6.9 for stockpiled soil, with the volume consisting of the amount of soil planned for reuse in any given reuse project, or a suitable alternative sampling plan submitted to the local regulatory agency for approval. To conform with these reuse categories, no sample should exceed the recommended values. If one or more samples exceed the recommended values, Ecology recommends that portion of the soil represented by that test result be separated from the other soil and appropriately disposed of. Soil samples bracketing the area should be taken to confirm whether the remainder of the soil qualifies for the selected category.

12.3 Soil Reuse Categories

Table 12.1 identifies four categories for re-use of petroleum contaminated soil. Table 12.2 describes uses and limitations for the four categories of soil. The footnotes to Table 12.1 are considered part of this Table and must be considered when reusing soils as specified in these tables.

While it is expected most petroleum contaminated soils will have been subjected to treatment prior to reuse, this is not a prerequisite for use of these guidelines. It may be possible, for example, through careful field screening using the methods described in Section 5 and segregation during excavation, to separate soils on the outer fringe of contamination or above the release that are only slighted contaminated. These soils may meet a particular soil reuse category without treatment.

Table 12.1 Guidelines for Reuse of Petroleum-Contaminated Soil					
Parameter	**Analytical Method**	**Soil Category (8)(9)(10)**			
		1 No detectable Petroleum Components (mg/kg)	**2 Commercial Fill Above Water Table (mg/kg)**	**3 Paving Base Material & Road Construction (mg/kg)**	**4 Landfill Daily Cover or Asphalt Manufacturing (mg/kg)**
Total Petroleum Hydrocarbons (1)(2) See Table 7.1 for petroleum products that fall within these categories.					
Gasoline Range Organics	NWTPH-Gx	<5	5 - 30	>30 - 100	>100
Diesel Range Organics	NWTPH-Dx	<25	25 - 200	>200 - 500	>500
Heavy Fuels and Oils*	NWTPH-Dx	<100	100 - 200	>200 – 500	>500
Mineral Oil	NWTPH-Dx	<100	100 - 200	>200 – 500	>500
Volatile Petroleum Components					
Benzene	SW8260B	<0.005	0.005 - 0.03	0.03 or less	See Table 12.2
Ethyl benzene	SW8260B	<0.005	0.005 - 6	6 or less	>6
Toluene	SW8260B	<0.005	0.005 - 7	7 or less	>7
Xylenes **(3)**	SW8260B	<0.015	0.015 - 9	9 or less	>9
Fuel Additives & Blending Components					
(MTBE) Methyl Tert-Butyl Ether	SW8260B	<0.005	0.005 - 0.1	0.1 or less	>0.1
Lead	SW6010A	<17	17 - 50	>50 - 220	See Table 12.2
Other Petroleum Components					
Polychlorinated **(4)** Biphenyls (PCBs)	SW8082	<0.04	<0.04	<0.04	See Table 12.2
Naphthalenes **(5)**	SW8260B	<0.05	0.05 - 5	5 or less	>5
cPAHs **(6)**	SW8270C	<0.05	0.05 - 0.1	>0.1 - 2	>2
Other Petroleum Characteristics (Applies to soils contaminated with any petroleum product.)					
Odors	Smell	No detectable odor			
Staining	Visual	No unusual color or staining			
Sheen Test	See Footnote **# 7**	No visible sheen			

IMPORTANT: See Table 12.2 and the footnotes to this Table on the following pages!
Test soil for the parameters specified in Table 7.2.
****Does NOT include waste oil contaminated soils, which should be disposed of in a landfill.***
"<" means less than; ">" means greater than

Table 12.2 Description and Recommended Best Management Practices for Soil Categories in Table 12.1 (continues on next page)		
Category	**Acceptable Uses**	**Limitations**
Category 1 Soils: Soils with no detectable/ quantifiable levels of petroleum hydrocarbons or constituents using the analytical methods listed in Table 7.3 and are not suspected of being contaminated with any other hazardous substances.	• Can be used anywhere the use is allowed under other regulations. • Any use allowed for Category 2, 3 & 4 soils.	• These soils may have a slight petroleum odor, depending on the sensitivity of individuals, and this should be considered when reusing these soils.
Category 2 Soils: Soils with residual levels of petroleum hydrocarbons that could have adverse impacts on the environment in some circumstances.	• Any use allowed for Category 3 & 4 soils. • Backfill at cleanup sites above the water table. • Fill in commercial or industrial areas above the water table. • Road and bridge embankment construction in areas above the water table.	• Should be placed above the highest anticipated high water table. If seasonal groundwater elevation information is not available, place at least 10 feet above the current water table. • Should not be placed within 100 feet of any private drinking water well or within the 10 year wellhead protection area of a public water supply well. • Should not be placed in or directly adjacent to wetlands or surface water where contact with water is possible. • Should not be placed under a surface water infiltration facility or septic drain field. • Any other limitations in state or local regulations.
Category 3 Soils: Soils with moderate levels of residual petroleum contamination that could have adverse impacts on the environment unless re-used in carefully controlled situations.	• Any use allowed for Category 4 soils. • Use as pavement base material under public and private paved streets and roads. • Use as pavement base material under commercial and industrial parking lots.	• Should be placed above the highest anticipated high water table. If seasonal ground water elevation information is not available, place at least 10 feet above the water table. • Should be a maximum of 2 feet thick to minimize potential for leaching or vapor impacts. • Should not be placed within 100 feet of any private drinking water well or within the 10 year wellhead protection area of a public water supply well. • Should not be placed in or directly adjacent to wetlands or surface water. • Should not be placed under a surface water infiltration facility or septic drain field. • When exposed, runoff from area in use should be contained or treated to prevent entrance to storm drains, surface water or wetlands. • Any other limitations in state or local regulations.

Table 12.2 Description and Recommended Best Management Practices for Soil Categories in Table 12.1 (continued)		
Category	**Acceptable Uses**	**Limitations**
Category 4 Soils: Soils with high levels of petroleum contamination that should not be re-used except in very limited circumstances.	• Use in the manufacture of asphalt. • Use as daily cover in a lined municipal solid waste or limited purpose landfill provided this is allowed under the landfill operating permit.	**Landfill Limitations:** The soil should be tested for and pass the following tests: ➢ Free liquids test. Soils that contain free liquids cannot be landfilled without treatment. ➢ TCLP for lead and benzene. Unless exempt under WAC 173-303-071(3)(t), soils that fail a TCLP for lead or benzene must be disposed of as hazardous waste. ➢ Flammability test. Soils that fail this test must be disposed of as hazardous waste. ➢ Bioassay test under WAC 173-303-100(5). Soils that fail this test must be disposed of as hazardous waste. ➢ PCBs. Soils with a total PCB content of 2 ppm or more must be disposed of as hazardous waste. Soil used for daily cover should be stockpiled within the landfill lined fill area. Soil containing more than 10,000 mg/kg TPH should be buried immediately with other wastes or daily covered to limit potential worker exposure. Any additional limitations specified in the landfill permit or in other state or local regulations. **Asphalt Manufacturing Limitations:** Soil storage areas should be contained in a bermed area to minimize contact with surface water runoff from adjacent areas. Runoff from storage areas should be considered contaminated until tested to prove otherwise. Soil storage areas should also be lined and covered with a roof or secured tarp to minimize contact with precipitation and potential groundwater contamination. Leachate from storage areas should be considered contaminated until tested to prove otherwise. The soil should be tested for and pass the following tests: ➢ TCLP for lead and benzene. Unless exempt under WAC 173-303-071(3)(t), soils that fail a TCLP for lead or benzene must be disposed of as hazardous waste. ➢ Flammability test. Soils that fail this test must be disposed of as hazardous waste. ➢ Bioassay test under WAC 173-303-100(5). Soils that fail this test must be disposed of as hazardous waste. ➢ No detectable levels of PCBs in soil (<0.04 mg/kg). Precautions should be taken to minimize worker exposure to soil storage piles and any dust or vapors from these piles prior to feeding into the asphalt batch plant.
IMPORTANT: See the following page for additional information!		

<u>Notes to Table 12.1</u>:

Contaminated soils can be treated to achieve these concentrations but dilution with clean soil to achieve these concentrations is a violation of Washington State solid and hazardous waste laws.

(1) See Table 7.1 for a description of what products fall within these general categories. If the product released is unknown, use the limitations for gasoline range organics. If the soil is contaminated from releases from more than one product, use the limitations for both products. For example, if the release is a mixture of gasoline and diesel, the soil should be tested for components of both gas and diesel and the limitations for both fuels and their components used.

(2) The concentrations for diesel, heavy oil and mineral oil are not additive. Use the TPH product category most closely representing the TPH mixture and apply the limitations for that product to the mixture. ***The reuse of waste oil contaminated soil is not allowed due to the wide variety of contaminants likely to be present.***

(3) Value is total of m, o, & p xylenes.

(4) Value is the total of all PCBs. Only heavy oil and mineral oil contaminated soils need to be tested for PCBs. Soil contaminated with a spill from a regulated PCB containing device must be disposed of in a TSCA permitted landfill, regardless of the PCB concentration. Other PCB contaminated soils may be disposed of in a municipal solid waste landfill permitted to receive such materials, provided the concentration does not exceed 2 ppm PCBs (WAC 173-303-9904).

(5) Value is total of naphthalene, 1-methyl naphthalene and 2-methyl naphthalene. Only diesel and heavy oil contaminated soils need to be tested for naphthalenes.

(6) The value is the benzo(a)pyrene equivalent concentration of the following seven cPAHs, using the procedures in WAC 173-340-708(8). The seven cPAHs are as follows: benz(a)anthracene; benzo(b)fluoranthene; benzo(k)fluoranthene; benzo(a)pyrene; chrysene; dibenz(a,h)anthracene; and, indeno(1,2,3-cd)pyrene. Only diesel and heavy oil contaminated soils need to be tested for cPAHs. Soils contaminated with more than 1% polycyclic aromatic hydrocarbons, as that term is defined in WAC 173-303-040 (which is more expansive than the above list), must be disposed of as hazardous waste.

(7) No visible sheen observed on water when approximately one tablespoon of soil placed in approximately ½ liter of water held in a shallow pan (like a gold pan or similar container).

(8) A soil in a lower category can be used for uses specified in any higher category. This means that:

- A category 1 soil can be used for any use specified in categories 1, 2, 3 and 4.
- A category 2 soil can be used for any use specified in categories 2, 3 and 4.
- A categories 3 soil can be used for any use specified in categories 3 and 4.

(9) ***If an environmental site assessment or soil or groundwater analyses indicate contaminants other than common petroleum constituents and naturally occurring levels of metals are likely to be present in the soil of interest at the site (for example, solvents or pesticides), do not reuse the soil.*** The soil should instead be treated using appropriate technology to address all contaminants or landfilled at a solid waste or hazardous waste facility permitted to receive these materials.

(10) Soils in categories 2, 3 and 4 should be stockpiled consistent with the soil storage recommendations in Section 11.3 of this guidance.

Appendix G – Soil Disposal Receipts

Non-Hazardous WAM Approval

WASTE MANAGEMENT

Requested Management Facility: Columbia Ridge Landfill

Profile Number: 110205WA

Waste Approval Expiration Date: 06/22/2016

APPROVAL DETAILS

Approval Decision: ☑ Approved ☐ Not Approved

Profile Renewal: ☐ Yes ☑ No

Management Method: Alternate Daily Cover (ADC)

Generator Name: Washington Dept of Transportation

Material Name: Fuel Oil Impacted Soil/Debris

Management Facility Precautions, Special Handling Procedures or Limitation on approval:

Generator Conditions

- Shall not contain free liquids.
- Shipment must be scheduled into the disposal facility at least 24 hours in advance. Contact information will be provided by your TSR.
- Waste manifest or applicable shipping document must accompany load.
- The waste profile number must appear on the shipping papers.

Via Alaska Street, 70 S. Alaska St, Seattle

Please call to schedule at 206-763-5025

Facility Conditions

Bulk, ADC

WM Authorization Name: Kristin Castner

Title: Waste Approval Manager

WM Authorization Signature:

Date: 06/22/2015

Agency Authorization (if Required):

Date:

THINK GREEN.

QUESTIONS? CALL 800 963 4776 FOR ASSISTANCE

Last Revised April 11, 2014

John Sandhop

From:	Portland TSC [TSCPortland@wm.com]
Sent:	Monday, June 22, 2015 10:02 AM
To:	John Sandhop
Subject:	[WMSolutions.com] Profile #110205WA has been approved

JUNE, 22 2015

Notice of Profile Approval: #110205WA

Profile Number:
110205WA
Waste Stream:
Fuel Oil Impacted Soil/Debris
Generator Name:
Washington Dept of Transportation
Disposal Site:
Columbia Ridge Landfill
Comments:
Please schedule your load with the landfill 24 hours in advance. A copy of the WAM Approval Form must be presented with each load to the landfill scale house attendant upon arrival.
Expiration Date:
06/22/2016

Dear John Sandhop,

We are pleased to inform you that Profile 110205WA has been approved by our

Portland Technical Service Center. Your Waste Approval Terms and Conditions can be found on either your *Profile Form* or *Approval Form*. Both documents are available as a PDF in the *Approved Tab* in your WMSolutions.com account.

Please feel free to email us at TSCPortland@wm.com or call 800-963-4776 with any questions.

Thank you for choosing Waste Management.

Portland TSC
7227 NE 55th Avenue
Portland, OR 97218
Phone: 800-685-8001
TSCPortland@wm.com

WASTE MANAGEMENT

Ticket Created Criteria: 06/01/2015 12:00 AM to 06/29/2015 11:59 PM

Business Unit Name: AK St Reload and Recycle Facility - S07325 (USA)

Profile: 110205WA

Ticket Date	Time	Ticket	Customer	Carrier	Vehicle	Material	Rate Unit	Tons
6/22/2015	10:55:59 AM	105114	ANDERSON ENVIRONMENTAL	SELF HAULER	M769	ENVCLEANUP RGCPCS-Tons	TON	34.84
6/22/2015	11:32:55 AM	105129	ANDERSON ENVIRONMENTAL	SELF HAULER	M769	ENVCLEANUP RGCPCS-Tons	TON	33.76
6/22/2015	12:22:20 PM	105145	ANDERSON ENVIRONMENTAL	SELF HAULER	M769	ENVCLEANUP RGCPCS-Tons	TON	32.27
6/22/2015	1:05:02 PM	105155	ANDERSON ENVIRONMENTAL	SELF HAULER	M769	ENVCLEANUP RGCPCS-Tons	TON	33.26
6/22/2015	1:59:17 PM	105173	ANDERSON ENVIRONMENTAL	SELF HAULER	M769	ENVCLEANUP RGCPCS-Tons	TON	34.02
6/22/2015	2:45:32 PM	105183	ANDERSON ENVIRONMENTAL	SELF HAULER	M769	ENVCLEANUP RGCPCS-Tons	TON	32.35
6/23/2015	8:16:07 AM	105199	ANDERSON ENVIRONMENTAL	SELF HAULER	M769	ENVCLEANUP RGCPCS-Tons	TON	31.16
6/23/2015	8:56:17 AM	105205	ANDERSON ENVIRONMENTAL	SELF HAULER	M769	ENVCLEANUP RGCPCS-Tons	TON	32.51
6/23/2015	9:37:26 AM	105211	ANDERSON ENVIRONMENTAL	SELF HAULER	M769	ENVCLEANUP RGCPCS-Tons	TON	33.28
6/23/2015	10:14:10 AM	105222	ANDERSON ENVIRONMENTAL	SELF HAULER	M769	ENVCLEANUP RGCPCS-Tons	TON	34.45
6/23/2015	10:51:06 AM	105228	ANDERSON ENVIRONMENTAL	SELF HAULER	M769	ENVCLEANUP RGCPCS-Tons	TON	32.13
6/23/2015	11:28:33 AM	105240	ANDERSON ENVIRONMENTAL	SELF HAULER	M769	ENVCLEANUP RGCPCS-Tons	TON	33.12
6/23/2015	12:17:24 PM	105254	ANDERSON ENVIRONMENTAL	SELF HAULER	M769	ENVCLEANUP RGCPCS-Tons	TON	31.39
6/23/2015	1:10:04 PM	105302	ANDERSON ENVIRONMENTAL	SELF HAULER	M769	ENVCLEANUP RGCPCS-Tons	TON	32.91
6/23/2015	1:48:19 PM	105319	ANDERSON ENVIRONMENTAL	SELF HAULER	M769	ENVCLEANUP RGCPCS-Tons	TON	33.38
6/23/2015	2:29:37 PM	105335	ANDERSON ENVIRONMENTAL	SELF HAULER	M769	ENVCLEANUP RGCPCS-Tons	TON	33.63
6/23/2015	3:07:44 PM	105341	ANDERSON ENVIRONMENTAL	SELF HAULER	M769	ENVCLEANUP RGCPCS-Tons	TON	33.35
Total								**561.81**

Appendix H – Analytical Data

OnSite
Environmental Inc.

14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

June 18, 2015

Trent Ensminger
Washington State Department of Transportation
HAZ-MAT
2214 RW Johnson Road SW; MS 47332
Tumwater, WA 98512-6111

Re: Analytical Data for Project Signals Fuel Site
Laboratory Reference No. 1506-183

Dear Trent:

Enclosed are the analytical results and associated quality control data for samples submitted on June 17, 2015.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: June 18, 2015
Samples Submitted: June 17, 2015
Laboratory Reference: 1506-183
Project: Signals Fuel Site

Case Narrative

Samples were collected on June 17, 2015 and received by the laboratory on June 17, 2015. They were maintained at the laboratory at a temperature of 2^oC to 6^oC.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

NWTPH Gx Analysis

Per EPA Method 5035A, samples were received by the laboratory in pre-weighed 40 mL VOA vials within 48 hours of sample collection. They were stored in a freezer at between -7^oC and -20^oC until extraction or analysis.

Volatiles EPA 8260C Analysis

Per EPA Method 5035A, samples were received by the laboratory in pre-weighed 40 mL VOA vials within 48 hours of sample collection. They were stored in a freezer at between -7^oC and -20^oC until extraction or analysis.

Some MTCA Method A cleanup levels are non-achievable for samples SFS-SP2 and SFS-SP3 due to the necessary dilutions of the samples.

Semivolatiles EPA 8270D/SIM Analysis

Samples SFS-SP1, SFS-SP2 and SFS-SP3 had one surrogate recovery out of control limits. This is within allowance of our standard operation procedure as long as the recovery is above 10%.

Total Metals EPA 6010C/7471B Analysis

Due to the high concentration of Barium in the QC sample, the amount spiked was insufficient for meaningful MS/MSD recovery data. The Spike Blank recovery was 96%.

Please note that any other QA/QC issues associated with these extractions and analyses will be indicated with a footnote reference and discussed in detail on the Data Qualifier page.

Date of Report: June 18, 2015
Samples Submitted: June 17, 2015
Laboratory Reference: 1506-183
Project: Signals Fuel Site

NWTPH-Gx

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-SP1**					
Laboratory ID:	06-183-01					
Gasoline	**ND**	9.4	NWTPH-Gx	6-18-15	6-18-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*75*	*68-123*				
Client ID:	**SFS-SP2**					
Laboratory ID:	06-183-02					
Gasoline	**ND**	8.7	NWTPH-Gx	6-18-15	6-18-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*78*	*68-123*				
Client ID:	**SFS-SP3**					
Laboratory ID:	06-183-03					
Gasoline	**ND**	6.5	NWTPH-Gx	6-18-15	6-18-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*77*	*68-123*				

Date of Report: June 18, 2015
Samples Submitted: June 17, 2015
Laboratory Reference: 1506-183
Project: Signals Fuel Site

NWTPH-Gx
QUALITY CONTROL

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0618S1					
Gasoline	**ND**	5.0	NWTPH-Gx	6-18-15	6-18-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*79*	*68-123*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	06-181-03										
	ORIG	DUP									
Gasoline	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Surrogate:											
Fluorobenzene						*89*	*91*	*68-123*			

Date of Report: June 18, 2015
Samples Submitted: June 17, 2015
Laboratory Reference: 1506-183
Project: Signals Fuel Site

NWTPH-Dx

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-SP1**					
Laboratory ID:	06-183-01					
Diesel Fuel #2	**2700**	27	NWTPH-Dx	6-18-15	6-18-15	
Lube Oil Range Organics	**ND**	150	NWTPH-Dx	6-18-15	6-18-15	U1
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*121*	*50-150*				
Client ID:	**SFS-SP2**					
Laboratory ID:	06-183-02					
Diesel Fuel #2	**4500**	140	NWTPH-Dx	6-18-15	6-19-15	
Lube Oil Range Organics	**4900**	270	NWTPH-Dx	6-18-15	6-19-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*123*	*50-150*				
Client ID:	**SFS-SP3**					
Laboratory ID:	06-183-03					
Diesel Fuel #2	**2600**	27	NWTPH-Dx	6-18-15	6-18-15	
Lube Oil Range Organics	**ND**	92	NWTPH-Dx	6-18-15	6-18-15	U1
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*112*	*50-150*				

Date of Report: June 18, 2015
Samples Submitted: June 17, 2015
Laboratory Reference: 1506-183
Project: Signals Fuel Site

NWTPH-Dx
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0618S1					
Diesel Range Organics	**ND**	25	NWTPH-Dx	6-18-15	6-18-15	
Lube Oil Range Organics	**ND**	50	NWTPH-Dx	6-18-15	6-18-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*125*	*50-150*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	06-144-02										
	ORIG	DUP									
Diesel Fuel #1	**2190**	**1010**	NA	NA		NA		NA	74	NA	
Lube Oil Range	**ND**	**ND**	NA	NA		NA		NA	NA	NA	
Surrogate:											
o-Terphenyl						*94*	*116*	*50-150*			

Date of Report: June 18, 2015
Samples Submitted: June 17, 2015
Laboratory Reference: 1506-183
Project: Signals Fuel Site

VOLATILES EPA 8260C
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Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-SP1**					
Laboratory ID:	06-183-01					
Dichlorodifluoromethane	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
Chloromethane	ND	0.0031	EPA 8260C	6-19-15	6-19-15	
Vinyl Chloride	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
Bromomethane	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
Chloroethane	ND	0.0031	EPA 8260C	6-19-15	6-19-15	
Trichlorofluoromethane	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
1,1-Dichloroethene	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
Acetone	ND	0.0063	EPA 8260C	6-19-15	6-19-15	
Iodomethane	ND	0.0031	EPA 8260C	6-19-15	6-19-15	
Carbon Disulfide	0.00065	0.00063	EPA 8260C	6-19-15	6-19-15	
Methylene Chloride	ND	0.0031	EPA 8260C	6-19-15	6-19-15	
(trans) 1,2-Dichloroethene	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
Methyl t-Butyl Ether	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
1,1-Dichloroethane	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
Vinyl Acetate	ND	0.0031	EPA 8260C	6-19-15	6-19-15	
2,2-Dichloropropane	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
(cis) 1,2-Dichloroethene	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
2-Butanone	ND	0.0031	EPA 8260C	6-19-15	6-19-15	
Bromochloromethane	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
Chloroform	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
1,1,1-Trichloroethane	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
Carbon Tetrachloride	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
1,1-Dichloropropene	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
Benzene	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
1,2-Dichloroethane	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
Trichloroethene	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
1,2-Dichloropropane	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
Dibromomethane	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
Bromodichloromethane	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
2-Chloroethyl Vinyl Ether	ND	0.0031	EPA 8260C	6-19-15	6-19-15	
(cis) 1,3-Dichloropropene	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
Methyl Isobutyl Ketone	ND	0.0031	EPA 8260C	6-19-15	6-19-15	
Toluene	ND	0.0031	EPA 8260C	6-19-15	6-19-15	
(trans) 1,3-Dichloropropene	ND	0.00063	EPA 8260C	6-19-15	6-19-15	

Date of Report: June 18, 2015
Samples Submitted: June 17, 2015
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Project: Signals Fuel Site

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Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-SP1**					
Laboratory ID:	06-183-01					
1,1,2-Trichloroethane	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
Tetrachloroethene	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
1,3-Dichloropropane	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
2-Hexanone	ND	0.0031	EPA 8260C	6-19-15	6-19-15	
Dibromochloromethane	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
1,2-Dibromoethane	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
Chlorobenzene	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
1,1,1,2-Tetrachloroethane	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
Ethylbenzene	0.00077	0.00063	EPA 8260C	6-19-15	6-19-15	
m,p-Xylene	ND	0.0013	EPA 8260C	6-19-15	6-19-15	
o-Xylene	0.00086	0.00063	EPA 8260C	6-19-15	6-19-15	
Styrene	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
Bromoform	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
Isopropylbenzene	0.032	0.00063	EPA 8260C	6-19-15	6-19-15	
Bromobenzene	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
1,1,2,2-Tetrachloroethane	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
1,2,3-Trichloropropane	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
n-Propylbenzene	0.084	0.00063	EPA 8260C	6-19-15	6-19-15	
2-Chlorotoluene	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
4-Chlorotoluene	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
1,3,5-Trimethylbenzene	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
tert-Butylbenzene	0.0021	0.00063	EPA 8260C	6-19-15	6-19-15	
1,2,4-Trimethylbenzene	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
sec-Butylbenzene	0.11	0.00063	EPA 8260C	6-19-15	6-19-15	
1,3-Dichlorobenzene	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
p-Isopropyltoluene	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
1,4-Dichlorobenzene	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
1,2-Dichlorobenzene	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
n-Butylbenzene	0.068	0.00063	EPA 8260C	6-19-15	6-19-15	
1,2-Dibromo-3-chloropropane	ND	0.0031	EPA 8260C	6-19-15	6-19-15	
1,2,4-Trichlorobenzene	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
Hexachlorobutadiene	ND	0.0031	EPA 8260C	6-19-15	6-19-15	
Naphthalene	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
1,2,3-Trichlorobenzene	ND	0.00063	EPA 8260C	6-19-15	6-19-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*88*	*76-131*				
Toluene-d8	*93*	*82-129*				
4-Bromofluorobenzene	*160*	*79-126*				Q

Date of Report: June 18, 2015
Samples Submitted: June 17, 2015
Laboratory Reference: 1506-183
Project: Signals Fuel Site

VOLATILES EPA 8260C
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Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-SP2**					
Laboratory ID:	06-183-02					
Dichlorodifluoromethane	ND	0.038	EPA 8260C	6-18-15	6-18-15	
Chloromethane	ND	0.19	EPA 8260C	6-18-15	6-18-15	
Vinyl Chloride	ND	0.038	EPA 8260C	6-18-15	6-18-15	
Bromomethane	ND	0.038	EPA 8260C	6-18-15	6-18-15	
Chloroethane	ND	0.19	EPA 8260C	6-18-15	6-18-15	
Trichlorofluoromethane	ND	0.038	EPA 8260C	6-18-15	6-18-15	
1,1-Dichloroethene	ND	0.038	EPA 8260C	6-18-15	6-18-15	
Acetone	ND	0.38	EPA 8260C	6-18-15	6-18-15	
Iodomethane	ND	0.19	EPA 8260C	6-18-15	6-18-15	
Carbon Disulfide	ND	0.038	EPA 8260C	6-18-15	6-18-15	
Methylene Chloride	ND	0.19	EPA 8260C	6-18-15	6-18-15	
(trans) 1,2-Dichloroethene	ND	0.038	EPA 8260C	6-18-15	6-18-15	
Methyl t-Butyl Ether	ND	0.038	EPA 8260C	6-18-15	6-18-15	
1,1-Dichloroethane	ND	0.038	EPA 8260C	6-18-15	6-18-15	
Vinyl Acetate	ND	0.19	EPA 8260C	6-18-15	6-18-15	
2,2-Dichloropropane	ND	0.038	EPA 8260C	6-18-15	6-18-15	
(cis) 1,2-Dichloroethene	ND	0.038	EPA 8260C	6-18-15	6-18-15	
2-Butanone	ND	0.19	EPA 8260C	6-18-15	6-18-15	
Bromochloromethane	ND	0.038	EPA 8260C	6-18-15	6-18-15	
Chloroform	ND	0.038	EPA 8260C	6-18-15	6-18-15	
1,1,1-Trichloroethane	ND	0.038	EPA 8260C	6-18-15	6-18-15	
Carbon Tetrachloride	ND	0.038	EPA 8260C	6-18-15	6-18-15	
1,1-Dichloropropene	ND	0.038	EPA 8260C	6-18-15	6-18-15	
Benzene	ND	0.038	EPA 8260C	6-18-15	6-18-15	
1,2-Dichloroethane	ND	0.038	EPA 8260C	6-18-15	6-18-15	
Trichloroethene	ND	0.038	EPA 8260C	6-18-15	6-18-15	
1,2-Dichloropropane	ND	0.038	EPA 8260C	6-18-15	6-18-15	
Dibromomethane	ND	0.038	EPA 8260C	6-18-15	6-18-15	
Bromodichloromethane	ND	0.038	EPA 8260C	6-18-15	6-18-15	
2-Chloroethyl Vinyl Ether	ND	0.19	EPA 8260C	6-18-15	6-18-15	
(cis) 1,3-Dichloropropene	ND	0.038	EPA 8260C	6-18-15	6-18-15	
Methyl Isobutyl Ketone	ND	0.19	EPA 8260C	6-18-15	6-18-15	
Toluene	ND	0.19	EPA 8260C	6-18-15	6-18-15	
(trans) 1,3-Dichloropropene	ND	0.038	EPA 8260C	6-18-15	6-18-15	

Date of Report: June 18, 2015
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Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-SP2**					
Laboratory ID:	06-183-02					
1,1,2-Trichloroethane	ND	0.038	EPA 8260C	6-18-15	6-18-15	
Tetrachloroethene	ND	0.038	EPA 8260C	6-18-15	6-18-15	
1,3-Dichloropropane	ND	0.038	EPA 8260C	6-18-15	6-18-15	
2-Hexanone	ND	0.19	EPA 8260C	6-18-15	6-18-15	
Dibromochloromethane	ND	0.038	EPA 8260C	6-18-15	6-18-15	
1,2-Dibromoethane	ND	0.038	EPA 8260C	6-18-15	6-18-15	
Chlorobenzene	ND	0.038	EPA 8260C	6-18-15	6-18-15	
1,1,1,2-Tetrachloroethane	ND	0.038	EPA 8260C	6-18-15	6-18-15	
Ethylbenzene	ND	0.038	EPA 8260C	6-18-15	6-18-15	
m,p-Xylene	ND	0.076	EPA 8260C	6-18-15	6-18-15	
o-Xylene	ND	0.038	EPA 8260C	6-18-15	6-18-15	
Styrene	ND	0.038	EPA 8260C	6-18-15	6-18-15	
Bromoform	ND	0.038	EPA 8260C	6-18-15	6-18-15	
Isopropylbenzene	0.12	0.038	EPA 8260C	6-18-15	6-18-15	
Bromobenzene	ND	0.038	EPA 8260C	6-18-15	6-18-15	
1,1,2,2-Tetrachloroethane	ND	0.038	EPA 8260C	6-18-15	6-18-15	
1,2,3-Trichloropropane	ND	0.038	EPA 8260C	6-18-15	6-18-15	
n-Propylbenzene	0.26	0.038	EPA 8260C	6-18-15	6-18-15	
2-Chlorotoluene	ND	0.038	EPA 8260C	6-18-15	6-18-15	
4-Chlorotoluene	ND	0.038	EPA 8260C	6-18-15	6-18-15	
1,3,5-Trimethylbenzene	ND	0.038	EPA 8260C	6-18-15	6-18-15	
tert-Butylbenzene	ND	0.038	EPA 8260C	6-18-15	6-18-15	
1,2,4-Trimethylbenzene	0.061	0.038	EPA 8260C	6-18-15	6-18-15	
sec-Butylbenzene	0.41	0.038	EPA 8260C	6-18-15	6-18-15	
1,3-Dichlorobenzene	ND	0.038	EPA 8260C	6-18-15	6-18-15	
p-Isopropyltoluene	ND	0.038	EPA 8260C	6-18-15	6-18-15	
1,4-Dichlorobenzene	ND	0.038	EPA 8260C	6-18-15	6-18-15	
1,2-Dichlorobenzene	ND	0.038	EPA 8260C	6-18-15	6-18-15	
n-Butylbenzene	0.44	0.038	EPA 8260C	6-18-15	6-18-15	
1,2-Dibromo-3-chloropropane	ND	0.19	EPA 8260C	6-18-15	6-18-15	
1,2,4-Trichlorobenzene	ND	0.038	EPA 8260C	6-18-15	6-18-15	
Hexachlorobutadiene	ND	0.19	EPA 8260C	6-18-15	6-18-15	
Naphthalene	0.086	0.038	EPA 8260C	6-18-15	6-18-15	
1,2,3-Trichlorobenzene	ND	0.038	EPA 8260C	6-18-15	6-18-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*86*	*76-131*				
Toluene-d8	*90*	*82-129*				
4-Bromofluorobenzene	*110*	*79-126*				

Date of Report: June 18, 2015
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Project: Signals Fuel Site

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Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-SP3**					
Laboratory ID:	06-183-03					
Dichlorodifluoromethane	ND	0.087	EPA 8260C	6-18-15	6-18-15	
Chloromethane	ND	0.43	EPA 8260C	6-18-15	6-18-15	
Vinyl Chloride	ND	0.087	EPA 8260C	6-18-15	6-18-15	
Bromomethane	ND	0.087	EPA 8260C	6-18-15	6-18-15	
Chloroethane	ND	0.43	EPA 8260C	6-18-15	6-18-15	
Trichlorofluoromethane	ND	0.087	EPA 8260C	6-18-15	6-18-15	
1,1-Dichloroethene	ND	0.087	EPA 8260C	6-18-15	6-18-15	
Acetone	ND	0.87	EPA 8260C	6-18-15	6-18-15	
Iodomethane	ND	0.43	EPA 8260C	6-18-15	6-18-15	
Carbon Disulfide	ND	0.087	EPA 8260C	6-18-15	6-18-15	
Methylene Chloride	ND	0.43	EPA 8260C	6-18-15	6-18-15	
(trans) 1,2-Dichloroethene	ND	0.087	EPA 8260C	6-18-15	6-18-15	
Methyl t-Butyl Ether	ND	0.087	EPA 8260C	6-18-15	6-18-15	
1,1-Dichloroethane	ND	0.087	EPA 8260C	6-18-15	6-18-15	
Vinyl Acetate	ND	0.43	EPA 8260C	6-18-15	6-18-15	
2,2-Dichloropropane	ND	0.087	EPA 8260C	6-18-15	6-18-15	
(cis) 1,2-Dichloroethene	ND	0.087	EPA 8260C	6-18-15	6-18-15	
2-Butanone	ND	0.43	EPA 8260C	6-18-15	6-18-15	
Bromochloromethane	ND	0.087	EPA 8260C	6-18-15	6-18-15	
Chloroform	ND	0.087	EPA 8260C	6-18-15	6-18-15	
1,1,1-Trichloroethane	ND	0.087	EPA 8260C	6-18-15	6-18-15	
Carbon Tetrachloride	ND	0.087	EPA 8260C	6-18-15	6-18-15	
1,1-Dichloropropene	ND	0.087	EPA 8260C	6-18-15	6-18-15	
Benzene	ND	0.087	EPA 8260C	6-18-15	6-18-15	
1,2-Dichloroethane	ND	0.087	EPA 8260C	6-18-15	6-18-15	
Trichloroethene	ND	0.087	EPA 8260C	6-18-15	6-18-15	
1,2-Dichloropropane	ND	0.087	EPA 8260C	6-18-15	6-18-15	
Dibromomethane	ND	0.087	EPA 8260C	6-18-15	6-18-15	
Bromodichloromethane	ND	0.087	EPA 8260C	6-18-15	6-18-15	
2-Chloroethyl Vinyl Ether	ND	0.43	EPA 8260C	6-18-15	6-18-15	
(cis) 1,3-Dichloropropene	ND	0.087	EPA 8260C	6-18-15	6-18-15	
Methyl Isobutyl Ketone	ND	0.43	EPA 8260C	6-18-15	6-18-15	
Toluene	ND	0.43	EPA 8260C	6-18-15	6-18-15	
(trans) 1,3-Dichloropropene	ND	0.087	EPA 8260C	6-18-15	6-18-15	

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Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-SP3**					
Laboratory ID:	06-183-03					
1,1,2-Trichloroethane	ND	0.087	EPA 8260C	6-18-15	6-18-15	
Tetrachloroethene	ND	0.087	EPA 8260C	6-18-15	6-18-15	
1,3-Dichloropropane	ND	0.087	EPA 8260C	6-18-15	6-18-15	
2-Hexanone	ND	0.43	EPA 8260C	6-18-15	6-18-15	
Dibromochloromethane	ND	0.087	EPA 8260C	6-18-15	6-18-15	
1,2-Dibromoethane	ND	0.087	EPA 8260C	6-18-15	6-18-15	
Chlorobenzene	ND	0.087	EPA 8260C	6-18-15	6-18-15	
1,1,1,2-Tetrachloroethane	ND	0.087	EPA 8260C	6-18-15	6-18-15	
Ethylbenzene	ND	0.087	EPA 8260C	6-18-15	6-18-15	
m,p-Xylene	ND	0.17	EPA 8260C	6-18-15	6-18-15	
o-Xylene	ND	0.087	EPA 8260C	6-18-15	6-18-15	
Styrene	ND	0.087	EPA 8260C	6-18-15	6-18-15	
Bromoform	ND	0.087	EPA 8260C	6-18-15	6-18-15	
Isopropylbenzene	0.44	0.087	EPA 8260C	6-18-15	6-18-15	
Bromobenzene	ND	0.087	EPA 8260C	6-18-15	6-18-15	
1,1,2,2-Tetrachloroethane	ND	0.087	EPA 8260C	6-18-15	6-18-15	
1,2,3-Trichloropropane	ND	0.087	EPA 8260C	6-18-15	6-18-15	
n-Propylbenzene	1.0	0.087	EPA 8260C	6-18-15	6-18-15	
2-Chlorotoluene	ND	0.087	EPA 8260C	6-18-15	6-18-15	
4-Chlorotoluene	ND	0.087	EPA 8260C	6-18-15	6-18-15	
1,3,5-Trimethylbenzene	ND	0.087	EPA 8260C	6-18-15	6-18-15	
tert-Butylbenzene	ND	0.087	EPA 8260C	6-18-15	6-18-15	
1,2,4-Trimethylbenzene	ND	0.087	EPA 8260C	6-18-15	6-18-15	
sec-Butylbenzene	1.8	0.087	EPA 8260C	6-18-15	6-18-15	
1,3-Dichlorobenzene	ND	0.087	EPA 8260C	6-18-15	6-18-15	
p-Isopropyltoluene	ND	0.087	EPA 8260C	6-18-15	6-18-15	
1,4-Dichlorobenzene	ND	0.087	EPA 8260C	6-18-15	6-18-15	
1,2-Dichlorobenzene	ND	0.087	EPA 8260C	6-18-15	6-18-15	
n-Butylbenzene	1.8	0.087	EPA 8260C	6-18-15	6-18-15	
1,2-Dibromo-3-chloropropane	ND	0.43	EPA 8260C	6-18-15	6-18-15	
1,2,4-Trichlorobenzene	ND	0.087	EPA 8260C	6-18-15	6-18-15	
Hexachlorobutadiene	ND	0.43	EPA 8260C	6-18-15	6-18-15	
Naphthalene	ND	0.087	EPA 8260C	6-18-15	6-18-15	
1,2,3-Trichlorobenzene	ND	0.087	EPA 8260C	6-18-15	6-18-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*84*	*76-131*				
Toluene-d8	*90*	*82-129*				
4-Bromofluorobenzene	*106*	*79-126*				

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VOLATILES by EPA 8260C
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Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0618S1					
Dichlorodifluoromethane	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
Chloromethane	ND	0.0050	EPA 8260C	6-18-15	6-18-15	
Vinyl Chloride	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
Bromomethane	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
Chloroethane	ND	0.0050	EPA 8260C	6-18-15	6-18-15	
Trichlorofluoromethane	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
1,1-Dichloroethene	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
Acetone	ND	0.010	EPA 8260C	6-18-15	6-18-15	
Iodomethane	ND	0.0050	EPA 8260C	6-18-15	6-18-15	
Carbon Disulfide	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
Methylene Chloride	ND	0.0050	EPA 8260C	6-18-15	6-18-15	
(trans) 1,2-Dichloroethene	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
Methyl t-Butyl Ether	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
1,1-Dichloroethane	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
Vinyl Acetate	ND	0.0050	EPA 8260C	6-18-15	6-18-15	
2,2-Dichloropropane	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
(cis) 1,2-Dichloroethene	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
2-Butanone	ND	0.0050	EPA 8260C	6-18-15	6-18-15	
Bromochloromethane	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
Chloroform	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
1,1,1-Trichloroethane	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
Carbon Tetrachloride	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
1,1-Dichloropropene	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
Benzene	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
1,2-Dichloroethane	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
Trichloroethene	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
1,2-Dichloropropane	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
Dibromomethane	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
Bromodichloromethane	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
2-Chloroethyl Vinyl Ether	ND	0.0050	EPA 8260C	6-18-15	6-18-15	
(cis) 1,3-Dichloropropene	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
Methyl Isobutyl Ketone	ND	0.0050	EPA 8260C	6-18-15	6-18-15	
Toluene	ND	0.0050	EPA 8260C	6-18-15	6-18-15	
(trans) 1,3-Dichloropropene	ND	0.0010	EPA 8260C	6-18-15	6-18-15	

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Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0618S1					
1,1,2-Trichloroethane	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
Tetrachloroethene	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
1,3-Dichloropropane	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
2-Hexanone	ND	0.0050	EPA 8260C	6-18-15	6-18-15	
Dibromochloromethane	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
1,2-Dibromoethane	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
Chlorobenzene	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
1,1,1,2-Tetrachloroethane	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
Ethylbenzene	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
m,p-Xylene	ND	0.0020	EPA 8260C	6-18-15	6-18-15	
o-Xylene	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
Styrene	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
Bromoform	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
Isopropylbenzene	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
Bromobenzene	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
1,1,2,2-Tetrachloroethane	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
1,2,3-Trichloropropane	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
n-Propylbenzene	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
2-Chlorotoluene	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
4-Chlorotoluene	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
1,3,5-Trimethylbenzene	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
tert-Butylbenzene	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
1,2,4-Trimethylbenzene	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
sec-Butylbenzene	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
1,3-Dichlorobenzene	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
p-Isopropyltoluene	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
1,4-Dichlorobenzene	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
1,2-Dichlorobenzene	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
n-Butylbenzene	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
1,2-Dibromo-3-chloropropane	ND	0.0050	EPA 8260C	6-18-15	6-18-15	
1,2,4-Trichlorobenzene	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
Hexachlorobutadiene	ND	0.0050	EPA 8260C	6-18-15	6-18-15	
Naphthalene	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
1,2,3-Trichlorobenzene	ND	0.0010	EPA 8260C	6-18-15	6-18-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*94*	*76-131*				
Toluene-d8	*92*	*82-129*				
4-Bromofluorobenzene	*115*	*79-126*				

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VOLATILES by EPA 8260C
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Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0619S1					
Dichlorodifluoromethane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Chloromethane	ND	0.0050	EPA 8260C	6-19-15	6-19-15	
Vinyl Chloride	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Bromomethane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Chloroethane	ND	0.0050	EPA 8260C	6-19-15	6-19-15	
Trichlorofluoromethane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,1-Dichloroethene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Acetone	ND	0.010	EPA 8260C	6-19-15	6-19-15	
Iodomethane	ND	0.0050	EPA 8260C	6-19-15	6-19-15	
Carbon Disulfide	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Methylene Chloride	ND	0.0050	EPA 8260C	6-19-15	6-19-15	
(trans) 1,2-Dichloroethene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Methyl t-Butyl Ether	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,1-Dichloroethane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Vinyl Acetate	ND	0.0050	EPA 8260C	6-19-15	6-19-15	
2,2-Dichloropropane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
(cis) 1,2-Dichloroethene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
2-Butanone	ND	0.0050	EPA 8260C	6-19-15	6-19-15	
Bromochloromethane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Chloroform	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,1,1-Trichloroethane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Carbon Tetrachloride	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,1-Dichloropropene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Benzene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,2-Dichloroethane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Trichloroethene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,2-Dichloropropane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Dibromomethane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Bromodichloromethane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
2-Chloroethyl Vinyl Ether	ND	0.0050	EPA 8260C	6-19-15	6-19-15	
(cis) 1,3-Dichloropropene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Methyl Isobutyl Ketone	ND	0.0050	EPA 8260C	6-19-15	6-19-15	
Toluene	ND	0.0050	EPA 8260C	6-19-15	6-19-15	
(trans) 1,3-Dichloropropene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	

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Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0619S1					
1,1,2-Trichloroethane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Tetrachloroethene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,3-Dichloropropane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
2-Hexanone	ND	0.0050	EPA 8260C	6-19-15	6-19-15	
Dibromochloromethane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,2-Dibromoethane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Chlorobenzene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,1,1,2-Tetrachloroethane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Ethylbenzene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
m,p-Xylene	ND	0.0020	EPA 8260C	6-19-15	6-19-15	
o-Xylene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Styrene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Bromoform	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Isopropylbenzene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Bromobenzene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,1,2,2-Tetrachloroethane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,2,3-Trichloropropane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
n-Propylbenzene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
2-Chlorotoluene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
4-Chlorotoluene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,3,5-Trimethylbenzene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
tert-Butylbenzene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,2,4-Trimethylbenzene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
sec-Butylbenzene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,3-Dichlorobenzene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
p-Isopropyltoluene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,4-Dichlorobenzene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,2-Dichlorobenzene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
n-Butylbenzene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,2-Dibromo-3-chloropropane	ND	0.0050	EPA 8260C	6-19-15	6-19-15	
1,2,4-Trichlorobenzene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Hexachlorobutadiene	ND	0.0050	EPA 8260C	6-19-15	6-19-15	
Naphthalene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,2,3-Trichlorobenzene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*90*	*76-131*				
Toluene-d8	*94*	*82-129*				
4-Bromofluorobenzene	*117*	*79-126*				

Date of Report: June 18, 2015
Samples Submitted: June 17, 2015
Laboratory Reference: 1506-183
Project: Signals Fuel Site

VOLATILES by EPA 8260C
SB/SBD QUALITY CONTROL

Matrix: Soil
Units: mg/kg

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS										
Laboratory ID:	SB0618S1									
	SB	SBD	SB	SBD	SB	SBD				
1,1-Dichloroethene	**0.0452**	**0.0425**	0.0500	0.0500	90	85	66-129	6	15	
Benzene	**0.0464**	**0.0467**	0.0500	0.0500	93	93	71-123	1	15	
Trichloroethene	**0.0460**	**0.0462**	0.0500	0.0500	92	92	75-115	0	15	
Toluene	**0.0472**	**0.0470**	0.0500	0.0500	94	94	75-120	0	15	
Chlorobenzene	**0.0460**	**0.0459**	0.0500	0.0500	92	92	75-121	0	15	
Surrogate:										
Dibromofluoromethane					*87*	*84*	*76-131*			
Toluene-d8					*90*	*88*	*82-129*			
4-Bromofluorobenzene					*109*	*109*	*79-126*			

Date of Report: June 18, 2015
Samples Submitted: June 17, 2015
Laboratory Reference: 1506-183
Project: Signals Fuel Site

VOLATILES by EPA 8260C
SB/SBD QUALITY CONTROL

Matrix: Soil
Units: mg/kg

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS										
Laboratory ID:	SB0619S1									
	SB	SBD	SB	SBD	SB	SBD				
1,1-Dichloroethene	**0.0449**	**0.0436**	0.0500	0.0500	90	87	66-129	3	15	
Benzene	**0.0481**	**0.0477**	0.0500	0.0500	96	95	71-123	1	15	
Trichloroethene	**0.0463**	**0.0460**	0.0500	0.0500	93	92	75-115	1	15	
Toluene	**0.0483**	**0.0471**	0.0500	0.0500	97	94	75-120	3	15	
Chlorobenzene	**0.0472**	**0.0458**	0.0500	0.0500	94	92	75-121	3	15	
Surrogate:										
Dibromofluoromethane					*88*	*88*	*76-131*			
Toluene-d8					*90*	*88*	*82-129*			
4-Bromofluorobenzene					*110*	*111*	*79-126*			

Date of Report: June 18, 2015
Samples Submitted: June 17, 2015
Laboratory Reference: 1506-183
Project: Signals Fuel Site

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Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-SP1**					
Laboratory ID:	06-183-01					
n-Nitrosodimethylamine	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Pyridine	**ND**	1.8	EPA 8270D	6-18-15	6-18-15	
Phenol	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Aniline	**ND**	0.90	EPA 8270D	6-18-15	6-18-15	
bis(2-Chloroethyl)ether	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2-Chlorophenol	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
1,3-Dichlorobenzene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
1,4-Dichlorobenzene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Benzyl alcohol	**ND**	0.90	EPA 8270D	6-18-15	6-18-15	
1,2-Dichlorobenzene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2-Methylphenol (o-Cresol)	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
bis(2-Chloroisopropyl)ether	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
(3+4)-Methylphenol (m,p-Cresol)	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
n-Nitroso-di-n-propylamine	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Hexachloroethane	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Nitrobenzene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Isophorone	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2-Nitrophenol	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2,4-Dimethylphenol	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
bis(2-Chloroethoxy)methane	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2,4-Dichlorophenol	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
1,2,4-Trichlorobenzene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Naphthalene	**0.18**	0.0072	EPA 8270D/SIM	6-18-15	6-18-15	
4-Chloroaniline	**ND**	0.90	EPA 8270D	6-18-15	6-18-15	
Hexachlorobutadiene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
4-Chloro-3-methylphenol	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2-Methylnaphthalene	**0.022**	0.0072	EPA 8270D/SIM	6-18-15	6-18-15	
1-Methylnaphthalene	**0.43**	0.18	EPA 8270D	6-18-15	6-18-15	
Hexachlorocyclopentadiene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2,4,6-Trichlorophenol	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2,3-Dichloroaniline	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2,4,5-Trichlorophenol	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2-Chloronaphthalene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2-Nitroaniline	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
1,4-Dinitrobenzene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Dimethylphthalate	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
1,3-Dinitrobenzene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2,6-Dinitrotoluene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
1,2-Dinitrobenzene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Acenaphthylene	**0.031**	0.0072	EPA 8270D/SIM	6-18-15	6-18-15	
3-Nitroaniline	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	

Date of Report: June 18, 2015
Samples Submitted: June 17, 2015
Laboratory Reference: 1506-183
Project: Signals Fuel Site

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Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-SP1**					
Laboratory ID:	06-183-01					
2,4-Dinitrophenol	**ND**	0.90	EPA 8270D	6-18-15	6-18-15	
Acenaphthene	**0.29**	0.18	EPA 8270D	6-18-15	6-18-15	
4-Nitrophenol	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2,4-Dinitrotoluene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Dibenzofuran	**0.32**	0.18	EPA 8270D	6-18-15	6-18-15	
2,3,5,6-Tetrachlorophenol	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2,3,4,6-Tetrachlorophenol	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Diethylphthalate	**ND**	0.90	EPA 8270D	6-18-15	6-18-15	
4-Chlorophenyl-phenylether	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
4-Nitroaniline	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Fluorene	**1.0**	0.18	EPA 8270D	6-18-15	6-18-15	
4,6-Dinitro-2-methylphenol	**ND**	0.90	EPA 8270D	6-18-15	6-18-15	
n-Nitrosodiphenylamine	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
1,2-Diphenylhydrazine	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
4-Bromophenyl-phenylether	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Hexachlorobenzene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Pentachlorophenol	**ND**	0.90	EPA 8270D	6-18-15	6-18-15	
Phenanthrene	**0.039**	0.0072	EPA 8270D/SIM	6-18-15	6-18-15	
Anthracene	**0.26**	0.18	EPA 8270D	6-18-15	6-18-15	
Carbazole	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Di-n-butylphthalate	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Fluoranthene	**0.042**	0.0072	EPA 8270D/SIM	6-18-15	6-18-15	
Benzidine	**ND**	1.8	EPA 8270D	6-18-15	6-18-15	
Pyrene	**0.19**	0.18	EPA 8270D	6-18-15	6-18-15	
Butylbenzylphthalate	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
bis-2-Ethylhexyladipate	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
3,3'-Dichlorobenzidine	**ND**	0.90	EPA 8270D	6-18-15	6-18-15	
Benzo[a]anthracene	**0.016**	0.0072	EPA 8270D/SIM	6-18-15	6-18-15	
Chrysene	**0.032**	0.0072	EPA 8270D/SIM	6-18-15	6-18-15	
bis(2-Ethylhexyl)phthalate	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Di-n-octylphthalate	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Benzo[b]fluoranthene	**0.0087**	0.0072	EPA 8270D/SIM	6-18-15	6-18-15	
Benzo(j,k)fluoranthene	**ND**	0.0072	EPA 8270D/SIM	6-18-15	6-18-15	
Benzo[a]pyrene	**ND**	0.0072	EPA 8270D/SIM	6-18-15	6-18-15	
Indeno[1,2,3-cd]pyrene	**ND**	0.0072	EPA 8270D/SIM	6-18-15	6-18-15	
Dibenz[a,h]anthracene	**ND**	0.0072	EPA 8270D/SIM	6-18-15	6-18-15	
Benzo[g,h,i]perylene	**ND**	0.0072	EPA 8270D/SIM	6-18-15	6-18-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorophenol	*81*	*31 - 110*				
Phenol-d6	*89*	*34 - 109*				
Nitrobenzene-d5	*130*	*30 - 109*				Q
2-Fluorobiphenyl	*101*	*39 - 103*				
2,4,6-Tribromophenol	*87*	*25 - 120*				
Terphenyl-d14	*91*	*40 - 117*				

Date of Report: June 18, 2015
Samples Submitted: June 17, 2015
Laboratory Reference: 1506-183
Project: Signals Fuel Site

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Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-SP2**					
Laboratory ID:	06-183-02					
n-Nitrosodimethylamine	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Pyridine	**ND**	1.8	EPA 8270D	6-18-15	6-18-15	
Phenol	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Aniline	**ND**	0.90	EPA 8270D	6-18-15	6-18-15	
bis(2-Chloroethyl)ether	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2-Chlorophenol	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
1,3-Dichlorobenzene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
1,4-Dichlorobenzene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Benzyl alcohol	**ND**	0.90	EPA 8270D	6-18-15	6-18-15	
1,2-Dichlorobenzene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2-Methylphenol (o-Cresol)	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
bis(2-Chloroisopropyl)ether	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
(3+4)-Methylphenol (m,p-Cresol)	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
n-Nitroso-di-n-propylamine	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Hexachloroethane	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Nitrobenzene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Isophorone	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2-Nitrophenol	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2,4-Dimethylphenol	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
bis(2-Chloroethoxy)methane	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2,4-Dichlorophenol	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
1,2,4-Trichlorobenzene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Naphthalene	**0.42**	0.18	EPA 8270D	6-18-15	6-18-15	
4-Chloroaniline	**ND**	0.90	EPA 8270D	6-18-15	6-18-15	
Hexachlorobutadiene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
4-Chloro-3-methylphenol	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2-Methylnaphthalene	**3.6**	0.18	EPA 8270D	6-18-15	6-18-15	
1-Methylnaphthalene	**2.8**	0.18	EPA 8270D	6-18-15	6-18-15	
Hexachlorocyclopentadiene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2,4,6-Trichlorophenol	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2,3-Dichloroaniline	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2,4,5-Trichlorophenol	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2-Chloronaphthalene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2-Nitroaniline	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
1,4-Dinitrobenzene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Dimethylphthalate	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
1,3-Dinitrobenzene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2,6-Dinitrotoluene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
1,2-Dinitrobenzene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Acenaphthylene	**0.052**	0.0072	EPA 8270D/SIM	6-18-15	6-18-15	
3-Nitroaniline	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	

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Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-SP2**					
Laboratory ID:	06-183-02					
2,4-Dinitrophenol	**ND**	0.90	EPA 8270D	6-18-15	6-18-15	
Acenaphthene	**0.40**	0.18	EPA 8270D	6-18-15	6-18-15	
4-Nitrophenol	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2,4-Dinitrotoluene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Dibenzofuran	**0.53**	0.18	EPA 8270D	6-18-15	6-18-15	
2,3,5,6-Tetrachlorophenol	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2,3,4,6-Tetrachlorophenol	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Diethylphthalate	**ND**	0.90	EPA 8270D	6-18-15	6-18-15	
4-Chlorophenyl-phenylether	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
4-Nitroaniline	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Fluorene	**1.3**	0.18	EPA 8270D	6-18-15	6-18-15	
4,6-Dinitro-2-methylphenol	**ND**	0.90	EPA 8270D	6-18-15	6-18-15	
n-Nitrosodiphenylamine	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
1,2-Diphenylhydrazine	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
4-Bromophenyl-phenylether	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Hexachlorobenzene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Pentachlorophenol	**ND**	0.90	EPA 8270D	6-18-15	6-18-15	
Phenanthrene	**2.4**	0.18	EPA 8270D	6-18-15	6-18-15	
Anthracene	**0.18**	0.0072	EPA 8270D/SIM	6-18-15	6-18-15	
Carbazole	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Di-n-butylphthalate	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Fluoranthene	**0.80**	0.18	EPA 8270D	6-18-15	6-18-15	
Benzidine	**ND**	1.8	EPA 8270D	6-18-15	6-18-15	
Pyrene	**0.75**	0.18	EPA 8270D	6-18-15	6-18-15	
Butylbenzylphthalate	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
bis-2-Ethylhexyladipate	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
3,3'-Dichlorobenzidine	**ND**	0.90	EPA 8270D	6-18-15	6-18-15	
Benzo[a]anthracene	**0.28**	0.18	EPA 8270D	6-18-15	6-18-15	
Chrysene	**0.34**	0.18	EPA 8270D	6-18-15	6-18-15	
bis(2-Ethylhexyl)phthalate	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Di-n-octylphthalate	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Benzo[b]fluoranthene	**0.38**	0.18	EPA 8270D	6-18-15	6-18-15	
Benzo(j,k)fluoranthene	**0.10**	0.0072	EPA 8270D/SIM	6-18-15	6-18-15	
Benzo[a]pyrene	**0.28**	0.18	EPA 8270D	6-18-15	6-18-15	
Indeno[1,2,3-cd]pyrene	**0.14**	0.0072	EPA 8270D/SIM	6-18-15	6-18-15	
Dibenz[a,h]anthracene	**0.041**	0.0072	EPA 8270D/SIM	6-18-15	6-18-15	
Benzo[g,h,i]perylene	**0.17**	0.0072	EPA 8270D/SIM	6-18-15	6-18-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorophenol	*80*	*31 - 110*				
Phenol-d6	*90*	*34 - 109*				
Nitrobenzene-d5	*111*	*30 - 109*				Q
2-Fluorobiphenyl	*94*	*39 - 103*				
2,4,6-Tribromophenol	*88*	*25 - 120*				
Terphenyl-d14	*92*	*40 - 117*				

Date of Report: June 18, 2015
Samples Submitted: June 17, 2015
Laboratory Reference: 1506-183
Project: Signals Fuel Site

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Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-SP3**					
Laboratory ID:	06-183-03					
n-Nitrosodimethylamine	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Pyridine	**ND**	1.8	EPA 8270D	6-18-15	6-18-15	
Phenol	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Aniline	**ND**	0.91	EPA 8270D	6-18-15	6-18-15	
bis(2-Chloroethyl)ether	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2-Chlorophenol	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
1,3-Dichlorobenzene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
1,4-Dichlorobenzene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Benzyl alcohol	**ND**	0.91	EPA 8270D	6-18-15	6-18-15	
1,2-Dichlorobenzene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2-Methylphenol (o-Cresol)	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
bis(2-Chloroisopropyl)ether	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
(3+4)-Methylphenol (m,p-Cresol)	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
n-Nitroso-di-n-propylamine	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Hexachloroethane	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Nitrobenzene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Isophorone	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2-Nitrophenol	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2,4-Dimethylphenol	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
bis(2-Chloroethoxy)methane	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2,4-Dichlorophenol	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
1,2,4-Trichlorobenzene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Naphthalene	**0.31**	0.0073	EPA 8270D/SIM	6-18-15	6-18-15	
4-Chloroaniline	**ND**	0.91	EPA 8270D	6-18-15	6-18-15	
Hexachlorobutadiene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
4-Chloro-3-methylphenol	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2-Methylnaphthalene	**1.6**	0.18	EPA 8270D	6-18-15	6-18-15	
1-Methylnaphthalene	**1.8**	0.18	EPA 8270D	6-18-15	6-18-15	
Hexachlorocyclopentadiene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2,4,6-Trichlorophenol	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2,3-Dichloroaniline	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2,4,5-Trichlorophenol	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2-Chloronaphthalene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2-Nitroaniline	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
1,4-Dinitrobenzene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Dimethylphthalate	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
1,3-Dinitrobenzene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2,6-Dinitrotoluene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
1,2-Dinitrobenzene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Acenaphthylene	**0.041**	0.0073	EPA 8270D/SIM	6-18-15	6-18-15	
3-Nitroaniline	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	

Date of Report: June 18, 2015
Samples Submitted: June 17, 2015
Laboratory Reference: 1506-183
Project: Signals Fuel Site

SEMIVOLATILES EPA 8270D/SIM
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Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-SP3**					
Laboratory ID:	06-183-03					
2,4-Dinitrophenol	**ND**	0.91	EPA 8270D	6-18-15	6-18-15	
Acenaphthene	**0.24**	0.18	EPA 8270D	6-18-15	6-18-15	
4-Nitrophenol	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2,4-Dinitrotoluene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Dibenzofuran	**0.38**	0.18	EPA 8270D	6-18-15	6-18-15	
2,3,5,6-Tetrachlorophenol	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
2,3,4,6-Tetrachlorophenol	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Diethylphthalate	**ND**	0.91	EPA 8270D	6-18-15	6-18-15	
4-Chlorophenyl-phenylether	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
4-Nitroaniline	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Fluorene	**0.88**	0.18	EPA 8270D	6-18-15	6-18-15	
4,6-Dinitro-2-methylphenol	**ND**	0.91	EPA 8270D	6-18-15	6-18-15	
n-Nitrosodiphenylamine	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
1,2-Diphenylhydrazine	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
4-Bromophenyl-phenylether	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Hexachlorobenzene	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Pentachlorophenol	**ND**	0.91	EPA 8270D	6-18-15	6-18-15	
Phenanthrene	**1.1**	0.18	EPA 8270D	6-18-15	6-18-15	
Anthracene	**0.11**	0.0073	EPA 8270D/SIM	6-18-15	6-18-15	
Carbazole	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Di-n-butylphthalate	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Fluoranthene	**0.062**	0.0073	EPA 8270D/SIM	6-18-15	6-18-15	
Benzidine	**ND**	1.8	EPA 8270D	6-18-15	6-18-15	
Pyrene	**0.19**	0.0073	EPA 8270D/SIM	6-18-15	6-18-15	
Butylbenzylphthalate	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
bis-2-Ethylhexyladipate	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
3,3'-Dichlorobenzidine	**ND**	0.91	EPA 8270D	6-18-15	6-18-15	
Benzo[a]anthracene	**0.017**	0.0073	EPA 8270D/SIM	6-18-15	6-18-15	
Chrysene	**0.026**	0.0073	EPA 8270D/SIM	6-18-15	6-18-15	
bis(2-Ethylhexyl)phthalate	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Di-n-octylphthalate	**ND**	0.18	EPA 8270D	6-18-15	6-18-15	
Benzo[b]fluoranthene	**0.015**	0.0073	EPA 8270D/SIM	6-18-15	6-18-15	
Benzo(j,k)fluoranthene	**ND**	0.0073	EPA 8270D/SIM	6-18-15	6-18-15	
Benzo[a]pyrene	**0.0093**	0.0073	EPA 8270D/SIM	6-18-15	6-18-15	
Indeno[1,2,3-cd]pyrene	**ND**	0.0073	EPA 8270D/SIM	6-18-15	6-18-15	
Dibenz[a,h]anthracene	**ND**	0.0073	EPA 8270D/SIM	6-18-15	6-18-15	
Benzo[g,h,i]perylene	**0.0073**	0.0073	EPA 8270D/SIM	6-18-15	6-18-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorophenol	*30*	*31 - 110*				Q
Phenol-d6	*42*	*34 - 109*				
Nitrobenzene-d5	*61*	*30 - 109*				
2-Fluorobiphenyl	*71*	*39 - 103*				
2,4,6-Tribromophenol	*64*	*25 - 120*				
Terphenyl-d14	*67*	*40 - 117*				

Date of Report: June 18, 2015
Samples Submitted: June 17, 2015
Laboratory Reference: 1506-183
Project: Signals Fuel Site

SEMIVOLATILES EPA 8270D/SIM
METHOD BLANK QUALITY CONTROL
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Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0618S1					
n-Nitrosodimethylamine	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
Pyridine	**ND**	0.33	EPA 8270D	6-18-15	6-18-15	
Phenol	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
Aniline	**ND**	0.17	EPA 8270D	6-18-15	6-18-15	
bis(2-Chloroethyl)ether	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
2-Chlorophenol	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
1,3-Dichlorobenzene	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
1,4-Dichlorobenzene	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
Benzyl alcohol	**ND**	0.17	EPA 8270D	6-18-15	6-18-15	
1,2-Dichlorobenzene	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
2-Methylphenol (o-Cresol)	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
bis(2-Chloroisopropyl)ether	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
(3+4)-Methylphenol (m,p-Cresol)	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
n-Nitroso-di-n-propylamine	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
Hexachloroethane	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
Nitrobenzene	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
Isophorone	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
2-Nitrophenol	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
2,4-Dimethylphenol	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
bis(2-Chloroethoxy)methane	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
2,4-Dichlorophenol	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
1,2,4-Trichlorobenzene	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
Naphthalene	**ND**	0.0067	EPA 8270D/SIM	6-18-15	6-18-15	
4-Chloroaniline	**ND**	0.17	EPA 8270D	6-18-15	6-18-15	
Hexachlorobutadiene	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
4-Chloro-3-methylphenol	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
2-Methylnaphthalene	**ND**	0.0067	EPA 8270D/SIM	6-18-15	6-18-15	
1-Methylnaphthalene	**ND**	0.0067	EPA 8270D/SIM	6-18-15	6-18-15	
Hexachlorocyclopentadiene	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
2,4,6-Trichlorophenol	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
2,3-Dichloroaniline	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
2,4,5-Trichlorophenol	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
2-Chloronaphthalene	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
2-Nitroaniline	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
1,4-Dinitrobenzene	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
Dimethylphthalate	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
1,3-Dinitrobenzene	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
2,6-Dinitrotoluene	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
1,2-Dinitrobenzene	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
Acenaphthylene	**ND**	0.0067	EPA 8270D/SIM	6-18-15	6-18-15	
3-Nitroaniline	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	

Date of Report: June 18, 2015
Samples Submitted: June 17, 2015
Laboratory Reference: 1506-183
Project: Signals Fuel Site

SEMIVOLATILES EPA 8270D/SIM
METHOD BLANK QUALITY CONTROL
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Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0618S1					
2,4-Dinitrophenol	**ND**	0.17	EPA 8270D	6-18-15	6-18-15	
Acenaphthene	**ND**	0.0067	EPA 8270D/SIM	6-18-15	6-18-15	
4-Nitrophenol	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
2,4-Dinitrotoluene	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
Dibenzofuran	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
2,3,5,6-Tetrachlorophenol	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
2,3,4,6-Tetrachlorophenol	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
Diethylphthalate	**ND**	0.17	EPA 8270D	6-18-15	6-18-15	
4-Chlorophenyl-phenylether	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
4-Nitroaniline	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
Fluorene	**ND**	0.0067	EPA 8270D/SIM	6-18-15	6-18-15	
4,6-Dinitro-2-methylphenol	**ND**	0.17	EPA 8270D	6-18-15	6-18-15	
n-Nitrosodiphenylamine	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
1,2-Diphenylhydrazine	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
4-Bromophenyl-phenylether	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
Hexachlorobenzene	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
Pentachlorophenol	**ND**	0.17	EPA 8270D	6-18-15	6-18-15	
Phenanthrene	**ND**	0.0067	EPA 8270D/SIM	6-18-15	6-18-15	
Anthracene	**ND**	0.0067	EPA 8270D/SIM	6-18-15	6-18-15	
Carbazole	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
Di-n-butylphthalate	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
Fluoranthene	**ND**	0.0067	EPA 8270D/SIM	6-18-15	6-18-15	
Benzidine	**ND**	0.33	EPA 8270D	6-18-15	6-18-15	
Pyrene	**ND**	0.0067	EPA 8270D/SIM	6-18-15	6-18-15	
Butylbenzylphthalate	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
bis-2-Ethylhexyladipate	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
3,3'-Dichlorobenzidine	**ND**	0.17	EPA 8270D	6-18-15	6-18-15	
Benzo[a]anthracene	**ND**	0.0067	EPA 8270D/SIM	6-18-15	6-18-15	
Chrysene	**ND**	0.0067	EPA 8270D/SIM	6-18-15	6-18-15	
bis(2-Ethylhexyl)phthalate	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
Di-n-octylphthalate	**ND**	0.033	EPA 8270D	6-18-15	6-18-15	
Benzo[b]fluoranthene	**ND**	0.0067	EPA 8270D/SIM	6-18-15	6-18-15	
Benzo(j,k)fluoranthene	**ND**	0.0067	EPA 8270D/SIM	6-18-15	6-18-15	
Benzo[a]pyrene	**ND**	0.0067	EPA 8270D/SIM	6-18-15	6-18-15	
Indeno[1,2,3-cd]pyrene	**ND**	0.0067	EPA 8270D/SIM	6-18-15	6-18-15	
Dibenz[a,h]anthracene	**ND**	0.0067	EPA 8270D/SIM	6-18-15	6-18-15	
Benzo[g,h,i]perylene	**ND**	0.0067	EPA 8270D/SIM	6-18-15	6-18-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorophenol	*87*	*31 - 110*				
Phenol-d6	*88*	*34 - 109*				
Nitrobenzene-d5	*93*	*30 - 109*				
2-Fluorobiphenyl	*86*	*39 - 103*				
2,4,6-Tribromophenol	*82*	*25 - 120*				
Terphenyl-d14	*88*	*40 - 117*				

Date of Report: June 18, 2015
Samples Submitted: June 17, 2015
Laboratory Reference: 1506-183
Project: Signals Fuel Site

SEMIVOLATILES EPA 8270D/SIM
SB/SBD QUALITY CONTROL

Matrix: Soil
Units: mg/Kg

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS										
Laboratory ID:	SB0618S1									
	SB	SBD	SB	SBD	SB	SBD				
Phenol	**0.933**	**1.12**	1.33	1.33	70	84	55 - 105	18	25	
2-Chlorophenol	**0.922**	**1.13**	1.33	1.33	69	85	56 - 102	20	30	
1,4-Dichlorobenzene	**0.433**	**0.550**	0.667	0.667	65	82	49 - 99	24	35	
n-Nitroso-di-n-propylamine	**0.478**	**0.579**	0.667	0.667	72	87	52 - 102	19	26	
1,2,4-Trichlorobenzene	**0.466**	**0.572**	0.667	0.667	70	86	49 - 110	20	30	
4-Chloro-3-methylphenol	**1.14**	**1.19**	1.33	1.33	86	89	59 - 113	4	22	
Acenaphthene	**0.470**	**0.499**	0.667	0.667	70	75	52 - 103	6	22	
4-Nitrophenol	**1.14**	**1.03**	1.33	1.33	86	77	51 - 125	10	23	
2,4-Dinitrotoluene	**0.604**	**0.546**	0.667	0.667	91	82	53 - 118	10	23	
Pentachlorophenol	**0.565**	**0.484**	1.33	1.33	42	36	25 - 141	15	39	
Pyrene	**0.590**	**0.539**	0.667	0.667	88	81	57 - 120	9	20	
Surrogate:										
2-Fluorophenol					*69*	*85*	*31 - 110*			
Phenol-d6					*72*	*85*	*34 - 109*			
Nitrobenzene-d5					*72*	*88*	*30 - 109*			
2-Fluorobiphenyl					*71*	*78*	*39 - 103*			
2,4,6-Tribromophenol					*85*	*76*	*25 - 120*			
Terphenyl-d14					*92*	*80*	*40 - 117*			

Date of Report: June 18, 2015
Samples Submitted: June 17, 2015
Laboratory Reference: 1506-183
Project: Signals Fuel Site

PCBs
EPA 8082A

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-SP1**					
Laboratory ID:	06-183-01					
Aroclor 1016	**ND**	0.054	EPA 8082A	6-18-15	6-18-15	
Aroclor 1221	**ND**	0.054	EPA 8082A	6-18-15	6-18-15	
Aroclor 1232	**ND**	0.054	EPA 8082A	6-18-15	6-18-15	
Aroclor 1242	**ND**	0.054	EPA 8082A	6-18-15	6-18-15	
Aroclor 1248	**ND**	0.054	EPA 8082A	6-18-15	6-18-15	
Aroclor 1254	**ND**	0.054	EPA 8082A	6-18-15	6-18-15	
Aroclor 1260	**ND**	0.054	EPA 8082A	6-18-15	6-18-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
DCB	*107*	*55-140*				
Client ID:	**SFS-SP2**					
Laboratory ID:	06-183-02					
Aroclor 1016	**ND**	0.054	EPA 8082A	6-18-15	6-18-15	
Aroclor 1221	**ND**	0.054	EPA 8082A	6-18-15	6-18-15	
Aroclor 1232	**ND**	0.054	EPA 8082A	6-18-15	6-18-15	
Aroclor 1242	**ND**	0.054	EPA 8082A	6-18-15	6-18-15	
Aroclor 1248	**ND**	0.054	EPA 8082A	6-18-15	6-18-15	
Aroclor 1254	**ND**	0.054	EPA 8082A	6-18-15	6-18-15	
Aroclor 1260	**ND**	0.054	EPA 8082A	6-18-15	6-18-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
DCB	*102*	*55-140*				
Client ID:	**SFS-SP3**					
Laboratory ID:	06-183-03					
Aroclor 1016	**ND**	0.054	EPA 8082A	6-18-15	6-18-15	
Aroclor 1221	**ND**	0.054	EPA 8082A	6-18-15	6-18-15	
Aroclor 1232	**ND**	0.054	EPA 8082A	6-18-15	6-18-15	
Aroclor 1242	**ND**	0.054	EPA 8082A	6-18-15	6-18-15	
Aroclor 1248	**ND**	0.054	EPA 8082A	6-18-15	6-18-15	
Aroclor 1254	**ND**	0.054	EPA 8082A	6-18-15	6-18-15	
Aroclor 1260	**ND**	0.054	EPA 8082A	6-18-15	6-18-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
DCB	*101*	*55-140*				

Date of Report: June 18, 2015
Samples Submitted: June 17, 2015
Laboratory Reference: 1506-183
Project: Signals Fuel Site

PCBs EPA 8082A
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0618S2					
Aroclor 1016	**ND**	0.050	EPA 8082A	6-18-15	6-18-15	
Aroclor 1221	**ND**	0.050	EPA 8082A	6-18-15	6-18-15	
Aroclor 1232	**ND**	0.050	EPA 8082A	6-18-15	6-18-15	
Aroclor 1242	**ND**	0.050	EPA 8082A	6-18-15	6-18-15	
Aroclor 1248	**ND**	0.050	EPA 8082A	6-18-15	6-18-15	
Aroclor 1254	**ND**	0.050	EPA 8082A	6-18-15	6-18-15	
Aroclor 1260	**ND**	0.050	EPA 8082A	6-18-15	6-18-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
DCB	*110*	*55-140*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
MATRIX SPIKES											
Laboratory ID:	06-183-01										
	MS	MSD	MS	MSD		MS	MSD				
Aroclor 1260	**0.398**	**0.392**	0.500	0.500	ND	**80**	**78**	46-136	2	17	
Surrogate:											
DCB						*107*	*101*	*55-140*			

Date of Report: June 18, 2015
Samples Submitted: June 17, 2015
Laboratory Reference: 1506-183
Project: Signals Fuel Site

TOTAL METALS
EPA 6010C/7471B

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	06-183-01					
Client ID:	**SFS-SP1**					
Arsenic	**ND**	11	6010C	6-18-15	6-18-15	
Barium	**28**	2.7	6010C	6-18-15	6-18-15	
Cadmium	**ND**	0.54	6010C	6-18-15	6-18-15	
Chromium	**21**	0.54	6010C	6-18-15	6-18-15	
Lead	**ND**	5.4	6010C	6-18-15	6-18-15	
Mercury	**ND**	0.27	7471B	6-18-15	6-18-15	
Selenium	**ND**	11	6010C	6-18-15	6-18-15	
Silver	**ND**	1.1	6010C	6-18-15	6-18-15	
Lab ID:	06-183-02					
Client ID:	**SFS-SP2**					
Arsenic	**ND**	11	6010C	6-18-15	6-18-15	
Barium	**27**	2.7	6010C	6-18-15	6-18-15	
Cadmium	**ND**	0.54	6010C	6-18-15	6-18-15	
Chromium	**23**	0.54	6010C	6-18-15	6-18-15	
Lead	**ND**	5.4	6010C	6-18-15	6-18-15	
Mercury	**ND**	0.27	7471B	6-18-15	6-18-15	
Selenium	**ND**	11	6010C	6-18-15	6-18-15	
Silver	**ND**	1.1	6010C	6-18-15	6-18-15	

Date of Report: June 18, 2015
Samples Submitted: June 17, 2015
Laboratory Reference: 1506-183
Project: Signals Fuel Site

TOTAL METALS
EPA 6010C/7471B

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	06-183-03					
Client ID:	**SFS-SP3**					
Arsenic	**ND**	11	6010C	6-18-15	6-18-15	
Barium	**30**	2.7	6010C	6-18-15	6-18-15	
Cadmium	**ND**	0.54	6010C	6-18-15	6-18-15	
Chromium	**23**	0.54	6010C	6-18-15	6-18-15	
Lead	**ND**	5.4	6010C	6-18-15	6-18-15	
Mercury	**ND**	0.27	7471B	6-18-15	6-18-15	
Selenium	**ND**	11	6010C	6-18-15	6-18-15	
Silver	**ND**	1.1	6010C	6-18-15	6-18-15	

Date of Report: June 18, 2015
Samples Submitted: June 17, 2015
Laboratory Reference: 1506-183
Project: Signals Fuel Site

TOTAL METALS
EPA 6010C/7471B
METHOD BLANK QUALITY CONTROL

Date Extracted: 6-18-15
Date Analyzed: 6-18-15

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: MB0618SM1&MB0618S1

Analyte	Method	Result	PQL
Arsenic	6010C	**ND**	10
Barium	6010C	**ND**	2.5
Cadmium	6010C	**ND**	0.50
Chromium	6010C	**ND**	0.50
Lead	6010C	**ND**	5.0
Mercury	7471B	**ND**	0.25
Selenium	6010C	**ND**	10
Silver	6010C	**ND**	1.0

Date of Report: June 18, 2015
Samples Submitted: June 17, 2015
Laboratory Reference: 1506-183
Project: Signals Fuel Site

TOTAL METALS
EPA 6010C/7471B
DUPLICATE QUALITY CONTROL

Date Extracted: 6-18-15
Date Analyzed: 6-18-15

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: 06-184-01

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Arsenic	**ND**	**ND**	NA	10	
Barium	**3110**	**3190**	3	25	
Cadmium	**1.39**	**1.33**	4	0.50	
Chromium	**125**	**127**	1	0.50	
Lead	**67.5**	**66.9**	1	5.0	
Mercury	**ND**	**ND**	NA	0.25	
Selenium	**ND**	**ND**	NA	10	
Silver	**ND**	**ND**	NA	1.0	

Date of Report: June 18, 2015
Samples Submitted: June 17, 2015
Laboratory Reference: 1506-183
Project: Signals Fuel Site

TOTAL METALS
EPA 6010C/7471B
MS/MSD QUALITY CONTROL

Date Extracted: 6-18-15
Date Analyzed: 6-18-15

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: 06-184-01

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Arsenic	100	**86.1**	86	**83.3**	83	3	
Barium	100	**3210**	105	**3250**	143	1	A
Cadmium	50.0	**46.3**	90	**45.7**	89	1	
Chromium	100	**200**	75	**204**	79	2	
Lead	250	**271**	81	**267**	80	2	
Mercury	0.500	**0.523**	105	**0.495**	99	6	
Selenium	100	**85.8**	86	**84.4**	84	2	
Silver	25.0	**21.7**	87	**21.8**	87	0	

Date of Report: June 18, 2015
Samples Submitted: June 17, 2015
Laboratory Reference: 1506-183
Project: Signals Fuel Site

% MOISTURE

Date Analyzed: 6-18-15

Client ID	Lab ID	% Moisture
SFS-SP1	06-183-01	7
SFS-SP2	06-183-02	8
SFS-SP3	06-183-03	8

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-napthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical ____________.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1- Sample extract treated with a Sulfuric acid/Silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in method 8260C, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

DAVID

OnSite Environmental Inc.
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Chain of Custody

Page 1 of 1

Laboratory Number: 06-183

Company: WSDOT
Project Number:
Project Name: Signals Fuel Site
Project Manager: Trent Gunsminger
Sampled by: "

Turnaround Request (in working days)
(Check One)
☐ Same Day ☑ 1 Day
☐ 2 Days ☐ 3 Days
☐ Standard (7 Days) (TPH analysis 5 Days)
☐ ________ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Volatiles 8260C	Halogenated Volatiles 8260C	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664A						% Moisture
1	SFS-SP1	6/17/15	1530	soil	6			✓	✓	✓		✓		✓				✓									✓
2	SFS-SP2	↓	↓	↓	↓			↓	↓	↓		↓		↓				↓									✓
3	SFS-SP3	↓	↓	↓	↓			↓	↓	↓		↓		↓				↓									✓

	Signature	Company	Date	Time
Relinquished	John Sandell	ANDERSON ENVIRO.	6/17/15	5:12 pm
Received	[signature]	OSE	6/17/15	5:12 pm
Relinquished				
Received				
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions:

Chromatograms with final report ☐

Data Package: Standard ☐ Level III ☐ Level IV ☐ Electronic Data Deliverables (EDDs) ☐ ________

OnSite
Environmental Inc.
14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

June 25, 2015

Trent Ensminger
Washington State Department of Transportation
HAZ-MAT
2214 RW Johnson Road SW; MS 47332
Tumwater, WA 98512-6111

Re: Analytical Data for Project WSDOT Signal Fuel Site
Laboratory Reference No. 1506-238

Dear Trent:

Enclosed are the analytical results and associated quality control data for samples submitted on June 23, 2015.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: June 25, 2015
Samples Submitted: June 23, 2015
Laboratory Reference: 1506-238
Project: WSDOT Signal Fuel Site

Case Narrative

Samples were collected on June 23, 2015 and received by the laboratory on June 23, 2015. They were maintained at the laboratory at a temperature of 2^oC to 6^oC.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

<u>NWTPH Gx and Volatiles EPA 8260C Analysis</u>

Per EPA Method 5035A, samples were received by the laboratory in pre-weighed 40 mL VOA vials within 48 hours of sample collection. They were stored in a freezer at between -7^oC and -20^oC until extraction or analysis.

Any other QA/QC issues associated with this extraction and analysis will be indicated with a footnote reference and discussed in detail on the Data Qualifier page.

Date of Report: June 25, 2015
Samples Submitted: June 23, 2015
Laboratory Reference: 1506-238
Project: WSDOT Signal Fuel Site

NWTPH-Gx

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-B1**					
Laboratory ID:	06-238-01					
Gasoline	**ND**	5.7	NWTPH-Gx	6-23-15	6-24-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*81*	*68-123*				
Client ID:	**SFS-E**					
Laboratory ID:	06-238-02					
Gasoline	**ND**	5.1	NWTPH-Gx	6-23-15	6-24-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*87*	*68-123*				

Date of Report: June 25, 2015
Samples Submitted: June 23, 2015
Laboratory Reference: 1506-238
Project: WSDOT Signal Fuel Site

NWTPH-Gx
QUALITY CONTROL

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0623S1					
Gasoline	**ND**	5.0	NWTPH-Gx	6-23-15	6-23-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*78*	*68-123*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	06-200-01										
	ORIG	DUP									
Gasoline	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Surrogate:											
Fluorobenzene						*103*	*104*	*68-123*			

Date of Report: June 25, 2015
Samples Submitted: June 23, 2015
Laboratory Reference: 1506-238
Project: WSDOT Signal Fuel Site

NWTPH-Dx

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-B1**					
Laboratory ID:	06-238-01					
Diesel Fuel #2	**50**	41	NWTPH-Dx	6-24-15	6-24-15	
Lube Oil Range Organics	**ND**	82	NWTPH-Dx	6-24-15	6-24-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*84*	*50-150*				
Client ID:	**SFS-E**					
Laboratory ID:	06-238-02					
Diesel Range Organics	**ND**	30	NWTPH-Dx	6-24-15	6-24-15	
Lube Oil Range Organics	**ND**	60	NWTPH-Dx	6-24-15	6-24-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*58*	*50-150*				

Date of Report: June 25, 2015
Samples Submitted: June 23, 2015
Laboratory Reference: 1506-238
Project: WSDOT Signal Fuel Site

NWTPH-Dx
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0624S2					
Diesel Range Organics	**ND**	25	NWTPH-Dx	6-24-15	6-24-15	
Lube Oil Range Organics	**ND**	50	NWTPH-Dx	6-24-15	6-24-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*68*	*50-150*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	06-216-18										
	ORIG	DUP									
Diesel Range	**ND**	**ND**	NA	NA		NA		NA	NA	NA	X1
Lube Oil Range	**ND**	**ND**	NA	NA		NA		NA	NA	NA	X1
Surrogate:											
o-Terphenyl						*78*	*85*	*50-150*			

Date of Report: June 25, 2015
Samples Submitted: June 23, 2015
Laboratory Reference: 1506-238
Project: WSDOT Signal Fuel Site

VOLATILES EPA 8260C
page 1 of 2

Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-B1**					
Laboratory ID:	06-238-01					
Dichlorodifluoromethane	ND	0.0013	EPA 8260C	6-24-15	6-24-15	
Chloromethane	ND	0.0048	EPA 8260C	6-24-15	6-24-15	
Vinyl Chloride	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
Bromomethane	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
Chloroethane	ND	0.0048	EPA 8260C	6-24-15	6-24-15	
Trichlorofluoromethane	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
1,1-Dichloroethene	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
Acetone	ND	0.0096	EPA 8260C	6-24-15	6-24-15	
Iodomethane	ND	0.0048	EPA 8260C	6-24-15	6-24-15	
Carbon Disulfide	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
Methylene Chloride	ND	0.0048	EPA 8260C	6-24-15	6-24-15	
(trans) 1,2-Dichloroethene	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
Methyl t-Butyl Ether	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
1,1-Dichloroethane	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
Vinyl Acetate	ND	0.0048	EPA 8260C	6-24-15	6-24-15	
2,2-Dichloropropane	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
(cis) 1,2-Dichloroethene	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
2-Butanone	ND	0.0048	EPA 8260C	6-24-15	6-24-15	
Bromochloromethane	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
Chloroform	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
1,1,1-Trichloroethane	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
Carbon Tetrachloride	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
1,1-Dichloropropene	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
Benzene	0.0025	0.00096	EPA 8260C	6-24-15	6-24-15	
1,2-Dichloroethane	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
Trichloroethene	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
1,2-Dichloropropane	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
Dibromomethane	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
Bromodichloromethane	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
2-Chloroethyl Vinyl Ether	ND	0.0048	EPA 8260C	6-24-15	6-24-15	
(cis) 1,3-Dichloropropene	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
Methyl Isobutyl Ketone	ND	0.0048	EPA 8260C	6-24-15	6-24-15	
Toluene	0.013	0.0048	EPA 8260C	6-24-15	6-24-15	
(trans) 1,3-Dichloropropene	ND	0.00096	EPA 8260C	6-24-15	6-24-15	

Date of Report: June 25, 2015
Samples Submitted: June 23, 2015
Laboratory Reference: 1506-238
Project: WSDOT Signal Fuel Site

VOLATILES EPA 8260C
page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-B1**					
Laboratory ID:	06-238-01					
1,1,2-Trichloroethane	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
Tetrachloroethene	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
1,3-Dichloropropane	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
2-Hexanone	ND	0.0048	EPA 8260C	6-24-15	6-24-15	
Dibromochloromethane	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
1,2-Dibromoethane	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
Chlorobenzene	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
1,1,1,2-Tetrachloroethane	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
Ethylbenzene	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
m,p-Xylene	0.0024	0.0019	EPA 8260C	6-24-15	6-24-15	
o-Xylene	0.0012	0.00096	EPA 8260C	6-24-15	6-24-15	
Styrene	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
Bromoform	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
Isopropylbenzene	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
Bromobenzene	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
1,1,2,2-Tetrachloroethane	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
1,2,3-Trichloropropane	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
n-Propylbenzene	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
2-Chlorotoluene	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
4-Chlorotoluene	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
1,3,5-Trimethylbenzene	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
tert-Butylbenzene	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
1,2,4-Trimethylbenzene	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
sec-Butylbenzene	0.0030	0.00096	EPA 8260C	6-24-15	6-24-15	
1,3-Dichlorobenzene	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
p-Isopropyltoluene	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
1,4-Dichlorobenzene	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
1,2-Dichlorobenzene	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
n-Butylbenzene	0.0028	0.00096	EPA 8260C	6-24-15	6-24-15	
1,2-Dibromo-3-chloropropane	ND	0.0048	EPA 8260C	6-24-15	6-24-15	
1,2,4-Trichlorobenzene	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
Hexachlorobutadiene	ND	0.0048	EPA 8260C	6-24-15	6-24-15	
Naphthalene	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
1,2,3-Trichlorobenzene	ND	0.00096	EPA 8260C	6-24-15	6-24-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*86*	*76-131*				
Toluene-d8	*92*	*82-129*				
4-Bromofluorobenzene	*116*	*79-126*				

Date of Report: June 25, 2015
Samples Submitted: June 23, 2015
Laboratory Reference: 1506-238
Project: WSDOT Signal Fuel Site

VOLATILES EPA 8260C
page 1 of 2

Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-E**					
Laboratory ID:	06-238-02					
Dichlorodifluoromethane	ND	0.0016	EPA 8260C	6-23-15	6-23-15	
Chloromethane	ND	0.0062	EPA 8260C	6-23-15	6-23-15	
Vinyl Chloride	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
Bromomethane	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
Chloroethane	ND	0.0062	EPA 8260C	6-23-15	6-23-15	
Trichlorofluoromethane	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
1,1-Dichloroethene	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
Acetone	0.020	0.012	EPA 8260C	6-23-15	6-23-15	
Iodomethane	ND	0.0062	EPA 8260C	6-23-15	6-23-15	
Carbon Disulfide	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
Methylene Chloride	ND	0.0062	EPA 8260C	6-23-15	6-23-15	
(trans) 1,2-Dichloroethene	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
Methyl t-Butyl Ether	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
1,1-Dichloroethane	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
Vinyl Acetate	ND	0.0062	EPA 8260C	6-23-15	6-23-15	
2,2-Dichloropropane	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
(cis) 1,2-Dichloroethene	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
2-Butanone	ND	0.0062	EPA 8260C	6-23-15	6-23-15	
Bromochloromethane	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
Chloroform	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
1,1,1-Trichloroethane	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
Carbon Tetrachloride	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
1,1-Dichloropropene	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
Benzene	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
1,2-Dichloroethane	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
Trichloroethene	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
1,2-Dichloropropane	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
Dibromomethane	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
Bromodichloromethane	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
2-Chloroethyl Vinyl Ether	ND	0.0062	EPA 8260C	6-23-15	6-23-15	
(cis) 1,3-Dichloropropene	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
Methyl Isobutyl Ketone	ND	0.0062	EPA 8260C	6-23-15	6-23-15	
Toluene	ND	0.0062	EPA 8260C	6-23-15	6-23-15	
(trans) 1,3-Dichloropropene	ND	0.0012	EPA 8260C	6-23-15	6-23-15	

Date of Report: June 25, 2015
Samples Submitted: June 23, 2015
Laboratory Reference: 1506-238
Project: WSDOT Signal Fuel Site

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Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-E**					
Laboratory ID:	06-238-02					
1,1,2-Trichloroethane	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
Tetrachloroethene	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
1,3-Dichloropropane	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
2-Hexanone	ND	0.0062	EPA 8260C	6-23-15	6-23-15	
Dibromochloromethane	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
1,2-Dibromoethane	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
Chlorobenzene	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
1,1,1,2-Tetrachloroethane	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
Ethylbenzene	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
m,p-Xylene	ND	0.0025	EPA 8260C	6-23-15	6-23-15	
o-Xylene	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
Styrene	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
Bromoform	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
Isopropylbenzene	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
Bromobenzene	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
1,1,2,2-Tetrachloroethane	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
1,2,3-Trichloropropane	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
n-Propylbenzene	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
2-Chlorotoluene	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
4-Chlorotoluene	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
1,3,5-Trimethylbenzene	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
tert-Butylbenzene	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
1,2,4-Trimethylbenzene	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
sec-Butylbenzene	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
1,3-Dichlorobenzene	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
p-Isopropyltoluene	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
1,4-Dichlorobenzene	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
1,2-Dichlorobenzene	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
n-Butylbenzene	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
1,2-Dibromo-3-chloropropane	ND	0.0062	EPA 8260C	6-23-15	6-23-15	
1,2,4-Trichlorobenzene	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
Hexachlorobutadiene	ND	0.0062	EPA 8260C	6-23-15	6-23-15	
Naphthalene	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
1,2,3-Trichlorobenzene	ND	0.0012	EPA 8260C	6-23-15	6-23-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*90*	*76-131*				
Toluene-d8	*90*	*82-129*				
4-Bromofluorobenzene	*115*	*79-126*				

Date of Report: June 25, 2015
Samples Submitted: June 23, 2015
Laboratory Reference: 1506-238
Project: WSDOT Signal Fuel Site

VOLATILES by EPA 8260C
METHOD BLANK QUALITY CONTROL
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Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0623S1					
Dichlorodifluoromethane	ND	0.0013	EPA 8260C	6-23-15	6-23-15	
Chloromethane	ND	0.0050	EPA 8260C	6-23-15	6-23-15	
Vinyl Chloride	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
Bromomethane	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
Chloroethane	ND	0.0050	EPA 8260C	6-23-15	6-23-15	
Trichlorofluoromethane	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
1,1-Dichloroethene	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
Acetone	ND	0.010	EPA 8260C	6-23-15	6-23-15	
Iodomethane	ND	0.0050	EPA 8260C	6-23-15	6-23-15	
Carbon Disulfide	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
Methylene Chloride	ND	0.0050	EPA 8260C	6-23-15	6-23-15	
(trans) 1,2-Dichloroethene	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
Methyl t-Butyl Ether	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
1,1-Dichloroethane	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
Vinyl Acetate	ND	0.0050	EPA 8260C	6-23-15	6-23-15	
2,2-Dichloropropane	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
(cis) 1,2-Dichloroethene	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
2-Butanone	ND	0.0050	EPA 8260C	6-23-15	6-23-15	
Bromochloromethane	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
Chloroform	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
1,1,1-Trichloroethane	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
Carbon Tetrachloride	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
1,1-Dichloropropene	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
Benzene	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
1,2-Dichloroethane	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
Trichloroethene	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
1,2-Dichloropropane	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
Dibromomethane	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
Bromodichloromethane	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
2-Chloroethyl Vinyl Ether	ND	0.0050	EPA 8260C	6-23-15	6-23-15	
(cis) 1,3-Dichloropropene	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
Methyl Isobutyl Ketone	ND	0.0050	EPA 8260C	6-23-15	6-23-15	
Toluene	ND	0.0050	EPA 8260C	6-23-15	6-23-15	
(trans) 1,3-Dichloropropene	ND	0.0010	EPA 8260C	6-23-15	6-23-15	

Date of Report: June 25, 2015
Samples Submitted: June 23, 2015
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Project: WSDOT Signal Fuel Site

VOLATILES by EPA 8260C
METHOD BLANK QUALITY CONTROL
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Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0623S1					
1,1,2-Trichloroethane	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
Tetrachloroethene	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
1,3-Dichloropropane	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
2-Hexanone	ND	0.0050	EPA 8260C	6-23-15	6-23-15	
Dibromochloromethane	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
1,2-Dibromoethane	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
Chlorobenzene	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
1,1,1,2-Tetrachloroethane	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
Ethylbenzene	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
m,p-Xylene	ND	0.0020	EPA 8260C	6-23-15	6-23-15	
o-Xylene	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
Styrene	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
Bromoform	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
Isopropylbenzene	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
Bromobenzene	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
1,1,2,2-Tetrachloroethane	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
1,2,3-Trichloropropane	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
n-Propylbenzene	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
2-Chlorotoluene	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
4-Chlorotoluene	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
1,3,5-Trimethylbenzene	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
tert-Butylbenzene	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
1,2,4-Trimethylbenzene	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
sec-Butylbenzene	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
1,3-Dichlorobenzene	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
p-Isopropyltoluene	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
1,4-Dichlorobenzene	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
1,2-Dichlorobenzene	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
n-Butylbenzene	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
1,2-Dibromo-3-chloropropane	ND	0.0050	EPA 8260C	6-23-15	6-23-15	
1,2,4-Trichlorobenzene	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
Hexachlorobutadiene	ND	0.0050	EPA 8260C	6-23-15	6-23-15	
Naphthalene	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
1,2,3-Trichlorobenzene	ND	0.0010	EPA 8260C	6-23-15	6-23-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*91*	*76-131*				
Toluene-d8	*95*	*82-129*				
4-Bromofluorobenzene	*119*	*79-126*				

Date of Report: June 25, 2015
Samples Submitted: June 23, 2015
Laboratory Reference: 1506-238
Project: WSDOT Signal Fuel Site

VOLATILES by EPA 8260C
METHOD BLANK QUALITY CONTROL
page 1 of 2

Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0624S1					
Dichlorodifluoromethane	ND	0.0014	EPA 8260C	6-24-15	6-24-15	
Chloromethane	ND	0.0050	EPA 8260C	6-24-15	6-24-15	
Vinyl Chloride	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
Bromomethane	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
Chloroethane	ND	0.0050	EPA 8260C	6-24-15	6-24-15	
Trichlorofluoromethane	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
1,1-Dichloroethene	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
Acetone	ND	0.010	EPA 8260C	6-24-15	6-24-15	
Iodomethane	ND	0.0050	EPA 8260C	6-24-15	6-24-15	
Carbon Disulfide	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
Methylene Chloride	ND	0.0050	EPA 8260C	6-24-15	6-24-15	
(trans) 1,2-Dichloroethene	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
Methyl t-Butyl Ether	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
1,1-Dichloroethane	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
Vinyl Acetate	ND	0.0050	EPA 8260C	6-24-15	6-24-15	
2,2-Dichloropropane	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
(cis) 1,2-Dichloroethene	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
2-Butanone	ND	0.0050	EPA 8260C	6-24-15	6-24-15	
Bromochloromethane	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
Chloroform	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
1,1,1-Trichloroethane	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
Carbon Tetrachloride	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
1,1-Dichloropropene	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
Benzene	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
1,2-Dichloroethane	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
Trichloroethene	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
1,2-Dichloropropane	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
Dibromomethane	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
Bromodichloromethane	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
2-Chloroethyl Vinyl Ether	ND	0.0050	EPA 8260C	6-24-15	6-24-15	
(cis) 1,3-Dichloropropene	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
Methyl Isobutyl Ketone	ND	0.0050	EPA 8260C	6-24-15	6-24-15	
Toluene	ND	0.0050	EPA 8260C	6-24-15	6-24-15	
(trans) 1,3-Dichloropropene	ND	0.0010	EPA 8260C	6-24-15	6-24-15	

Date of Report: June 25, 2015
Samples Submitted: June 23, 2015
Laboratory Reference: 1506-238
Project: WSDOT Signal Fuel Site

VOLATILES by EPA 8260C
METHOD BLANK QUALITY CONTROL
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Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0624S1					
1,1,2-Trichloroethane	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
Tetrachloroethene	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
1,3-Dichloropropane	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
2-Hexanone	ND	0.0050	EPA 8260C	6-24-15	6-24-15	
Dibromochloromethane	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
1,2-Dibromoethane	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
Chlorobenzene	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
1,1,1,2-Tetrachloroethane	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
Ethylbenzene	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
m,p-Xylene	ND	0.0020	EPA 8260C	6-24-15	6-24-15	
o-Xylene	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
Styrene	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
Bromoform	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
Isopropylbenzene	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
Bromobenzene	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
1,1,2,2-Tetrachloroethane	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
1,2,3-Trichloropropane	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
n-Propylbenzene	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
2-Chlorotoluene	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
4-Chlorotoluene	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
1,3,5-Trimethylbenzene	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
tert-Butylbenzene	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
1,2,4-Trimethylbenzene	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
sec-Butylbenzene	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
1,3-Dichlorobenzene	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
p-Isopropyltoluene	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
1,4-Dichlorobenzene	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
1,2-Dichlorobenzene	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
n-Butylbenzene	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
1,2-Dibromo-3-chloropropane	ND	0.0050	EPA 8260C	6-24-15	6-24-15	
1,2,4-Trichlorobenzene	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
Hexachlorobutadiene	ND	0.0050	EPA 8260C	6-24-15	6-24-15	
Naphthalene	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
1,2,3-Trichlorobenzene	ND	0.0010	EPA 8260C	6-24-15	6-24-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*89*	*76-131*				
Toluene-d8	*92*	*82-129*				
4-Bromofluorobenzene	*117*	*79-126*				

Date of Report: June 25, 2015
Samples Submitted: June 23, 2015
Laboratory Reference: 1506-238
Project: WSDOT Signal Fuel Site

VOLATILES by EPA 8260C
SB/SBD QUALITY CONTROL

Matrix: Soil
Units: mg/kg

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS										
Laboratory ID:	SB0623S1									
	SB	SBD	SB	SBD	SB	SBD				
1,1-Dichloroethene	**0.0441**	**0.0431**	0.0500	0.0500	88	86	66-129	2	15	
Benzene	**0.0487**	**0.0475**	0.0500	0.0500	97	95	71-123	2	15	
Trichloroethene	**0.0470**	**0.0481**	0.0500	0.0500	94	96	75-115	2	15	
Toluene	**0.0478**	**0.0472**	0.0500	0.0500	96	94	75-120	1	15	
Chlorobenzene	**0.0462**	**0.0455**	0.0500	0.0500	92	91	75-121	2	15	
Surrogate:										
Dibromofluoromethane					*88*	*84*	*76-131*			
Toluene-d8					*88*	*87*	*82-129*			
4-Bromofluorobenzene					*111*	*109*	*79-126*			

Date of Report: June 25, 2015
Samples Submitted: June 23, 2015
Laboratory Reference: 1506-238
Project: WSDOT Signal Fuel Site

VOLATILES by EPA 8260C
SB/SBD QUALITY CONTROL

Matrix: Soil
Units: mg/kg

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS										
Laboratory ID:	SB0624S1									
	SB	SBD	SB	SBD	SB	SBD				
1,1-Dichloroethene	**0.0443**	**0.0423**	0.0500	0.0500	89	85	66-129	5	15	
Benzene	**0.0473**	**0.0470**	0.0500	0.0500	95	94	71-123	1	15	
Trichloroethene	**0.0462**	**0.0469**	0.0500	0.0500	92	94	75-115	2	15	
Toluene	**0.0478**	**0.0478**	0.0500	0.0500	96	96	75-120	0	15	
Chlorobenzene	**0.0452**	**0.0456**	0.0500	0.0500	90	91	75-121	1	15	
Surrogate:										
Dibromofluoromethane					*86*	*83*	*76-131*			
Toluene-d8					*89*	*86*	*82-129*			
4-Bromofluorobenzene					*109*	*107*	*79-126*			

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Project: WSDOT Signal Fuel Site

SEMIVOLATILES EPA 8270D/SIM
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Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-B1**					
Laboratory ID:	06-238-01					
n-Nitrosodimethylamine	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Pyridine	**ND**	0.41	EPA 8270D	6-23-15	6-24-15	
Phenol	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Aniline	**ND**	0.21	EPA 8270D	6-23-15	6-24-15	
bis(2-Chloroethyl)ether	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
2-Chlorophenol	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
1,3-Dichlorobenzene	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
1,4-Dichlorobenzene	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Benzyl alcohol	**ND**	0.21	EPA 8270D	6-23-15	6-24-15	
1,2-Dichlorobenzene	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
2-Methylphenol (o-Cresol)	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
bis(2-Chloroisopropyl)ether	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
(3+4)-Methylphenol (m,p-Cresol)	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
n-Nitroso-di-n-propylamine	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Hexachloroethane	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Nitrobenzene	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Isophorone	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
2-Nitrophenol	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
2,4-Dimethylphenol	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
bis(2-Chloroethoxy)methane	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
2,4-Dichlorophenol	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
1,2,4-Trichlorobenzene	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Naphthalene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-24-15	
4-Chloroaniline	**ND**	0.21	EPA 8270D	6-23-15	6-24-15	
Hexachlorobutadiene	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
4-Chloro-3-methylphenol	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
2-Methylnaphthalene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-24-15	
1-Methylnaphthalene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-24-15	
Hexachlorocyclopentadiene	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
2,4,6-Trichlorophenol	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
2,3-Dichloroaniline	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
2,4,5-Trichlorophenol	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
2-Chloronaphthalene	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
2-Nitroaniline	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
1,4-Dinitrobenzene	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Dimethylphthalate	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
1,3-Dinitrobenzene	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
2,6-Dinitrotoluene	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
1,2-Dinitrobenzene	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Acenaphthylene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-24-15	
3-Nitroaniline	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	

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Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-B1**					
Laboratory ID:	06-238-01					
2,4-Dinitrophenol	**ND**	0.21	EPA 8270D	6-23-15	6-24-15	
Acenaphthene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-24-15	
4-Nitrophenol	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
2,4-Dinitrotoluene	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Dibenzofuran	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
2,3,5,6-Tetrachlorophenol	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
2,3,4,6-Tetrachlorophenol	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Diethylphthalate	**ND**	0.21	EPA 8270D	6-23-15	6-24-15	
4-Chlorophenyl-phenylether	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
4-Nitroaniline	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Fluorene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-24-15	
4,6-Dinitro-2-methylphenol	**ND**	0.21	EPA 8270D	6-23-15	6-24-15	
n-Nitrosodiphenylamine	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
1,2-Diphenylhydrazine	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
4-Bromophenyl-phenylether	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Hexachlorobenzene	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Pentachlorophenol	**ND**	0.21	EPA 8270D	6-23-15	6-24-15	
Phenanthrene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-24-15	
Anthracene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-24-15	
Carbazole	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Di-n-butylphthalate	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Fluoranthene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-24-15	
Benzidine	**ND**	0.41	EPA 8270D	6-23-15	6-24-15	
Pyrene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-24-15	
Butylbenzylphthalate	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
bis-2-Ethylhexyladipate	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
3,3'-Dichlorobenzidine	**ND**	0.21	EPA 8270D	6-23-15	6-24-15	
Benzo[a]anthracene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-24-15	
Chrysene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-24-15	
bis(2-Ethylhexyl)phthalate	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Di-n-octylphthalate	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Benzo[b]fluoranthene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-24-15	
Benzo(j,k)fluoranthene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-24-15	
Benzo[a]pyrene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-24-15	
Indeno[1,2,3-cd]pyrene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-24-15	
Dibenz[a,h]anthracene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-24-15	
Benzo[g,h,i]perylene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-24-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorophenol	*43*	*31 - 110*				
Phenol-d6	*42*	*34 - 109*				
Nitrobenzene-d5	*41*	*30 - 109*				
2-Fluorobiphenyl	*48*	*39 - 103*				
2,4,6-Tribromophenol	*61*	*25 - 120*				
Terphenyl-d14	*63*	*40 - 117*				

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Project: WSDOT Signal Fuel Site

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Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-E**					
Laboratory ID:	06-238-02					
n-Nitrosodimethylamine	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Pyridine	**ND**	0.40	EPA 8270D	6-23-15	6-24-15	
Phenol	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Aniline	**ND**	0.20	EPA 8270D	6-23-15	6-24-15	
bis(2-Chloroethyl)ether	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
2-Chlorophenol	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
1,3-Dichlorobenzene	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
1,4-Dichlorobenzene	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Benzyl alcohol	**ND**	0.20	EPA 8270D	6-23-15	6-24-15	
1,2-Dichlorobenzene	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
2-Methylphenol (o-Cresol)	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
bis(2-Chloroisopropyl)ether	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
(3+4)-Methylphenol (m,p-Cresol)	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
n-Nitroso-di-n-propylamine	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Hexachloroethane	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Nitrobenzene	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Isophorone	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
2-Nitrophenol	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
2,4-Dimethylphenol	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
bis(2-Chloroethoxy)methane	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
2,4-Dichlorophenol	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
1,2,4-Trichlorobenzene	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Naphthalene	**ND**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
4-Chloroaniline	**ND**	0.20	EPA 8270D	6-23-15	6-24-15	
Hexachlorobutadiene	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
4-Chloro-3-methylphenol	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
2-Methylnaphthalene	**ND**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
1-Methylnaphthalene	**ND**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
Hexachlorocyclopentadiene	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
2,4,6-Trichlorophenol	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
2,3-Dichloroaniline	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
2,4,5-Trichlorophenol	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
2-Chloronaphthalene	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
2-Nitroaniline	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
1,4-Dinitrobenzene	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Dimethylphthalate	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
1,3-Dinitrobenzene	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
2,6-Dinitrotoluene	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
1,2-Dinitrobenzene	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Acenaphthylene	**ND**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
3-Nitroaniline	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	

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Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-E**					
Laboratory ID:	06-238-02					
2,4-Dinitrophenol	**ND**	0.20	EPA 8270D	6-23-15	6-24-15	
Acenaphthene	**ND**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
4-Nitrophenol	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
2,4-Dinitrotoluene	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Dibenzofuran	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
2,3,5,6-Tetrachlorophenol	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
2,3,4,6-Tetrachlorophenol	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Diethylphthalate	**ND**	0.20	EPA 8270D	6-23-15	6-24-15	
4-Chlorophenyl-phenylether	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
4-Nitroaniline	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Fluorene	**ND**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
4,6-Dinitro-2-methylphenol	**ND**	0.20	EPA 8270D	6-23-15	6-24-15	
n-Nitrosodiphenylamine	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
1,2-Diphenylhydrazine	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
4-Bromophenyl-phenylether	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Hexachlorobenzene	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Pentachlorophenol	**ND**	0.20	EPA 8270D	6-23-15	6-24-15	
Phenanthrene	**ND**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
Anthracene	**ND**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
Carbazole	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Di-n-butylphthalate	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Fluoranthene	**ND**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
Benzidine	**ND**	0.40	EPA 8270D	6-23-15	6-24-15	
Pyrene	**ND**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
Butylbenzylphthalate	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
bis-2-Ethylhexyladipate	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
3,3'-Dichlorobenzidine	**ND**	0.20	EPA 8270D	6-23-15	6-24-15	
Benzo[a]anthracene	**ND**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
Chrysene	**ND**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
bis(2-Ethylhexyl)phthalate	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Di-n-octylphthalate	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Benzo[b]fluoranthene	**ND**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
Benzo(j,k)fluoranthene	**ND**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
Benzo[a]pyrene	**ND**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
Indeno[1,2,3-cd]pyrene	**ND**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
Dibenz[a,h]anthracene	**ND**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
Benzo[g,h,i]perylene	**ND**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorophenol	*59*	*31 - 110*				
Phenol-d6	*59*	*34 - 109*				
Nitrobenzene-d5	*55*	*30 - 109*				
2-Fluorobiphenyl	*58*	*39 - 103*				
2,4,6-Tribromophenol	*52*	*25 - 120*				
Terphenyl-d14	*53*	*40 - 117*				

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SEMIVOLATILES EPA 8270D/SIM
METHOD BLANK QUALITY CONTROL
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Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0623S1					
n-Nitrosodimethylamine	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Pyridine	**ND**	0.33	EPA 8270D	6-23-15	6-23-15	
Phenol	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Aniline	**ND**	0.17	EPA 8270D	6-23-15	6-23-15	
bis(2-Chloroethyl)ether	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
2-Chlorophenol	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
1,3-Dichlorobenzene	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
1,4-Dichlorobenzene	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Benzyl alcohol	**ND**	0.17	EPA 8270D	6-23-15	6-23-15	
1,2-Dichlorobenzene	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
2-Methylphenol (o-Cresol)	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
bis(2-Chloroisopropyl)ether	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
(3+4)-Methylphenol (m,p-Cresol)	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
n-Nitroso-di-n-propylamine	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Hexachloroethane	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Nitrobenzene	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Isophorone	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
2-Nitrophenol	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
2,4-Dimethylphenol	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
bis(2-Chloroethoxy)methane	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
2,4-Dichlorophenol	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
1,2,4-Trichlorobenzene	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Naphthalene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
4-Chloroaniline	**ND**	0.17	EPA 8270D	6-23-15	6-23-15	
Hexachlorobutadiene	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
4-Chloro-3-methylphenol	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
2-Methylnaphthalene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
1-Methylnaphthalene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
Hexachlorocyclopentadiene	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
2,4,6-Trichlorophenol	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
2,3-Dichloroaniline	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
2,4,5-Trichlorophenol	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
2-Chloronaphthalene	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
2-Nitroaniline	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
1,4-Dinitrobenzene	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Dimethylphthalate	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
1,3-Dinitrobenzene	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
2,6-Dinitrotoluene	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
1,2-Dinitrobenzene	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Acenaphthylene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
3-Nitroaniline	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	

Date of Report: June 25, 2015
Samples Submitted: June 23, 2015
Laboratory Reference: 1506-238
Project: WSDOT Signal Fuel Site

SEMIVOLATILES EPA 8270D/SIM
METHOD BLANK QUALITY CONTROL
page 2 of 2

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0623S1					
2,4-Dinitrophenol	**ND**	0.17	EPA 8270D	6-23-15	6-23-15	
Acenaphthene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
4-Nitrophenol	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
2,4-Dinitrotoluene	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Dibenzofuran	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
2,3,5,6-Tetrachlorophenol	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
2,3,4,6-Tetrachlorophenol	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Diethylphthalate	**ND**	0.17	EPA 8270D	6-23-15	6-23-15	
4-Chlorophenyl-phenylether	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
4-Nitroaniline	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Fluorene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
4,6-Dinitro-2-methylphenol	**ND**	0.17	EPA 8270D	6-23-15	6-23-15	
n-Nitrosodiphenylamine	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
1,2-Diphenylhydrazine	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
4-Bromophenyl-phenylether	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Hexachlorobenzene	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Pentachlorophenol	**ND**	0.17	EPA 8270D	6-23-15	6-23-15	
Phenanthrene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
Anthracene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
Carbazole	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Di-n-butylphthalate	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Fluoranthene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
Benzidine	**ND**	0.33	EPA 8270D	6-23-15	6-23-15	
Pyrene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
Butylbenzylphthalate	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
bis-2-Ethylhexyladipate	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
3,3'-Dichlorobenzidine	**ND**	0.17	EPA 8270D	6-23-15	6-23-15	
Benzo[a]anthracene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
Chrysene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
bis(2-Ethylhexyl)phthalate	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Di-n-octylphthalate	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Benzo[b]fluoranthene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
Benzo(j,k)fluoranthene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
Benzo[a]pyrene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
Indeno[1,2,3-cd]pyrene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
Dibenz[a,h]anthracene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
Benzo[g,h,i]perylene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorophenol	*82*	*31 - 110*				
Phenol-d6	*84*	*34 - 109*				
Nitrobenzene-d5	*81*	*30 - 109*				
2-Fluorobiphenyl	*79*	*39 - 103*				
2,4,6-Tribromophenol	*89*	*25 - 120*				
Terphenyl-d14	*87*	*40 - 117*				

Date of Report: June 25, 2015
Samples Submitted: June 23, 2015
Laboratory Reference: 1506-238
Project: WSDOT Signal Fuel Site

SEMIVOLATILES EPA 8270D/SIM
SB/SBD QUALITY CONTROL

Matrix: Soil
Units: mg/Kg

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS										
Laboratory ID:	SB0623S1									
	SB	SBD	SB	SBD	SB	SBD				
Phenol	**1.09**	**1.03**	1.33	1.33	82	77	55 - 105	6	25	
2-Chlorophenol	**1.12**	**1.06**	1.33	1.33	84	80	56 - 102	6	30	
1,4-Dichlorobenzene	**0.585**	**0.538**	0.667	0.667	88	81	49 - 99	8	35	
n-Nitroso-di-n-propylamine	**0.571**	**0.517**	0.667	0.667	86	78	52 - 102	10	26	
1,2,4-Trichlorobenzene	**0.615**	**0.577**	0.667	0.667	92	87	49 - 110	6	30	
4-Chloro-3-methylphenol	**1.26**	**1.15**	1.33	1.33	95	86	59 - 113	9	22	
Acenaphthene	**0.537**	**0.495**	0.667	0.667	81	74	52 - 103	8	22	
4-Nitrophenol	**1.31**	**1.23**	1.33	1.33	98	92	51 - 125	6	23	
2,4-Dinitrotoluene	**0.595**	**0.553**	0.667	0.667	89	83	53 - 118	7	23	
Pentachlorophenol	**1.36**	**1.23**	1.33	1.33	102	92	25 - 141	10	39	
Pyrene	**0.608**	**0.555**	0.667	0.667	91	83	57 - 120	9	20	
Surrogate:										
2-Fluorophenol					*85*	*81*	*31 - 110*			
Phenol-d6					*88*	*83*	*34 - 109*			
Nitrobenzene-d5					*84*	*78*	*30 - 109*			
2-Fluorobiphenyl					*84*	*77*	*39 - 103*			
2,4,6-Tribromophenol					*100*	*90*	*25 - 120*			
Terphenyl-d14					*91*	*84*	*40 - 117*			

Date of Report: June 25, 2015
Samples Submitted: June 23, 2015
Laboratory Reference: 1506-238
Project: WSDOT Signal Fuel Site

PCBs
EPA 8082A

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-B1**					
Laboratory ID:	06-238-01					
Aroclor 1016	**ND**	0.062	EPA 8082A	6-23-15	6-24-15	
Aroclor 1221	**ND**	0.062	EPA 8082A	6-23-15	6-24-15	
Aroclor 1232	**ND**	0.062	EPA 8082A	6-23-15	6-24-15	
Aroclor 1242	**ND**	0.062	EPA 8082A	6-23-15	6-24-15	
Aroclor 1248	**ND**	0.062	EPA 8082A	6-23-15	6-24-15	
Aroclor 1254	**ND**	0.062	EPA 8082A	6-23-15	6-24-15	
Aroclor 1260	**ND**	0.062	EPA 8082A	6-23-15	6-24-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
DCB	*133*	*55-140*				
Client ID:	**SFS-E**					
Laboratory ID:	06-238-02					
Aroclor 1016	**ND**	0.060	EPA 8082A	6-23-15	6-24-15	
Aroclor 1221	**ND**	0.060	EPA 8082A	6-23-15	6-24-15	
Aroclor 1232	**ND**	0.060	EPA 8082A	6-23-15	6-24-15	
Aroclor 1242	**ND**	0.060	EPA 8082A	6-23-15	6-24-15	
Aroclor 1248	**ND**	0.060	EPA 8082A	6-23-15	6-24-15	
Aroclor 1254	**ND**	0.060	EPA 8082A	6-23-15	6-24-15	
Aroclor 1260	**ND**	0.060	EPA 8082A	6-23-15	6-24-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
DCB	*106*	*55-140*				

Date of Report: June 25, 2015
Samples Submitted: June 23, 2015
Laboratory Reference: 1506-238
Project: WSDOT Signal Fuel Site

PCBs EPA 8082A
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0623S1					
Aroclor 1016	**ND**	0.050	EPA 8082A	6-23-15	6-23-15	
Aroclor 1221	**ND**	0.050	EPA 8082A	6-23-15	6-23-15	
Aroclor 1232	**ND**	0.050	EPA 8082A	6-23-15	6-23-15	
Aroclor 1242	**ND**	0.050	EPA 8082A	6-23-15	6-23-15	
Aroclor 1248	**ND**	0.050	EPA 8082A	6-23-15	6-23-15	
Aroclor 1254	**ND**	0.050	EPA 8082A	6-23-15	6-23-15	
Aroclor 1260	**ND**	0.050	EPA 8082A	6-23-15	6-23-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
DCB	*104*	*55-140*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
MATRIX SPIKES											
Laboratory ID:	06-167-02										
	MS	MSD	MS	MSD		MS	MSD				
Aroclor 1260	**0.373**	**0.398**	0.500	0.500	ND	**75**	**80**	46-136	6	17	
Surrogate:											
DCB						*80*	*92*	*55-140*			

Date of Report: June 25, 2015
Samples Submitted: June 23, 2015
Laboratory Reference: 1506-238
Project: WSDOT Signal Fuel Site

TOTAL METALS
EPA 6010C/7471B

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	06-238-01					
Client ID:	**SFS-B1**					
Arsenic	**ND**	12	6010C	6-24-15	6-24-15	
Barium	**33**	3.1	6010C	6-24-15	6-24-15	
Cadmium	**ND**	0.62	6010C	6-24-15	6-24-15	
Chromium	**39**	0.62	6010C	6-24-15	6-24-15	
Lead	**ND**	6.2	6010C	6-24-15	6-24-15	
Mercury	**ND**	0.31	7471B	6-24-15	6-24-15	
Selenium	**ND**	12	6010C	6-24-15	6-24-15	
Silver	**ND**	1.2	6010C	6-24-15	6-24-15	
Lab ID:	06-238-02					
Client ID:	**SFS-E**					
Arsenic	**ND**	12	6010C	6-24-15	6-24-15	
Barium	**110**	3.0	6010C	6-24-15	6-24-15	
Cadmium	**ND**	0.60	6010C	6-24-15	6-24-15	
Chromium	**62**	0.60	6010C	6-24-15	6-24-15	
Lead	**10**	6.0	6010C	6-24-15	6-24-15	
Mercury	**ND**	0.30	7471B	6-24-15	6-24-15	
Selenium	**ND**	12	6010C	6-24-15	6-24-15	
Silver	**ND**	1.2	6010C	6-24-15	6-24-15	

Date of Report: June 25, 2015
Samples Submitted: June 23, 2015
Laboratory Reference: 1506-238
Project: WSDOT Signal Fuel Site

TOTAL METALS
EPA 6010C/7471B
METHOD BLANK QUALITY CONTROL

Date Extracted: 6-24-15
Date Analyzed: 6-24-15

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: MB0624SM1&MB0624S1

Analyte	Method	Result	PQL
Arsenic	6010C	**ND**	10
Barium	6010C	**ND**	2.5
Cadmium	6010C	**ND**	0.50
Chromium	6010C	**ND**	0.50
Lead	6010C	**ND**	5.0
Mercury	7471B	**ND**	0.25
Selenium	6010C	**ND**	10
Silver	6010C	**ND**	1.0

Date of Report: June 25, 2015
Samples Submitted: June 23, 2015
Laboratory Reference: 1506-238
Project: WSDOT Signal Fuel Site

TOTAL METALS
EPA 6010C/7471B
DUPLICATE QUALITY CONTROL

Date Extracted: 6-24-15
Date Analyzed: 6-24-15

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: 06-238-01

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Arsenic	**ND**	**ND**	NA	10	
Barium	**26.8**	**26.1**	3	2.5	
Cadmium	**ND**	**ND**	NA	0.50	
Chromium	**31.5**	**27.9**	12	0.50	
Lead	**ND**	**ND**	NA	5.0	
Mercury	**ND**	**ND**	NA	0.25	
Selenium	**ND**	**ND**	NA	10	
Silver	**ND**	**ND**	NA	1.0	

Date of Report: June 25, 2015
Samples Submitted: June 23, 2015
Laboratory Reference: 1506-238
Project: WSDOT Signal Fuel Site

TOTAL METALS
EPA 6010C/7471B
MS/MSD QUALITY CONTROL

Date Extracted: 6-24-15
Date Analyzed: 6-24-15

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: 06-238-01

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Arsenic	100	**92.3**	92	**92.0**	92	0	
Barium	100	**118**	92	**117**	90	1	
Cadmium	50.0	**45.2**	90	**45.2**	90	0	
Chromium	100	**118**	87	**117**	86	1	
Lead	250	**227**	91	**230**	92	1	
Mercury	0.500	**0.448**	90	**0.434**	87	3	
Selenium	100	**94.3**	94	**95.7**	96	2	
Silver	25.0	**21.5**	86	**21.6**	86	0	

Date of Report: June 25, 2015
Samples Submitted: June 23, 2015
Laboratory Reference: 1506-238
Project: WSDOT Signal Fuel Site

% MOISTURE

Date Analyzed: 6-23-15

Client ID	Lab ID	% Moisture
SFS-B1	06-238-01	19
SFS-E	06-238-02	17

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-napthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical ____________.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1- Sample extract treated with a Sulfuric acid/Silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in method 8260C, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

OnSite Environmental Inc.
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Chain of Custody

Page 1 of 1

Laboratory Number: 06-238

Company: WSDOT
Project Number:
Project Name: WSDOT Signal Fuel Site
Project Manager: Trent Ensminger
Sampled by: "

Turnaround Request (in working days)
(Check One)

- [ ] Same Day
- [ ] 1 Day
- [x] 2 Days
- [ ] 3 Days
- [ ] Standard (7 Days) (TPH analysis 5 Days)
- [ ] ______ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Volatiles 8260C	Halogenated Volatiles 8260C	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664A						% Moisture
1	SFS-B1	6/22/15	1440	Soil	6			✓	✓	✓		✓		✓				✓									✓
2	SFS-E	6/23/15	1320	Soil	1			✓	✓	✓		✓		✓				✓									✓

	Signature	Company	Date	Time
Relinquished	[signature]	WSDOT	6/23/15	1354
Received	[signature]	Speedy Msngr	6-23-15	1354
Relinquished	[signature]	" "	" "	1458
Received	[signature]	OnSite Env	6/23/15	1458
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions

Chromatograms with final report ☐

Data Package: Standard ☐ Level III ☐ Level IV ☐ Electronic Data Deliverables (EDDs) ☐ ______

OnSite Environmental Inc.

14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

June 26, 2015

Trent Ensminger
Washington State Department of Transportation
HAZ-MAT
2214 RW Johnson Road SW; MS 47332
Tumwater, WA 98512-6111

Re: Analytical Data for Project Signals Fuel Site
Laboratory Reference No. 1506-191

Dear Trent:

Enclosed are the analytical results and associated quality control data for samples submitted on June 18, 2015.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: June 26, 2015
Samples Submitted: June 18, 2015
Laboratory Reference: 1506-191
Project: Signals Fuel Site

Case Narrative

Samples were collected on June 18, 2015 and received by the laboratory on June 18, 2015. They were maintained at the laboratory at a temperature of 2^oC to 6^oC.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

NWTPH Gx and Volatiles EPA 8260C Analysis

Per EPA Method 5035A, samples were received by the laboratory in pre-weighed 40 mL VOA vials within 48 hours of sample collection. They were stored in a freezer at between -7^oC and -20^oC until extraction or analysis.

Total Metals EPA 6010C/7471B Analysis

Due to the high concentration of Barium in the QC sample, the amount spiked was insufficient for meaningful MS/MSD recovery data. The Spike Blank recovery was 96%.

Please note that any other QA/QC issues associated with these extractions and analyses will be indicated with a footnote reference and discussed in detail on the Data Qualifier page.

Date of Report: June 26, 2015
Samples Submitted: June 18, 2015
Laboratory Reference: 1506-191
Project: Signals Fuel Site

NWTPH-Gx

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-N**					
Laboratory ID:	06-191-01					
Gasoline	**ND**	4.6	NWTPH-Gx	6-18-15	6-18-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*91*	*68-123*				
Client ID:	**SFS-W**					
Laboratory ID:	06-191-02					
Gasoline	**ND**	6.4	NWTPH-Gx	6-18-15	6-18-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*86*	*68-123*				
Client ID:	**SFS-S**					
Laboratory ID:	06-191-03					
Gasoline	**ND**	9.6	NWTPH-Gx	6-18-15	6-18-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*85*	*68-123*				

Date of Report: June 26, 2015
Samples Submitted: June 18, 2015
Laboratory Reference: 1506-191
Project: Signals Fuel Site

NWTPH-Gx
QUALITY CONTROL

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0618S1					
Gasoline	**ND**	5.0	NWTPH-Gx	6-18-15	6-18-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*79*	*68-123*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	06-181-03										
	ORIG	DUP									
Gasoline	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Surrogate:											
Fluorobenzene						*89*	*91*	*68-123*			

Date of Report: June 26, 2015
Samples Submitted: June 18, 2015
Laboratory Reference: 1506-191
Project: Signals Fuel Site

NWTPH-Dx

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-N**					
Laboratory ID:	06-191-01					
Diesel Range Organics	**ND**	31	NWTPH-Dx	6-23-15	6-23-15	
Lube Oil Range Organics	**ND**	62	NWTPH-Dx	6-23-15	6-23-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*62*	*50-150*				
Client ID:	**SFS-W**					
Laboratory ID:	06-191-02					
Diesel Range Organics	**ND**	30	NWTPH-Dx	6-23-15	6-24-15	
Lube Oil	**75**	60	NWTPH-Dx	6-23-15	6-24-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*75*	*50-150*				
Client ID:	**SFS-S**					
Laboratory ID:	06-191-03					
Diesel Fuel #2	**340**	28	NWTPH-Dx	6-23-15	6-23-15	
Lube Oil Range Organics	**ND**	57	NWTPH-Dx	6-23-15	6-23-15	U1
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*70*	*50-150*				

Date of Report: June 26, 2015
Samples Submitted: June 18, 2015
Laboratory Reference: 1506-191
Project: Signals Fuel Site

NWTPH-Dx
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	**Result**	**PQL**	**Method**	**Date Prepared**	**Date Analyzed**	**Flags**
METHOD BLANK						
Laboratory ID:	MB0623S1					
Diesel Range Organics	**ND**	25	NWTPH-Dx	6-23-15	6-23-15	
Lube Oil Range Organics	**ND**	50	NWTPH-Dx	6-23-15	6-23-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
o-Terphenyl	*83*	*50-150*				

Analyte	**Result**		**Spike Level**		**Source Result**	**Percent Recovery**		**Recovery Limits**	**RPD**	**RPD Limit**	**Flags**
DUPLICATE											
Laboratory ID:	06-181-02										
	ORIG	DUP									
Diesel Fuel #2	**28.7**	**ND**	NA	NA		NA		NA	NA	NA	
Lube Oil Range	**ND**	**ND**	NA	NA		NA		NA	NA	NA	
Surrogate:											
o-Terphenyl						*78*	*71*	*50-150*			

Date of Report: June 26, 2015
Samples Submitted: June 18, 2015
Laboratory Reference: 1506-191
Project: Signals Fuel Site

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Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-N**					
Laboratory ID:	06-191-01					
Dichlorodifluoromethane	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
Chloromethane	ND	0.0034	EPA 8260C	6-19-15	6-19-15	
Vinyl Chloride	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
Bromomethane	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
Chloroethane	ND	0.0034	EPA 8260C	6-19-15	6-19-15	
Trichlorofluoromethane	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
1,1-Dichloroethene	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
Acetone	0.0084	0.0069	EPA 8260C	6-19-15	6-19-15	
Iodomethane	ND	0.0034	EPA 8260C	6-19-15	6-19-15	
Carbon Disulfide	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
Methylene Chloride	ND	0.0034	EPA 8260C	6-19-15	6-19-15	
(trans) 1,2-Dichloroethene	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
Methyl t-Butyl Ether	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
1,1-Dichloroethane	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
Vinyl Acetate	ND	0.0034	EPA 8260C	6-19-15	6-19-15	
2,2-Dichloropropane	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
(cis) 1,2-Dichloroethene	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
2-Butanone	ND	0.0034	EPA 8260C	6-19-15	6-19-15	
Bromochloromethane	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
Chloroform	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
1,1,1-Trichloroethane	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
Carbon Tetrachloride	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
1,1-Dichloropropene	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
Benzene	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
1,2-Dichloroethane	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
Trichloroethene	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
1,2-Dichloropropane	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
Dibromomethane	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
Bromodichloromethane	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
2-Chloroethyl Vinyl Ether	ND	0.0034	EPA 8260C	6-19-15	6-19-15	
(cis) 1,3-Dichloropropene	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
Methyl Isobutyl Ketone	ND	0.0034	EPA 8260C	6-19-15	6-19-15	
Toluene	ND	0.0034	EPA 8260C	6-19-15	6-19-15	
(trans) 1,3-Dichloropropene	ND	0.00069	EPA 8260C	6-19-15	6-19-15	

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Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-N**					
Laboratory ID:	06-191-01					
1,1,2-Trichloroethane	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
Tetrachloroethene	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
1,3-Dichloropropane	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
2-Hexanone	ND	0.0034	EPA 8260C	6-19-15	6-19-15	
Dibromochloromethane	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
1,2-Dibromoethane	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
Chlorobenzene	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
1,1,1,2-Tetrachloroethane	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
Ethylbenzene	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
m,p-Xylene	ND	0.0014	EPA 8260C	6-19-15	6-19-15	
o-Xylene	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
Styrene	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
Bromoform	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
Isopropylbenzene	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
Bromobenzene	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
1,1,2,2-Tetrachloroethane	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
1,2,3-Trichloropropane	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
n-Propylbenzene	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
2-Chlorotoluene	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
4-Chlorotoluene	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
1,3,5-Trimethylbenzene	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
tert-Butylbenzene	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
1,2,4-Trimethylbenzene	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
sec-Butylbenzene	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
1,3-Dichlorobenzene	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
p-Isopropyltoluene	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
1,4-Dichlorobenzene	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
1,2-Dichlorobenzene	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
n-Butylbenzene	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
1,2-Dibromo-3-chloropropane	ND	0.0034	EPA 8260C	6-19-15	6-19-15	
1,2,4-Trichlorobenzene	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
Hexachlorobutadiene	ND	0.0034	EPA 8260C	6-19-15	6-19-15	
Naphthalene	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
1,2,3-Trichlorobenzene	ND	0.00069	EPA 8260C	6-19-15	6-19-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*99*	*76-131*				
Toluene-d8	*99*	*82-129*				
4-Bromofluorobenzene	*120*	*79-126*				

Date of Report: June 26, 2015
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Project: Signals Fuel Site

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Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-W**					
Laboratory ID:	06-191-02					
Dichlorodifluoromethane	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
Chloromethane	ND	0.0057	EPA 8260C	6-19-15	6-19-15	
Vinyl Chloride	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
Bromomethane	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
Chloroethane	ND	0.0057	EPA 8260C	6-19-15	6-19-15	
Trichlorofluoromethane	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
1,1-Dichloroethene	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
Acetone	0.012	0.011	EPA 8260C	6-19-15	6-19-15	
Iodomethane	ND	0.0057	EPA 8260C	6-19-15	6-19-15	
Carbon Disulfide	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
Methylene Chloride	ND	0.0057	EPA 8260C	6-19-15	6-19-15	
(trans) 1,2-Dichloroethene	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
Methyl t-Butyl Ether	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
1,1-Dichloroethane	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
Vinyl Acetate	ND	0.0057	EPA 8260C	6-19-15	6-19-15	
2,2-Dichloropropane	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
(cis) 1,2-Dichloroethene	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
2-Butanone	ND	0.0057	EPA 8260C	6-19-15	6-19-15	
Bromochloromethane	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
Chloroform	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
1,1,1-Trichloroethane	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
Carbon Tetrachloride	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
1,1-Dichloropropene	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
Benzene	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
1,2-Dichloroethane	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
Trichloroethene	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
1,2-Dichloropropane	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
Dibromomethane	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
Bromodichloromethane	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
2-Chloroethyl Vinyl Ether	ND	0.0057	EPA 8260C	6-19-15	6-19-15	
(cis) 1,3-Dichloropropene	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
Methyl Isobutyl Ketone	ND	0.0057	EPA 8260C	6-19-15	6-19-15	
Toluene	ND	0.0057	EPA 8260C	6-19-15	6-19-15	
(trans) 1,3-Dichloropropene	ND	0.0011	EPA 8260C	6-19-15	6-19-15	

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Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-W**					
Laboratory ID:	06-191-02					
1,1,2-Trichloroethane	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
Tetrachloroethene	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
1,3-Dichloropropane	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
2-Hexanone	ND	0.0057	EPA 8260C	6-19-15	6-19-15	
Dibromochloromethane	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
1,2-Dibromoethane	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
Chlorobenzene	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
1,1,1,2-Tetrachloroethane	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
Ethylbenzene	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
m,p-Xylene	ND	0.0023	EPA 8260C	6-19-15	6-19-15	
o-Xylene	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
Styrene	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
Bromoform	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
Isopropylbenzene	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
Bromobenzene	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
1,1,2,2-Tetrachloroethane	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
1,2,3-Trichloropropane	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
n-Propylbenzene	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
2-Chlorotoluene	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
4-Chlorotoluene	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
1,3,5-Trimethylbenzene	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
tert-Butylbenzene	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
1,2,4-Trimethylbenzene	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
sec-Butylbenzene	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
1,3-Dichlorobenzene	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
p-Isopropyltoluene	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
1,4-Dichlorobenzene	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
1,2-Dichlorobenzene	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
n-Butylbenzene	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
1,2-Dibromo-3-chloropropane	ND	0.0057	EPA 8260C	6-19-15	6-19-15	
1,2,4-Trichlorobenzene	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
Hexachlorobutadiene	ND	0.0057	EPA 8260C	6-19-15	6-19-15	
Naphthalene	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
1,2,3-Trichlorobenzene	ND	0.0011	EPA 8260C	6-19-15	6-19-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*102*	*76-131*				
Toluene-d8	*102*	*82-129*				
4-Bromofluorobenzene	*124*	*79-126*				

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Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-S**					
Laboratory ID:	06-191-03					
Dichlorodifluoromethane	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
Chloromethane	ND	0.0043	EPA 8260C	6-19-15	6-19-15	
Vinyl Chloride	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
Bromomethane	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
Chloroethane	ND	0.0043	EPA 8260C	6-19-15	6-19-15	
Trichlorofluoromethane	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
1,1-Dichloroethene	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
Acetone	ND	0.0086	EPA 8260C	6-19-15	6-19-15	
Iodomethane	ND	0.0043	EPA 8260C	6-19-15	6-19-15	
Carbon Disulfide	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
Methylene Chloride	ND	0.0043	EPA 8260C	6-19-15	6-19-15	
(trans) 1,2-Dichloroethene	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
Methyl t-Butyl Ether	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
1,1-Dichloroethane	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
Vinyl Acetate	ND	0.0043	EPA 8260C	6-19-15	6-19-15	
2,2-Dichloropropane	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
(cis) 1,2-Dichloroethene	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
2-Butanone	ND	0.0043	EPA 8260C	6-19-15	6-19-15	
Bromochloromethane	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
Chloroform	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
1,1,1-Trichloroethane	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
Carbon Tetrachloride	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
1,1-Dichloropropene	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
Benzene	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
1,2-Dichloroethane	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
Trichloroethene	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
1,2-Dichloropropane	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
Dibromomethane	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
Bromodichloromethane	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
2-Chloroethyl Vinyl Ether	ND	0.0043	EPA 8260C	6-19-15	6-19-15	
(cis) 1,3-Dichloropropene	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
Methyl Isobutyl Ketone	ND	0.0043	EPA 8260C	6-19-15	6-19-15	
Toluene	ND	0.0043	EPA 8260C	6-19-15	6-19-15	
(trans) 1,3-Dichloropropene	ND	0.00086	EPA 8260C	6-19-15	6-19-15	

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Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-S**					
Laboratory ID:	06-191-03					
1,1,2-Trichloroethane	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
Tetrachloroethene	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
1,3-Dichloropropane	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
2-Hexanone	ND	0.0043	EPA 8260C	6-19-15	6-19-15	
Dibromochloromethane	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
1,2-Dibromoethane	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
Chlorobenzene	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
1,1,1,2-Tetrachloroethane	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
Ethylbenzene	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
m,p-Xylene	ND	0.0017	EPA 8260C	6-19-15	6-19-15	
o-Xylene	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
Styrene	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
Bromoform	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
Isopropylbenzene	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
Bromobenzene	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
1,1,2,2-Tetrachloroethane	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
1,2,3-Trichloropropane	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
n-Propylbenzene	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
2-Chlorotoluene	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
4-Chlorotoluene	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
1,3,5-Trimethylbenzene	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
tert-Butylbenzene	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
1,2,4-Trimethylbenzene	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
sec-Butylbenzene	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
1,3-Dichlorobenzene	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
p-Isopropyltoluene	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
1,4-Dichlorobenzene	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
1,2-Dichlorobenzene	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
n-Butylbenzene	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
1,2-Dibromo-3-chloropropane	ND	0.0043	EPA 8260C	6-19-15	6-19-15	
1,2,4-Trichlorobenzene	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
Hexachlorobutadiene	ND	0.0043	EPA 8260C	6-19-15	6-19-15	
Naphthalene	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
1,2,3-Trichlorobenzene	ND	0.00086	EPA 8260C	6-19-15	6-19-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*88*	*76-131*				
Toluene-d8	*93*	*82-129*				
4-Bromofluorobenzene	*117*	*79-126*				

Date of Report: June 26, 2015
Samples Submitted: June 18, 2015
Laboratory Reference: 1506-191
Project: Signals Fuel Site

VOLATILES by EPA 8260C
METHOD BLANK QUALITY CONTROL
page 1 of 2

Matrix: Soil
Units: mg/kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0619S1					
Dichlorodifluoromethane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Chloromethane	ND	0.0050	EPA 8260C	6-19-15	6-19-15	
Vinyl Chloride	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Bromomethane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Chloroethane	ND	0.0050	EPA 8260C	6-19-15	6-19-15	
Trichlorofluoromethane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,1-Dichloroethene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Acetone	ND	0.010	EPA 8260C	6-19-15	6-19-15	
Iodomethane	ND	0.0050	EPA 8260C	6-19-15	6-19-15	
Carbon Disulfide	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Methylene Chloride	ND	0.0050	EPA 8260C	6-19-15	6-19-15	
(trans) 1,2-Dichloroethene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Methyl t-Butyl Ether	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,1-Dichloroethane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Vinyl Acetate	ND	0.0050	EPA 8260C	6-19-15	6-19-15	
2,2-Dichloropropane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
(cis) 1,2-Dichloroethene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
2-Butanone	ND	0.0050	EPA 8260C	6-19-15	6-19-15	
Bromochloromethane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Chloroform	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,1,1-Trichloroethane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Carbon Tetrachloride	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,1-Dichloropropene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Benzene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,2-Dichloroethane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Trichloroethene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,2-Dichloropropane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Dibromomethane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Bromodichloromethane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
2-Chloroethyl Vinyl Ether	ND	0.0050	EPA 8260C	6-19-15	6-19-15	
(cis) 1,3-Dichloropropene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Methyl Isobutyl Ketone	ND	0.0050	EPA 8260C	6-19-15	6-19-15	
Toluene	ND	0.0050	EPA 8260C	6-19-15	6-19-15	
(trans) 1,3-Dichloropropene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	

Date of Report: June 26, 2015
Samples Submitted: June 18, 2015
Laboratory Reference: 1506-191
Project: Signals Fuel Site

VOLATILES by EPA 8260C
METHOD BLANK QUALITY CONTROL
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Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0619S1					
1,1,2-Trichloroethane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Tetrachloroethene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,3-Dichloropropane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
2-Hexanone	ND	0.0050	EPA 8260C	6-19-15	6-19-15	
Dibromochloromethane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,2-Dibromoethane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Chlorobenzene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,1,1,2-Tetrachloroethane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Ethylbenzene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
m,p-Xylene	ND	0.0020	EPA 8260C	6-19-15	6-19-15	
o-Xylene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Styrene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Bromoform	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Isopropylbenzene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Bromobenzene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,1,2,2-Tetrachloroethane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,2,3-Trichloropropane	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
n-Propylbenzene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
2-Chlorotoluene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
4-Chlorotoluene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,3,5-Trimethylbenzene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
tert-Butylbenzene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,2,4-Trimethylbenzene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
sec-Butylbenzene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,3-Dichlorobenzene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
p-Isopropyltoluene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,4-Dichlorobenzene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,2-Dichlorobenzene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
n-Butylbenzene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,2-Dibromo-3-chloropropane	ND	0.0050	EPA 8260C	6-19-15	6-19-15	
1,2,4-Trichlorobenzene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Hexachlorobutadiene	ND	0.0050	EPA 8260C	6-19-15	6-19-15	
Naphthalene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
1,2,3-Trichlorobenzene	ND	0.0010	EPA 8260C	6-19-15	6-19-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
Dibromofluoromethane	*90*	*76-131*				
Toluene-d8	*94*	*82-129*				
4-Bromofluorobenzene	*117*	*79-126*				

Date of Report: June 26, 2015
Samples Submitted: June 18, 2015
Laboratory Reference: 1506-191
Project: Signals Fuel Site

VOLATILES by EPA 8260C
SB/SBD QUALITY CONTROL

Matrix: Soil
Units: mg/kg

Analyte	Result		Spike Level		Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
SPIKE BLANKS										
Laboratory ID:	SB0619S1									
	SB	SBD	SB	SBD	SB	SBD				
1,1-Dichloroethene	**0.0449**	**0.0436**	0.0500	0.0500	90	87	66-129	3	15	
Benzene	**0.0481**	**0.0477**	0.0500	0.0500	96	95	71-123	1	15	
Trichloroethene	**0.0463**	**0.0460**	0.0500	0.0500	93	92	75-115	1	15	
Toluene	**0.0483**	**0.0471**	0.0500	0.0500	97	94	75-120	3	15	
Chlorobenzene	**0.0472**	**0.0458**	0.0500	0.0500	94	92	75-121	3	15	
Surrogate:										
Dibromofluoromethane					*88*	*88*	*76-131*			
Toluene-d8					*90*	*88*	*82-129*			
4-Bromofluorobenzene					*110*	*111*	*79-126*			

Date of Report: June 26, 2015
Samples Submitted: June 18, 2015
Laboratory Reference: 1506-191
Project: Signals Fuel Site

SEMIVOLATILES EPA 8270D/SIM
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Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-N**					
Laboratory ID:	06-191-01					
n-Nitrosodimethylamine	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Pyridine	**ND**	0.41	EPA 8270D	6-23-15	6-24-15	
Phenol	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Aniline	**ND**	0.21	EPA 8270D	6-23-15	6-24-15	
bis(2-Chloroethyl)ether	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
2-Chlorophenol	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
1,3-Dichlorobenzene	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
1,4-Dichlorobenzene	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Benzyl alcohol	**ND**	0.21	EPA 8270D	6-23-15	6-24-15	
1,2-Dichlorobenzene	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
2-Methylphenol (o-Cresol)	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
bis(2-Chloroisopropyl)ether	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
(3+4)-Methylphenol (m,p-Cresol)	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
n-Nitroso-di-n-propylamine	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Hexachloroethane	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Nitrobenzene	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Isophorone	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
2-Nitrophenol	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
2,4-Dimethylphenol	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
bis(2-Chloroethoxy)methane	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
2,4-Dichlorophenol	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
1,2,4-Trichlorobenzene	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Naphthalene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-23-15	
4-Chloroaniline	**ND**	0.21	EPA 8270D	6-23-15	6-24-15	
Hexachlorobutadiene	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
4-Chloro-3-methylphenol	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
2-Methylnaphthalene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-23-15	
1-Methylnaphthalene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-23-15	
Hexachlorocyclopentadiene	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
2,4,6-Trichlorophenol	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
2,3-Dichloroaniline	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
2,4,5-Trichlorophenol	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
2-Chloronaphthalene	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
2-Nitroaniline	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
1,4-Dinitrobenzene	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Dimethylphthalate	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
1,3-Dinitrobenzene	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
2,6-Dinitrotoluene	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
1,2-Dinitrobenzene	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Acenaphthylene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-23-15	
3-Nitroaniline	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	

Date of Report: June 26, 2015
Samples Submitted: June 18, 2015
Laboratory Reference: 1506-191
Project: Signals Fuel Site

SEMIVOLATILES EPA 8270D/SIM
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Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-N**					
Laboratory ID:	06-191-01					
2,4-Dinitrophenol	**ND**	0.21	EPA 8270D	6-23-15	6-24-15	
Acenaphthene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-23-15	
4-Nitrophenol	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
2,4-Dinitrotoluene	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Dibenzofuran	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
2,3,5,6-Tetrachlorophenol	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
2,3,4,6-Tetrachlorophenol	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Diethylphthalate	**ND**	0.21	EPA 8270D	6-23-15	6-24-15	
4-Chlorophenyl-phenylether	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
4-Nitroaniline	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Fluorene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-23-15	
4,6-Dinitro-2-methylphenol	**ND**	0.21	EPA 8270D	6-23-15	6-24-15	
n-Nitrosodiphenylamine	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
1,2-Diphenylhydrazine	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
4-Bromophenyl-phenylether	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Hexachlorobenzene	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Pentachlorophenol	**ND**	0.21	EPA 8270D	6-23-15	6-24-15	
Phenanthrene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-23-15	
Anthracene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-23-15	
Carbazole	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Di-n-butylphthalate	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Fluoranthene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-23-15	
Benzidine	**ND**	0.41	EPA 8270D	6-23-15	6-24-15	
Pyrene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-23-15	
Butylbenzylphthalate	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
bis-2-Ethylhexyladipate	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
3,3'-Dichlorobenzidine	**ND**	0.21	EPA 8270D	6-23-15	6-24-15	
Benzo[a]anthracene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-23-15	
Chrysene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-23-15	
bis(2-Ethylhexyl)phthalate	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Di-n-octylphthalate	**ND**	0.041	EPA 8270D	6-23-15	6-24-15	
Benzo[b]fluoranthene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-23-15	
Benzo(j,k)fluoranthene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-23-15	
Benzo[a]pyrene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-23-15	
Indeno[1,2,3-cd]pyrene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-23-15	
Dibenz[a,h]anthracene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-23-15	
Benzo[g,h,i]perylene	**ND**	0.0083	EPA 8270D/SIM	6-23-15	6-23-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorophenol	*77*	*31 - 110*				
Phenol-d6	*78*	*34 - 109*				
Nitrobenzene-d5	*73*	*30 - 109*				
2-Fluorobiphenyl	*76*	*39 - 103*				
2,4,6-Tribromophenol	*81*	*25 - 120*				
Terphenyl-d14	*76*	*40 - 117*				

Date of Report: June 26, 2015
Samples Submitted: June 18, 2015
Laboratory Reference: 1506-191
Project: Signals Fuel Site

SEMIVOLATILES EPA 8270D/SIM
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Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-W**					
Laboratory ID:	06-191-02					
n-Nitrosodimethylamine	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Pyridine	**ND**	0.40	EPA 8270D	6-23-15	6-24-15	
Phenol	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Aniline	**ND**	0.20	EPA 8270D	6-23-15	6-24-15	
bis(2-Chloroethyl)ether	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
2-Chlorophenol	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
1,3-Dichlorobenzene	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
1,4-Dichlorobenzene	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Benzyl alcohol	**ND**	0.20	EPA 8270D	6-23-15	6-24-15	
1,2-Dichlorobenzene	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
2-Methylphenol (o-Cresol)	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
bis(2-Chloroisopropyl)ether	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
(3+4)-Methylphenol (m,p-Cresol)	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
n-Nitroso-di-n-propylamine	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Hexachloroethane	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Nitrobenzene	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Isophorone	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
2-Nitrophenol	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
2,4-Dimethylphenol	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
bis(2-Chloroethoxy)methane	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
2,4-Dichlorophenol	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
1,2,4-Trichlorobenzene	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Naphthalene	**0.010**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
4-Chloroaniline	**ND**	0.20	EPA 8270D	6-23-15	6-24-15	
Hexachlorobutadiene	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
4-Chloro-3-methylphenol	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
2-Methylnaphthalene	**0.019**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
1-Methylnaphthalene	**0.014**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
Hexachlorocyclopentadiene	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
2,4,6-Trichlorophenol	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
2,3-Dichloroaniline	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
2,4,5-Trichlorophenol	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
2-Chloronaphthalene	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
2-Nitroaniline	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
1,4-Dinitrobenzene	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Dimethylphthalate	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
1,3-Dinitrobenzene	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
2,6-Dinitrotoluene	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
1,2-Dinitrobenzene	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Acenaphthylene	**ND**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
3-Nitroaniline	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	

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Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-W**					
Laboratory ID:	06-191-02					
2,4-Dinitrophenol	**ND**	0.20	EPA 8270D	6-23-15	6-24-15	
Acenaphthene	**ND**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
4-Nitrophenol	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
2,4-Dinitrotoluene	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Dibenzofuran	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
2,3,5,6-Tetrachlorophenol	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
2,3,4,6-Tetrachlorophenol	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Diethylphthalate	**ND**	0.20	EPA 8270D	6-23-15	6-24-15	
4-Chlorophenyl-phenylether	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
4-Nitroaniline	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Fluorene	**ND**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
4,6-Dinitro-2-methylphenol	**ND**	0.20	EPA 8270D	6-23-15	6-24-15	
n-Nitrosodiphenylamine	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
1,2-Diphenylhydrazine	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
4-Bromophenyl-phenylether	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Hexachlorobenzene	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Pentachlorophenol	**ND**	0.20	EPA 8270D	6-23-15	6-24-15	
Phenanthrene	**0.018**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
Anthracene	**ND**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
Carbazole	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Di-n-butylphthalate	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Fluoranthene	**0.011**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
Benzidine	**ND**	0.40	EPA 8270D	6-23-15	6-24-15	
Pyrene	**0.013**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
Butylbenzylphthalate	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
bis-2-Ethylhexyladipate	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
3,3'-Dichlorobenzidine	**ND**	0.20	EPA 8270D	6-23-15	6-24-15	
Benzo[a]anthracene	**ND**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
Chrysene	**0.0082**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
bis(2-Ethylhexyl)phthalate	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Di-n-octylphthalate	**ND**	0.040	EPA 8270D	6-23-15	6-24-15	
Benzo[b]fluoranthene	**0.0091**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
Benzo(j,k)fluoranthene	**ND**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
Benzo[a]pyrene	**ND**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
Indeno[1,2,3-cd]pyrene	**ND**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
Dibenz[a,h]anthracene	**ND**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
Benzo[g,h,i]perylene	**ND**	0.0080	EPA 8270D/SIM	6-23-15	6-24-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorophenol	*67*	*31 - 110*				
Phenol-d6	*69*	*34 - 109*				
Nitrobenzene-d5	*63*	*30 - 109*				
2-Fluorobiphenyl	*66*	*39 - 103*				
2,4,6-Tribromophenol	*63*	*25 - 120*				
Terphenyl-d14	*71*	*40 - 117*				

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Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-S**					
Laboratory ID:	06-191-03					
n-Nitrosodimethylamine	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
Pyridine	**ND**	0.38	EPA 8270D	6-23-15	6-24-15	
Phenol	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
Aniline	**ND**	0.19	EPA 8270D	6-23-15	6-24-15	
bis(2-Chloroethyl)ether	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
2-Chlorophenol	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
1,3-Dichlorobenzene	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
1,4-Dichlorobenzene	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
Benzyl alcohol	**ND**	0.19	EPA 8270D	6-23-15	6-24-15	
1,2-Dichlorobenzene	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
2-Methylphenol (o-Cresol)	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
bis(2-Chloroisopropyl)ether	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
(3+4)-Methylphenol (m,p-Cresol)	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
n-Nitroso-di-n-propylamine	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
Hexachloroethane	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
Nitrobenzene	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
Isophorone	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
2-Nitrophenol	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
2,4-Dimethylphenol	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
bis(2-Chloroethoxy)methane	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
2,4-Dichlorophenol	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
1,2,4-Trichlorobenzene	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
Naphthalene	**ND**	0.0075	EPA 8270D/SIM	6-23-15	6-24-15	
4-Chloroaniline	**ND**	0.19	EPA 8270D	6-23-15	6-24-15	
Hexachlorobutadiene	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
4-Chloro-3-methylphenol	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
2-Methylnaphthalene	**ND**	0.0075	EPA 8270D/SIM	6-23-15	6-24-15	
1-Methylnaphthalene	**ND**	0.0075	EPA 8270D/SIM	6-23-15	6-24-15	
Hexachlorocyclopentadiene	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
2,4,6-Trichlorophenol	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
2,3-Dichloroaniline	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
2,4,5-Trichlorophenol	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
2-Chloronaphthalene	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
2-Nitroaniline	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
1,4-Dinitrobenzene	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
Dimethylphthalate	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
1,3-Dinitrobenzene	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
2,6-Dinitrotoluene	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
1,2-Dinitrobenzene	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
Acenaphthylene	**ND**	0.0075	EPA 8270D/SIM	6-23-15	6-24-15	
3-Nitroaniline	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	

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Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-S**					
Laboratory ID:	06-191-03					
2,4-Dinitrophenol	**ND**	0.19	EPA 8270D	6-23-15	6-24-15	
Acenaphthene	**ND**	0.0075	EPA 8270D/SIM	6-23-15	6-24-15	
4-Nitrophenol	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
2,4-Dinitrotoluene	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
Dibenzofuran	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
2,3,5,6-Tetrachlorophenol	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
2,3,4,6-Tetrachlorophenol	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
Diethylphthalate	**ND**	0.19	EPA 8270D	6-23-15	6-24-15	
4-Chlorophenyl-phenylether	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
4-Nitroaniline	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
Fluorene	**ND**	0.0075	EPA 8270D/SIM	6-23-15	6-24-15	
4,6-Dinitro-2-methylphenol	**ND**	0.19	EPA 8270D	6-23-15	6-24-15	
n-Nitrosodiphenylamine	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
1,2-Diphenylhydrazine	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
4-Bromophenyl-phenylether	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
Hexachlorobenzene	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
Pentachlorophenol	**ND**	0.19	EPA 8270D	6-23-15	6-24-15	
Phenanthrene	**ND**	0.0075	EPA 8270D/SIM	6-23-15	6-24-15	
Anthracene	**0.015**	0.0075	EPA 8270D/SIM	6-23-15	6-24-15	
Carbazole	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
Di-n-butylphthalate	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
Fluoranthene	**ND**	0.0075	EPA 8270D/SIM	6-23-15	6-24-15	
Benzidine	**ND**	0.38	EPA 8270D	6-23-15	6-24-15	
Pyrene	**0.012**	0.0075	EPA 8270D/SIM	6-23-15	6-24-15	
Butylbenzylphthalate	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
bis-2-Ethylhexyladipate	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
3,3'-Dichlorobenzidine	**ND**	0.19	EPA 8270D	6-23-15	6-24-15	
Benzo[a]anthracene	**ND**	0.0075	EPA 8270D/SIM	6-23-15	6-24-15	
Chrysene	**ND**	0.0075	EPA 8270D/SIM	6-23-15	6-24-15	
bis(2-Ethylhexyl)phthalate	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
Di-n-octylphthalate	**ND**	0.038	EPA 8270D	6-23-15	6-24-15	
Benzo[b]fluoranthene	**ND**	0.0075	EPA 8270D/SIM	6-23-15	6-24-15	
Benzo(j,k)fluoranthene	**ND**	0.0075	EPA 8270D/SIM	6-23-15	6-24-15	
Benzo[a]pyrene	**ND**	0.0075	EPA 8270D/SIM	6-23-15	6-24-15	
Indeno[1,2,3-cd]pyrene	**ND**	0.0075	EPA 8270D/SIM	6-23-15	6-24-15	
Dibenz[a,h]anthracene	**ND**	0.0075	EPA 8270D/SIM	6-23-15	6-24-15	
Benzo[g,h,i]perylene	**ND**	0.0075	EPA 8270D/SIM	6-23-15	6-24-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorophenol	*84*	*31 - 110*				
Phenol-d6	*86*	*34 - 109*				
Nitrobenzene-d5	*79*	*30 - 109*				
2-Fluorobiphenyl	*81*	*39 - 103*				
2,4,6-Tribromophenol	*103*	*25 - 120*				
Terphenyl-d14	*86*	*40 - 117*				

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Matrix: Soil
Units: mg/Kg

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0623S1					
n-Nitrosodimethylamine	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Pyridine	**ND**	0.33	EPA 8270D	6-23-15	6-23-15	
Phenol	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Aniline	**ND**	0.17	EPA 8270D	6-23-15	6-23-15	
bis(2-Chloroethyl)ether	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
2-Chlorophenol	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
1,3-Dichlorobenzene	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
1,4-Dichlorobenzene	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Benzyl alcohol	**ND**	0.17	EPA 8270D	6-23-15	6-23-15	
1,2-Dichlorobenzene	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
2-Methylphenol (o-Cresol)	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
bis(2-Chloroisopropyl)ether	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
(3+4)-Methylphenol (m,p-Cresol)	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
n-Nitroso-di-n-propylamine	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Hexachloroethane	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Nitrobenzene	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Isophorone	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
2-Nitrophenol	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
2,4-Dimethylphenol	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
bis(2-Chloroethoxy)methane	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
2,4-Dichlorophenol	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
1,2,4-Trichlorobenzene	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Naphthalene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
4-Chloroaniline	**ND**	0.17	EPA 8270D	6-23-15	6-23-15	
Hexachlorobutadiene	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
4-Chloro-3-methylphenol	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
2-Methylnaphthalene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
1-Methylnaphthalene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
Hexachlorocyclopentadiene	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
2,4,6-Trichlorophenol	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
2,3-Dichloroaniline	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
2,4,5-Trichlorophenol	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
2-Chloronaphthalene	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
2-Nitroaniline	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
1,4-Dinitrobenzene	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Dimethylphthalate	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
1,3-Dinitrobenzene	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
2,6-Dinitrotoluene	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
1,2-Dinitrobenzene	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Acenaphthylene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
3-Nitroaniline	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	

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Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Laboratory ID:	MB0623S1					
2,4-Dinitrophenol	**ND**	0.17	EPA 8270D	6-23-15	6-23-15	
Acenaphthene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
4-Nitrophenol	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
2,4-Dinitrotoluene	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Dibenzofuran	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
2,3,5,6-Tetrachlorophenol	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
2,3,4,6-Tetrachlorophenol	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Diethylphthalate	**ND**	0.17	EPA 8270D	6-23-15	6-23-15	
4-Chlorophenyl-phenylether	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
4-Nitroaniline	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Fluorene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
4,6-Dinitro-2-methylphenol	**ND**	0.17	EPA 8270D	6-23-15	6-23-15	
n-Nitrosodiphenylamine	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
1,2-Diphenylhydrazine	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
4-Bromophenyl-phenylether	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Hexachlorobenzene	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Pentachlorophenol	**ND**	0.17	EPA 8270D	6-23-15	6-23-15	
Phenanthrene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
Anthracene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
Carbazole	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Di-n-butylphthalate	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Fluoranthene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
Benzidine	**ND**	0.33	EPA 8270D	6-23-15	6-23-15	
Pyrene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
Butylbenzylphthalate	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
bis-2-Ethylhexyladipate	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
3,3'-Dichlorobenzidine	**ND**	0.17	EPA 8270D	6-23-15	6-23-15	
Benzo[a]anthracene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
Chrysene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
bis(2-Ethylhexyl)phthalate	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Di-n-octylphthalate	**ND**	0.033	EPA 8270D	6-23-15	6-23-15	
Benzo[b]fluoranthene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
Benzo(j,k)fluoranthene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
Benzo[a]pyrene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
Indeno[1,2,3-cd]pyrene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
Dibenz[a,h]anthracene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
Benzo[g,h,i]perylene	**ND**	0.0067	EPA 8270D/SIM	6-23-15	6-23-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
2-Fluorophenol	*82*	*31 - 110*				
Phenol-d6	*84*	*34 - 109*				
Nitrobenzene-d5	*81*	*30 - 109*				
2-Fluorobiphenyl	*79*	*39 - 103*				
2,4,6-Tribromophenol	*89*	*25 - 120*				
Terphenyl-d14	*87*	*40 - 117*				

Date of Report: June 26, 2015
Samples Submitted: June 18, 2015
Laboratory Reference: 1506-191
Project: Signals Fuel Site

SEMIVOLATILES EPA 8270D/SIM
MS/MSD QUALITY CONTROL

Matrix: Soil
Units: mg/Kg

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
MATRIX SPIKES											
Laboratory ID:	06-181-01										
	MS	MSD	MS	MSD		MS	MSD				
Phenol	**0.938**	**1.06**	1.33	1.33	ND	71	80	33 - 111	12	33	
2-Chlorophenol	**0.929**	**1.11**	1.33	1.33	ND	70	83	34 - 107	18	39	
1,4-Dichlorobenzene	**0.475**	**0.608**	0.667	0.667	0.0518	63	83	35 - 106	25	39	
n-Nitroso-di-n-propylamine	**0.473**	**0.523**	0.667	0.667	ND	71	78	34 - 106	10	33	
1,2,4-Trichlorobenzene	**0.500**	**0.591**	0.667	0.667	ND	75	89	35 - 106	17	39	
4-Chloro-3-methylphenol	**1.12**	**1.16**	1.33	1.33	ND	84	87	44 - 114	4	22	
Acenaphthene	**0.479**	**0.499**	0.667	0.667	ND	72	75	37 - 108	4	25	
4-Nitrophenol	**1.24**	**1.20**	1.33	1.33	ND	93	90	35 - 111	3	24	
2,4-Dinitrotoluene	**0.535**	**0.544**	0.667	0.667	ND	80	82	33 - 113	2	23	
Pentachlorophenol	**1.26**	**1.23**	1.33	1.33	ND	95	92	25 - 110	2	34	
Pyrene	**0.535**	**0.537**	0.667	0.667	ND	80	81	37 - 120	0	36	
Surrogate:											
2-Fluorophenol						*73*	*83*	*31 - 110*			
Phenol-d6						*75*	*84*	*34 - 109*			
Nitrobenzene-d5						*68*	*79*	*30 - 109*			
2-Fluorobiphenyl						*75*	*78*	*39 - 103*			
2,4,6-Tribromophenol						*93*	*91*	*25 - 120*			
Terphenyl-d14						*83*	*83*	*40 - 117*			

Date of Report: June 26, 2015
Samples Submitted: June 18, 2015
Laboratory Reference: 1506-191
Project: Signals Fuel Site

PCBs
EPA 8082A

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SFS-N**					
Laboratory ID:	06-191-01					
Aroclor 1016	**ND**	0.062	EPA 8082A	6-23-15	6-23-15	
Aroclor 1221	**ND**	0.062	EPA 8082A	6-23-15	6-23-15	
Aroclor 1232	**ND**	0.062	EPA 8082A	6-23-15	6-23-15	
Aroclor 1242	**ND**	0.062	EPA 8082A	6-23-15	6-23-15	
Aroclor 1248	**ND**	0.062	EPA 8082A	6-23-15	6-23-15	
Aroclor 1254	**ND**	0.062	EPA 8082A	6-23-15	6-23-15	
Aroclor 1260	**ND**	0.062	EPA 8082A	6-23-15	6-23-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
DCB	*86*	*55-140*				
Client ID:	**SFS-W**					
Laboratory ID:	06-191-02					
Aroclor 1016	**ND**	0.060	EPA 8082A	6-23-15	6-23-15	
Aroclor 1221	**ND**	0.060	EPA 8082A	6-23-15	6-23-15	
Aroclor 1232	**ND**	0.060	EPA 8082A	6-23-15	6-23-15	
Aroclor 1242	**ND**	0.060	EPA 8082A	6-23-15	6-23-15	
Aroclor 1248	**ND**	0.060	EPA 8082A	6-23-15	6-23-15	
Aroclor 1254	**ND**	0.060	EPA 8082A	6-23-15	6-23-15	
Aroclor 1260	**ND**	0.060	EPA 8082A	6-23-15	6-23-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
DCB	*85*	*55-140*				
Client ID:	**SFS-S**					
Laboratory ID:	06-191-03					
Aroclor 1016	**ND**	0.056	EPA 8082A	6-23-15	6-23-15	
Aroclor 1221	**ND**	0.056	EPA 8082A	6-23-15	6-23-15	
Aroclor 1232	**ND**	0.056	EPA 8082A	6-23-15	6-23-15	
Aroclor 1242	**ND**	0.056	EPA 8082A	6-23-15	6-23-15	
Aroclor 1248	**ND**	0.056	EPA 8082A	6-23-15	6-23-15	
Aroclor 1254	**ND**	0.056	EPA 8082A	6-23-15	6-23-15	
Aroclor 1260	**ND**	0.056	EPA 8082A	6-23-15	6-23-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
DCB	*95*	*55-140*				

Date of Report: June 26, 2015
Samples Submitted: June 18, 2015
Laboratory Reference: 1506-191
Project: Signals Fuel Site

PCBs EPA 8082A
QUALITY CONTROL

Matrix: Soil
Units: mg/Kg (ppm)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0623S1					
Aroclor 1016	**ND**	0.050	EPA 8082A	6-23-15	6-23-15	
Aroclor 1221	**ND**	0.050	EPA 8082A	6-23-15	6-23-15	
Aroclor 1232	**ND**	0.050	EPA 8082A	6-23-15	6-23-15	
Aroclor 1242	**ND**	0.050	EPA 8082A	6-23-15	6-23-15	
Aroclor 1248	**ND**	0.050	EPA 8082A	6-23-15	6-23-15	
Aroclor 1254	**ND**	0.050	EPA 8082A	6-23-15	6-23-15	
Aroclor 1260	**ND**	0.050	EPA 8082A	6-23-15	6-23-15	
Surrogate:	*Percent Recovery*	*Control Limits*				
DCB	*104*	*55-140*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
MATRIX SPIKES											
Laboratory ID:	06-167-02										
	MS	MSD	MS	MSD		MS	MSD				
Aroclor 1260	**0.373**	**0.398**	0.500	0.500	ND	**75**	**80**	46-136	6	17	
Surrogate:											
DCB						*80*	*92*	*55-140*			

Date of Report: June 26, 2015
Samples Submitted: June 18, 2015
Laboratory Reference: 1506-191
Project: Signals Fuel Site

TOTAL METALS
EPA 6010C/7471B

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	06-191-01					
Client ID:	**SFS-N**					
Arsenic	**ND**	12	6010C	6-18-15	6-18-15	
Barium	**59**	3.1	6010C	6-18-15	6-18-15	
Cadmium	**ND**	0.62	6010C	6-18-15	6-18-15	
Chromium	**37**	0.62	6010C	6-18-15	6-18-15	
Lead	**ND**	6.2	6010C	6-18-15	6-18-15	
Mercury	**ND**	0.31	7471B	6-25-15	6-25-15	
Selenium	**ND**	12	6010C	6-18-15	6-18-15	
Silver	**ND**	1.2	6010C	6-18-15	6-18-15	
Lab ID:	06-191-02					
Client ID:	**SFS-W**					
Arsenic	**ND**	12	6010C	6-18-15	6-18-15	
Barium	**120**	3.0	6010C	6-18-15	6-18-15	
Cadmium	**ND**	0.60	6010C	6-18-15	6-18-15	
Chromium	**69**	0.60	6010C	6-18-15	6-18-15	
Lead	**6.2**	6.0	6010C	6-18-15	6-18-15	
Mercury	**ND**	0.30	7471B	6-25-15	6-25-15	
Selenium	**ND**	12	6010C	6-18-15	6-18-15	
Silver	**ND**	1.2	6010C	6-18-15	6-18-15	

Date of Report: June 26, 2015
Samples Submitted: June 18, 2015
Laboratory Reference: 1506-191
Project: Signals Fuel Site

TOTAL METALS
EPA 6010C/7471B

Matrix: Soil
Units: mg/kg (ppm)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	06-191-03					
Client ID:	**SFS-S**					
Arsenic	**ND**	11	6010C	6-18-15	6-18-15	
Barium	**27**	2.8	6010C	6-18-15	6-18-15	
Cadmium	**ND**	0.56	6010C	6-18-15	6-18-15	
Chromium	**14**	0.56	6010C	6-18-15	6-18-15	
Lead	**ND**	5.6	6010C	6-18-15	6-18-15	
Mercury	**ND**	0.28	7471B	6-25-15	6-25-15	
Selenium	**ND**	11	6010C	6-18-15	6-18-15	
Silver	**ND**	1.1	6010C	6-18-15	6-18-15	

Date of Report: June 26, 2015
Samples Submitted: June 18, 2015
Laboratory Reference: 1506-191
Project: Signals Fuel Site

TOTAL METALS
EPA 6010C
METHOD BLANK QUALITY CONTROL

Date Extracted: 6-18-15
Date Analyzed: 6-18-25

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: MB0618SM1

Analyte	Method	Result	PQL
Arsenic	6010C	**ND**	10
Barium	6010C	**ND**	2.5
Cadmium	6010C	**ND**	0.50
Chromium	6010C	**ND**	0.50
Lead	6010C	**ND**	5.0
Selenium	6010C	**ND**	10
Silver	6010C	**ND**	1.0

Date of Report: June 26, 2015
Samples Submitted: June 18, 2015
Laboratory Reference: 1506-191
Project: Signals Fuel Site

TOTAL MERCURY
EPA 7471B
METHOD BLANK QUALITY CONTROL

Date Extracted:	6-25-15
Date Analyzed:	6-25-15
Matrix:	Soil
Units:	mg/kg (ppm)
Lab ID:	MB0625S1

Analyte	Method	Result	PQL
Mercury	7471B	**ND**	0.25

Date of Report: June 26, 2015
Samples Submitted: June 18, 2015
Laboratory Reference: 1506-191
Project: Signals Fuel Site

TOTAL METALS
EPA 6010C
DUPLICATE QUALITY CONTROL

Date Extracted: 6-18-15
Date Analyzed: 6-18-25

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: 06-184-01

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Arsenic	**ND**	**ND**	NA	10	
Barium	**3100**	**3180**	3	25	
Cadmium	**1.39**	**1.33**	4	0.50	
Chromium	**125**	**127**	1	0.50	
Lead	**67.5**	**66.9**	1	5.0	
Selenium	**ND**	**ND**	NA	10	
Silver	**ND**	**ND**	NA	1.0	

Date of Report: June 26, 2015
Samples Submitted: June 18, 2015
Laboratory Reference: 1506-191
Project: Signals Fuel Site

TOTAL MERCURY
EPA 7471B
DUPLICATE QUALITY CONTROL

Date Extracted: 6-25-15
Date Analyzed: 6-25-15

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: 06-179-01

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Mercury	**ND**	**ND**	NA	0.25	

Date of Report: June 26, 2015
Samples Submitted: June 18, 2015
Laboratory Reference: 1506-191
Project: Signals Fuel Site

TOTAL METALS
EPA 6010C
MS/MSD QUALITY CONTROL

Date Extracted: 6-18-15
Date Analyzed: 6-18-25

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: 06-184-01

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Arsenic	100	**86.1**	86	**83.3**	83	3	
Barium	100	**3190**	93	**3240**	139	1	A
Cadmium	50.0	**46.3**	90	**45.7**	89	1	
Chromium	100	**200**	75	**204**	79	2	
Lead	250	**271**	81	**267**	80	2	
Selenium	100	**85.8**	86	**84.4**	84	2	
Silver	25.0	**21.7**	87	**21.8**	87	0	

Date of Report: June 26, 2015
Samples Submitted: June 18, 2015
Laboratory Reference: 1506-191
Project: Signals Fuel Site

TOTAL MERCURY
EPA 7471B
MS/MSD QUALITY CONTROL

Date Extracted: 6-25-15
Date Analyzed: 6-25-15

Matrix: Soil
Units: mg/kg (ppm)

Lab ID: 06-179-01

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Mercury	0.500	**0.527**	105	**0.531**	106	1	

Date of Report: June 26, 2015
Samples Submitted: June 18, 2015
Laboratory Reference: 1506-191
Project: Signals Fuel Site

% MOISTURE

Date Analyzed: 6-18-15

Client ID	Lab ID	% Moisture
SFS-N	06-191-01	20
SFS-W	06-191-02	16
SFS-S	06-191-03	11

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-napthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical ____________.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1- Sample extract treated with a Sulfuric acid/Silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in method 8260C, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

OnSite Environmental Inc.
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Chain of Custody

Page ______ of ______

Laboratory Number: 06-191

Company: WSDOT
Project Number:
Project Name: WSDOT Signal Fuel Site
Project Manager: Trent Ensminger
Sampled by: "

Turnaround Request (in working days)
(Check One)
- [ ] Same Day
- [ ] 1 Day
- [ ] 2 Days
- [ ] 3 Days
- [x] Standard (7 Days) (TPH analysis 5 Days)
- [ ] ______ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx	Volatiles 8260C	Halogenated Volatiles 8260C	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664A						% Moisture
1	SFS-N	6/18/15	0700	Soil	6			✓	✓	✓		✓		✓				✓									X
2	SFS-W	↓	↓	↓	↓			↓	↓	↓		↓		↓				↓									X
3	SFS-S	↓	1000	↓	↓			↓	↓	↓		↓		↓				↓									X

	Signature	Company	Date	Time
Relinquished	[illegible]	WSDOT	6/18/15	1105
Received	[illegible]	SPEEDY	6/18/15	1105
Relinquished	[illegible]	SPEEDY	6/18/15	1144
Received	Alex Armantrout	OSE	6/18/15	1144
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions:

Chromatograms with final report ☐

Data Package: Standard ☐ Level III ☐ Level IV ☐ Electronic Data Deliverables (EDDs) ☐ ______

Appendix B

Title Search and Historical Aerial Photographs

King County

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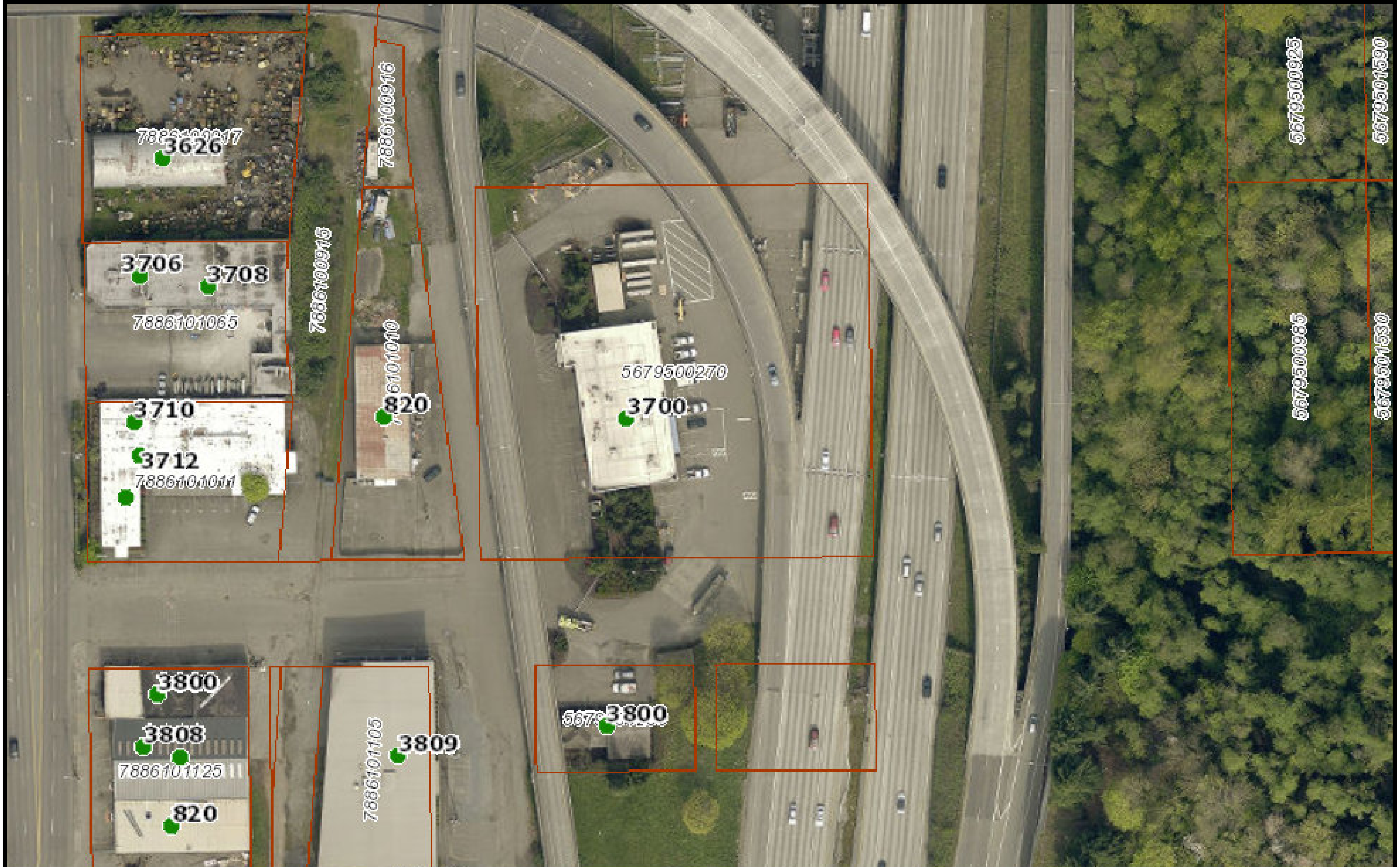
Date: 6/12/2017

N

King County
GIS Center

King County



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Date: 6/12/2017

King County
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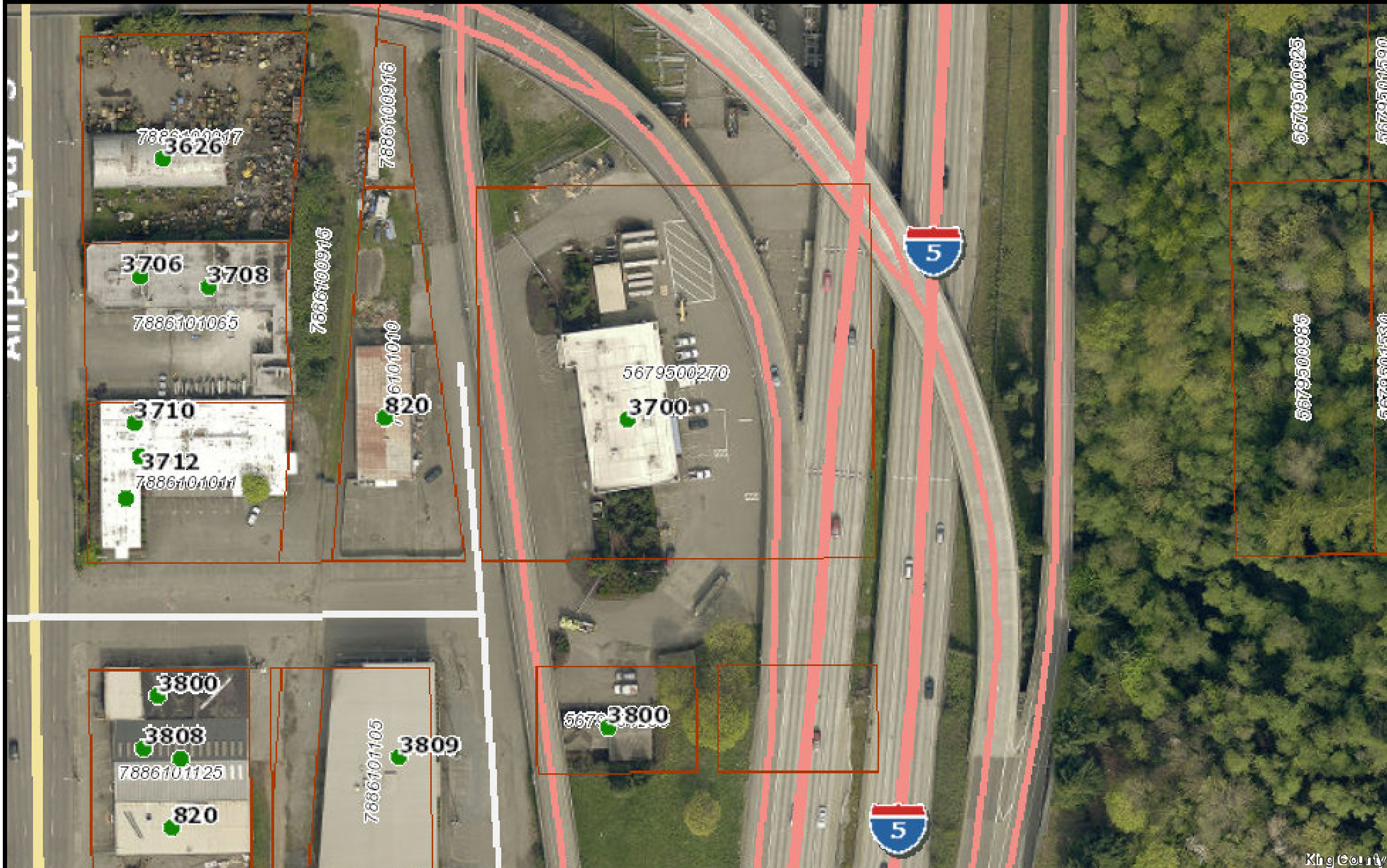
King County



Date: 6/12/2017

N

King County
GIS CENTER

METROSCAN
PROPERTY PROFILE

Parcel ID	:567950 0270	Bldg :1		Total	:
Owner	:State of Washington Dot			Land	:
CoOwner	:			Struct	:
Site Addr	:3700 9th Ave S Seattle 98134			%Imprvd	:
Mail Addr	:PO Box 330310 Seattle Wa 98133			Levy Cd	:0010
Sale Date	:	Doc#	:	2016 Tax	:$12.85
SalePrice	:	Deed	:	Phone	:
Loan Amt	:	Type	:	Vol :1	Pg :53
Use Code	:172 PUB,GOVERNMENTAL SERVICE			MapGrid	:
Zoning	:IG2 U85			NbrhdCd	:035030
Prop Desc	:Dept of Transportation Facility			-- CENSUS --	
Legal	:MOSS J J 1ST ADD TO S SEATTLE BLK			Tract	:93.00
	:35 & POR VAC STS & ALLEY PLAT			Block	:1
	:BLOCK: 35 PLAT LOT:			QSTR	:NE 17 24N 04E

BUILDING INFO					
Bedrooms	:	1st Floor SF	:	Year Built	:1983
Bath Full	:	2nd Floor SF	:	Eff Year	:1985
Bath 3/4	:	3rd Floor SF	:	Bldg Matl	:Masonry
Bath 1/2	:	Half Floor SF	:	Bldg Cond	:
Fireplace	:	AboveGrnd SF	:	Bldg Grade	:Avg
Laundry	:	Bsmnt Finished	:	Interior	:
Porch	:	Bsmnt Total SF	:	Insulation	:
Deck	:	Building SqFt	:11,304	HeatSource	:
Stories	:2	DeckSqFt	:	Heat Type	:Frcd Air
Units	:	Garage Type	:	Air Method	:
Nuisance	:	Attached GrgSF	:	Wtr Source	:Water District
Easements	:	Bsmnt ParkingSF	:	Sewer Type	:Public
DesignType	:	Basement Type	:	Purpose	:
		Basement Grade	:		

LAND INFORMATION / **OTHER INFORMATION**

St Access	:	Lot SqFt	:82,880	St Surface	:	Soundproof	:
Beach Acc	:	Lot Acres	:1.90	Elevator	:	Storage	:
WtrFront	:	Lot Shape	:Corner Lot	Sprinklers	:No	Security	:
WtrFntLoc	:	Tde/Uplnd	:	Golf Adj	:		
WtrFrntFT	:	TopoProbd	:				

TRANSFER HISTORY

OWNERS	DATE	/DOC #	PRICE	DEED	LOAN	TYPE
:	:		:	:	:	:
:	:		:	:	:	:
:	:		:	:	:	:
:	:		:	:	:	:
:	:		:	:	:	:
:	:		:	:	:	:

METROSCAN
PROPERTY PROFILE

Parcel ID	:567950 0270 Bldg :2	Total	:
Owner	:State of Washington Dot	Land	:
CoOwner	:	Struct	:
Site Addr	:3700 9th Ave S Seattle 98134	%Imprvd	:
Mail Addr	:PO Box 330310 Seattle Wa 98133	Levy Cd	:0010
Sale Date	: Doc# :	2016 Tax	:$12.85
SalePrice	: Deed :	Phone	:
Loan Amt	: Type :	Vol :1	Pg :53
Use Code	:172 PUB,GOVERNMENTAL SERVICE	MapGrid	:
Zoning	:IG2 U85	NbrhdCd	:035030
Prop Desc	:Warehouse	-- CENSUS --	
Legal	:MOSS J J 1ST ADD TO S SEATTLE BLK	Tract	:93.00
	:35 & POR VAC STS & ALLEY PLAT	Block	:1
	:BLOCK: 35 PLAT LOT:	QSTR	:NE 17 24N 04E

BUILDING INFO

Bedrooms	:	1st Floor SF	:	Year Built	:1983
Bath Full	:	2nd Floor SF	:	Eff Year	:1985
Bath 3/4	:	3rd Floor SF	:	Bldg Matl	:Masonry
Bath 1/2	:	Half Floor SF	:	Bldg Cond	:
Fireplace	:	AboveGrnd SF	:	Bldg Grade	:Avg
Laundry	:	Bsmnt Finished	:	Interior	:
Porch	:	Bsmnt Total SF	:	Insulation	:
Deck	:	Building SqFt	:7,267	HeatSource	:
Stories	:1	DeckSqFt	:	Heat Type	:No
Units	:	Garage Type	:	Air Method	:
Nuisance	:	Attached GrgSF	:	Wtr Source	:Water District
Easements	:	Bsmnt ParkingSF	:	Sewer Type	:Public
DesignType	:	Basement Type	:	Purpose	:
		Basement Grade	:		

LAND INFORMATION / **OTHER INFORMATION**

St Access	:	Lot SqFt	:82,880	St Surface	:	Soundproof	:
Beach Acc	:	Lot Acres	:1.90	Elevator	:	Storage	:
WtrFront	:	Lot Shape	:Corner Lot	Sprinklers	:No	Security	:
WtrFntLoc	:	Tde/Uplnd	:	Golf Adj	:		
WtrFrntFT	:	TopoProbd	:				

TRANSFER HISTORY

OWNERS	DATE /DOC #	PRICE	DEED	LOAN	TYPE
:	:	:	:	:	:
:	:	:	:	:	:
:	:	:	:	:	:
:	:	:	:	:	:
:	:	:	:	:	:
:	:	:	:	:	:

5805447

IN THE SUPERIOR COURT OF THE STATE OF WASHINGTON

IN AND FOR KING COUNTY

THE STATE OF WASHINGTON, Petitioner, -vs- BUILDERS BRICK COMPANY, a Washington corporation; AMERICAN NATIONAL INSURANCE COMPANY, a Texas Corporation; THE PACIFIC NATIONAL BANK OF SEATTLE, a National Banking Association, Respondents.	NO. 630033 L I S P E N D E N S

TO WHOM IT MAY CONCERN:

An action affecting the title to real property has been commenced in the Superior Court of King County, State of Washington, and is now pending in said court. Said property is more particularly described as follows:

4 additional sheets

OCT 29 1964

5805447

S I N G L E

PARCELS 7-1490, 1492, 1500, 1502, 1503, 1504, 1518, 1555

INTERESTED PARTIES: BUILDERS BRICK COMPANY, a Washington corporation; AMERICAN NATIONAL INSURANCE COMPANY, a Texas Corporation; THE PACIFIC NATIONAL BANK OF SEATTLE, a National Banking Association.

DESCRIPTION:

All that part of the following described Tract "X" lying between the two following described Lines, said Lines to be designated as Line 1 and Line 2.

LINE 1

Begin at a point 50 feet distant westerly, when measured at right angles from the W-S Line Survey of Primary State Highway No. 1, Seattle Freeway, Norfolk Street to Bayview Street, at Highway Engineer's Station W-S 2058+50; thence northerly, parallel with said W-S Line, 750 feet, more or less, to intersect a line drawn parallel with and 35 feet distant southerly, when measured radially from the E-S Overcrossing Center Line Survey of said Primary State Highway No. 1; thence westerly, along said parallel line, 100 feet; thence north 500 feet to a point and the end of this line description.

LINE 2

Begin at a point 250 feet distant easterly, when measured radially from the R/W Baseline of said Primary State Highway No. 1 at Highway Engineer's Station 2058+50; thence northeasterly 220 feet, more or less, to a point 450 feet distant easterly, when measured radially from said Baseline at Highway Engineer's Station 2059+50; thence northerly, parallel with said Baseline, 160 feet, more or less, to a point 450 feet distant easterly, when measured radially from said Baseline at Highway Engineer's Station 2061+00; thence northwesterly 200 feet, more or less, to a point 280 feet distant easterly, when measured radially from said Baseline at Highway Engineer's Station 2062+00; thence northerly 510 feet, more or less, to a point 240 feet distant easterly, when measured radially from said Baseline at Highway Engineer's Station 2067+00; thence easterly 100 feet to a point 340 feet distant easterly, when measured radially from said Baseline at Highway Engineer's Station 2067+00; thence northerly, parallel with said Baseline, 185 feet, more or less, to a point 340 feet distant easterly, when measured at right angles from said Baseline at Highway Engineer's Station 2068+84.86, said point also being 205 feet distant southeasterly, when measured at right angles from the East Bound Center Line Survey of said Primary State Highway No. 1 at Highway Engineer's Station E.B. 32+13.15; thence northeasterly, parallel with said East Bound Center Line, 350 feet to a point, and the end of this Line 2 description.

TRACT "X"

Property situate in the County of King, State of Washington:
Lots 1 to 10, inclusive, and the north half of Lot 11, Block 47; Lots 5, 6, 7, 8 and 10, Block 34; Lots 1 to 9, inclusive, and the North 30 feet of Lot 10, Block 54; ALL in the First Addition to South Seattle by J. J. Moss, according to plat recorded in Volume 1 of Plats, Page 53, records of said County.

ALSO, Blocks 45 and 46 and vacated alleys therein, vacated Court Street lying between the same, and the West 1/2 of vacated Decatur Street (now 11th Avenue South) adjoining the same in First Addition to South Seattle by J. J. Moss, as per plat recorded in Volume 1 of Plats, page 53, records of King County; situate in the City of Seattle, County of King, State of Washington.

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TRACT "X" (CONTINUED)

ALSO, Lots 1, 2, 3, 10, 11 and 12 in Block 44 of First Addition to South Seattle by J. J. Moss, as per plat recorded in Volume 1 of Plats, page 53, records of King County; situate in the City of Seattle, County of King, State of Washington.

ALSO, Lots 1, 2, 3, 10, 11 and 12 in Block 57 of First Addition to South Seattle by J. J. Moss, as per plat recorded in Volume 1 of Plats, page 53, records of King County; situate in the City of Seattle, County of King, State of Washington.

ALSO, those portions of Lots 1 to 6, inclusive, Block 25, and Lots 1 to 6, inclusive, Block 26, South Seattle, according to plat recorded in Volume 1 of Plats, page 35, records of said County, and of adjacent vacated Court Street, as colored in solid pink on the blue print attached to and made a part of that certain deed executed December 21, 1923, by Northern Pacific Railway Company, a Wisconsin Corporation, to Annie Nixon Houlahan, a widow, recorded January 2, 1924, in Volume 1222 of Deeds, page 28, under Auditor's File No. 1817532, being more particularly described as follows:

Beginning at a point on the south line of said Block 26, distant 15 feet easterly, measured at right angles from the center line of the Franchise granted to the Northern Pacific Railway Company, by Ordinance No. 9118 of the City of Seattle, amended by Ordinance No. 12018 of said city, covering "Shore Line" Tract; thence North 4°18'58" east, a distance of 562.12 feet, more or less, to the intersection with the north line of said Block 25; thence easterly along said north line a distance of 16.31 feet, more or less, to the northeast corner of said Block 25, according to the recorded plat; thence southerly on the west line of grant Avenue (now 9th Avenue South), according to the recorded plat, 560 feet, to the southeast corner of said Block 26; thence west along the south line of said Block 26, 67.16 feet to the point of beginning.

TOGETHER WITH that portion of Spokane Street, adjoining, which was vacated under Ordinance No. 76937 of the City of Seattle, EXCEPTING and RESERVING a right of way 9 feet in width on each side of the center lines of the spur tracks of Railway Company constructed, over and across said premises, said center lines being shown in red on said blue print.

Those portions of Lots 1, 2 and 3 in Block 26, South Seattle, according to plat recorded in Volume 1 of Plats, page 35, records of said County, lying westerly of a line 22.5 feet westerly of and parallel to the center line of main track of Northern Pacific Shore Line; TOGETHER WITH the easterly half of vacated alley adjoining.

Lots 10, 11 and 12, Block 26, South Seattle, according to plat recorded in Volume 1 of Plats, page 35, records of said county, TOGETHER WITH the west half of alley adjoining, vacated by Ordinance No. 45130.

Blocks 35 and 36, First Addition to South Seattle by J. J. Moss, according to plat thereof recorded in Volume 1 of Plats, Page 53, records of said County, and the vacated alleys therein, and vacated Court Street lying between the same.

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5805447

The lands being herein condemned contain an area of 368,470 square feet, more or less, the specific details concerning all of which may be found within those certain maps of definite location now of record and on file in the Office of the Director of Highways at Olympia, Washington, bearing date of approval October 2, 1962, revised May 12th and 19th, and June 30th, 1964; and the center line of which is also of record in Volume No. 3 of Highway Plats, pages 39, 40 and 41, under Auditor's File No. 5593643, records of King County, State of Washington.

TOGETHER WITH all rights of ingress and egress, if any (including all existing, future or potential easements of access, light, view and air) to, from and between said Primary State Highway No. 1 and the remainders of said Tract "X".

TOGETHER WITH the right to enter upon the respondents remaining lands, where necessary, to remove improvements located wholly or partially upon the right of way.

PRIMARY STATE HIGHWAY NO. 1, SEATTLE FREEWAY: NORFOLK STREET TO BAYVIEW STREET. (7-22-64)

OCT 29 1964

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The object of said action is to acquire by condemnation the lands, real estate, premises and other property and/or property rights hereinbefore described, as a right of way and/or pit or stockpile site for that certain state highway known as Primary State Highway No. 1, said lands being situate, lying and being in the County of King, State of Washington.

The name of the petitioner and plaintiff in said action is the State of Washington, and the names of the respondents and defendants in said action are:

Builders Brick Company, a Washington corporation;
American National Insurance Company, a Texas Corporation;
The Pacific National Bank of Seattle, a National Banking Association.

DATED this 29th day of October, 1964.

JOHN J. O'CONNELL
Attorney General

JOHN C. O'ROURKE
Assistant Attorney General

Attorneys for Petitioner.

OCT 29 1964

564811

B-557574 4937875

QUIT CLAIM DEED

THE GRANTOR, JEAN HOULAHAN ELLIOTT, as her separate property, for and in consideration of Ten Dollars ($10.00), conveys and quit claims to BUILDERS BRICK COMPANY, a Washington corporation, the following described real estate, situated in the County of King, State of Washington, including any interest therein which grantor may hereafter acquire:

A strip of land 80 feet in width, extending from the south margin of Spokane Street (formerly Orleans Street) to the north margin of Charlestown Street (formerly Yesler Street), and being between the east lines of blocks 25 and 26, South Seattle, according to plat recorded in volume 1 of plats, page 35, in King County, Washington, and the west lines of blocks 35 and 36, First Addition to South Seattle by J. J. Moss, according to plat recorded in volume 1 of plats, page 53, in King County, Washington, said strip vacated under Ordinance 77305 of City of Seattle;
EXCEPTING and RESERVING a right of way 9 feet in width on each side of the center lines of the spur tracks of the Northern Pacific Railway Company constructed over and across said premises.

Lots 5, 6, 7 and 8, block 34; Blocks 35 and 36 and the vacated alleys therein, and vacated Court Street lying between the same; Lots 1, 2, 3, 10, 11 and 12, Block 44; Blocks 45 and 46 and vacated alleys therein, vacated Court Street lying between the same, and the west half of vacated Decatur Street (now 11th Avenue South), adjoining the same; Lots 1 to 10 inclusive, and the north half of Lot 11, Block 47; Lots 1 to 9 inclusive, and the north 30 feet of Lot 10, Block 54; Block 55, Block 56 and the vacated alley in said block, and vacated Court Street between the same, and adjoining east half of vacated Decatur Street (now 11th Avenue South); Lots 1, 2, 3, 10, 11 and 12, Block 57; ALL in First Addition to South Seattle by J. J. Moss, according to plat recorded in volume 1 of plats, page 53, in King County, Washington.

Dated this 14 day of August, 1958.

Jean Houlahan Elliott

NO SALES TAX REQUIRED
AFF. No. 1346593
AUG 27 1958
A. A. TREMPER
By [signature] Deputy

2 sheets

AUG 28 1958 830 Filed by WTI

SPAIN
PROVINCE OF BARCELONA
CITY OF BARCELONA

CONSULATE GENERAL OF THE UNITED STATES OF AMERICA
Barcelona

I, Brewster R. Hemenway------------Vice, Consul of the United States of America at Barcelona, Spain, ______, duly commissioned and qualified, do hereby certify that on this 14th day of August, 1958, before me personally appeared JEAN HOULAHAN ELLIOTT, to me personally known, and known to me to be the individual described in, whose name is subscribed to, and who executed the annexed instrument, and being informed by me of the contents of said instrument, she duly acknowledged to me that she executed the same freely and voluntarily for the uses and purposes therein mentioned.

IN WITNESS WHEREOF I have hereunto set my hand and official seal the day and year last above written.

Brewster R. Hemenway
Brewster R. Hemenway
Vice Consul of the United States of America

Service No. 1205
Tariff Item No. 46
Fee Paid: U S $ 2.50
Legal CY equiv. Pts 125

AUG 28 1958 8 30 Filed by WTI

564044
F-F-614[illegible]

B-564044
4937675

QUIT CLAIM DEED

THE GRANTORS, THE PACIFIC NATIONAL BANK OF SEATTLE, a national banking association, and RICHARD C. HOULAHAN, as the Executors of the Estate of Clifford A. Houlahan, for and in consideration of Ten Dollars ($10.00), convey and quit claim to BUILDERS BRICK COMPANY, a Washington corporation, the following described real estate, situated in the County of King, State of Washington, including any interest therein which grantors may hereafter acquire:

A strip of land 80 feet in width, extending from the south margin of Spokane Street (formerly Orleans Street) to the north margin of Charlestown Street (formerly Yesler Street), and being between the east lines of blocks 25 and 26, South Seattle, according to plat recorded in volume 1 of plats, page 35, in King County, Washington, and the west lines of blocks 35 and 36, First Addition to South Seattle by J. J. Moss, according to plat recorded in volume 1 of plats, page 53, in King County, Washington, said strip vacated under Ordinance 77305 of City of Seattle;
EXCEPTING and RESERVING a right of way 9 feet in width on each side of the center lines of the spur tracks of the Northern Pacific Railway Company constructed over and across said premises.

Lots 5, 6, 7 and 8, block 34; blocks 35 and 36 and the vacated alleys therein, and vacated Court Street lying between the same; Lots 1, 2, 3, 10, 11 and 12, block 44; blocks 45 and 46 and vacated alleys therein, vacated Court Street lying between the same, and the west half of vacated Decatur Street (now 11th Avenue South) adjoining the same; Lots 1 to 10, inclusive, and the north half of lot 11, block 47; Lots 1 to 9 inclusive, and the north 30 feet of lot 10, block 54; block 55, block 56 and the vacated alley in said block, and vacated Court Street between the same, and adjoining east half of vacated Decatur Street (now 11th Avenue South); Lots 1, 2, 3, 10, 11 and 12, block 57; ALL in First Addition to South Seattle by J. J. Moss, according to plat recorded in volume 1 of plats, page 53, in King County, Washington.

Dated this 24th day of July, 1958.

THE PACIFIC NATIONAL BANK OF SEATTLE

By: [signature]
Its Vice President and Trust Officer

[signature] Asst. Cashier

[signature]
Richard C. Houlahan

NO SALES TAX REQUIRED
E310565
AUG 27 1958
A. A. TREMPER

AUG 28 1958 830 Filed by WTI

564014
~~FF-61929~~

B-564044
7-14

QUIT CLAIM DEED

THE GRANTORS, KATHLEEN EVA HOULAHAN, ANNIE EILEEN HOULAHAN, CONSTANCE D. HOULAHAN, andRICHARD HOULAHAN, each as his separate estate, for and in consideration of Ten Dollars ($10.00), convey and quit claim to BUILDERS BRICK COMPANY, a Washington corporation, the following described real estate, situated in the County of King, State of Washington, including any interest therein which grantors may hereafter acquire:

A strip of land 80 feet in width, extending from the south margin of 'pokane Street (formerly Orleans Street) to the north margin of Charlestown Street (formerly Yesler Street), and being between the east lines of blocks 25 and 26, South Seattle, according to plat recorded in volume 1 of plats, page 35, in King County, Washington, and the west lines of blocks 35 and 36, First Addition to South Seattle by J. J. Moss, according to plat recorded in volume 1 of plats, page 53, in King County, Washington, said strip vacated under Ordinance 77305 of City of Seattle;
EXCEPTING and RESERVING a right of way 9 feet in width on each side of the center lines of the spur tracks of the Northern Pacific Railway Company constructed over and across said premises.

Lots 5, 6, 7 and 8, block 34; blocks 35 and 36 and the vacated alleys therein, and vacated Court Street lying between the same; Lots 1, 2, 3, 10, 11 and 12, block 44; blocks 45 and 46 and vacated alleys therein, vacated Court Street lying between the same, and the west half of vacated Decatur Street (now 11th Avenue South) adjoining the same; Lots 1 to 10 inclusive, and the north half of lot 11, block 47; Lots 1 to 9 inclusive, and the north 30 feet of lot 10, block 54; block 55, block 56 and the vacated alley in said block, and vacated Court Street between the same, and adjoining east half of vacated Decatur Street (now 11th Avenue South); Lots 1, 2, 3, 10, 11 and 12, block 57; ALL in First Addition to South Seattle by J. J. Moss, according to plat recorded in volume 1 of plats, page 53, in King County, Washington.

Dated this 24th day of July, 1958.

Kathleen Eva Houlahan
Kathleen Eva Houlahan

Annie Eileen Houlahan
Annie Eileen Houlahan

Constance D. Houlahan
Constance D. Houlahan

Richard Houlahan
Richard Houlahan

NO SALES TAX REQUIRED
AFF. No. E314560
AUG 27 1958
A. A. TREMPER

2 sheets

AUG 28 1958 830 Filed by WTI

D Mar 12-47 3665602
Jan 10-47 $10.
Richard Houlahan
to Houlahan Realty Company
The Sp edge to sp the fire, sitken:

The por of Lot 1 -- bel des as as 597 down to & imedg --
And Lots 11 and 12 Blk 66 J. J. Moss 2nd Add to So Seattle.
This deed is given for the purp of confirming an advance hereto-
fore made by Arthur G. Houlahan and Clifford Houlahan of the abv
desbd ppty to the abv Gtee No stamp taxesare due, either Federal or
state, upon this deed.
Richard Houlahan
ack Jan 10-47 by RichardHoulahan, bef L.J.Leitch npforWn resat 3(Cm Nov
8-50) Mlto Sheel McKelvey?? 914 Ins Bldg

+++

D Mar 12-47 3665603
Jan 10-47 $10.
Arthur G. Houlahan
to Houlahan Realty Company
The Sp & edge to sp the fire, sitken:

The por of Lot 1 -- bel des as as 597 dwnto & imedg --
And Lots 11 and 12 Blk 66 J. J. Moss 2nd Add to So Seattle.
Thisdeed is given for the purpose of confirming an advance
heretofore made by Arthur G. Houlahan and Clifford A. Houlahan, of the
abv desbdppty to the abv Gtee No stamp taxes are due, either Federal
or state, upon this deed.
Arthur G. Houlahan
ack Jan 10-47 by Arthur G. Houlahan, bef Willard E. Sheel npforWares
at Se Sep 2-49) Mlto Sheel McKelvey?? 914 InsBldg

+++

vls

tofore made by Arthur C. Houlahan and Clifford A. Houlahan of the abv desbd ppty to the abv gtee No stamp taxes are due, either Federal or state, upon this deed.
Kathleen Eva Houlahan
Ackw Jan 10-47 by Kathleen Eva Houlahan, bef L.J. Leitch np forWnresat S (cm Nov 8-50) Wito Skeel McKelvey 914 Ins Bldg, City

---

D Mar 12-47 3663600
Jan 10-47 $10.
Annie Eileen Houlahan
to Houlahan Realty Company
The fp desc to mp the fire, situate keys

Tht por of Lot 1 -- bal des same as 597 down to & inedg --
And lots 11 and 12 Blk 66 J. J. Moss 2nd Add to So Seattle.
This deed is given for the purp of confirming an advance heretofore made by Arthur C. Houlahan and Clifford A. Houlahan of the abv desbd ppty to the abv Gtee No stamp taxes are due, either Fed or State, upon this deed.
Annie Eileen Houlahan
Ackw Jan 10-47 by Annie Eileen Houlahan, bef L.J. Leitch np forWnres at S(cm Nov 8-50) Wito Skeel McKelvey?? 914 Ins Bldg

---

D Mar 12-47 3663601
Jan 10-47 $10.
Jean Houlahan Elliott
to Houlahan Realty Company
The fp desc to mp the fire, situate:

Tht por of Lot 1-- bal des same as 597 down to & inedg --
And lots 11 and 12 Blk 66 J. J. Moss 2nd Add to So Seattle.
This deed is given for the purp of confirming an advance heretofore made by Arthur C. Houlahan and Clifford A. Houlahan of the abv desbd ppty to the abv Gtee No dyastamp taxes are due, either Federal or state, upon this deed.
Jean Houlahan Elliott
Ackw Jan 10-47 by Jean Houlahan Elliott, bef L.J. Leitch npforWnresatS (cm Nov 8-50) Wi Skeel McKelvey?? 914 Ins Bldg
vls

D Mar 12-47 3665598
Jan 10-47 $10.
Clifford A. Houlahan
to Houlahan Realty Company
The fp edge to wp the fore,sitkew:

The por of Lot 1 -- bel des same as 597 down to a inedg --
and lots 11 and 12 Blk 66 J. J. Moss 2nd Add to So Seattle.
This deed is given for the purp of confirming an advance heretofore made by Arthur G. Houlahan and Clifford A. Houlahan of the abv desbd ppty to the abv Gtee No stamps taxes are due, either Federal or state, upon this deed.
Clifford A. Houlahan
Ackw Jan 10-47 by Clifford A. Houlahan, bef L.J. Leitch np for Wn res at S (ce Nov 8-50) Wite Skeel McKelly 914 Ins Bldg, City

* * *

D Mar 12-47 3665599
Jan 10-47 $10.
Kathleen Eve Houlahan
to Houlahan Realty Company
The fp edge to wp the fore,sitkew:

The por of Lot 1 -- bel des same as 597 down to a inedg --
and lots 11 and 12 Blk 66 J. J. Moss 2nd Add to So Seattle.
This deed is given for the purp of confirming an advance heretofore made by Arthur G. Houlahan and Clifford A. Houlahan of the abv desbd ppty to the abv gtee No stamp taxes are due, either Federal or state, upon this deed.
Kathleen Eve Houlahan
Ackw Jan 10-47 by Kathleen Eve Houlahan, bef L.J. Leitch np for Wn res at S (ce Nov 8-50) Wite Skeel McKelly 914 Ins Bldg, City

* * *

D Mar 12-47 3665600
Jan 10-47 $10.
Aunde Eileen Houlahan
to Houlahan Realty Company
The fp edge to wp the fore,sitkew

The por of Lot 1 -- bel des same as 597 down to a inedg --

clear of any encumbrances whatsoever.
tup $7800. tgw int then at rate of 4%pa from Dec 1-46 until paid, as evid bylnote dtd Nov 4-46 made by fps phl in mely instinute to order of sp
Mlts sp 1222 2nd Av,City; Fld bySTCo

◆◆◆

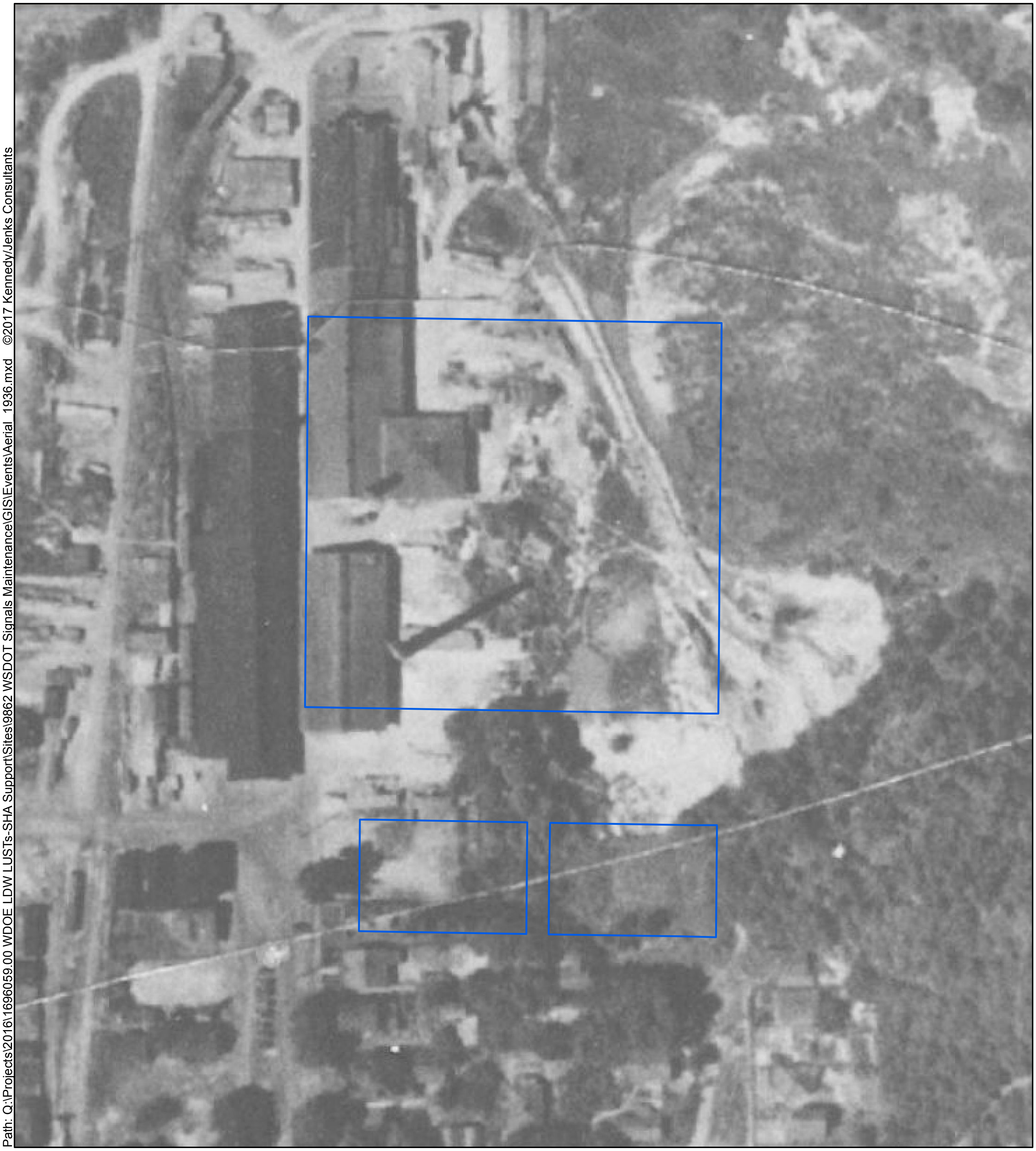
D Mar 12-47 3665597
Jan 1947 $10.
Arthur C. Houlahan and Clifford A. Houlahan, as Trustees for the Annie Nixon Houlahan Trust
Sto Houlahan Realty Company
The fps cdqc to sp the fdre, sitkcw:

Tht por of Lot 1 and por of vacated street tgw those certain portions of Lots 2-3-4-5 and 6, all lyng E of the Northern Pacific r/w, Blk 25 South Seattle Add to Seattle, and
Tht por of Lot 6 and por of vacated st tgw those portions of Lots 1-2-3-4 and 5, all lyng E of the Northern Pacific r/w, Blk 26 to the South Seattle Add to Seattle.
Also
Lots 1-2-3-4-5-8-9-10-11-12 and portions of vac alley adjng, tgw Lots 6 and 7 and por of vac st and alley adjng, all in Blk35, J. J. Moss 1st Add to South Seattle, and
Lots 1-2-3-4-5-6-12 and por of vacated st and alley adjng, tgw Lots 7-8-9-10-11 all in Blk 36, J.J. Moss 1st Add to South Seattle, and Lots 1-2-3-10-11 & 12, Blk 44, J.J. Moss 1st Add to South Seattle
Lots 1-2-3-4-5-6 and 12 and por of vacated st and alley adjng, tgw Lots 7-8-9-10-11 and por of vacated alley adjng, all in Blk 45, J. J. Moss 1st Add to South Seattle, and
Lots 1-2-3-4-5-6 and 7 andpor of vacated st and alley adjng, tgw Lots 8-9-10-11 and 12 and por of vacated alley adjng, all inBlk 46, J.J. Moss 1st Add to South Seattle, and
Lots 6-7-8-9-10-11-12 and por of vacated st adjng, tgw Lots 1-2-3 and 4 all in Blk 55, J. J. Moss 1st Add to South Seattle, and
Lots 1-7-8-9-10-11 and 12 and por of vacated st andalley adjng, tgw Lots 2-3-4-5-6 and por of vacated alley adjng, all in Blk 56 J.J.Moss 1st Add to South Seattle, and
Lots 1-2-3-10-11 and 12 Blk 57, J.J.Moss 1st Add to South Seattle, and Lots 11, and 12 Blk 66 J. J. Moss 2nd Add to South Seattle.
Arthur C. Houlahan, Trustee
Clifford A. Houlahan, Trustee
Ackn Jan 18-47 by Arthur C.Houlahan & Clifford A.Houlahan, bef L.J. Leitch nptorWnresatS(ce Nov 6-50) Mlts Skool McKaly 914 InsCity

◆◆◆

vls

DATE	FILE #	INST	GRANTOR	GRANTEE	BLOCK
October 29, 1964	5805447	LP	BUILDERS BRICK COMPANY	THE STATE OF WASHINGTON	
August 28, 1958	4937676	QCD	JEAN HOULAHAN ELLIOTT	BUILDERS BRICK COMPANY	
August 28, 1958	4937675	QCD	CLIFFORD A. HOULAHAN	BUILDERS BRICK COMPANY	
August 28, 1958	4937674	QCD	KATHLEEN, ANNIE, CONSTANCE AND RICHARD HOULAHAN	BUILDERS BRICK COMPANY	
March 12, 1947	3665603	D	ARTHUR C. HOULAHAN	HOULAHAN REALTY COMPANY	
March 12, 1947	3665602	D	RICHARD HOULAHAN	HOULAHAN REALTY COMPANY	
March 12, 1947	3665601	D	JEAN HOULAHAN ELLIOTT	HOULAHAN REALTY COMPANY	
March 12, 1947	3665600	D	ANNIE EILEEN HOULAHAN	HOULAHAN REALTY COMPANY	
March 12, 1947	3665599	D	KATHLEEN EVE HOULAHAN	HOULAHAN REALTY COMPANY	
March 12, 1947	3665598	D	CLIFFORD A. HOULAHAN	HOULAHAN REALTY COMPANY	
March 12, 1947	3665597	D	ANNIE NIXON HOULAHAN TRUST	HOULAHAN REALTY COMPANY	



Path: Q:\Projects\2016\1696059.00 WDOE LDW LUSTs-SHA Support\Sites\9862 WSDOT Signals Maintenance\GIS\Events\Aerial_1936.mxd ©2017 Kennedy/Jenks Consultants

Legend

Approximate Site Location

N

0 50 100

Scale: Feet

Notes:
1. Aerial photo from King County, 1936.

Kennedy/Jenks Consultants

WA DOT Signals Maintenance Site
Seattle, Washington

1936 Aerial Image

K/J 1696059*00

Figure B-1

Path: Q:\Projects\2016\1696059.00 WDOE LDW LUSTs-SHA Support\Sites\9862 WSDOT Signals Maintenance\GIS\Events\Aerial_1965.mxd

Legend

Approximate Site Location

N

0 50 100

Scale: Feet

Notes:
1. Aerial photo from Department of Natural Resources, 1965.

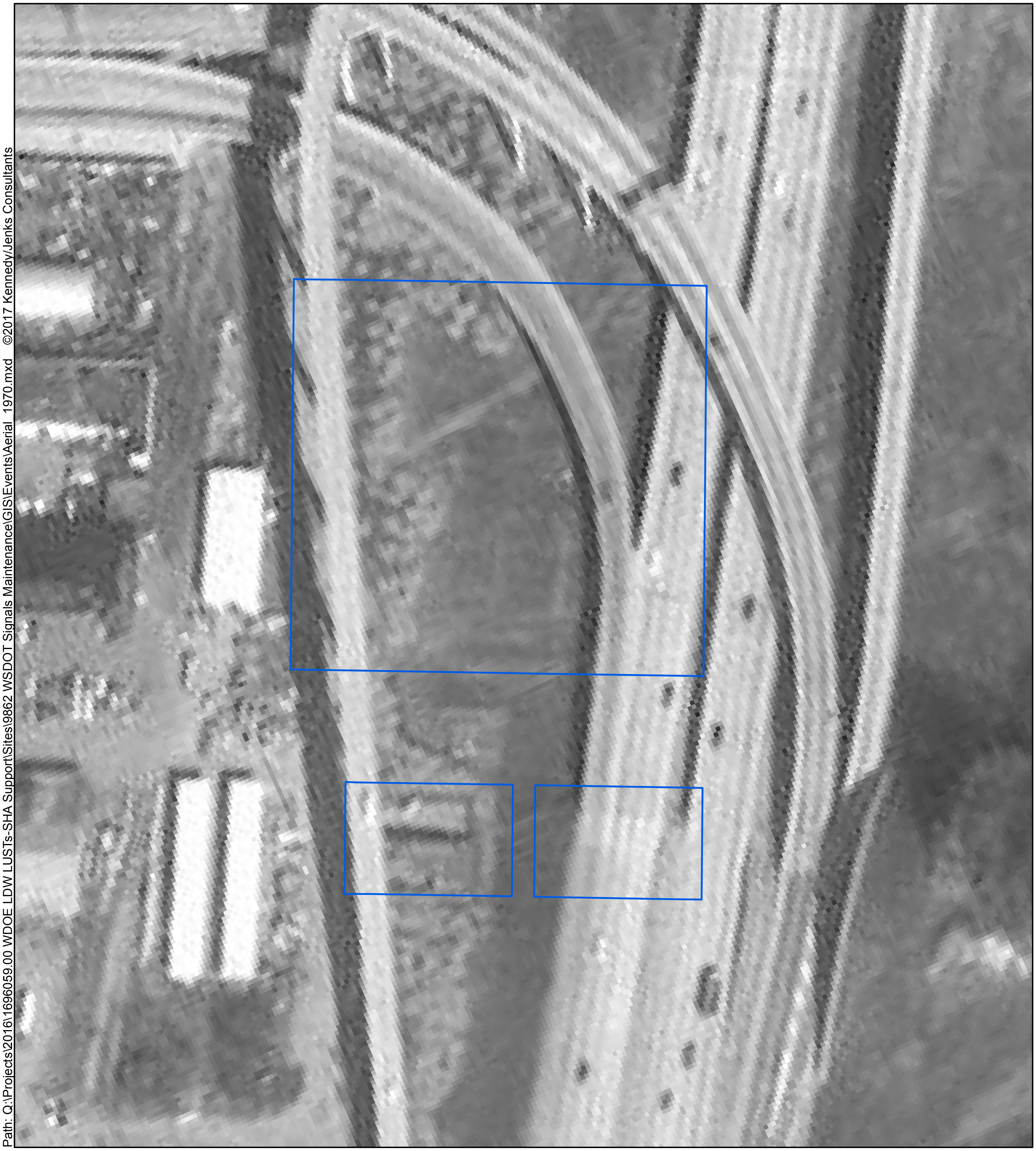
Kennedy/Jenks Consultants

WA DOT Signals Maintenance Site
Seattle, Washington

1965 Aerial Image

K/J 1696059*00

Figure B-2



Path: Q:\Projects\2016\1696059.00 WDOE LDW LUSTs-SHA Support\Sites\9862 WSDOT Signals Maintenance\GIS\Events\Aerial_1970.mxd ©2017 Kennedy/Jenks Consultants

Legend

Approximate Site Location

N

0 50 100

Scale: Feet

Notes:

1. Aerial photo from United States Army Corps of Engineers, 1970.

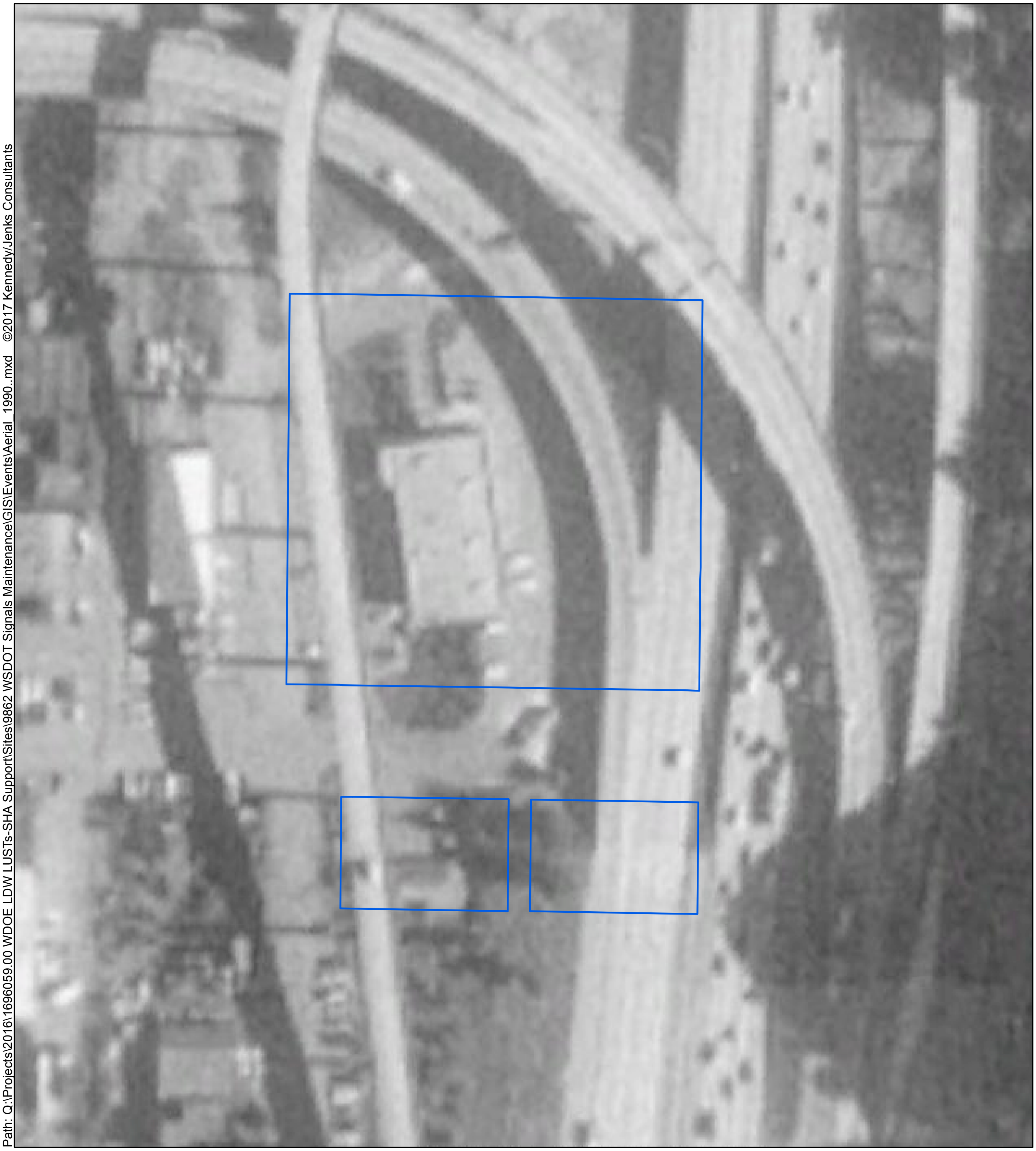
Kennedy/Jenks Consultants

WA DOT Signals Maintenance Site
Seattle, Washington

1970 Aerial Image

K/J 1696059*00

Figure B-3



Path: Q:\Projects\2016\1696059.00 WDOE LDW LUSTs-SHA Support\Sites\9862 WSDOT Signals Maintenance\GIS\Events\Aerial_1990..mxd   ©2017 Kennedy/Jenks Consultants

Legend

Approximate Site Location

N

0 50 100

Scale: Feet

Notes:
1. Aerial photo from United States Geological Survey, 1990.

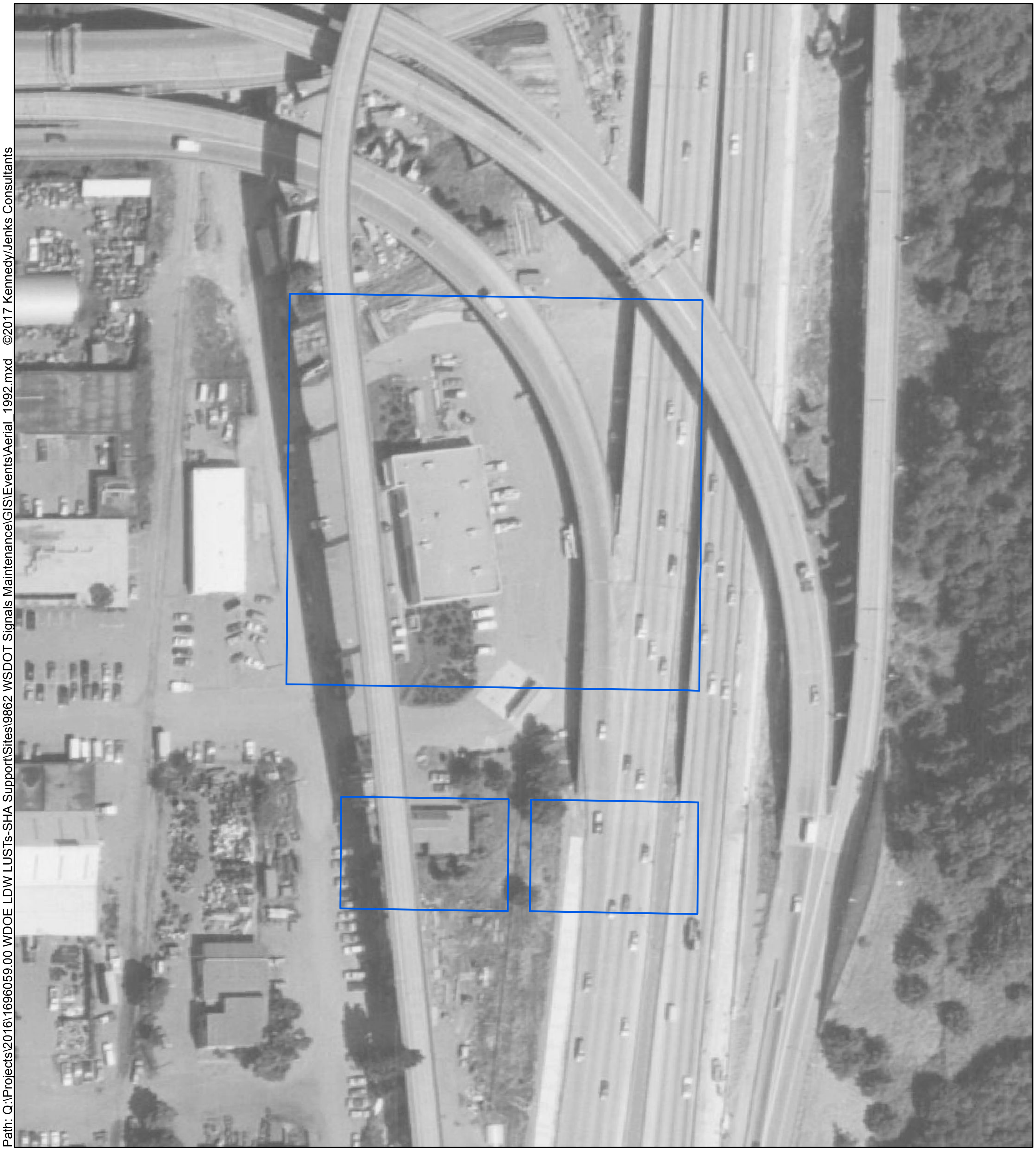
Kennedy/Jenks Consultants

WA DOT Signals Maintenance Site
Seattle, Washington

1990 Aerial Image

K/J 1696059*00

Figure B-4



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Legend

Approximate Site Location

N

0 50 100

Scale: Feet

Notes:
1. Aerial photo from Department of Natural Resources, 1992.

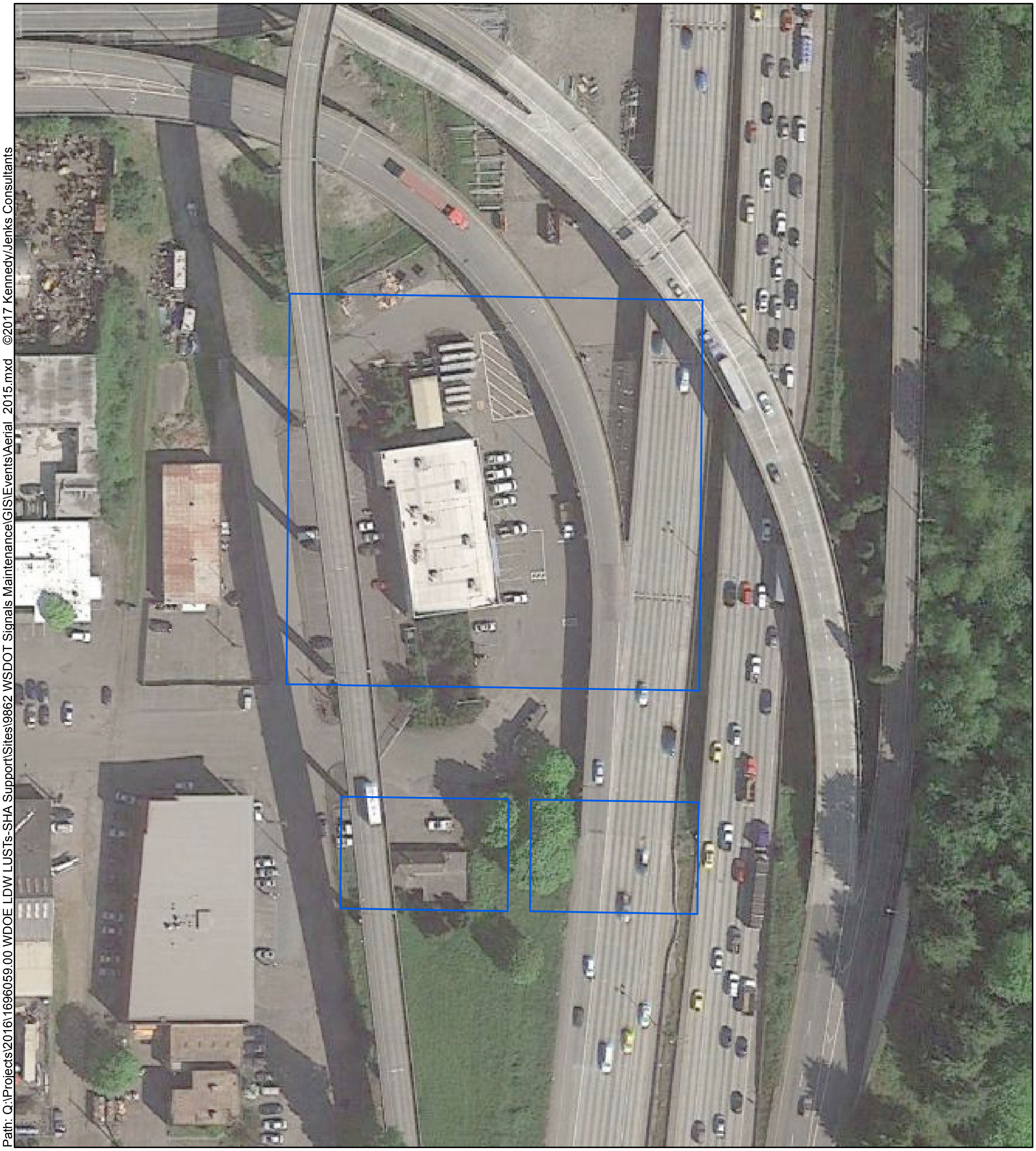
Kennedy/Jenks Consultants

WA DOT Signals Maintenance Site
Seattle, Washington

1992 Aerial Image

K/J 1696059*00

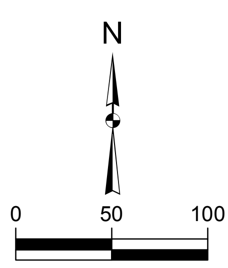
Figure B-5



Path: Q:\Projects\2016\1696059.00 WDOE LDW LUSTs-SHA Support\Sites\9862 WSDOT Signals Maintenance\GIS\Events\Aerial_2015.mxd ©2017 Kennedy/Jenks Consultants

Legend

Approximate Site Location



Notes:
1. Aerial photo from Google Earth, 2015.

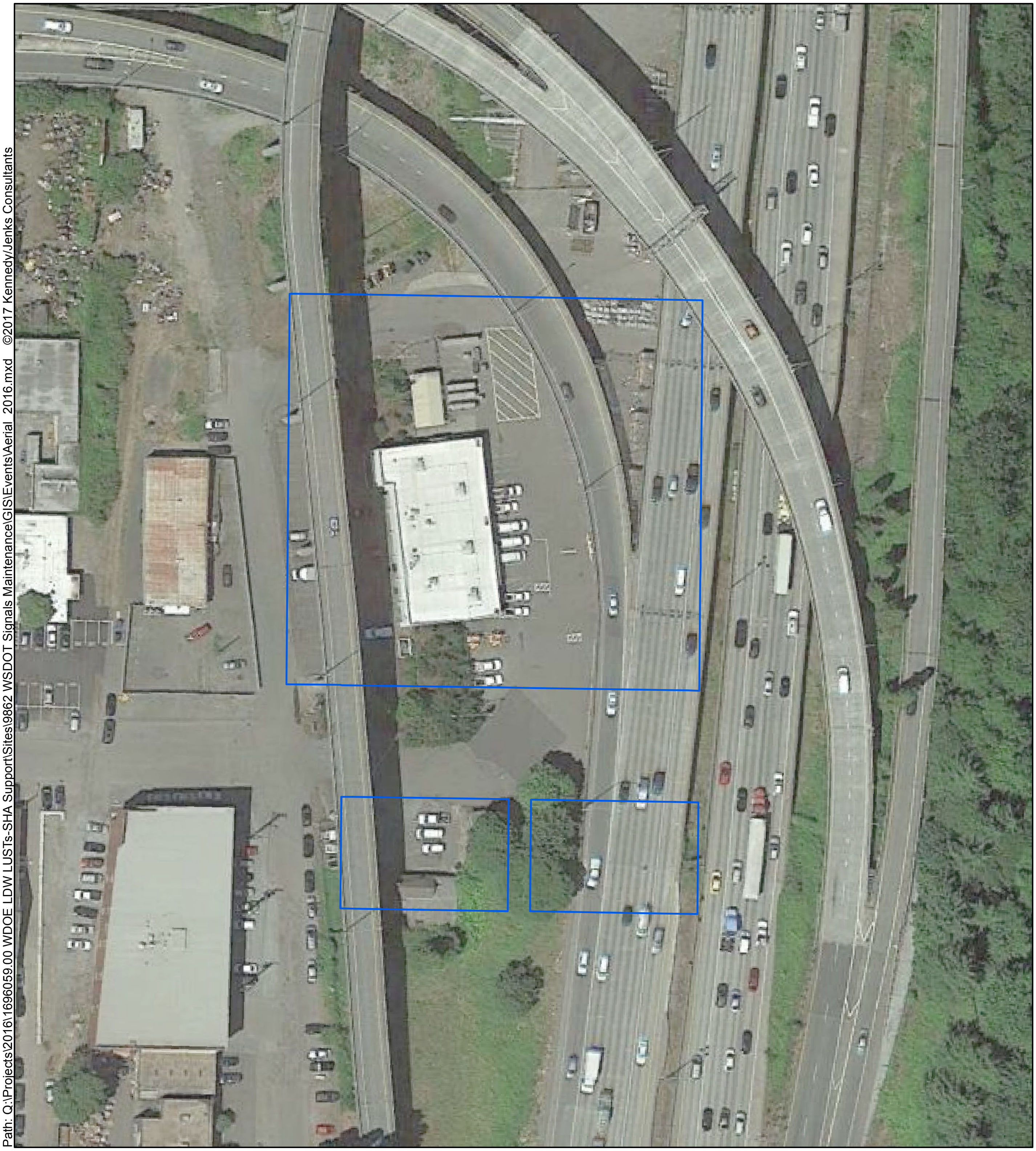
Kennedy/Jenks Consultants

WA DOT Signals Maintenance Site
Seattle, Washington

2015 Aerial Image

K/J 1696059*00

Figure B-6



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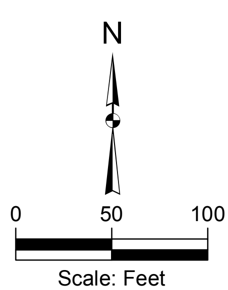
Approximate Site Location



Notes:
1. Aerial photo from Google Earth, 2016.

Kennedy/Jenks Consultants

WA DOT Signals Maintenance Site
Seattle, Washington

2016 Aerial Image

K/J 1696059*00

Figure B-7

DOT Signals
3700 9th Ave S
Seattle, WA 98134

Inquiry Number: 4881963.5
March 17, 2017

Certified Sanborn® Map Report

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

Certified Sanborn® Map Report

03/17/17

Site Name:

DOT Signals
3700 9th Ave S
Seattle, WA 98134
EDR Inquiry # 4881963.5

Client Name:

Kennedy/Jenks Consultants
32001 32nd Ave South
Federal Way, WA 98001
Contact: Dean Malte

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Certified Sanborn Results:

Certification # 15DE-4EC0-B485

PO # NA

Project DOT Signals

Maps Provided:

1967
1950
1949
1929
1917
1904
1893

Sanborn® Library search results

Certification #: 15DE-4EC0-B485

The Sanborn Library includes more than 1.2 million fire insurance maps from Sanborn, Bromley, Perris & Browne, Hopkins, Barlow and others which track historical property usage in approximately 12,000 American cities and towns. Collections searched:

- ✔ Library of Congress
- ✔ University Publications of America
- ✔ EDR Private Collection

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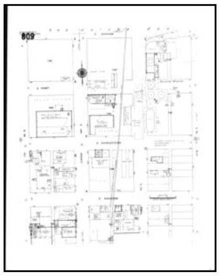
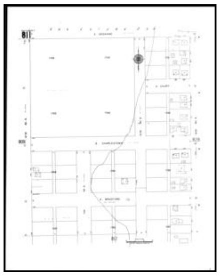
Sanborn Sheet Key

This Certified Sanborn Map Report is based upon the following Sanborn Fire Insurance map sheets.

1967 Source Sheets


Volume 8, Sheet 809
1967


Volume 8, Sheet 811
1967

1950 Source Sheets


Volume 1, Sheet xxxx
1950

1949 Source Sheets


Volume 8, Sheet 809
1949


Volume 8, Sheet 811
1949

1929 Source Sheets


Volume 8, Sheet 809
1929


Volume 8, Sheet 811
1929

Sanborn Sheet Key

This Certified Sanborn Map Report is based upon the following Sanborn Fire Insurance map sheets.

1917 Source Sheets

Volume 3, Sheet 342
1917

1904 Source Sheets

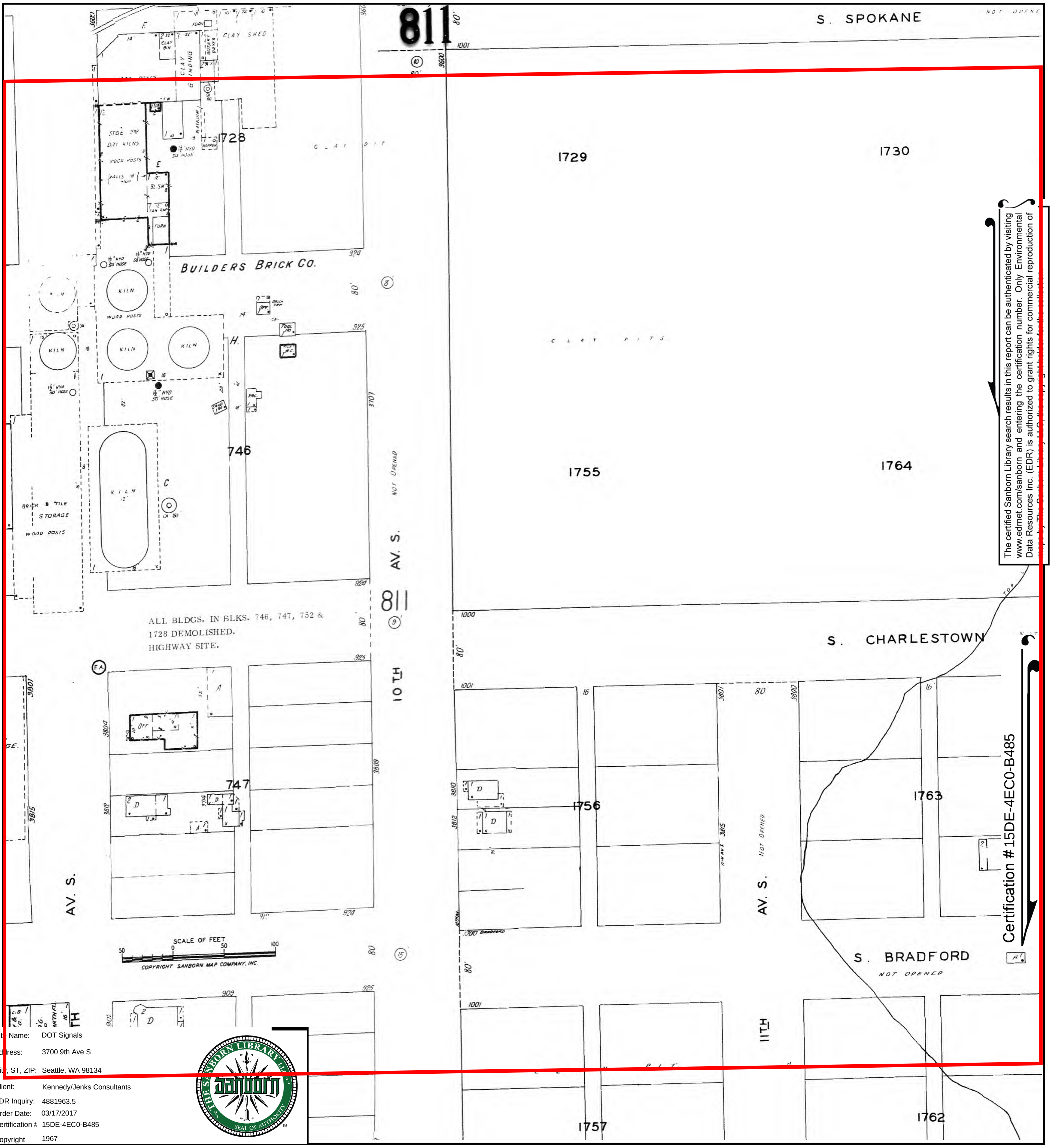
Volume 1, Sheet 84
1904

1893 Source Sheets

Volume 1, Sheet 39
1893

Certified Sanborn® Map

1967



Site Name: DOT Signals
Address: 3700 9th Ave S
City, ST, ZIP: Seattle, WA 98134
Client: Kennedy/Jenks Consultants
EDR Inquiry: 4881963.5
Order Date: 03/17/2017
Certification #: 15DE-4EC0-B485
Copyright: 1967

This Certified Sanborn Map combines the following sheets.
Outlined areas indicate map sheets within the collection.

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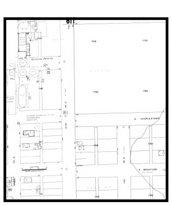

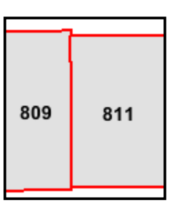

Volume 8, Sheet 811
Volume 8, Sheet 809

N

Certified Sanborn® Map

1950

Certification # 15DE-4EC0-B485

Site Name: DOT Signals
Address: 3700 9th Ave S
City, ST, ZIP: Seattle, WA 98134
Client: Kennedy/Jenks Consultants
EDR Inquiry: 4881963.5
Order Date: 03/17/2017
Certification #: 15DE-4EC0-B485
Copyright 1950

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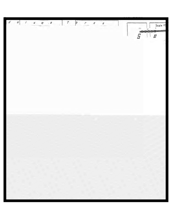

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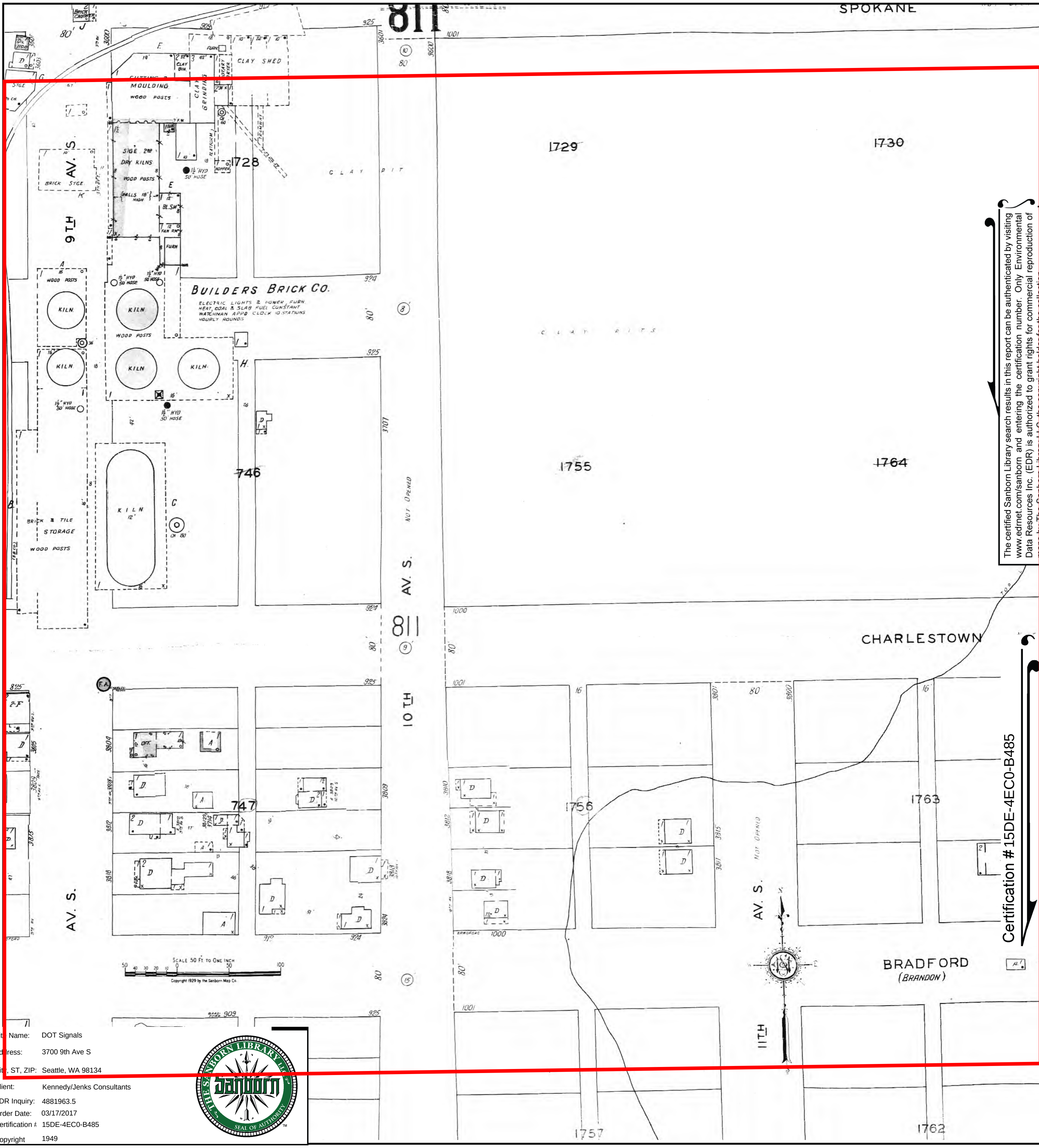
Volume 1, Sheet xxxx

Certified Sanborn® Map

1949



Site Name: DOT Signals
Address: 3700 9th Ave S
City, ST, ZIP: Seattle, WA 98134
Client: Kennedy/Jenks Consultants
EDR Inquiry: 4881963.5
Order Date: 03/17/2017
Certification #: 15DE-4EC0-B485
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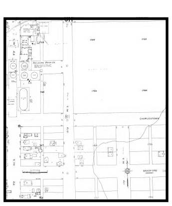

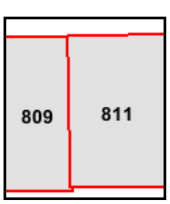

Volume 8, Sheet 811
Volume 8, Sheet 809

N

EDR®

Certified Sanborn® Map

1929

Site Name: DOT Signals
Address: 3700 9th Ave S
City, ST, ZIP: Seattle, WA 98134
Client: Kennedy/Jenks Consultants
EDR Inquiry: 4881963.5
Order Date: 03/17/2017
Certification #: 15DE-4EC0-B485
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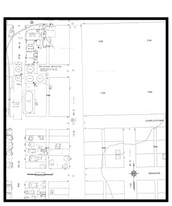

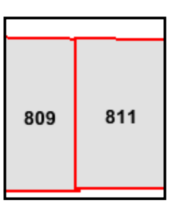

Volume 8, Sheet 811
Volume 8, Sheet 809

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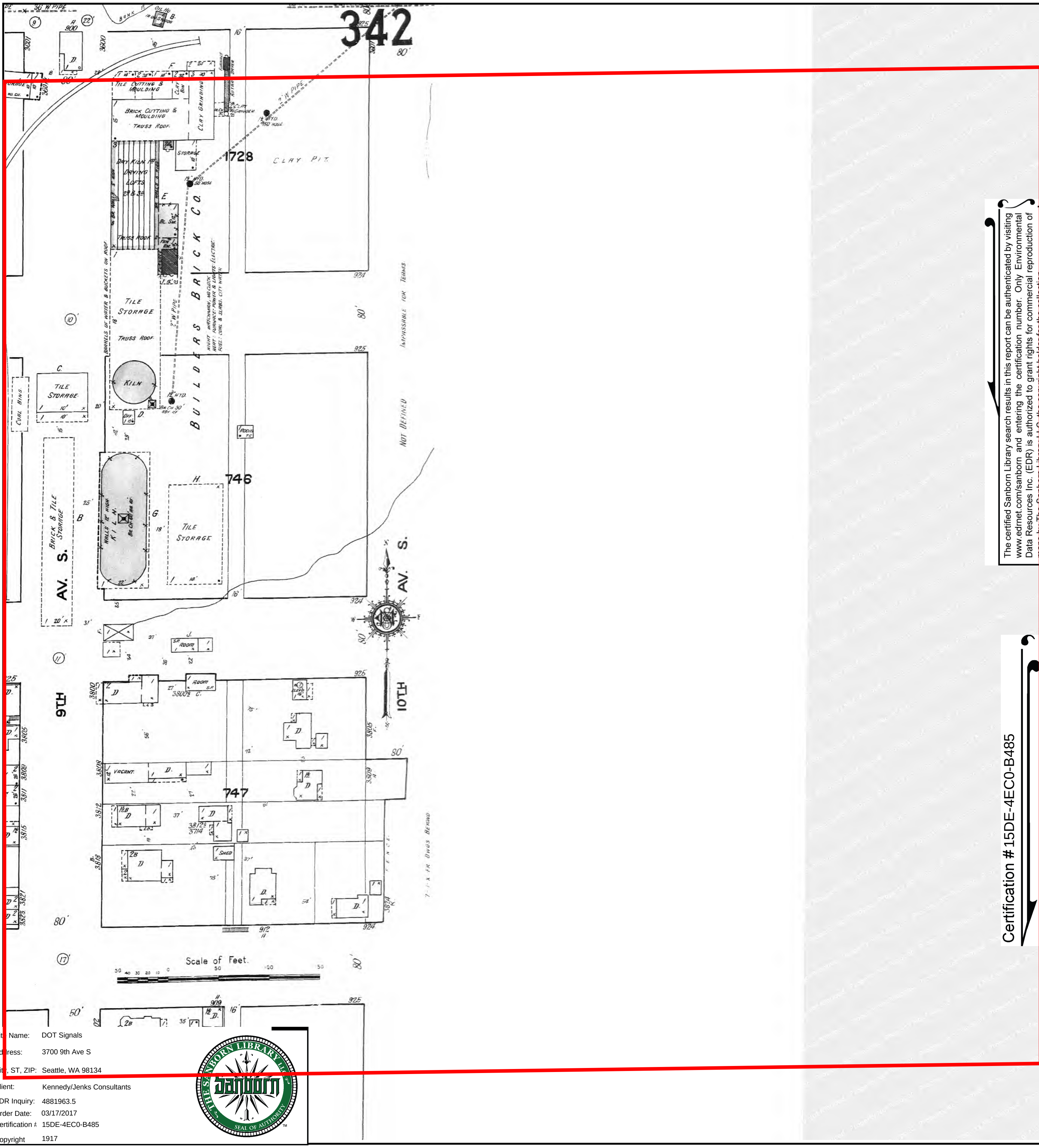

Site Name: DOT Signals
Address: 3700 9th Ave S
City, ST, ZIP: Seattle, WA 98134
Client: Kennedy/Jenks Consultants
EDR Inquiry: 4881963.5
Order Date: 03/17/2017
Certification #: 15DE-4EC0-B485
Copyright: 1917

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Volume 3, Sheet 342

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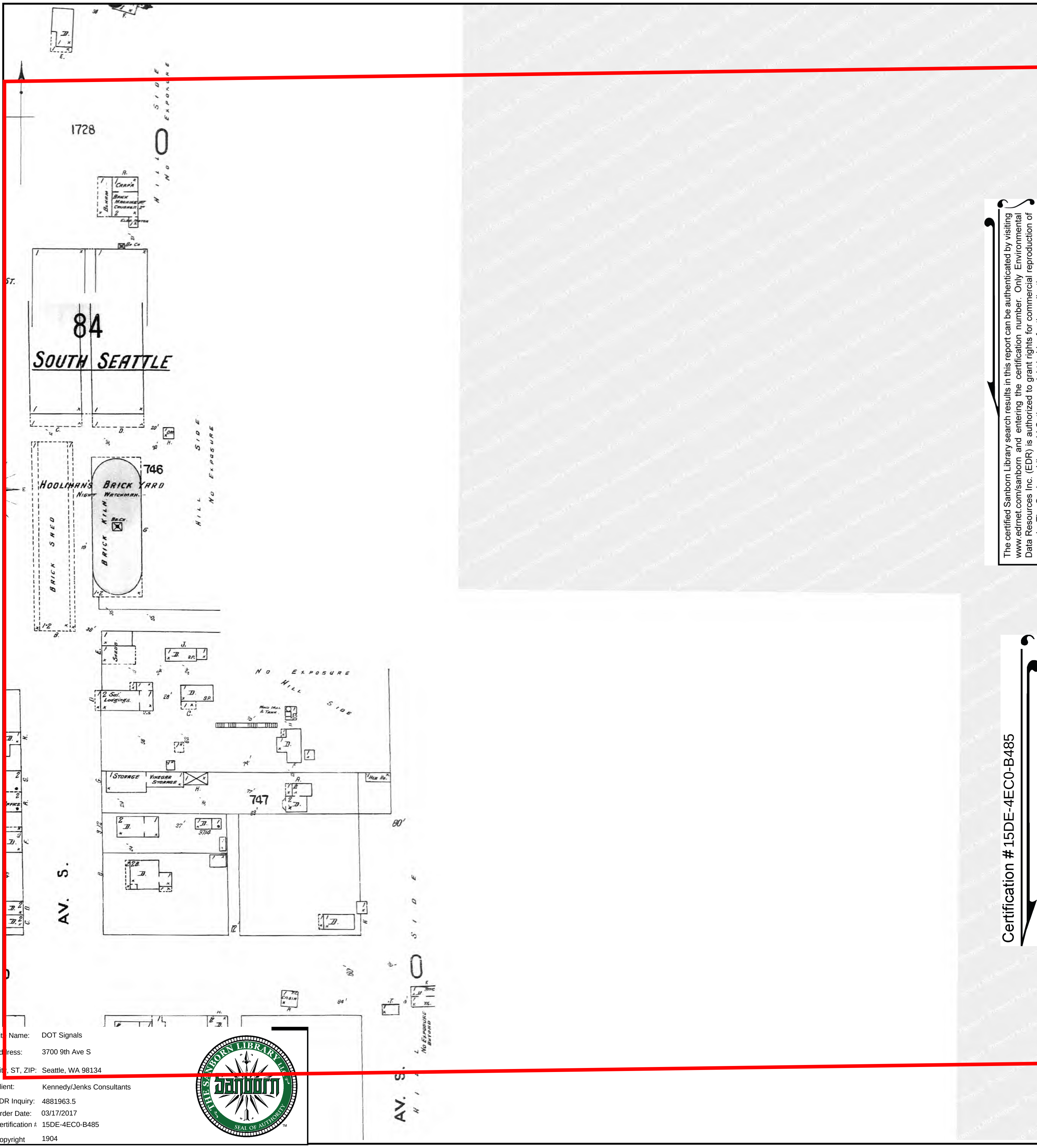

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Certification # 15DE-4EC0-B485

Site Name:	DOT Signals
Address:	3700 9th Ave S
City, ST, ZIP:	Seattle, WA 98134
Client:	Kennedy/Jenks Consultants
EDR Inquiry:	4881963.5
Order Date:	03/17/2017
Certification #:	15DE-4EC0-B485
Copyright	1904

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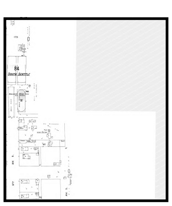
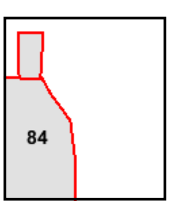
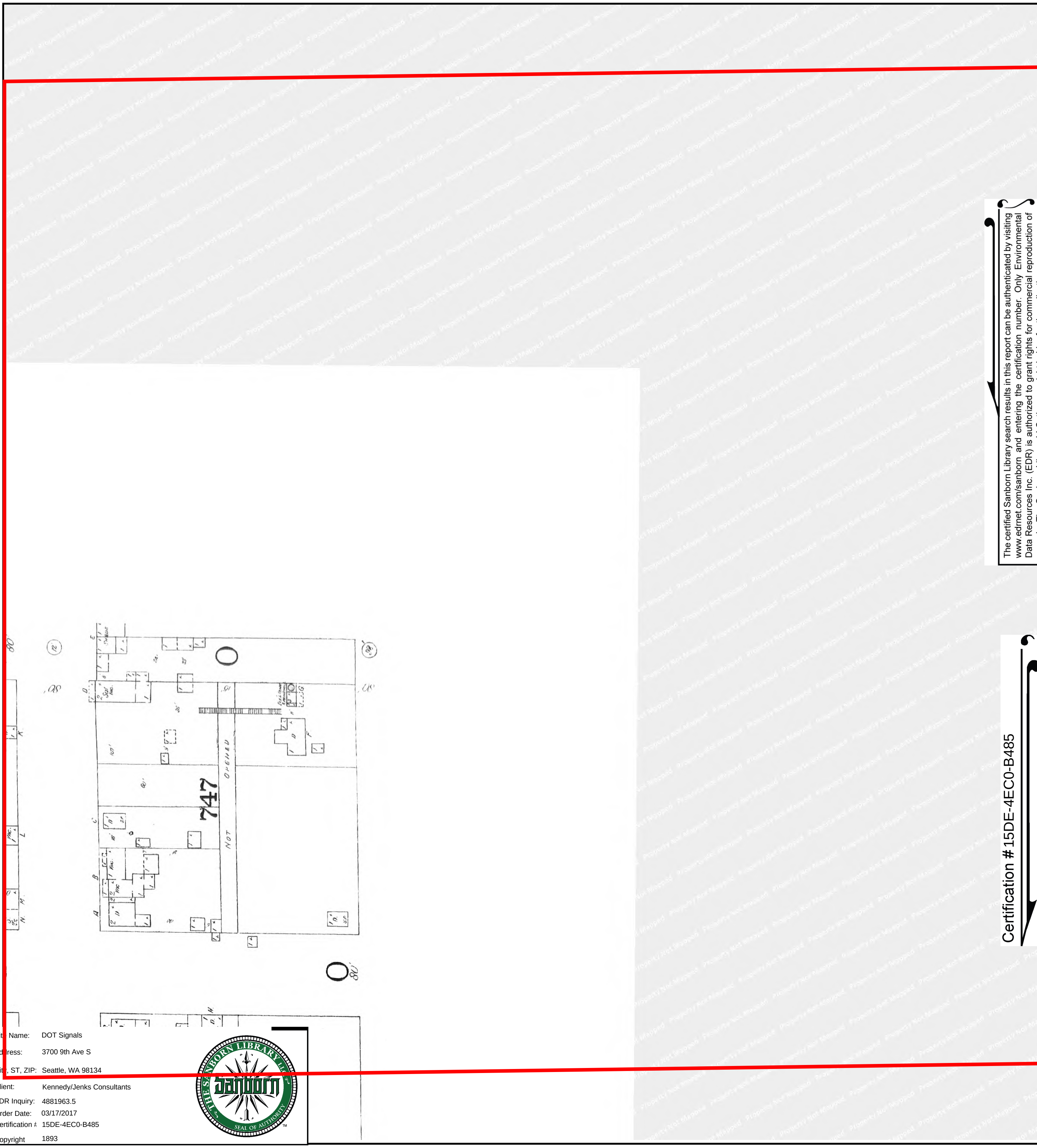




Volume 1, Sheet 84



Certification # 15DE-4EC0-B485

Site Name: DOT Signals
Address: 3700 9th Ave S
City, ST, ZIP: Seattle, WA 98134
Client: Kennedy/Jenks Consultants
EDR Inquiry: 4881963.5
Order Date: 03/17/2017
Certification #: 15DE-4EC0-B485
Copyright 1893

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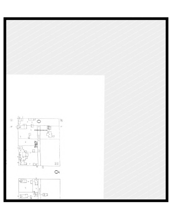
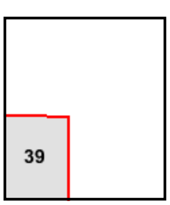




Volume 1, Sheet 39

N

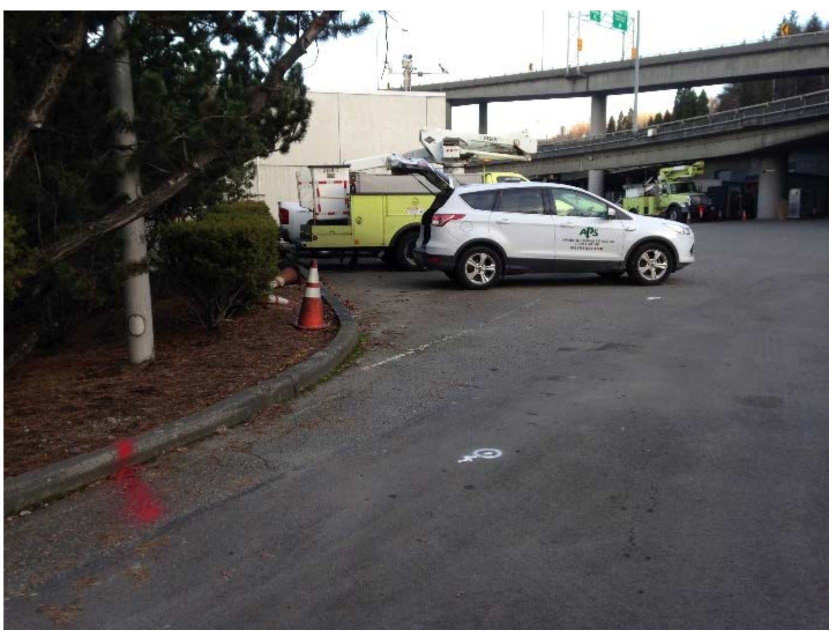
Appendix C

Photograph Log

View of utility locate for B-05 and B-01, looking to the south.

View of utility locate, B-01 location in foreground, looking to the north.

Utility locate, B-03 location in foreground, looking to the northeast.



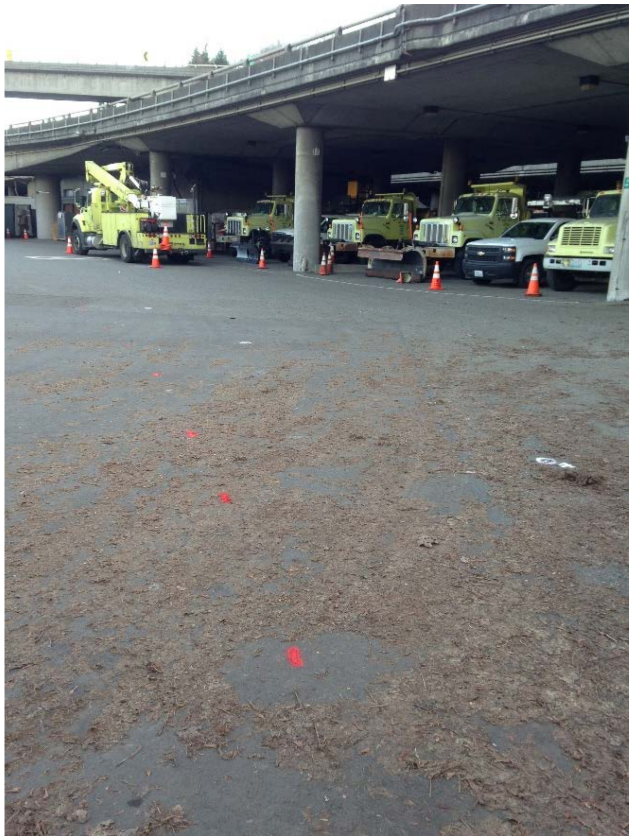
Utility locate, B-04 location in foreground, looking to the northeast.

Utility locate, B-08 location in foreground, view of I-5 overpass and WADOT truck storage looking to the east.

Utility locate, view of I-5 overpass and WADOT truck storage looking to the east.

Utility locate, south end of the site, view of I-5 overpass and
WADOT truck storage looking to the east.

Utility locate, taken near B-01, view of I-5 overpass and WADOT
truck storage looking to the northeast.



Utility locate, taken near B-01, view of I-5 overpass and WADOT truck storage looking to the northeast.

Utility locate, taken near B-02, view of I-5 overpass and WADOT truck storage looking to the northeast.

Air knifing B-03 looking to the north.

Air knifing B-03 looking to the north.

Decontamination of drill rods near B-02.

View of air knife hose and entry gate looking to the west.

View of air knifed location prior to direct push drilling activities.

Appendix D

SAP/QAPP and SAP Addendum

Kennedy/Jenks Consultants

32001 32nd Avenue South, Suite 100
Federal Way, Washington 98001
253-835-6400
FAX: 253-952-3435

Draft Lower Duwamish Waterway – Site Hazard Assessments and Limited Investigations Sampling and Analysis Plan/Quality Assurance Project Plan

9 February 2017

Prepared for

Washington State Department of Ecology
Northwest Regional Office
3190 – 160th Avenue SE, Bellevue, WA 98008

K/J Project No. 1696059.00

Quality Assurance Project Plan
Signature Page

Site: Various contaminated sites within the Lower Duwamish Waterway CSO and storm drain basins.

Document Name: Lower Duwamish Waterway – Site Hazard Assessments and Limited Investigations Sampling and Analysis Plan/Quality Assurance Project Plan

Document Date:

Signature below indicates review and approval of the Quality Assurance Project Plan and agreement that the anticipated sampling and analytical methods are sufficient to meet the quality objectives of the NBF-GTSP Remedial Investigation.

Washington State Department of Ecology:

____

Tamara Cardona, PhD Date
Northwest Regional Office
Phone: (425) 649-7058
taca461@ecy.wa.gov

Kennedy/Jenks Project Manager:

____

Ty C. Schreiner Date
Title: Project Manager
Phone: (253) 835-6400
e-mail: TySchreiner@KennedyJenks.com

Data validation reviewer (QAPP review, data validation):

____

Josh Hopp Date
Title: Quality Validation Reviewer
Phone: (253) 835-6400
e-mail: JoshHopp@KennedyJenks.com

Table of Contents

Table of Contents (cont'd)

List of Tables

List of Appendices

List of Acronyms

ARAR	applicable, relevant, and appropriate requirement
ASTM	ASTM International
C	Celsius
CFR	Code of Federal Regulations
COC	chain-of-custody
CSCSL	Confirmed and Suspected Contaminated Sites List
CSM	Conceptual Site Model
CWA	Clean Water Act
DI	distilled/deionized
DO	dissolved oxygen
DOT	Department of Transportation
DSARS	Document Storage and Retrieval System
Ecology	Washington State Department of Ecology
EDD	electronic data deliverables
EPA	U.S. Environmental Protection Agency
FID	flame ionization detector
GC	gas chromatography
H_2SO_4	sulfuric acid
HASP	Health and Safety Plan
HCID	Hydrocarbon Identification
HCl	hydrochloric acid
HNO_3	nitric acid
IDW	investigation-derived waste
ISIS	Integrated Site Information System
LDW	Lower Duwamish Waterway
LUST	leaking underground storage tank
mL	milliliter
MRL	method reporting limit
MS	matrix spike
MSD	matrix spike duplicate
MTCA	Model Toxics Control Act
NaOH	sodium hydroxide
NAPL	non-aqueous phase liquid
NFA	No Further Action
NIST	National Institute of Standards and Technology
NPDES	National Pollutant Discharge Elimination System
NWTPH	Northwest Total Petroleum Hydrocarbons

OSHA	Occupational Safety and Health Administration
oz	ounce
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PID	photoionization detector
PIMS	Photo and Image Management System
PPE	personal protective equipment
PQL	practical quantitation limit
PVC	polyvinyl chloride
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RCRA	Resource Conservation and Recovery Act
RPD	relative percent difference
SAP	Sampling and Analysis Plan
SDWA	Safe Drinking Water Act
SHA	Site Hazard Assessment
SOP	Standard Operating Procedure
SVOC	semi-volatile organic compound
TAL	target analyte list
TPH	total petroleum hydrocarbon
USACE	U.S. Army Corps of Engineers
USCS	Unified Soil Classification System
UST	underground storage tank
VOA	volatile organic acid
VOC	volatile organic compound
WAC	Washington Administrative Code
WARM	Washington Ranking Method
WISHA	Washington Industrial Safety and Health Act

Section 1: Introduction

The Washington State Department of Ecology (Ecology) has contracted with Kennedy/Jenks Consultants to support their efforts to perform Site Hazard Assessments (SHAs) and/or limited investigation for sites located along the Lower Duwamish Waterway (LDW) upland source control areas. This support will include limited soil and/or ground water sample collection at various sites. Sample collection at these sites is expected to support the SHA scoring process, or assist in the evaluation of the current condition of sites that have already been ranked a 5 through the SHA scoring process.

The purpose of this Sampling and Analysis Plan/Quality Assurance Project Plan (SAP/QAPP) is to document the sampling procedures and protocols for possible investigative activities that may be performed at Ecology's direction to support the SHA process. This SAP/QAPP is also intended to satisfy the technical requirements of the Washington Administrative Code (WAC) 173-340-820, Ecology's Site Hazard Assessment Guidance and Procedures for Washington Ranking Method (Ecology 1992a), and other Ecology policies and/or procedures.

The SAP/QAPP describes sample collection, handling, and analysis procedures, including quality assurance and quality control (QA/QC) requirements. The SAP/QAPP Addendum for each site will include a discussion of the rationale and number of samples for each environmental media associated with the site. Organization and responsibilities for sampling and analysis activities are discussed in Section 2.

Specific information required by WAC 173-340-820 and provided in this document includes:

- Purpose and objectives of the data collection including QA/QC.
- Organization and responsibilities for sampling and analysis activities.
- Requirements for sampling activities:
    - Project schedule
    - Rationale for location and frequency of sampling and parameters to be analyzed
    - Procedures for sample collection and handling including decontamination for equipment and personnel
    - Procedures for management of waste materials generated by sampling activities
    - Description of QA/QC samples
    - Sample labeling, packaging, and chain-of-custody (COC) protocols
    - Procedures for splitting samples.

- Procedures for sample analyses and reporting including analytical laboratory detection/reporting limits, analytical methods, QA/QC procedures, data reporting, and data validation.

This SAP/QAPP was developed to be used for multiple sites; therefore, it is intended to be used in conjunction with other site-specific project documents, including a Health and Safety Plan (HASP) (Kennedy/Jenks Consultants 2017) and a Site-Specific SAP Checklist (SAP Checklist template is included in Appendix A). Detailed descriptions of site-specific investigations are not included in this document and will be added as addenda for each site.

The SAP Checklists will include the following:

- Document approval/signatures
- Site information
- An attached map of the site, including prospective sampling locations
- Project contact information
- Summary of field investigation activities, objective and purpose
- Sampling protocol, including number of samples, analytical methods, and reporting limits
- Pre-field checklist
- HASP addendum (template is in the LDW SHA HASP)
- Copy of the signed access agreement.

A SAP Checklist template is presented in Appendix A.

The remainder of this document is organized as follows:

- Section 2: Organization and Responsibilities
- Section 3: Project Description and Background
- Section 4: Quality Objectives
- Section 5: Field Sampling Activities
- Section 6: Field Documentation
- Section 7: Analytical Methods
- Section 8: Quality Control

- Section 9: Calibration, Testing, Inspection, and Maintenance of Equipment, Instrumentation and Supplies
- Section 10: Data Management, Review, and Reporting.

Section 2: Organization and Responsibilities

This section identifies key individuals and their responsibilities for all major aspects of the project. Project organization including contact information for relevant people will be documented in the SAP Checklist to be prepared for each of the LDW SHA site investigations. The SAP Checklist template is presented in Appendix A.

2.5 Project Organization

Ecology is the primary regulatory agency providing oversight of the limited investigation and SHAs. Ecology will provide review and approval of planned sampling frequency and analytical tests, and review of analytical results for each of the site investigations. The site investigations will involve the following key personnel:

- Ecology Project Manager – Tamara Cardona-Marek
- Environmental Consultant – Kennedy/Jenks Consultants
- Licensed Subcontractors
- An Accredited Analytical Laboratory

  [Note: Because of the nature of this project, a specific accredited analytical laboratory has not been established at this time and may vary depending on the specific work performed and the environmental media being analyzed. ESC Lab Sciences laboratory of Mt. Juliet, Tennessee, will likely be contracted for analysis of environmental samples collected during the site investigations. However, other laboratories such as Analytical Resources, Inc. (ARI) laboratory of Seattle, Washington, may be used depending on the specific scope of services performed].

Each of the SAP Checklists will identify the specific personnel involved in each site investigation and their roles, affiliations, and contact information.

2.1.1 Ecology Project Manager

Ecology's Project Manager will:

- Review and approve SAP Checklists for each of the site investigations.
- Ensure that the proposed work will meet the requirements of this SAP/QAPP.
- Coordinate property access.
- Oversee work performed by the environmental consultant.
- Review reports evaluating and summarizing project activities, investigation results, and further-action, if any.

- Conduct site visits as needed.
- Update Ecology's Integrated Site Information System (ISIS) database.
- Provide technical assistance to site owners of selected projects as needed.
- Participate in public outreach efforts as needed.

2.1.2 Environmental Consultant

The environmental consultant conducting site investigations will work closely with the Ecology Project Manager, as requested, to complete the following tasks:

- Complete a SAP Checklist for each site investigation in accordance with this SAP/QAPP, including any required HASP addenda.
- Communicate data quality objectives to the analytical laboratories analyzing samples collected during site investigation.
- Assemble project teams, implement field work, and coordinate sample analyses.
- Verify that all equipment is adequately calibrated and in functioning condition before beginning field activities.
- Ensure that the proper number, type, and quantity of sample containers, including preservation requirements, are available for field activities.
- Follow standard sampling protocols as defined in this SAP/QAPP and specified in the SAP Checklist specific to each site investigation.
- Record and document all field data in the manner specified in this SAP/QAPP and the applicable SAP Checklist.
- Following applicable Standard Operating Procedures (SOPs; see Appendix B), ensure that all samples are collected, preserved, labeled, packaged, and shipped to the contract analytical laboratory in an appropriate manner.
- Review analytical laboratory results and QC data.
- Prepare analytical laboratory data summary reports and QA reports.
- Where applicable, report deficiencies in sample collection, preservation, handling, test methods, or documentation.
- Initiate and support technical audits and corrective action that may arise from deficiencies in sample collection, preservation, handling, test methods, or documentation.
- Summarize field investigation activities, sample results, and potential data gaps.

- Complete SHA for sites where an SHA has not been completed and the data is sufficient to allow for completion.
- Participate and assist with public outreach efforts, as requested by Ecology.

2.1.3 Analytical Laboratory

Analytical laboratories analyzing and reporting results for samples collected during site investigations will:

- Understand and follow sampling objectives outlined in this SAP/QAPP and SAP Checklists.
- Perform requested analyses using appropriate test methods specified in this QAPP and the SAP Checklist.
- Prepare analytical laboratory reports for the environmental consultant, including all relevant data and QC reports.
- Communicate analytical problems, issues, or concerns to the environmental consultant in a timely manner.
- Initiate corrective action when deficiencies in sample collection, preservation, handling, test methods, or documentation are identified internally by the contract analytical laboratory, or by the environmental consultant.

2.1.4 Health and Safety Plan

Kennedy/Jenks Consultants will prepare a site-specific HASP addendum (under separate cover), which will describe health and safety measures to be followed by Kennedy/Jenks Consultants' employees, for each site investigation. The HASP addenda will be used in conjunction with the primary HASP for LDW sites (Kennedy/Jenks Consultants 2017). All subcontractors providing support during sampling will be required to maintain their own HASP documenting their health and safety procedures.

Personnel, including subcontractors, must obtain the proper training to recognize and protect themselves from hazardous chemicals known or suspected to be present at LDW sites. All field personnel are required to have appropriate Occupational Safety and Health Administration (OSHA) health and safety training for hazardous waste sites per 29 Code of Federal Regulations (CFR) 1910.120, supplemented by annual refresher courses. Environmental consultants are responsible for ensuring that their personnel are informed about and trained on relevant OSHA and Washington Industrial Safety and Health Act (WISHA) guidelines.

Section 3: Project Description and Background

3.5 Background

Kennedy/Jenks Consultants has been asked by Ecology to assist with ranking sites that have not been ranked using the Washington Ranking Method (WARM) scoring manual, or to verify the current status of sites that are expected to represent a low risk. The selected sites have been listed in Ecology’s Confirmed and Suspected Contaminated Sites List (CSCSL) for over 15 years, are located within the LDW storm water or CSO basins, have been ranked as a 5 (if ranked), and have been listed due to a leaking underground storage tank (LUST).

To facilitate site ranking, some sites may need field sampling to collect information on current site conditions. Kennedy/Jenks Consultants has prepared this SAP/QAPP to perform sampling activities where additional field data are necessary to complete a ranking or to understand the status of a site. The scope of sampling or investigation activities will be established on a site-specific basis, but may include collection of groundwater samples from existing monitoring wells, inspection of site features, advancing soil borings for purposes of subsurface soil and groundwater sample collection using a Geoprobe or similar drilling technology, and/or installation of permanent groundwater monitoring wells.

3.5 Project Description

The overall objective of each individual site investigation is to collect and assemble adequate and appropriate data of known quality that are representative of current site conditions. Ecology will use data obtained under this SAP/QAPP to address data gaps at the site. Where an SHA has not been conducted, the data will be used to develop site scores for sites where the existing data set is insufficient for scoring purposes. If an SHA has already been conducted at the site, these data will be used to prepare a short report updating Ecology on current site conditions. It is not the purpose of this project to complete a remedial investigation of each selected site.

Media to be sampled under this SAP/QAPP may include:

- Soil
- Groundwater
- Surface Water/Stormwater
- Sediment or catch basin solids
- Soil vapor
- Ambient air (indoor and/or outdoor).

Categories of contaminants anticipated to be analyzed under this SAP/QAPP may include:

- Petroleum hydrocarbons

- Volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs)
- Polycyclic aromatic hydrocarbons (PAHs)
- Metals
- Pesticides and herbicides
- Polychlorinated biphenyls (PCBs)
- Chlorinated Phenols
- Phthalates
- Dioxins/furans
- Other hazardous substances or waste characteristics.

3.5 Conceptual Site Model

A Conceptual Site Model (CSM) identifies potential primary and secondary sources of contaminants at the site, transport mechanisms, exposure pathways, and potential receptors. In general, sites chosen for this project have been listed on Ecology's CSCSL due to a LUST. Potential primary sources of contaminants at the site may include (but are not limited to) leaks and spills associated with underground storage tank (UST) related uses. These primary sources may have caused impacts to soil, groundwater, or other media at the site. Over the last 15+ years since listing in Ecology's database, these impacts may have attenuated through natural processes (e.g., biodegradation). Site investigations performed under this SAP will help characterize the current conditions at the site, and current contaminant concentrations.

Residual soil and/or groundwater contamination exceeding cleanup standards may be subject to the following transport processes:

- Runoff (surface soil)
- Leaching (surface and subsurface soil)
- Volatilization (surface soil, subsurface soil, groundwater)
- Non-aqueous phase liquid (NAPL) migration (on or below the water table)
- Advection and diffusion (dissolved analytes in groundwater)
- Infiltration (groundwater into surface water pathways, e.g. stormwater conveyance systems).

Potential exposure pathways resulting from these transport processes may include:

- Dermal contact or incidental ingestion of soil, solids, surface water, and/or groundwater
- Inhalation of vapors and/or dust.

Potential receptors at the site include site workers, construction workers, and pedestrians, soil biota, plants, and animals.

The media investigated at each site will vary depending on past site use and data gaps. The presence or absence of contaminants of concern in sampled media will help identify the risk to potential receptors from each exposure pathway. The preliminary CSM will be updated after evaluation of data from the field sampling described in this SAP, as appropriate.

3.5 Project Schedule

The project schedule including milestones such as mobilization, field sampling, and reporting will be documented in the SAP Checklist to be prepared for each of the site investigations. A SAP Checklist template is presented in Appendix A. It is anticipated that work on this project will be completed by June 2017.

Project Milestone	Estimated Date	Actual Date (if different)
Contract kick-off	December 2017	
SAP/QAPP draft	6 January 2017	
SAP/QAPP final	30 January 2017	
Field sampling	30 January – 31 May 2017	
Reporting	February – June 2017	
All deliverables submitted	30 June 2017	

Section 4: Quality Objectives

The goals of the sampling and analysis activities at each selected site are to obtain enough information regarding the current status of the contamination to do one of the follwoing:

1. Complete an SHA
2. Determine whether additional site characterization and cleanup is needed to obtain a no further action determination for the LUST issue.

The data objectives for these site investigations are based on the purpose of the SHA as defined under Chapter 173-340-320 WAC. These data objectives are to provide sufficient sampling data and other environmental information to:

- Confirm or rule out that a release or threatened release of a hazardous substance(s) has occurred.
- Identify the hazardous substance and provide some information regarding the extent and concentration of the substance(s).
- Identify site characteristics that could result in the hazardous substance(s) entering and moving through the environment, including contributions to the stormwater drainage systems.
- Determine the ranking of the site using the WARM Scoring Manual under Chapter 173-340-330 WAC, if possible.

The purpose of the QAPP is to identify the QA/QC protocols necessary to achieve the site-specific objectives for sample collection and analysis during the site investigation. Data acquired during site investigations must be collected in accordance with QA/QC requirements (i.e., the QAPP). Records will be maintained documenting activities performed, data generated during implementation of each site investigation.

4.5 Sampling Objectives

The objective of field sampling activities conducted at each site is to meet the requirements necessary to score and rank a site under WARM, or, if an SHA has already been conducted, to inform Ecology about current site conditions. Data acquired during site investigations may be compared to variety standards including applicable, relevant, and appropriate requirement (ARARs), Model Toxics Control Act (MTCA) cleanup levels, background concentrations and practical quantification limits (PQLs). Site-specific sampling objectives will be established for each of the Site investigations and will be documented in the Sampling and Analysis Summary section of the SAP Checklist. A SAP Checklist template is presented in Appendix A.

Some general objectives for the individual site investigations, based on the information required for scoring purposes, may include:

- Establish, confirm, or identify hazardous substances currently present at the site.
- Document the hazardous substance concentration in a specific media (soil, groundwater, surface water, sediment or air).
- Indicate whether a hazardous substance currently present at a site is likely to extend off the boundaries of the property investigated.
- Determine if a site qualifies for a “No Further Action” (NFA) determination.
- If applicable, recommend additional steps that may be taken at a site to advance towards an NFA determination.
- Characterize physical site properties for purposes of developing a CSM (to the extent practicable under the scope of work and consistent with the project objectives):
  - Collect data necessary to understand the containment features at the site.
  - Make a site-specific determination regarding substance mobility from soil to air, groundwater, and/or to surface water.
  - Identify the deepest point of known contamination in soil relative to groundwater.
  - Help to characterize onsite soils, through soil borings, where local/regional data are deficient/lacking.
  - Determine depth to groundwater, groundwater flow direction, and hydraulic gradient.
  - Identify the elevation of impacted groundwater and/or soil relative to the storm drain systems or other conveyance mechanisms.

4.5 Sampling Process Design

For each site requiring the collection and analysis of samples, a separate SAP Checklist will be prepared. The SAP Checklist (provided in Appendix A) will include a Sampling and Analysis Summary section that describes the overall objective of the field investigation and applicable sampling objectives, specific activities to be performed and other site specific information needed for implementation of the activities. All SAP Checklists must be reviewed and approved by the Ecology Project Manager or designee.

The sampling design and approach is based on an understanding of the data required to fulfill the requirements of the SHA, or of key data gaps identified by the project team (if an SHA has already been completed). Field activities will primarily involve sampling of soil, groundwater, soil vapor, ambient air, sediment, stormwater, and surface water.

The required number of environmental samples to be collected during a site investigation is a function of many factors to be considered, such as the following:

- Past sampling history, if any
- Number and types of identified waste/substance management activities/practices
- Number of available routes of exposure.

Actual sample quantities and locations may be adjusted in the field if obstructions are encountered in the field such as buildings, excessively steep slopes, underground utilities, etc. If proposed sampling locations are not accessible for any reason, the environmental consultant, in consultation with the Ecology Project Manager, will attempt to adjust to an adjacent location. Adjusted sample locations will be as close as possible to the original sample location or will be selected with consideration of the likelihood of success.

Section 5: Field Sampling Activities

This section of the SAP/QAPP describes anticipated field activities, including sampling procedures, sample identification, decontamination, and waste disposal. Specific sampling methodologies for various sample types are described in detail in the SOPs provided in Appendix B and referenced below where applicable. The following SOPs will guide sampling activities:

- SOP-1: Environmental Data Collection
- SOP-2: Surface and Shallow Subsurface Soil Sampling
- SOP-3: Boring and Subsurface Soil Sampling
- SOP-4: Hammer-Driven Direct-Push Drilling and Soil Sampling
- SOP-5: Procedures for Using a Photoionization Detector (PID)
- SOP-6: Borehole Logging
- SOP-7: Surface Water Sampling
- SOP-8: Groundwater Sampling
- SOP-9: Measuring Groundwater Levels
- SOP-10: Well Construction and Development
- SOP-11: Design of Well Screen Filter Packs and Selection of Well Screens
- SOP-12: Stormwater and Storm Drain Sediment Sampling
- SOP-13: Air Sampling
- SOP-14: Soil Gas Sampling
- SOP-15: Sediment Sampling
- SOP-16: Measurement of Field Parameters: pH, Dissolved Oxygen, Specific Conductance, Turbidity, Oxidation-Reduction Potential, and Temperature
- SOP-17: Collecting Field Duplicates
- SOP-18: Sample Packing and Shipping (Soil, Sediment, and Water)
- SOP-19: Equipment Decontamination

- SOP-20: Personnel Decontamination
- SOP-21: Handling and Disposal of Investigative-Derived Waste.

The SOP identified above are generic and intended to be suitable for a variety of site conditions. It is anticipated that the specific procedures in the SOP will be modified in the field as needed to address site-specific conditions.

5.5 Pre-Field Checklist

The Pre-Field Checklist section of the SAP Checklist will be completed (and approved by Ecology) prior to conducting any field activities, including the following:

- Request a public utility locate and arrange for a private utility locator to identify and mark the locations of underground utilities within 50 feet of each planned drilling (or other intrusive work) location (refer to SOP-2: Surface and Shallow Subsurface Soil Sampling for more information on utility clearance). Under most circumstances, an air-knife will be used to assess the potential for shallow underground utilities.
- Assist Ecology as needed to secure necessary access agreements, property maps, property history, and uses. Specifically request any maps or other information regarding current and historical underground utilities.
- Contact property owner or designated contact at least 24 hours in advance of any field work or as requested by property owner or representative.
- Obtain applicable permits and/or Ecology Start Cards required for sampling.
- Coordinate with the analytical laboratory and other suppliers to secure the proper sample containers, sampling request forms, and sampling equipment before field work begins.
- Coordinate subcontractor work, if applicable.
- Prepare a site-specific HASP addendum and hospital route map.
- Procure appropriate field monitoring or screening equipment, if necessary.

5.5 Utility Locating

Prior to any subsurface investigation, Kennedy/Jenks Consultants will coordinate the location of underground utilities adjacent to the site sampling locations. The appropriate service (Utility Location Center) will be contacted to locate publicly-owned underground utilities before intrusive activities occur. In addition, underground utilities will be evaluated by reviewing available as-built drawings of underground site utilities that have been provide to us, interviewing site operations personnel cognizant of utility locations, hiring a private utility location company to locate utilities and features and/or using an air-knife to locate possible underground utilities. Additional procedures for underground utility location are described in the HASP (Kennedy/Jenks Consultants 2014) and in SOP-2: Surface and Shallow Subsurface Soil Sampling.

5.5 Sampling Locations/Types/Frequency

Environmental sampling for scoring and ranking sites under WARM does not entail a complete remedial investigation. The emphasis is upon performing a focused sampling event to address data gaps which preclude developing an accurate SHA score. Data gaps will be identified as part of the initial review of available information for each selected site.

The Sampling and Analysis Summary in the SAP Checklist (see Appendix A) will describe the proposed sampling plan and include sample location, depth intervals, and required analysis. A site map will be provided with the SAP Checklist that shows the proposed sampling locations (see example Figure A-1 in Appendix A). The SAP Checklist will also include the analyses required per depth interval and/or per location in each sampling area, as well as the required number of QA/QC samples (see Section 8). All samples will be submitted to the analytical laboratory for analyses of the site-specific chemicals of interest.

Additional guidance regarding sampling locations/types/frequency is provided in the Ecology guidance:

- Ecology. 1992b. *Statistical Guidance for Ecology Site Managers*. Publication No. 92-54.

- Ecology. 1995. *Guidance on Sampling and Data Analysis Methods*. Publication No. 94-49.

The Environmental Consultant and Ecology Project Manager must use best professional judgment, based on all available site information and current use, in deciding site-specific sampling locations, the number of samples to collect from each environmental medium, and which analyses to perform on the samples to meet sampling objectives of the site investigation.

5.5 Parameter-Specific Sampling Requirements

Parameter-specific sampling requirements, including container type, preservation requirements, and holding times, will be documented in the SAP Checklist (see Appendix A) whenever they depart from those defined in Table 1. Exceptions to standard sampling requirements may be allowed with written approval of the Ecology Project Manager, and will be specified in the SAP Checklist.

The order of sample collection, regardless of the matrix, will be from the most volatile to the least volatile, as follows:

- VOCs

- Hydrocarbon Identifications (HCIDs) and Total Petroleum Hydrocarbons (TPH) using Northwest TPH (NWTPH) methods NWTPH-Gx and NWTPH-Dx

- SVOCs

- SVOCs--PAHs, chlorinated phenols, and phthalates, if analyzed separately

- Pesticides and PCBs

- Dioxins/furans
- Metals [to be identified on the SAP Checklist and may include Resource Conservation and Recovery Act (RCRA) 8 or target analyte list (TAL) metals].

5.5 Sampling Procedures

All samples must be collected in a manner consistent with the media being sampled and the analytes of interest. Sampling procedures will be carried out following the SOPs listed at the beginning of Section 5. Additional methods may be used with the approval of the Ecology Project Manager. Some sources for the appropriate sampling methods include, but are not limited to:

- Ecology. 1992a. *Site Hazard Assessments Guidance and Procedures for Washington Ranking Method*. Publication No. 91-73.
- Ecology. 1995. *Guidance on Sampling and Data Analysis Methods*. Publication No. 94-49.
- Ecology. 2011. *Guidance for Remediation of Petroleum Contaminated Sites*. Publication No. 10-09-057.
- Ecology. 2016 (Revision). *Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action*. Publication No. 09-09-047.
- EPA. 2007. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* (SW-846), Chapter 10 – describes sampling techniques for various media, including soils, sediments, air, water, etc.
- EPA. 1996. *Ground Water Issue. Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedure.* Document No. EPA/540/S-95/504. April 1996.

The use of proper sample containers and appropriate preservation techniques when collecting samples is important. Samples will be collected in containers supplied by the analytical laboratory. This ensures that the container has been properly cleaned and that the analytical laboratory will have sufficient sample material to conduct the requested test. Samples must also be properly preserved or they may be rejected.

Table 1 summarizes common sample containers, preservation techniques, and holding times for the most commonly requested analytes anticipated for LDW site investigations. Check with the analytical laboratory for information about analytes not listed in Table 1. Specific sampling methods for media of interest are discussed in greater detail in the following sections.

5.5.1 Soil Sampling

Surface soils, if sampled, will be collected using hand tools (e.g., stainless steel spoon, trowel, and mixing bowl as appropriate, see SOP-2: Surface and Shallow Subsurface Soil Sampling). Subsurface soils are typically collected during the advancement of soil boring or during the excavation test pits using a variety of equipment including the use of direct-push, hollow-stem, air rotary, or sonic drilling methods, excavation equipment, or hand auger. Samples will be collected according to procedures outlined in Ecology's *Guidance on Sampling and Data Analysis Methods* (Ecology 1995), Ecology's Guidance for Remediation of Petroleum Contaminated Sites, other applicable Ecology guidance and in accordance with in procedures outlined in SOPs provided in Appendix B (see SOP-3: Boring and Subsurface Soil Sampling, and SOP-4: Hammer-Driven Direct-Push Drilling and Soil Sampling).

Field screening of soil samples will be performed to evaluate the presence of VOCs by using a PID and headspace vapor measurement methods, as described in SOP-5: Procedures for Using a Photoionization Detector. Field screening techniques and the laboratory analyses that will be performed will be identified in the SAP Checklist. Borehole logging and soil classification will be conducted in accordance with the visual-manual procedure for soil description, using the Unified Soil Classification System (USCS) (ASTM D 2488-09a) and SOP-6: Borehole Logging.

Soil samples will be collected as discrete samples, unless the SAP Checklist has identified collection of composite samples for a specified purpose, such as characterization of investigation-derived waste. Soil samples will be collected by standard grab methods as described in the referenced SOPs and will contain as few cobbles or stones as possible. Composite sampling is achieved by collecting several roughly equal sub-samples (e.g., aliquots) and thoroughly mixing to form one sample. Soil sample compositing in the field is generally not recommended for volatile contaminants (i.e. VOCs and TPH-Gx), but discrete samples can be composited by the analytical laboratory if needed.

Table A-1 of the SAP Checklist (see Appendix A) will include the proposed soil sample locations, depth intervals, collection method, and required laboratory analyses. Table A-1 will also describe the required number of QA/QC soil samples (see Section 8). Soil samples will be packaged and handled in accordance with SOPs provided in Appendix B.

5.5.2 Water Sampling

Surface water samples may be collected from streams, brooks, drainage ways, wetlands or other water bodies determined to be potentially affected by, or contributing to, contaminant sources at the site.

Groundwater samples are typically collected from permanent monitoring wells screened within the saturated intervals for the specific site. Reconnaissance groundwater samples may also be collected from temporary well screens installed in soil borings, or from excavations. Many sites have multiple saturated zones, and each should be considered for sampling to address data gaps. If the existing monitoring well network at a site is inadequate to address data gaps, installation of permanent wells and sampling of reconnaissance borings may be considered.

Common surface water and/or groundwater sampling procedures are discussed below. Table A-1 of the SAP Checklist (see Appendix A) will describe the proposed sample locations, depth intervals, collection method, and required analytical laboratory analyses. Table A-1 will also describe the required number of QA/QC samples (see Section 8).

5.5.2.1 Surface Water

Surface water grab samples will be collected directly into sample containers as discussed in SOP-7: Surface Water Sampling. Surface water samples will be collected before any proposed sediment samples at each location. Where applicable, the downstream sample will be collected before the upstream sample to minimize the potential for cross-contamination. If insufficient water is present to fill all sample containers, samples will be collected in the order listed in Section 5.4 or in an order based on site-specific data needs (to be identified on the SAP Checklist).

5.5.2.2 Groundwater

If data gaps are identified during the initial file review, or if the soil investigation sampling results indicate subsurface soils have been chemically impacted, groundwater sampling may be necessary to evaluate the depth of subsurface impacts the potential for impacts to groundwater, or the lateral extent of impacts to groundwater. Both reconnaissance sampling and standard monitoring well sampling techniques may be used to meet the objectives for a groundwater investigation.

Reconnaissance groundwater sampling will consist of collecting a grab groundwater sample from the specified saturated zone without installing a permanent monitoring well. Reconnaissance groundwater sample concentrations may be biased high. If reconnaissance groundwater sample results are below the applicable cleanup levels, they may be used to make a determination that no additional sampling is needed at that location. However, if detections are observed, reconnaissance groundwater samples may be used to assist in placement of permanent wells. Reconnaissance groundwater sampling is typically performed during direct-push drilling, which frequently includes the insertion of plastic tubing through the center of the drive rod once the target sampling depth has been reached. A minimum of groundwater is purged using a peristaltic (or similar) pump to reduce turbidity. After purging, a grab groundwater sample is collected (using the pump) and transferred to the appropriate sample containers in accordance with groundwater sampling SOP-8 in Appendix B. Analyses for reconnaissance groundwater samples will be identified on Table A-1 in the SAP Checklist. Depending on the analyses specified, field filtering of reconnaissance groundwater samples may be identified in the SAP Checklist. Following completion of sampling, the boring is abandoned by backfilling the borehole with bentonite chips and completed with appropriate patch to restore the surface cover.

Monitoring wells may be sampled using dedicated pumps, disposable bailers, peristaltic pumps with new tubing, bladder pumps, foot-valve inertia pumps with polyethylene tubing, or 2-inch submersible pumps. Appropriate purge methods (e.g., low-flow or three casing volume removal) will be followed prior to well sampling. Low-flow purging is preferred by Ecology, and will be the default method for all groundwater sampling at the sites. Other purge methods will not be used without Ecology approval. Purge methods and monitoring parameters will be documented on approved purge and sample forms. Depth to groundwater measurements will be collected following guidance in SOP-9 in Appendix B.

For split and/or duplicate samples, the sample containers will each be filled directly from the sample source in the following manner: One from the primary sample bottle set, then one from the split/duplicate sample bottle set, and so forth. Primary and split/duplicate containers may also be filled by alternating the pump discharge between the containers at a set interval; however, this practice is not appropriate for sampling of VOCs in groundwater.

If monitoring well installation is required, the specific well design and construction details will be outlined in the SAP Checklist. Installation will be conducted following guidance in SOP-10: Well Construction and Development, and SOP-11: Design of Well Screen Filter Packs and Selection of Well Screens.

5.5.2.3 Stormwater Sampling

Stormwater samples may be collected during an individual site investigation. There are two types of stormwater sampling; surface water and storm drain. Surface water sampling includes collecting samples of free-flowing runoff from the site. Storm drain sampling involves the collection of samples of runoff from within a storm drain system, including outfalls, catch basins, pipes, sumps, oil-water separators, or other site-specific features.

The SAP Checklist will include stormwater collection and testing procedures for use during a site investigation, in accordance with SOP-12: Stormwater and Storm Drain Sediment Sampling.

5.5.3 Air and Soil Vapor Sampling

Air and soil vapor sampling may consist of sampling indoor and outdoor ambient air, sub-slab air, crawlspace air, and subsurface soil vapor. Ambient air sampling should always be approached with caution as the source of contamination is often not readily apparent, such as at operating dry cleaners or auto fueling/servicing facilities.

Air and soil vapor sampling equipment depends on the nature of the site, sampling objectives, the contaminants of interest, and laboratory analytical methods. Typical sampling containers include Tedlar® bags, stainless steel summa™ canisters, and sorbent traps used with sampling pumps. The sample containers will be verified with the analytical laboratory to ensure they are appropriate for the chemicals of interest and data quality objectives. Indoor, outdoor, and crawlspace air is typically collected directly into sampling containers. Soil vapor samples and sub-slab vapor samples are collected into sampling containers from subsurface soil vapor sampling probes which may be permanent or temporary installations. More information on air and soil vapor sampling and analyses used to evaluate vapor intrusion from contaminated soil or groundwater is available in Ecology's (Revised 2016)) *Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action*.

Table A-1 of the SAP Checklist (see Appendix A) will describe the proposed sample locations, sample duration, depth intervals, sample container types, collection method, collection frequency, and required laboratory analyses. Table A-1 will also describe the required number of QA/QC samples (see Section 8). Samples will be collected in accordance with SOP-13: Air Sampling and SOP-14: Soil Gas Sampling.

5.5.4 Sediment Sampling

Sediment samples may be collected from shallow (surface) depths, as discussed in SOP-15: Sediment Sampling. The SAP Checklist will include sediment collection and testing procedures for sediment characterization during a site investigation.

There are many factors to consider when choosing sediment sampling equipment, such as: sample site access, sample volume requirements, sediment texture, and target depth for sediment collection. In general, piston samplers are best used for soft, fine-grained sediments at depth. Grab/dredge samplers are best for coarse, shallow sediments and where large volumes of sediment are required. It is important to attain adequate sample volume for physical, chemical, and potential bioassay analyses.

Detailed information on sediment sampling is available in the Ecology (2008) *Guidance on the Development of Sediment Sampling and Analysis Plans Meeting the Requirements of the Sediment Management Standards* (Chapter 173-204 WAC). Additional criteria for determining whether the dredged material is suitable for unconfined, open-water, or upland disposal are documented in the *Dredged Material Evaluation and Disposal Procedures Users' Manual* (Users' Manual) published by the U.S. Army Corps of Engineers (USACE) in July 2008 and updated in November 2009 (USACE 2009).

5.5.5 Catch Basin Sediment Sampling

Catch basin sediment samples may be collected from material accumulated in catch basins, pipes, sumps, or other site-specific stormwater features. Sampling could involve a variety of situations and sampling equipment will be site-specific. Equipment might include stainless steel trowels or spoons, hand augers, or dredges. The SAP Checklist may be amended to include sludge sample collection and testing procedures for a LDW-SHA site investigation.

If water samples are to be collected at the same location as catch basin sediment samples, the water samples will be collected first. The protocol for catch basin or storm drain sediment sampling is provided in SOP-12: Stormwater and Storm Drain Sediment Sampling, in Appendix B.

5.5 Sample Handling and Custody

Chain of custody procedures for each analytical laboratory will be identified and included in the SAP Checklist prior to the start of field activities.

Samples for chemical analysis will be packaged and stored in an appropriate manner consistent with preservation requirements for each test method. Samples will be transported directly or shipped to the analytical laboratory under COC protocol in accordance with SOP-18: Sample Packaging and Shipping (Soil, Sediment, and Water) and SOP-13: Air Sampling provided in Appendix B.

5.5 Decontamination Requirements

To the greatest extent possible, disposable and/or dedicated personnel protective and sampling equipment will be used to avoid cross-contamination. All non-disposable sampling equipment will be cleaned between sample locations to avoid cross-contamination in accordance with procedures described in SOP-19: Equipment Decontamination. To the extent possible, sampling using non-disposable sampling equipment will begin at locations suspected to be least contaminated, progressing to the most contaminated locations.

It is anticipated that all fieldwork will be conducted according to the HASP (Kennedy/Jenks Consultants 2017) using Level “D” personal protective equipment (PPE). In accordance with the decontamination procedures described in SOP-20: Personal Decontamination, disposable PPE and equipment will be placed in appropriate disposal containers.

The following decontamination procedures will be used as the minimum requirements for all non-disposable equipment used to collect routine samples undergoing organic or inorganic constituent analyses:

- Clean with tap water and non-phosphate detergent using a brush if necessary to remove particulate matter and surface films. Equipment may be steam cleaned (using high-pressure hot water) as an alternative to brushing. PVC or plastic items should not be steam cleaned.

- Rinse with tap water. Repeat cleaning and tap water rinse as needed to remove particulate matter and surface films.

  [NOTE: If tap water is suspected to be contaminated, use containerized drinking water or distilled/deionized (DI) water]

- Final rinse with tap water.

- Additional final rinse with distilled/DI water.

  [NOTE; Each rinse may be performed with distilled/DI water if desired, but only the final rinse needs to be performed with distilled/DI water]

- Air-dry the equipment completely.

- Store the decontaminated equipment in a clean container.

Decontamination will be conducted in a central location, upwind and away from suspected contaminant sources.

5.5 IDW Management

Investigation-derived waste (IDW) may be generated during the LDW site investigations. Generally, due to the relatively small quantities generated, IDW such as disposable sampling equipment and protective clothing (e.g., gloves) can be disposed of at a state-permitted, licensed, or registered municipal or industrial solid waste landfill. Otherwise, IDW may include contaminated soil, water, or sediment, used PPE, and decontamination water that remains after sampling. IDW will be stored in new or reconditioned, Department of Transportation (DOT)-approved, 55-gallon drums pending characterization and offsite disposal. Drums will be consolidated in one location at each site prior to removal. The property contact will be notified of the location and number of drums.

The Environmental Consultant will be responsible for waste management at the site, which includes containerizing and securing the IDW, and labeling, staging, and profiling the IDW for ultimate disposal within a timely manner and in accordance with SOP-21: Handling and

Disposal of Investigative-Derived Waste. IDW drums will be placed in a configuration that allows room for inspections, operations and maintenance, and handling. Each drum will be labeled with the following information: contents, name of generator, and date.

Samples will be collected from each type of IDW and analyzed for disposal purposes as needed. Some IDW may be characterized using the results of the investigation samples and may not require separate sampling. Each IDW container will be referenced to a set of analytical (sample) data that is representative of the IDW. Before receipt of analytical data, IDW will be preliminarily characterized based on site knowledge, field observations, and field analytical data (typically hazardous vs. non-hazardous). Final IDW classification/characterization will be based on analytical data for investigation and/or waste characterization samples.

IDW will be disposed of promptly after characterization is performed. The IDW characterization process is outlined in EPA's (1991) *Management of Investigation-Derived Wastes During Site Inspections* and EPA’s (1992) *Guide to Management of Investigation-Derived Wastes*. Classification of IDW will also follow the regulations as published in Dangerous Waste Regulations (WAC 173-303) and/or Water Quality Regulations on the basis of the laboratory analyses. IDW will also be evaluated as required by WAC 173-303-100 State Only Dangerous Waste. Once the IDW is characterized, the environmental consultant will make a determination and adequately document the proper management and/or disposal.

Section 6: Field Documentation

To ensure that samples are correctly identified and tracked, careful sample documentation and custody procedures will be used during the site investigation to maintain sample integrity during collection, transport, storage, and analysis.

Field sampling personnel will be responsible for maintaining proper documentation and custody procedures from sample collection until samples are transferred to the analytical laboratory or a commercial freight carrier. The environmental consultant will review and approve all field documentation. The analytical laboratory will be responsible for maintaining sample custody and documentation from the time the analytical laboratory receives the samples until final sample disposal. Field documentation and sample COC requirements are discussed below.

6.5 Documentation of Field Activities

A field logbook will be maintained by the sampling team. Field logbooks will be waterproof pages in bound notebooks. All entries to field logbooks, and all other field documentation, will be made using indelible ink. Any errors will be corrected by drawing a single line through the incorrect entry, entering the correct information, and dating and initialing the change. After project completion, all field logbooks will be stored in the final project file. It is important to note that following the LDW site investigation, the written comments recorded in the field notebook become public record.

The title page of each field logbook will contain the following:

- Name, facility ID and address of the site
- Name of the Ecology Project Manager, the environmental consultant, and the field contact person (individual to whom the logbook is assigned)
- Project start/end date.

Daily entries into the logbook will generally include the information listed below, but information recorded on field forms (i.e. boring logs, purge forms, etc.) need not be duplicated in the field logbook.

- Date
- Personnel onsite (including visitors)
- Weather conditions
- Type(s) of field equipment used
- Field equipment calibration methods (if applicable)
- Sample location and depth (locations to be logged using GPS)

- Date and time of sample collection
- Sample identification number
- Description of sampling location
- Sample type (e.g., duplicates)
- Photographs (including general field activities, soil borings, and sample locations)
- Issues encountered and/or corrective actions
- Any deviations from the SAP/QAPP
- Any other observations that may be relevant to the specific field program or activities that may affect the resulting analytical data.

6.5 Photographs

Where practical, photographs will be taken to document field activities, including sample locations and soil sample materials observed in core sleeves before being placed in sample containers. Also, a small whiteboard may be included in the photograph to list the sample name, date, and time of collection.

In order for these photographs to be effective documentation, the accompanying information will be entered into the field logbook, or on a field map:

- Date
- Time
- Name of photographer
- Name and identification number (if any) of the LDW-SHA site
- Location of area within LDW-SHA site which is photographed
- General direction faced when photograph taken
- Any other appropriate comments (e.g., weather).

6.5 Sample Field Forms

Field sampling personnel may complete field sample forms for soil, water, sediment, and or air/soil vapor sampling. Example field forms to be used for sampling activities at LDW sites will be included with the SAP Checklist (see Appendix A). As previously noted, data entered on field forms does not need to be duplicated in the field notebook.

6.5 Field Chain-of-Custody Procedures

All samples will be placed immediately in appropriate containers with appropriate preservatives per the analytical method requirements (see Table 1). The filled containers will be tightly sealed, the outer surface wiped to remove any loose particulates, and stored in a dedicated cooler with ice (or ice packs) pending transport to the analytical laboratory.

Samples will be labeled with the following information:

- Kennedy/Jenks Consultants name
- Project name/location
- Sample identification number
- Date and time of sample collection
- Preservative (if applicable)
- Analyses to be performed
- Sample matrix (i.e., soil, water, sediment)
- Sampler's name or initials.

COC procedures provide an accurate written record of sample possession from the time of collection through analytical laboratory analysis. A sample is considered in custody *only* when one of the following applies:

- It is in an authorized person's immediate possession.
- It is in view of an authorized person after being in that person's physical possession.
- It is in a secure area, restricted to authorized personnel only, after having been in an authorized person's physical possession.

Each COC form will be completed properly to ensure that sample custody is documented, appropriate samples have been collected, and scheduled analyses are assigned correctly. All entries will be made using indelible ink. Any errors will be corrected by drawing a single line through the incorrect entry, entering the correct information, and then initialing and dating the change. Analytical laboratories typically provide a COC form that they prefer. At a minimum, these forms will contain the following information:

- Sample identification
- Date and time of sample collection
- Sample matrix (i.e., soil, smelter material, water, sediment)
- Number and type of containers per sample

- Preservative (if applicable)
- Analyses to be performed
- Sampler's name and initials
- Release and acceptance information, including date, location, and sampler's signature.

Custody seals must be used when samples are shipped to the analytical laboratory, or when they are delivered to the analytical laboratory after hours. The seals must be signed by the field personnel and be affixed to the sample cooler in a way that would necessitate breaking the seal in order to open the cooler. If the samples are delivered directly to the analytical laboratory by the sampler, sample seals are not necessary.

If the samples are shipped via a commercial carrier, the carrier will relinquish samples to the analytical laboratory upon arrival, and the analytical laboratory personnel will complete the COC form. The COC forms will be sealed in plastic zip-lock bags (or similar) and secured to the top of the lid inside the cooler with tape.

6.4.1 Analytical Laboratory COC Procedures

A signed COC form will be obtained from the analytical laboratory custodian after the samples have been received and sample condition recorded. Upon receipt by the analytical laboratory, samples will be checked carefully to ensure that sample containers are not broken or leaking, proper preservation methods have been followed [including receipt at 4 degrees Celsius (°C) ± 2°C when applicable], and labels and custody seals are intact. Each COC form will be verified for accuracy and completeness, and any discrepancies will be brought to the attention of the environmental consultant or Ecology Project Manager. From the time of receipt, the analytical laboratory will use its standard internal COC procedures to ensure that the samples are tracked through completion of the analytical process.

Sample custody will be maintained within the analytical laboratory's secure facility until disposal. Following sample analysis and throughout the holding time, the analytical laboratory will archive any remaining sample material for all samples (100 percent). The analytical laboratory will be responsible for sample disposal, which will be conducted in accordance with all applicable local, state, and federal regulations.

6.5 Handling/Referring Possible Violations

If, during the course of SHA or limited investigation field activities, questionable practices or site conditions are noted, it is incumbent upon the field personnel to suitably document these facts, without compromising the objectives of the investigation or SHA. A summary of these observations will be forwarded to the Ecology Project Manager following completion of onsite activities.

Section 7: Analytical Methods

This section provides a description of the common analytical testing that may be performed during the LDW site investigations. The analytical laboratory will have their own SOPs to address sample preparation and extraction methods and analytical procedures.

7.5 Analytical Considerations

As recommended by Ecology (1992a), the employment of best professional judgment is necessary to determine specific analyte requirements for any environmental samples collected during a site investigation. The analytical program for the selected sites should be based on the specific contaminants that are confirmed or suspected, on the basis of existing site information, to pose a threat to human health and/or the environment.

If little or no information is available about current site conditions and/or historical site uses, particularly site uses that are known to be associated with environmental contaminants, best professional judgment will be employed. The analytical testing program (including sampling locations, types, frequencies, and analyses) must be adequate to address the data gaps identified for the site. The purpose of the sampling is to facilitate accurate scoring and/or obtain information on current status of the Site, not to define the full “nature and extent” of the contamination.

A summary of sampling and analyses to be performed will be presented on Table A-1 in the SAP Checklist to be prepared for each of the LDW-SHA site investigations. The QA/QC samples to be collected during each field sampling activity are discussed in Section 8.

7.5 Field Screening and Field Parameter Measurement

This section provides a summary of the field screening and field parameter measurements that may be collected during LDW site investigations, including the types of field observations and measurements and methodologies.

7.2.1 Soil

Field screening of soil materials will typically include the following:

- Visual observation of staining and other discoloration.
- Water-sheen testing for the presence of hydrocarbon or other sheen/film.
- Headspace analysis for organic vapors using a portable PID and headspace technique.

Field screening methodologies for soil are described in the SOP-5: Procedures for Using a Photoionization Detector in Appendix B. In addition, soil logging as described in SOP-6: Borehole Logging in Appendix B will be performed. Additional instructions and SOPs for field screening soil samples will be presented in greater detail in the SAP Checklist for each of the LDW-SHA site investigations.

7.2.2 Groundwater

Field parameter monitoring for groundwater will be conducted during the purging process prior to sample collection at each well location. Field parameters may be measured using a portable meter equipped with separate probes for temperature, pH, specific conductivity, redox potential, and dissolved oxygen. The probe housing may be installed down-well or in an in-line flow-through cell during the purging process (the in-line flow-through cell is preferred). Turbidity will also be measured using a field meter.

Meter readings will be recorded at minimum of 10-minute intervals during the purging process, including a final reading taken at the completion of purging for each well location. Purging will continue until stabilization criteria (listed in SOP-8: Groundwater Sampling and SOP-16: Measurement of Field Parameters: pH, Dissolved Oxygen, Specific Conductance, Turbidity, Oxidation-Reduction Potential, and Temperature presented in Appendix B) for each parameter have been met.

Methods for measurement of groundwater field parameters are described in SOP-8: Groundwater Sampling presented in Appendix B.

7.2.3 Surface Water

If surface water will be sampled, water quality parameters will be collected from surface water in accordance with SOP-16: Measurement of Field Parameters - pH, Dissolved Oxygen, Specific Conductance, Turbidity, Oxidation Reduction Potential, and Temperature.

7.5 Laboratory Analytical Methods

Laboratory analytical methods used for site investigations must be approved by the Ecology Project Manager. In general, petroleum-impacted sites will follow the guidance for laboratory analytical methods set out in Ecology (2011) *Guidance for Remediation of Petroleum Contaminated Sites*. As the lists of approved analytical methods are subject to routine update, the Environmental Consultant will contact the Ecology Project Manager for a list of currently approved methods. Additional methods may be available and appropriate; consult with the Ecology Project Manager for approval of alternate methods.

Section 8: Quality Control

QC is the implementation, monitoring, and documentation of the quality processes and procedures. Every procedural aspect, from project planning, sample collection, laboratory analysis, to data assessment, imparts a significant and often critical bearing on environmental decisions.

QC samples to be used to evaluate analytical data in terms of the quality criteria parameters include duplicate samples, equipment-rinsate blanks, temperature blanks, method blanks, and MS/MSD. These include QC samples prepared in the field and by the analytical laboratory. Method-specific QC procedures are detailed in the analytical laboratory's SOPs and will be available upon request. The minimum requirements of the analytical laboratory's QA/QC plan include the frequency of QC sample analysis, acceptance criteria (control limits), and corrective actions and also describe the holding time criteria to be used to assess data quality.

8.5 Project Planning

This SAP/QAPP describes and defines the general quality objectives of LDW site investigations. Site-specific quality objectives will be further defined by in SAP Checklists, if needed. This approach to quality management ensures that quality activities are conducted throughout the project, but allows for the flexibility to tailor quality-related activities to individual LDW site investigations.

8.5 Field QC Requirements Samples

For field sampling, QC samples are used to assess sample collection techniques and environmental conditions during sample collection and transport. For this project, field QC samples may include duplicate samples, equipment-rinsate blanks, and temperature blanks. QC samples and frequency of collection are discussed in the following sections. A summary of specifications for containers, holding times, preservation, and handling for each matrix and analysis group is shown in Table 1. Specific field QC sample requirements for each site will be listed on each SAP addendum.

8.2.1 Duplicate Samples

Duplicate samples may be used to assess variability in sampling techniques. A duplicate sample pair is typically a single grab sample that is split into two samples during collection. For each duplicate sample pair, one sample is labeled with the sample identification and the other is labeled with a blind duplicate sample identification. This sample pair is then submitted to the same analytical laboratory as two separate samples. Precision will be evaluated by calculating the RPD between the field duplicate samples. The RPD will be calculated for field duplicate pairs for each analyte whose measured values are greater than the MRL. The frequency for duplicate samples shall typically be one per 20 investigative samples, with a minimum of one duplicate within each media per sampling event.

8.2.2 Equipment-Rinsate Blanks/Field Blanks

Equipment-rinsate blanks consist of analyte- and reagent-free water (preferably provided by the analytical laboratory) that is poured over reusable sampling equipment after standard decontamination has been performed. The runoff (rinsate) is collected in clean sample containers appropriate for the analyses being performed. Typically, equipment-rinsate blanks are analyzed for the same parameters as the associated environmental samples that were collected using the sampling equipment.

Equipment blanks are commonly used to evaluate the effectiveness of decontamination of sampling equipment, and data validation protocols include steps for evaluating equipment-rinsate blank results and application of appropriate data qualifiers when blank results indicate the potential for cross-contamination of field samples. Potential sources of bias or cross-contamination include sampling gloves and sampling equipment that may incidentally come into contact with the sample.

Equipment-rinsate blanks are analyzed as regular field samples for the same suite of analytical parameters as the associated samples. Equipment-rinsate blanks will not be designated for analytical laboratory use in preparation of MS or analytical duplicate samples. Equipment-rinsate blanks may be collected at a minimum frequency of one per every 20 field samples when non-dedicated sampling equipment is used.

If no reusable sampling equipment is used, a field blank may be collected in lieu of an equipment-rinsate blank. A field blank is collected by pouring analyte- and reagent-free water directly into sample containers at a location that is within the boundaries of the work area at the site.

8.2.3 Temperature Blanks

A temperature blank is used to monitor temperature preservation of samples transported to the contract analytical laboratory. The temperature blank is distilled water stored in a glass/plastic vial or jar, and is typically provided by the analytical laboratory. A temperature blank will be included with each sample cooler submitted for chemical analysis. Upon receipt by the analytical laboratory, the sample custodian will measure and record the temperature of the blank sample.

Temperature blanks are commonly used to evaluate the effectiveness of preservation requirements (e.g., chilling samples on ice during shipment to the analytical laboratory) and application of appropriate data qualifiers when blank results indicate the potential for elevated temperatures to affect field samples during transport to the analytical laboratory. Typically, the temperature blank must be within the criteria of 4±2°C (2°C to 6°C).

Section 9: Calibration, Testing, Inspection, and Maintenance of Equipment, Instrumentation, and Supplies

All field analytical instruments and equipment will be tested, inspected, and maintained according to the manufacturer's guidelines and recommendations. Data collected from improperly functioning equipment will not be used. The equipment testing, inspection, and maintenance logs for all equipment must be made available to the Ecology Project Manager, and/or their representative upon request.

9.5 Calibration

Calibration refers to the process of verifying, adjusting, or fine-tuning the measurements reported by a given instrument to agree with known values. In general, the calibration process involves analyzing commercially prepared calibration standards of known concentrations or values, which span either the measurement range of the instrument or the range of values anticipated to be encountered in a given investigation. The measured value produced by the instrument is then compared to the published value for that calibration standard, and the difference is compared to project, method, or instrument acceptance criteria. If the difference between the published and measured values for the calibration standard is smaller than the acceptance criteria, then the instrument is considered to be in calibration. If the difference is greater than the applicable acceptance criteria, the instrument is considered to be out of calibration and must be recalibrated in accordance with manufacturer's recommendations before any measurements made with the device can be considered valid. Field equipment calibration procedures and requirements are described in the following sections.

9.5 Field Equipment Calibration

Field calibration standards will be obtained from the National Institute of Standards and Technology (NIST), EPA Cooperative Research and Development Agreement vendors, American Association of Laboratory Accreditation vendors, or other reliable commercial sources. For the purposes of field instrument calibration, vendor standards will not be diluted. Before each use, standards will be checked for signs of deterioration (e.g., discoloration, formation of precipitates, and changes in concentrations), and will be discarded if deterioration is suspected or the expiration date identified by the vendor has passed.

Instrument calibration procedures are described in the SOPs provided in Appendix B. Field instruments that may be used during investigative activities include, though are not limited to, a PID for screening soil for the presence of VOCs, and water quality meters during groundwater sampling (typically pH, specific conductivity, temperature, DO, oxidation-reduction potential, and turbidity). The field instruments will be calibrated in accordance with the manufacturer's instructions and recommendations. The field instruments will be calibrated at the frequency described in Table 2 and following any equipment maintenance, correction of malfunction, or change or update of the analyzer software. The performance and results of equipment calibrations, and calibration source information (manufacturer, lot number, date opened) as well as any errors or maintenance will be documented in the field logbook.

For corrective action, if calibration of a field instrument is outside the criteria at the beginning of the day, the instrument will be recalibrated with new standards. If recalibration is unsuccessful, the unit will be repaired or replaced.

All field analytical instruments and equipment will be tested, inspected, and maintained according to the manufacturer's guidelines and recommendations. Data collected from improperly functioning equipment will not be used. The equipment testing, inspection, and maintenance logs for all environmental consultant equipment must be made available to the Ecology Project Manager, and/or their representative upon request.

9.5 Equipment Testing, Inspection, and Maintenance

A preventive maintenance program is necessary to promote the timely and effective completion of a measurement effort for field programs. The preventive maintenance program will be designed to minimize the downtime of crucial sampling or analytical equipment due to unexpected component failure. Efforts will focus on establishing maintenance responsibilities, maintenance schedules for major or critical instrumentation and apparatus, and an adequate inventory of critical spare parts and equipment.

9.3.1 Field Equipment/Instruments

The field equipment used for sampling will be maintained and used according to the manufacturer's directions. The field team leader will ensure that each piece of equipment is operational and is inspected on a regular basis. Any preventive maintenance or repair conducted in the field will be recorded in the field logbook or other appropriate field forms. If equipment is determined to be damaged, in need of maintenance, or otherwise unusable, it will be immediately taken out of service until such time that it can be repaired or replaced. The field team leader will be responsible for inspecting and testing the field equipment to verify it is in acceptable condition before the item is put back into service. Backup instruments and equipment will be available onsite or within a short turnaround time to avoid delays in the field schedule. Field instruments will be checked and calibrated before they are shipped or carried to the field and will be checked and calibrated before use. Calibration checks will be performed as specified in the manufacturer's directions.

9.5 Inspection/Acceptance of Supplies and Consumables

All supplies and consumables will be examined for damage or other characteristics that would otherwise compromise data quality.

Section 10: Data Management, Review, and Reporting

10.1 Laboratory Data Reporting

The analytical laboratory is responsible for providing sufficient laboratory documentation such that the sample results are traceable to the field samples, and the analytical data can be verified and validated by an independent third-party reviewer, if applicable. All analytical laboratory data packages will contain the following information:

- Cover letter
- COC forms
- Summary of sample results
- Summary of QC results.

The minimum information to be presented for each sample for each parameter or parameters group:

- Client sample number and analytical laboratory sample number
- Sample matrix
- Date of extraction/preparation and date/time of analysis
- Dilution factors
- Sample weights/volumes used in sample preparation/analysis
- Identification of analytical instrument
- Analytical method
- Detection/quantitation and reporting limits
- Definitions of any data qualifiers used.

The minimum QC summary information to be presented for each sample for each parameters or parameter group will include:

- Surrogate standard recovery results
- Matrix QC results (MS/MSD, duplicate)
- Method blank results
- Laboratory duplicate results and control limits

- Analytical laboratory check standard results
- Initial and continuing calibration results and control limits.

10.2 Data Management

Field data from LDW site investigations, such as sample identification and latitude/ longitude coordinates, will be recorded on field data sheets or hand-held computers. Field data are reported to the Ecology Project Manager through submission of a final report or site hazard assessment. The assessment report will include copies of field notebooks or field sampling data sheets, laboratory analytical data reports, and COC documents. The assessment report will be filed with the Ecology Project Manager and will be uniquely identified by the Site facility identification (ID) number in Ecology's ISIS database. Project records will be maintained in the site's ISIS file in accordance with Ecology's Record Retention Schedule.

Data will also be managed and stored using the following Ecology databases:

- Environmental data or sample results will be stored in Environmental Information Management (EIM) System. The analytical laboratory will provide data in a format compatible with EIM, in addition to any other reporting formats. The environmental consultant will be responsible for uploading data for LDW-SHA sites to Ecology's EIM database.
- Maps, and reports will be stored in Document Storage and Retrieval System (DSARS).

10.3 Data Review and Validation

This section discusses data review and verification procedures and requirements.

Field and analytical laboratory data generated from sampling activities will be reviewed and verified. Field data entered into databases will be verified. Errors identified during the verification of data will be corrected prior to release of the final data.

The analytical laboratory is responsible for verifying analytical results prior to the submittal of the final laboratory data report. Initially, all analytical data generated by the analytical laboratory are verified by the laboratory. During the analysis process, the analyst and the laboratory QA Manager verify that the results have met various performance-based control limits (e.g., surrogate recoveries and continuing calibration). Nonconformance of various method QC requirements and control limits warrants the re-analysis and/or re-extraction of a sample.

Data validation will be conducted in accordance with applicable sections of EPA's Contract Laboratory Program National Functional Guidelines for Organic and Inorganic Data Review (EPA 2008; 2010). For each data package, the Kennedy/Jenks' QA Officer will conduct a review of the QC results. If data do not meet required criteria, they will be flagged with data qualifiers as specified under the action portion of each requirement of the functional guidelines (EPA 2008; 2010). Data validation procedures will entail evaluating the following:

- Holding times (check to see whether samples were analyzed within the specified holding time)
- Method blank results [check to see whether analytes were present in method blank samples and that a blank was analyzed every 20 samples (or more often) for each matrix]
- Surrogate recovery results for organic analyses (check to see whether surrogate recoveries met control limits)
- Laboratory control sample results (check to see whether laboratory control samples met control limits)
- Field duplicate results
- Field blank results, where appropriate
- Laboratory duplicate results (check to see whether duplicate analyses were conducted every 20 samples for each matrix or at least for each batch of samples, where applicable, and that control limits were met)
- MS/MSD results for all relevant analyses (check to see whether matrix spike and matrix spike duplicates (MS/MSD) were analyzed every 20 samples for each matrix or at least for each batch of samples, where applicable, and that control limits were met)
- Reported detection limits for analyses (check to see if the detection/reporting limits were adequate for comparison to appropriate regulatory criteria).

The QA Officer will prepare a QA memorandum for each data package describing the results of the data validation and describing any qualifiers that are added to the data. Limitations to the usability of the data will also be discussed in the memorandum.

10.5 Data Reporting

A SHA, site status report, or Preliminary Draft Supplemental Investigation Report may be prepared by Kennedy/Jenks for each site and submitted to Ecology at the end of the investigation. The report will include the following, as applicable:

- A brief description of the site and site history, including a title search.
- A description of the sampling activities and procedures used during sampling.
- A description of the analysis performed on the samples.
- Tabulated analytical results, with comparison to appropriate regulatory criteria [MTCA WAC 173-340, WAC 173-201A-240 marine water quality criteria, WAC 173-204 sediment management standard criteria, and/or National Pollutant Discharge Elimination System (NPDES) permit requirements].

- A summary of deviations from the procedures described in this SAP/QAPP, if applicable.
- COC records.
- Deliverables in original format as received from the contract analytical laboratory, including Electronic Data Deliverables (EDDs) and electronic copies in Adobe™ portable data file (pdf) format.
- Data validation reports.
- A site hazard assessment and WARM scoring (if applicable).

Deliverables will be provided to Ecology electronically in MS Word, Excel, and/or Adobe .pdf formats for all documents, as appropriate. Kennedy/Jenks Consultants will provide georeferenced data files in the appropriate format specified by Ecology for all figures created with CAD or GIS software.

10.5 Data Usability

Laboratory data generated in accordance with this SAP/QAPP will be considered usable for site characterization and to direct future remedial actions unless the data validation process described herein results in rejection of data. Rejected data will not be used to support site characterization or any other project objective.

After environmental data have been reviewed, verified, and validated in accordance with the procedures described in this SAP/QAPP, the data must further be evaluated to determine whether project data quality objectives have been achieved. Data quality objectives may be evaluated by a review of the sampling design and methods to verify that these were implemented as planned and are adequate to support project objectives, a review of any issues brought up during data review and validation, and an evaluation of the limitations of the collected data.

Any report or technical memorandum in which data for this project is reported will discuss any potential impacts of data usability and will clearly define any limitations associated with the data.

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Tables

Table 1: Analytical Methods, Sample Containers, Preservation, and Holding Times[a]

Media	Analytical Method	Container [b]	Preservative	Holding Times
Volatile Organics				
Groundwater/ Stormwater/ Surface Water	Gasoline Range Hydrocarbons NWTPH-Gx BTEX EPA 8021B VOCs EPA 8260C	2 or 3 x 40mL VOA vials with Teflon-lined septum caps	HCl, ≤ 6 ºC No headspace	2 days without preservative OR 14 days with preservative
Soil/Sediment Collection by EPA Method 5035	Gasoline Range Hydrocarbons NWTPH-Gx BTEX EPA 8021B VOCs EPA 8260C	2 or 3 x 40mL pre-tared VOA vials with Teflon-lined septum caps containing: low level: 10 mL DI water or empty high level: 10 mL Methanol 1 x 2oz wide mouth jar with septa	Cool, ≤ 6°C Methanol or Sodium Bisulfate (as specified by laboratory)	14 days
Free Product (aqueous)	Gasoline Range Hydrocarbons NWTPH-Gx BTEX EPA 8021B VOCs EPA 8260C	1 x 40mL VOA vial with Teflon-lined septum caps	Cool, ≤ 6°C	14 days
Air/Soil Vapor	VOCs TO-15	1 x 1L or 6L Summa canister OR 1 x 1L Tedlar bag	None	Summa canister – 30 days Tedlar bag - 7 days

Table 1: Analytical Methods, Sample Containers, Preservation, and Holding Times[a]

Media	Analytical Method	Container [b]	Preservative	Holding Times
Hydrocarbons				
Groundwater/ Stormwater/ Surface Water	Diesel and Oil Range Hydrocarbons NWTPH-Dx Hydrocarbon Identification HCID	2 x 500mL Amber glass bottle with Teflon liner	HCl, Cool, ≤ 6°C	7 days to extract, analyze within 40 days of extraction
Soil/Sediment	Diesel and Oil Range Hydrocarbons NWTPH-Dx	1 x 8oz wide mouth glass jar with Teflon liner	Cool, ≤ 6°C	14 days to extract, analyze within 40 days of extraction
SVOCs, PCBs, PAHs, and Dioxins/Furans				
Groundwater/ Stormwater/ Surface Water	SVOCs EPA 8270D PCB Aroclors EPA 8082B PAHs EPA 8270-SIM Pentachlorophenol EPA 8041 Dioxins/Furans[c] EPA 1613B	2 x 500mL Amber glass bottle with Teflon liner Dioxin/Furans only: 1 x 1L Amber glass bottle with Teflon liner	Cool, ≤ 6°C	7 days to extract, analyze within 40 days of extraction – SVOCs, PAHs, & Pentachlorophenol Analyze within 1 year - PCB, Dioxins/Furans

Table 1: Analytical Methods, Sample Containers, Preservation, and Holding Times[a]

Media	Analytical Method	Container [b]	Preservative	Holding Times
Soil/Sediment	PCB Aroclors EPA 8082B PAHs EPA 8270-SIM SVOCs EPA 8270D Pentachlorophenol EPA 8041 Dioxins/Furans[c] EPA 1613B	1 x 16oz or 2 x 8oz wide-mouth glass jar with Teflon liner Dioxin/Furans only: 1 x 250mL Amber wide-mouth glass jar with Teflon liner	Cool, $\leq$ 6°C Dioxins/Furans only: Freeze	7-14 days to extract, analyze within 40 days of extraction – SVOCs, PAHs, & Pentachlorophenol 1 yr – PCB, Dioxins/Furans
Pesticides				
Groundwater/ Stormwater/ Surface Water	Chlorinated Pesticides EPA 8081A Organo-phosphorus Pesticides EPA 8270-SIM	2x500mL Amber glass bottle with Teflon liner	Cool, $\leq$ 6°C Organo-phosphorus Pesticides only: Adjust pH to 5-8 with NaOH or sulfuric acid H_2SO_4	7 days to extract, analyze within 40 days of extraction
Soil/Sediment	Chlorinated Pesticides EPA 8081A Organo-phosphorus Pesticides EPA 8270-SIM	1 x4oz or 8oz wide-mouth glass jar with Teflon liner	Cool, $\leq$ 6°C	7 days to extract, analyze within 40 days of extraction

Table 1: Analytical Methods, Sample Containers, Preservation, and Holding Times[a]

Media	Analytical Method	Container [b]	Preservative	Holding Times
Metals (except hexavalent chromium and mercury)				
Groundwater/ Stormwater/ Surface Water	Metals EPA 6010/6020	1 x 500mL HDPE	Total aqueous - unfiltered Dissolved aqueous – 0.45 micron filter onsite HNO_3, Cool, $\leq$ 6°C	6 months
Soil/Sediment	Metals EPA 6010/6020	1 x 4oz or 8oz wide mouth glass jar	Cool, $\leq$ 6°C	6 months
Hexavalent Chromium (Cr^{+6})				
Groundwater/ Stormwater/ Surface Water	Hexavalent Chromium EPA 7196A	1 x 500mL HDPE	Cool, $\leq$ 6°C	24 hours
Soil/Sediment	Hexavalent Chromium EPA 7196A	1 x 4oz or 8oz wide mouth glass jar	Cool, $\leq$ 6°C	28 days
Mercury				
Groundwater/ Stormwater/ Surface Water (EPA 1631)	Mercury EPA 7470A/7471A	1 x 500mL HDPE	Total aqueous - unfiltered Dissolved aqueous – 0.45 micron filter onsite HNO_3, Cool, $\leq$ 6°C	6 months
Soil/Sediment (EPA 7471)	Mercury EPA 7470A/7471A	1 x 4oz or 8oz wide mouth glass jar	Cool, $\leq$ 6°C	28 days

Table 1: Analytical Methods, Sample Containers, Preservation, and Holding Times[(a)]

Notes:

(a) Always consult the specific analytical method for special sample collection, handling, and storage requirements. Cool < 6ºC implies samples are held above freezing and below 6ºC.
(b) Collect duplicate containers on at least 5% of the water samples for MS/MSD analysis.
(c) Other sample collection or preservation specifications may be applicable to this analysis. Confer with analytical laboratory, as necessary.

$\leq$ = less than or equal to
BTEX = benzene, toluene, ethylbenzene, and xylenes
°C = degrees Celsius
Cr^{+6} = hexavalent chromium
DI = distilled/deionized
EPA = United States Environmental Protection Agency
HCl = hydrochloric acid
HNO_3 = nitric acid
H_2SO_4 = sulfuric acid
HDPE = high density polypropylene
L = liter
mL = milliliter
NaOH = sodium hydroxide
NWTPH-Dx = Northwest Total Petroleum Hydrocarbon Diesel extended method
NWTPH-Gx = Northwest Total Petroleum Hydrocarbon Gasoline extended method
oz = ounce
PAH = polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyls
SIM = select ion monitoring
SVOC = semi-volatile organic compounds (includes PAHs, phenols & phthalates)
VOA = volatile organic acid
VOC = volatile organic compound

Table 2: Field Instruments – Preventive Maintenance Table

Instrument	Activity	Frequency
Multi-Parameter Water Quality Meter	Calibration and Calibration Check – pre-sampling event	Once Prior to Sampling Event
	Battery check Calibration – beginning of day Calibration check – beginning of the day Possible mid-day calibration check Calibration check – end of day	Daily
Turbidity Meter	Calibration and Calibration Check – pre-sampling event	Once Prior to Sampling Event
	Battery check Calibration – beginning of day Calibration check – beginning of the day Possible mid-day calibration check Calibration check – end of day	Daily
PID	Calibration and Calibration Check – pre-sampling event	Once Prior to Sampling Event
	Battery check Calibration – beginning of day Calibration check – beginning of the day Possible mid-day calibration check Calibration check – end of day	Daily
Electronic Water Level Indicator	Battery Check	Daily

Figures

Source: Google Earth

Legend:

- Property location (approximate)
- Monitoring well (approximate)
- Soil sample (approximate)
- Catch Basin (approximate)
- Soil boring (approximate)

Notes:

1. All locations are approximate, and not to scale.

N

Site Name
Site Address

CSID #

Example Figure A-1
Sampling Locations

DEPARTMENT OF ECOLOGY
State of Washington

Appendix A

Site-Specific Sampling and Analysis Plan Checklist Template

Site Name:
Facility ID:

APPENDIX A

SITE-SPECIFIC SAMPLING AND ANALYSIS PLAN CHECKLIST

This checklist supplements the *Lower Duwamish Waterway – Site Hazard Assessment and Limited Investigation Sampling and Analysis Plan/Quality Assurance Project Plan* (SAP/QAPP) to support sampling activities for Site Hazards Assessments (SHAs) and limited site investigations for contaminated sites overseen by Washington State Department of Ecology (Ecology).

APPROVALS (PRINTED NAME, SIGNATURE, DATE):

Plan Preparer — Date

PM/Reviewer — Date

Ecology — Date

SITE INFORMATION

Site Name:

Site Address:

Known contaminants of concern:

Suspected contaminants of concern:

PROJECT ORGANIZATION

Title/Responsibility	Name	Affiliation	Phone Number/Email
Ecology Point of Contact			
KJ Project Manager			
Field Lead/SSO			
Laboratory			
Subcontractors			

Site Name:
Facility ID:

SAMPLING AND ANALYSIS SUMMARY

Describe the purpose and objective of field investigation and briefly state rationale for sampling locations.

Attach a site map identifying sampling locations and location ID.
Identify background features.

Types of sampling to be performed (See Table A-1 and Figure A-1 for details):

INVESTIGATION DERIVED WASTE

What waste is anticipated?
☐ Solid: ☐Liquid: ☐ Mixed:
How will it be handled?
☐ 55 Gallon Drums ☐ Other:
How will it be characterized?

If waste is to remain on site, by what date will it be removed?

If waste is to remain on site, who on site has been notified and serves as a contact?

Site Name:
Facility ID:

PRE-FIELD CHECKLIST

Activity	Date completed	Not applicable
Public utility locate requested by Kennedy/Jenks		
Private utility locate coordinated by Kennedy/Jenks		
Property owner/tenant coordination & access agreement (attach)		
Laboratory coordination		
Subcontractors coordination		
Hospital route map (attach)		
Sample location map (attach)		
HASP Addendum (attach if necessary)		

TABLE A-1: SAMPLING AND ANALYSIS PLAN

SITE NAME:

Sample Location/Designation (See Site Map)	Media	Sample Interval (Depth)	Blind Duplicate (X)	Analyses (X)									Description/Rationale/Comments (Include information such as sample type, e.g. discrete, composite; collection method, e.g. bailer, peristaltic pump; filter requirements; purge methods; frequency/duration, and leak test requirements for air and vapor samples)
				NWTPH-G	NWTPH-Dx	BTEX	PAHs	VOCs	RCRA Metals	PP Metals	PCBs	OTHER	
Analytical Samples	S = soil, GW = groundwater, SW = surface water, SD = sediment, IA = indoor air, AA = ambient air, SS = sub-slab soil gas, SG = soil gas												
Other QC Samples (Rinsate Blanks, Temperature Blanks)													
MEDIA DESIGNATIONS	S = soil, GW = groundwater, SW = surface water, SD = sediment, IA = indoor air, AA = ambient air, SS = sub-slab soil gas, SG = soil gas												
See Table 1 of the SAP/QAPP for Analytical Methods, Sample Containers, Preservatives, and Holding Times													

Source: Google Earth

Legend:

Property location (approximate)

Monitoring well (approximate)

Soil sample (approximate)

Catch Basin (approximate)

Soil boring (approximate)

Notes:

1. All locations are approximate, and not to scale.

N

Site Name
Site Address

DEPARTMENT OF ECOLOGY State of Washington

CSID #

Example Figure A-1
Sampling Locations

Appendix B

Field Standard Operating Procedures

STANDARD OPERATING PROCEDURE

SOP-1: DATA QUALITY - ENVIRONMENTAL DATA COLLECTION

INTRODUCTION

This guideline describes recommended procedures to be followed by Kennedy/Jenks Consultants when collecting environmental data. The guideline is divided into Pre-field Procedures and Field Procedures for ease of use.

PRE-FIELD PROCEDURES

The following procedures represent the minimal effort appropriate for most environmental data collection projects. Refer to project-specific plans for additional data collection procedures.

1. Review the work plan or sampling plan prior to initiating fieldwork, and discuss any questions with project manager or field leader.

2. Review the Health and Safety Plan.

3. Set up subcontract with analytical laboratory for type and quantity of analyses, documentation and delivery format, both hard copy and electronic data deliverables (EDDs) and turnaround time requirements. Establish contacts at the laboratory, field and home office (Project Manager or person responsible) for all communications.

4. Notify the analytical laboratory of the upcoming fieldwork and advise about the following:

    a. Number of samples per medium

    b. Analyses needed

    c. Dates of sample delivery, coordinate for Saturday pick-up if necessary

    d. Means of delivery (e.g., courier, FedEx)

    e. Turnaround time required

    f. Level of quality control (QC) reporting required

    g. Delivery format, for both hard copy and EDDs.

5. Order the sample containers from the laboratory. Determine whether field personnel will preserve the samples in the field or if pre-preserved sample containers will be provided. It is preferable to order containers with appropriate preservatives.

6. Arrange for delivery or pickup of sample containers.

7. Request the laboratory fax or email you chain-of-custody forms and laboratory receipt documents immediately after receiving the samples.

8. Check the chain-of-custody form to verify the correct samples were collected and correct analyses were requested. Double check the laboratory receipt documents to verify there are no typographical errors for samples.

   If changes are required, request change in writing, via email, do not request over the phone. Request the laboratory to include all change request documentation in the laboratory summary report.

FIELD PROCEDURES

1. At the beginning of each field day, identify planned work and document field conditions in the field notes.

2. Hold Tailgate Safety Meeting and have all present sign the form.

3. Complete sample identification labels for each sampling container using an indelible pen. Use the sample identification protocol described in the work plan or sampling plan. It is recommended that pre-printed labels be created at the office prior to going to the field site, if possible.

4. Complete the chain-of-custody form, accounting for each sample. Verify that sample identifications, sampling times, and requested analyses on the chain-of-custody form match the sample identifications, sampling times, and requested analyses on the sample labels.

5. Verify that the appropriate QC samples (field duplicate samples, trip blanks samples, etc.) required in the work plan or sampling plan were collected. If applicable, document blind duplicate parents in field notes, and if using a database, supply a summary table of your parent and duplicate samples to your database coordinator.

6. Verify, where applicable, that the appropriate sample volume was collected to enable the analytical laboratory to perform QC analyses (e.g., matrix spike and matrix spike duplicate analysis). (For example, if a water sample is being analyzed for polynuclear aromatic hydrocarbons, 1 liter of sample is required for the analysis, and another 2 liters are required for the matrix spike and matrix spike duplicate analyses.)

7. Collect, preserve, and transport samples to the analytical laboratory in accordance with the work plan or sampling plan.

8. Provide adequate ice in coolers so that the coolers arrive at the laboratory at a temperature of 4 degrees C ± 2 degrees C.

9. Keep in contact with the project manager or other team member to report any problems, unusual observations, etc.

10. Verify that samples were received by the analytical laboratory and that the laboratory understands the chain-of-custody and requested analyses prior to beginning analyses.

11. If samples are sent by overnight delivery, be sure to include the tracking number and time released to the delivery service on the chain-of-custody form.

STANDARD OPERATING PROCEDURE

SOP-2: SURFACE AND SHALLOW SUBSURFACE SOIL SAMPLING

INTRODUCTION

This guideline describes the procedures typically used by Kennedy/Jenks Consultants personnel to collect surface soil samples from 0 to 2 feet below ground surface (bgs).

EQUIPMENT

The sampling equipment listed below is not necessarily required for all sampling circumstances but represents the range of equipment that may be required.

- Stainless steel or plastic scoops.
- Stainless steel digging tool (such as a rock hammer).
- Stainless steel or plastic mixing bowls.
- Hand auger, slide-hammer, or powered sampling device.
- Split-spoon or similar drive sampler.
- 2.5- or 2.0-inch brass or stainless steel liners and sealing materials (plastic end caps, Teflon® seals, tape, zippable plastic bags) [Use non-chemical of concern (COC)-containing tape (i.e., Arlon tape, 3M 483 polyethylene tape, or similar) when sealing samples for chemical analysis].
- Shovel.
- Posthole digger.
- Pick.
- Breaker bar.
- Photoionization detector (PID).
- Measuring tape and/or measuring wheel.
- Stakes, flagging, or spray paint to mark sampling locations.
- Sample containers (laboratory-supplied).
- Sample labels, pens, and field logbook or other appropriate field forms (e.g., boring logs).
- Equipment and personnel decontamination supplies (refer to SOP-19 and SOP-20).
- Sample shipping and packaging supplies (refer to SOP-18).
- Personal protective equipment as specified in the health and safety plan.

PROCEDURES

1. Mark sampling locations specified in the sampling and analysis plan (SAP) and/or work plan. If sampling locations are based on a grid pattern, use stakes, flagging, or spray paint to define the grid layout. Sampling locations may need to be relocated based on presence of underground utilities (see Procedure 2). Invasive activities may not begin until utility marking is complete or notification from the utility company has been received that marking is unnecessary.
2. Clear sample locations for underground utilities and structures by notifying Washington's one-call notification center (1-800-424-5555) (required) at least 2 but not more than 10 business days prior to commencement of field activities. In addition, contact knowledgeable site operations personnel and use a private utility locator service (if necessary) to identify possible underground utilities.
3. If the SAP and/or work plan specifies the removal of overlying soil (e.g., a sod layer), use shovels, picks, or post-hole diggers, as needed.
4. Collect soil samples for chemical analysis using the appropriate sampling device.
5. Classify the soils in general accordance with the visual-manual procedure of the Unified Soil Classification System (ASTM D 2488-90) (refer to SOP-6: Borehole Logging). The Munsell Color Classification may also be used.
6. Transfer soil for volatile organic compound (VOC) analysis directly from the sampling device to the appropriate sample container PRIOR to soil homogenization.
7. If compositing samples, place approximately equal volumes of soil from each sub-sampling location into a pre-cleaned, decontamination, stainless steel mixing bowl. Mix soils thoroughly. DO NOT homogenize soil to be sampled for VOC analysis.
8. Place soil into the appropriate sample containers for the analyses being conducted. Fill the sample container and compact the soil to minimize head space. Minimize handling of the soil, especially if it is being collected for analysis of VOCs.
9. If using a hand or hammer driven split-spoon sampler, soil samples may be collected in brass, stainless steel, or polyethylene liners. Cover the ends of liners with Teflon® sheets or aluminum foil, seal the ends with plastic caps, and secure the caps with tape. Use non-COC-containing tape when sealing samples for chemical analysis. (Alternatively, soils may be transferred to glass sampling jars provided by the analytical laboratory.)
10. Place a completed sample label on the sample container.
11. If required in the SAP and/or work plan, for each sampling interval, place a small amount of soil not selected for chemical analysis in an airtight container (e.g., plastic bag) and allow it to equilibrate. Next, use a PID and/or FID to monitor the headspace in the container. Record the headspace concentration in the field logbook or appropriate field forms.

12. If required in the SAP and/or work plan, for each sampling interval, place a small amount of soil not selected for chemical analysis in a clean plastic or glass container. Add a small amount of water and gently swirl the container. Observe the water for the presence of an iridescent sheen. Record sheen test observations in the field logbook or appropriate field forms.
13. Follow the sample packaging and shipping procedures outlined in SOP-18.
14. Follow equipment and personnel decontamination procedures outlined in SOP-18 and SOP-19.

QUALITY CONTROL

Follow the quality control requirements specified in the SAP and/or work plan.

INVESTIGATION-DERIVED WASTES

Investigation-derived waste (IDW), including decontamination wastes, must be contained and properly handled and disposed. See SOP-21 regarding handling and disposal of IDW.

STANDARD OPERATING PROCEDURE

SOP-3: BORING AND SUBSURFACE SOIL SAMPLING

INTRODUCTION

This guideline describes the equipment and procedures that are used by Kennedy/Jenks Consultants personnel for drilling and collecting soil samples.

EQUIPMENT

- Drill rigs and associated drilling and sampling equipment as specified in work plan:
  - Hollow stem auger
  - Air-rotary casing hammer
  - Dual tube percussion hammer
  - Cable tool
  - Mud rotary
  - Reverse rotary
- CME, 5 ft x 94 mm continuous-core barrels (hollow-stem auger)
- 2.5-inch or 2.0-inch I.D. split-spoon drive sampler
- 2.5-inch or 2.0-inch brass liners and sealing materials (plastic end caps, Teflon seals, silicon tape, zip-lock plastic bags)
- Large capacity stainless steel borehole bailer
- Foxboro FID-Organic Vapor Analyzer (OVA)
- HNU PID-Organic Vapor Analyzer
- OVM
- Sampler cleaning equipment
  - Steamcleaner
  - Generator
  - Stiff-bristle brushes
  - Buckets
  - High purity phosphate-free liquid soap, such as Liquinox
  - Methanol (if necessary)
  - 0.1N nitric acid (if necessary)
  - Deionized water
  - Potable water
- Insulated sample storage and shipping containers
- Personal protective equipment (refer to project site safety plan)

TYPICAL PROCEDURE

1. Obtain applicable drilling and well construction permits prior to mobilization.
2. Clear drilling locations for underground utilities and structures by Underground Service Alert (USA) and subcontractors.
3. Have all downhole equipment steamcleaned prior to drilling each boring.
4. Ensure that soil borings not to be completed as monitoring wells are drilled with an auger drill rig, using hollow stem augers of appropriate size.
5. Make sure that borings not completed as monitoring wells are grouted to the surface, using a neat cement-bentonite grout (containing approximately 5 percent bentonite).
6. Ensure that borings made to construct shallow monitoring wells are drilled with an auger drill rig that uses hollow stem augers of appropriate size to provide an annular space of a minimum of 2 inches between borehole wall and well casing.
7. Verify that drill borings used to construct deeper monitoring wells are drilled with a dual tube percussion hammer or air-rotary casing hammer, using a steel drive casing of appropriate size, or with hollow stem augers through a steel conductor casing.
8. Collect soil samples for lithologic logging purposes with a CME continuous coring system in 5-foot increments.
9. Collect soil samples for lithologic logging and chemical and physical analyses by driving a split-spoon drive sampler, in 2.5- to 5-foot increments, below the depth of the auger bit with a rig-mounted hammer. Record the standard penetration resistance. If the sample is pushed rather than driven, be sure to record the push force.
10. When drilling with air-driven drill rigs, collect soil samples for lithologic logging purposes from the cyclone separator discharge on the dual tube percussion hammer, which separates air from formation cuttings as the drive casing is advanced.
11. Have the soils classified in the field in approximate accordance with the visual-manual procedure of the Unified Soil Classification System (ASTM D-2488-90) and the Munsell Color Classification.
12. Prior to each sampling event, wash the split-spoon drive sampler and brass liners with high purity phosphate-free soap, and double-rinse them with deionized water and methanol and/or 0.1N nitric acid, as appropriate.
13. At each sampling interval, collect soil in one brass liner for potential laboratory analysis. Cover this sample in Teflon sheets, seal it with plastic caps, and wrap it with silicon tape. Place a completed sample label on the brass liner. Then see that the samples are placed in appropriate containers and stored at approximately 4°C.
14. As a field screening procedure (if applicable), at each sampling interval put the soil from one of the brass liners into an airtight container and allow it to equilibrate. After this, use an OVA to monitor the headspace in the container. If significant organic vapors are detected with the OVA, save the appropriate brass sample liners for potential laboratory analysis.
15. Complete chain-of-custody forms in the field and transport the samples in insulated containers, at an internal temperature of approximately 4 °C, to the selected laboratory.
16. If applicable, as described in the site safety plan, use an OVA to analyze in situ air samples from the breathing zone, the inside of the augers or casing, and other locations as necessary.

INSTALLATION AND TESTING OF ISOLATION CASING

1. Upon completion of the initial small-diameter boring, use a rotary drill bit of appropriate diameter to ream the boring to a depth (to be determined). Use a bentonite mud mixture, in accordance with standard drilling practice, to maintain hole stability and to minimize infiltration and development of a mud cake on the borehole wall.

2. When reaming is completed, install isolation casing in the boring. Use conductor casing of an appropriate grade of 14-inch diameter steel with a wall thickness of 0.25 inch, per the following specifications:

   Sections are 20, 10, or 5 feet in length.

   Casing sections are beveled or butt-jointed.

   Field joints are arc-welded with 70 percent weld penetration, having a minimum of two passes per circumference.

   Welding rod is compatible with casing material.

   Joints are watertight.

   Casing centralizers are set on the bottom, middle, and top of the total casing length. Centralizers are installed in sets of four, spaced at 90°, and attached at the bottom by a tack weld. They are flanged 2 inches at the top and bottom to contact the borehole wall.

3. Make volumetric calculations prior to grouting, to estimate the total volume of grout required to fill the annular space. The amount of grout actually used must be compared with this estimate. Ensure that the grout meets the following specifications:

   Volumes of grout used must be within 10 percent of estimated value.

   The grout consists of ASTM C150 Type II cement and water at a ratio of 5 gallons of water per 94 lb sack of cement, weighing approximately 118 lbs per foot. Approximately 5 lb of powdered bentonite for each sack of cement is mixed into the grout.

4. Note that leakage tests or a bond log might be required to validate the grout seal.

5. Grout conductor casing into place by one of the following methods:

   Pressure-grout from the bottom of the casing, using a packer or Braden-head to force the grout into the annular space between the conductor casing and the borehole wall.

   Fill the casing with grout and use a spacer plug apparatus to force the grout into the annular space between the conductor casing and the borehole wall. The spacer plug must be composed of a material that can be left in the boring and later drilled through to complete it.

6. After allowing the grout to set, continue drilling with an appropriate diameter hollow stem auger. A rotary bit can be used initially to drill through any grout that might have hardened in, or directly below, the casing.

EQUIPMENT CLEANING

1. Prior to drilling each boring, steamclean downhole equipment (augers, well casing, sampler).

2. Before collection of each drilling sample, steamclean or wash sampling equipment (sampler and brass liners) with a brush, in a solution of high purity phosphate-free soap and potable water. Rinse the equipment with potable water and methanol and/or 0.1N nitric acid, as appropriate. Follow this with double-rinsing using distilled water.

3. Before leaving the site at completion of drilling, steamclean downhole equipment and vehicles that require cleaning.

INVESTIGATION-DERIVED RESIDUALS

Place soil cuttings and other residuals in appropriately labeled containers for disposition by the client. All soil samples transported to the laboratory must be returned to the client for disposition. Kennedy/Jenks Consultants is available to assist the client with options for disposition of residuals.

STANDARD OPERATING PROCEDURE

SOP-4: HAMMER-DRIVEN DIRECT-PUSH DRILLING AND SOIL SAMPLING

INTRODUCTION

This guideline described the equipment and procedures typically followed by Kennedy/Jenks Consultants personnel to collect soil samples with a hydraulically operated, hammer-driven, direct-push drilling rig.

EQUIPMENT

- Direct-push drilling rig.
- Soil sampling device:
  - 4- to 5-foot by 2-inch Macro-Core® with disposable polyethylene liner, or
  - 18-inch by 1.5-inch standard penetration test split-barrel sampler (lined or unlined).
- Disposable polyethylene liners.
- Dual-blade, hooknose box cutter.
- Photoionization detector (PID).
- Sample containers (laboratory-supplied) with appropriate preservatives.
- Sample labels, pens, field logbook, or other appropriate field forms (e.g., soil boring logs, groundwater purge and sample forms, chain-of-custody forms).
- Equipment and personal decontamination supplies (refer to SOP-19 and SOP-20).
- Sample shipping and packaging supplies (refer to SOP-18).
- Personal protective equipment as specified in the health and safety plan.

PROCEDURES

Calibrate the photoionization detector (PID), prior to beginning sampling and as necessary based on field conditions, in accordance with the instructions in the manufacturer's operation manual.

1. Obtain applicable drilling permits prior to mobilization

2. Mark boring locations specified in the sampling and analysis plan (SAP)/work plan. Sampling locations may need to be relocated based on presence of underground utilities (see Procedure 3). Invasive activities may not begin until utility marking is complete or notification from the utility company has been received that marking is unnecessary.

3. Clear sample locations for underground utilities and structures by notifying Montana's one-call notification center at 811 or 1-800-424-5555 (required) at least 2, but not more than 10, business days prior to commencement of field activities. In addition, contact knowledgeable site operations personnel and use a private utility locator service (if necessary) to identify possible underground utilities.
4. Steam clean or hand-wash downhole soil boring and sampling equipment prior to use at each location.
5. Advance soil borings by driving a 4- to 5-foot-long by 2-inch-diameter Macro-Core® lined with a disposable polyethylene sheath. After each drive-interval, withdrawn the Macro core from the boring, disassemble, and clean. Remove and replace the filled polyethylene sheath, and insert the core back into the boring for driving the next interval.
6. Split the filled polyethylene liner from each drive interval with a box cutter to observe the soil core and/or collect samples for laboratory analysis. The box cutter will be decontaminated between each soil interval, or that portion of the box cutter that comes in contact with the soil (razor blade) will be replaced and will not be re-used on subsequent intervals until it is decontaminated.
7. Classify the soils in the field in general accordance with the visual-manual procedure of the Unified Soil Classification System (ASTM D-2488-09a) (refer to SOP-6: Borehole Logging). Record observations on a soil boring log.
8. Collect soil samples at selected intervals if required by the SAP/work plan for laboratory analysis. Remove sample aliquots from the polyethylene liner and place into appropriately-sized, pre-cleaned, glass sample containers obtained from the analytical testing laboratory. If appropriate, samples may also be collected by sawing 6-inch-long sections of the polyethylene liner and sealing each end of the cut section with Teflon® sheeting and rubber caps.
9. If samples are to be collected to represent a depth interval or will be split into multiple representative samples, transfer the soil into a pre-cleaned, decontaminated, stainless steel mixing bowl and homogenize thoroughly before transferring to sample containers. (Note: DO NOT homogenize soil collected for VOC analysis).
10. Place completed sample label on sample container and place sample in chilled cooler.
11. Follow sample shipping and packaging procedures outlined in SOP-18.
12. Prepare soil boring for groundwater sampling by either driving a Hydropunch (or similar device) or by inserting slotted PVC casing into the open boring after driving the final soil core to the desired depth below the potentiometric surface. The PVC casing method is typically used because it allows for a greater volume of clear water to be withdrawn from the boring.

13. After inserting a 1-inch-diameter, slotted, PVC casing into the boring, allow the boring to stand undisturbed for approximately 10 minutes. Measure depth to groundwater in the temporary casing using an electronic water level indicator. Purge the casing with a peristaltic pump fitted with new polyethylene tubing, and collect a sample. Connect the pump discharge tubing to a flow-through cell for measuring groundwater quality parameters during purging. Route the additional discharge tubing from the flow-through cell to a collection bucket. Continue purging at a flow rate of approximately 0.25 to 0.3 liters per minute (L/min) until the water appears to be clear (based on visual observation) and/or groundwater quality parameters stabilize. (Note: In some cases, only a small volume of water is available and purging may not be possible prior to collecting a sample). Record water quality parameter measurements and visual observations on a groundwater purge and sample form.

14. When purging is complete, collect groundwater samples from the pump discharge tube upstream of the flow-through cell. Adjust the pump flow rate as necessary for filling each type of sample container. Use care to avoid spilling water from the discharge tube, flow-through cell, or other downstream collection equipment.

15. Place completed sample label on sample container and place sample in a chilled cooler.

16. Follow sample shipping and packaging procedures outlined in SOP-18.

17. After soil and groundwater sampling is complete, remove the PVC casing from the boring and backfill the open boring with bentonite pellets. For borings greater than approximately 15 feet deep, backfilling may be performed by using the PVC sample casing as a tremie tube for inserting cement/bentonite grout. Place bentonite within 6 inches of the ground surface, and repair the ground surface to approximate surrounding conditions. The drilling crew will return between 48 and 72 hours after backfilling each boring to verify the hole is completely filled, top off grout if necessary, and restore ground surface to the approximate surrounding conditions.

18. Steam clean or hand-wash downhole equipment or other non-disposable tools that come in contact with soil or water prior to each use. Follow equipment and personnel decontamination procedures outlines in SOP-19 and SOP-20.

QUALITY CONTROL

Follow the quality control requirements specified in the SAP/work plan.

INVESTIGATION-DERIVED WASTES

Investigation-derived waste (IDW), including decontamination wastes, must be contained and properly handled and disposed. See SOP-21 regarding handling and disposal of IDW.

STANDARD OPERATING PROCEDURE

SOP-5: PROCEDURES FOR USING A PHOTOIONIZATION DETECTOR (PID)

INTRODUCTION

This guideline describes the procedures typically followed by Kennedy/Jenks Consultants personnel during operation of a photoionization detector (PID).

EQUIPMENT

- RAE Systems model Plus Classic or equivalent
- Calibration gas with regulator, tubing, and Tedlar® bag
- Locking storage bags or pint plastic jars with aluminum foil covering
- Toolkit
- Operations manual
- Spare batteries
- Pens, field logbook, and/or appropriate field forms
- Personal protective equipment as specified in the health and safety plan.

PROCEDURES

Calibrate PID at the office prior to commencement of field activities to check instrument is in proper working order. At a minimum, calibrate before use each day (or more frequently as necessary) as indicated below. The initial daily calibration may be performed at the office (if located in proximity to the site), motel, or in the field.

1. Check the battery charge level. If in doubt, charge the battery as described in the manual. The battery should typically be recharged daily after use.
2. Turn unit on. Do not look into the sensor (ultraviolet radiation hazard). The probe or pump should make an audible sound (whine or solid tone) confirming operation.
3. Perform zero and calibration procedures as described in the operating manual. Calibration can be performed for specific compounds so that the instrument response is proportional to the calibration gas concentration. Isobutylene calibrant is available; the instrument manual provides response factors for other compounds. Note: Verify that the ionizing lamp in the PID is suitable for the compounds being evaluated. Consult the operation manual or other guidance for ionization potentials and response factors for common compounds. A PID is not suitable for detecting methane. The instrument should be calibrated under ambient conditions to account for temperature and humidity. Use instrument manufacturer-designed moisture trap on probe when testing saturated soil or water samples.
4. Once calibrated, the unit is ready for use. Position the intake assembly close to the area in question because the sampling rate allows only for localized readings.

5. A slow, sweeping motion of the intake assembly helps to prevent the bypassing of problem areas.
6. For ambient air monitoring, set the alarm at the desired level. Be prepared to evacuate the work area if the preset alarm sounds.
7. For soil monitoring, use the headspace method below:
   a. Place a consistent amount of soil into a sealable plastic bag (i.e., approximately 100 grams of soil).
   b. Seal the plastic bag.
   c. Wait a consistent amount to time (typically several minutes).
   d. Open the bag slightly, insert the intake assembly into bag, and observe the <u>peak</u> reading.

   Static voltage sources, such as power lines, radio transmissions, or transformers, may interfere with measurements. Consult the operating manual for a discussion of necessary considerations.
8. Record the measurements on the field logbook or other appropriate field form.

SPECIAL NOTES

Read the operator's manual thoroughly. As with any field instrument, accurate results depend on the operator being completely familiar with the unit. Be aware that moisture may affect readings. Clean and maintain the instrument and accessories to obtain representative readings.

In the event the instrument has to be shipped via a courier service (i.e., UPS, FedEx, etc.) from the office to a field location, ship the instrument (including calibration gas) via ground in accordance with Department of Transportation regulations and courier service requirements.

STANDARD OPERATING PROCEDURE

SOP-6: BOREHOLE LOGGING

INTRODUCTION

This Standard Operating Procedure (SOP) provides the procedures typically followed by Kennedy/Jenks Consultants personnel for classifying soils and preparing boring logs and other types of soil reports. The purpose of this SOP is to facilitate the acquisition of uniform descriptions of soils encountered during borehole programs and to promote consistency in the logging practices used by Kennedy/Jenks Consultants personnel. This SOP provides guidance on procedures that are generally consistent with standard practices used to classify soils. Deviations from, and additions to, the procedures described herein may be appropriate based on project-specific objectives, site-specific conditions, and/or regulatory requirements. The user of this SOP should modify the sampling procedures used, as appropriate, to conform to the project-specific requirements and then document such deviations from this SOP in the project-specific documentation of subsurface exploration activities.

Borehole logging is the systematic observation and recording of geologic and hydrogeologic information from subsurface borings and excavations. The Unified Soil Classification System (USCS) (ASTM D2487-00) is used to identify, classify, and describe soils principally for engineering purposes, and is based on laboratory tests.

For field applications, ASTM D2488-06 (Visual-Manual Procedure) is used as the general guide adopted under this SOP

Both ASTM D2487 and ASTM D2488 utilize the same group names and symbols. However, soil reports should state that boring logs are not formal USCS laboratory determinations, but are based on the visual-manual procedures described in ASTM D2488.

This SOP contains the following sections:

- Field Equipment/Materials
- Typical Procedures
  - Soil Classification
  - Classification of Coarse-Grained Soil
  - Classification of Fine-Grained Soil including Organic Soils
- Other Logging Parameters
- Logging Refuse
- References.

FIELD EQUIPMENT/MATERIALS

Material/equipment typically required for classifying soils and preparing boring logs may include:

- Pens, pencils, waterproof pens, and field logbook or other appropriate field forms (e.g., boring log forms), water-tight field case.
- Daily inspection report forms
- USCS (ASTM D 2488-06) table and classification chart

- Soil color chart (i.e., Munsell) If used, the edition of the Munsell chart should be specified on each borehole log as the color descriptions and hue, color values and chromas have changed between editions. Also, whenever possible, the newest version of Munsell's color charts should be used due to fading of color chips over time.
- American Geological Institute (AGI) Data Sheets
- Graph paper
- Engineer's scale
- Previous project reports and boring logs (if available)
- Pocket knife or putty knife
- Hand lens
- Supply of clean water
- Dilute hydrochloric acid (HCl) (make sure and MSDS for HCl is included in the project HASP)
- Aluminum foil, Teflon® sheets, and paper towels
- Sample containers (brass, stainless steel or aluminum liners, plastic or glass jars)
- Clean rags or paper towels
- Sample shipping and packaging supplies
- Personnel and equipment decontamination supplies
- Personal protective equipment as described in the Health and Safety Plan (HASP).

TYPICAL PROCEDURES

Soil classification and borehole logging should be conducted by a qualified geologist, engineer or other personnel trained and experienced in the classification of soils.

Soils are typically logged in conjunction with advancing boreholes and sampling subsurface soils. Although the guideline focuses on classifying soil samples obtained from boreholes, this particular procedure also applies to soils and sediments collected using other techniques (e.g., post hole digger, scoop, Ekman, Ponar, or Van Veen grab samplers, and backhoe).

The USCS as described in ASTM D2488-06 categorizes soils into 15 basic group names, each with distinct geologic and engineering properties. The following steps are required to classify a soil sample:

1. Observe basic properties and characteristics of the soil. These include grain-size grading and distribution and influence of moisture on fine-grained soil.
2. Assign the soil a USCS classification and denote it by the standard group name and symbol.
3. Provide a written description to differentiate between soils in the same group, if necessary.

Many soils have characteristics that are not clearly associated with a specific soil group. These soils might be near the borderline between groups, based on either grain-size grading and distribution, or plasticity characteristics. In this case, assigning dual group names and symbols might be appropriate (e.g., GW-GC or ML-CL).

The two basic soil groups are:

1. **Coarse-Grained Soils –** For soils in this group, more than half of the material is larger than No. 200 sieve (0.074 mm).
2. **Fine-Grained Soils (including Organic Soils) –** For soils in this group, one half or more of the material is smaller than No. 200 sieve (0.074 mm).

Note: No. 200 sieve is the smallest size that can be seen with the naked eye.

CLASSIFICATION OF COARSE-GRAINED SOILS

Coarse-grained soils are classified on the basis of:

1. Grain size and distribution
2. Quantity of fine-grained material (i.e., silt and clay)
3. Character of fine-grained material

Classification uses the following symbols:

Basic Symbols	**Modifying Symbols**
G - gravel	W - well graded
S - sand	P - poorly graded
	M - with silt fines
	C - with clay fines

The following are basic facts about coarse-grained soil classification:

- The basic symbol G is used if the estimated volume percentage of gravel is greater than that for sand. In contrast, the symbol S is used when the estimated volume percentage of sand is greater than the percentage of gravel.
- Gravels include material in the size range from 3 inches to 0.2 inches (i.e., retained on No. 4 sieve). Sand includes material in the size range from 0.2 inches to 0.003 inches. Use the grain size scale used by engineers (ASTM Standards D422-63 and D643-78) to further classify grain size as specified by the USCS.
- Although not specifically treated in ASTM D2488-06, cobbles range in size from 3 inches to 10 inches and boulders refer to particles with a single dimension greater than 10 inches. They are included here for the purpose of completeness and for their hydrogeologic significance.
  Note: The ASTM grain size scale differs from the Modified Wentworth Scale used in teaching most geologists. Also, it introduces a distinction between sorting and grading (i.e., well graded equals poorly sorted and poorly graded equals well sorted.)
- The modifying symbol W indicates good representation of a range of particle sizes in a soil.
- The modifying symbol P indicates that there is a predominant excess or absence of particle sizes.
- The symbol W or P is only used when a sample contains less than 15 percent fines.
- Modifying symbol M is used if fines have little or no plasticity.
- Modifying symbol C is used if fines have low to high plasticity (clayey)

The following rules apply for the written description of the soil group name:

Types of Soil	Rule
Sands and gravels (clean)	Less than 5 percent fines
Sands (or gravels) with fines	5 to 15 percent fines
Silty (or clayey) sands or gravels	Greater than 15 percent fines

- Other descriptive information may include:
  - Color (e.g., Munsell Soil Color chart, specify edition). Soil color is named and coded using the Munsell Soil Color chart if required for the project. The code should be in parentheses immediately following the written description. Presence of mottling and banding is also recorded. For example, "dk brn (7.5 YR, 3/4)."
  - Relative Density/Penetration Resistance. For cohesionless materials use very loose, loose, medium, dense, or very dense estimated from drive sample hammer blows or other field tests. Blow counts may be used, if reliable.
  - Maximum grain size (fine, medium, coarse, as described in AGI data sheets or USCS). Note the largest cross-sectional dimension measured in tenths of an inch for grains larger than sand size.
  - Composition of grains (mineralogy)
  - Approximate percentage of gravel, sand, and fines (use a percentage estimation chart as provided in the AGI data sheets)

Modifiers	Description
Trace	Less than 5 percent
Few	5 to 10 percent
Little	15 to 25 percent
Some	30 to 45 percent
Mostly	50 to 100 percent

  - Angularity (round, subround, angular, subangular)
  - Shape (flat or elongated)
  - Moisture Condition (dry, moist, wet)
    - Dry - Absence of moisture to the touch.
    - Damp - Contains enough water to keep the sample from being brittle, dusty or cohesionless; is darker in color than the same material in the dry state.
    - Moist - Leaves moisture on your hand, but displays no visible free water.
    - Wet - Displays visible free water.
  - HCl Reaction (none, weak, strong)
  - Cementation (Crumbles under finger pressure: weak, moderate, or strong)
  - Range of Particle Sizes (sand, gravel, cobble, boulder)
  - Maximum Particle Size (fine, medium, coarse)
  - Cementation (weak, moderate, or strong)
  - Hardness (breaks with hammer blow)
  - Structure (stratified, laminated, fissured, slickensided, blocky, lensed, homogeneous)
  - Organic material
  - Odor
  - Iridescent sheen (based on sheen test)
  - Debris (e.g., paper, wood, plastic, cloth, concrete, construction materials, etc.).
    - Additional Comments (e.g. roots or rootholes, difficult drilling, borehole caving, presence of mica, contact and/or bedding dip, bedding features, sorting, structures, fossils, cementation, geologic origin, formation name, minerals, oxidation, etc.

CLASSIFICATION OF FINE-GRAINED SOILS

Fine-grained soils are classified on the basis of:

1. Liquid limit

4. Plasticity

Classification uses the following symbols:

Basic Symbols	**Modifying Symbols**
M - silt	L - low liquid limit
C - clay	H - high liquid limit
O - organic	
Pt - peat	

The following rules apply for the written description of the soil group name:

Types of Soil	**Rule**
Silts and clays with sand and/or gravel	5 to 15 percent sand and/or gravel
Sandy or gravelly silts or clays	Greater than 15 percent sand and/or gravel

The following are basic facts about fine-grained soil classification:

- The basic symbol M is used if the soil is mostly silt, while symbol C applies if it consists mostly of clay. Use of symbol O indicates that organic matter is present in an amount sufficient to influence soil properties. The symbol Pt indicates soil that consists mostly of organic material.
- Modifying symbols are based on the following hand tests conducted on a soil sample:
  - Dry strength (crushing resistance : none, low, medium, high, very high)
  - Dilatancy (molded ball reaction to shaking: none, slow, rapid)
  - Toughness (resistance to rolling or kneading near plastic limit : low, medium, high)
  - Plasticity (nonplastic, low, medium, high).
- Soil designated ML has little or no plasticity and can be recognized by none to low dry strength, slow to rapid dilatency, and low toughness.
- CL (lean clay) indicates soil with medium plasticity, which can be recognized by medium to high dry strength, no or slow dilatency, and medium toughness.
- OL is used to describe an organic, fine-grained soil that is less plastic than CL soil and can be recognized by low to medium dry strength, medium to slow dilatency, and low toughness. In some cases, it may be possible to differentiate organic silts (OL) from organic clays (OH), based on correlations between dilatancy, dry strength, toughness, or laboratory tests.
- MH soil has low to medium plasticity and can be recognized by low to medium dry strength, no to slow dilatency, and low to medium toughness.
- Soil designated CH (fat clay) has high plasticity and is recognizable by its high to very high dry strength, no dilatency, and high toughness.
- OH is used to describe an organic fine-grained soil that is less plastic than CH soil and can be recognized by medium to high dry strength, slow dilatency, and low to medium toughness. In some cases, it may be possible to differentiate organic silts (OL) from organic clays (OH), based on correlations between dilatancy, dry strength, toughness, or laboratory tests.

Note: PT (peat) is used to describe a highly organic soil composed primarily of vegetable tissue with a fibrous to amorphous texture, usually a dark brown to black color, and an organic odor.

- Other descriptive information includes:
  - Color (e.g., Munsell) Soil color is named and coded using the Munsell Soil Color chart if required for the project. The code should be in parentheses immediately following the written description. Presence of mottling and banding is also recorded. For example, “reddish brn (5YR, 4/4).”
    - Moisture condition,
  - Omit moisture terms below the regional water table and when drilling with mud or air-mist rotary systems.
  - Consistency (thumb penetration test: very soft, soft, firm, hard, very hard. For fine sediments use very soft, soft, medium, stiff, very stiff, and hard.) These are estimated from drive sample hammer blows or other field tests. Blow counts may also be used, if reliable.
    - Structure (same descriptors as coarse grain)
    - Compactness (loose, dense) for silts
    - Odor
    - Iridescent sheen (based on sheen test)
    - Debris (e.g., paper, wood, plastic, cloth, concrete, construction materials, etc.).
    - HCl Reaction (none, weak, strong).
  - Additional Comments (e.g. roots or rootholes, difficult drilling, borehole caving, presence of mica, , contact and/or bedding dip, bedding features, cementation, structures, fractures, fracture fillings, fossils, formation name, minerals, oxidation).

Fine-Grained Rock Description

- Textural Classification
- Color. Rock color is named and coded using the Geological Society of America rock color chart. The code should be in parentheses immediately following the written description. Presence of mottling and banding is also recorded. For example, “gry grn (5G, 5/2).”
- Hardness. Very hard, hard, medium, soft, very soft..
- Moisture Content. Dry, damp, moist, wet (saturated).
- Size Distribution. Approximate percentage of gravel, sand, and fines (silt and clay).
- Estimated Permeability. Very low, low, moderate, or high. This is based primarily on grain size, sorting, and cementation. Estimate secondary permeability due to natural rock fractures when applicable.
- Miscellaneous. Odor, contact and/or bedding dip, cementation, bedding, inclusions, secondary mineralization, fossils, structures, formation name, and fractures.
- Fractures are identified by depth, angle, width, and associated mineralization if applicable. The interpretation of the fracture type (i.e., as natural [N], coring induced [CI], or handling induced [HI]) should be stated. For example, “NF @90.8', 25 deg to axis, 0.1” wide, minor calcite.”
- Coarse-Grained Rock Description
- Textural Classification.

- Color. Rock color is named and coded using the Geological Society of America rock color chart. The code should be in parentheses immediately following the written description. Presence of mottling and banding also is recorded. For example, “gry olive grn (5GY, 3/2).”Hardness. Very hard, hard, medium, soft, very soft.
- Moisture Content. Dry, damp, moist, and wet (saturated).
- Size Distribution. Approximate percentage of gravel, sand, and fines (silt and clay).
- Grain Shape. Angular, subangular, subrounded, rounded, or well-rounded, for grains larger than sand size.
- Grain Size. The largest cross-sectional dimension measured in tenths of an inch for grains larger than sand size.
- Miscellaneous. Odor, contact and/or bedding dip, cementation, bedding, inclusions, secondary mineralization, fossils, structures, formation name, and fractures.
- Fractures are identified by depth, angle, width, and associated mineralization, if applicable. The interpretation of the fracture type (i.e., as natural [N], coring induced [CI], or handling induced [HI]), should be stated. For example, “NF @126.1', 35 deg to axis, 0.1” wide, minor calcite.”

OTHER LOGGING PARAMETERS

Rock Quality Designation

This designation generally follows ASTM D6032-08 Standard Test Method for Determining Rock (RQD) of Rock Core.

The RQD denotes the percentage of intact and sound rock retrieved from a borehole of any orientation. All pieces of intact and sound rock core equal to or greater than 100 mm (4 in.) long are summed and divided by the total length of the core run. This method is generally applied to core barrel samples.

Standard Penetration Tests

This method generally follows ASTM D1586-08A Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils. This method provides a means of assigning a relative density to the soil by counting the number of hammer blows (blow counts) required to advance a split-barrel sampler a specified distance into the undisturbed soil ahead of the lead auger. This method is not applicable to boreholes advanced with direct-push sampling equipment. It is used primarily in conjunction with hollow stem auger drilling apparatus as the test can be performed through the auger string without removal of the augers thereby allowing the borehole to remain open to the bottom of the drill string without risk of caving. As the sampler is advanced by the repeated drop of a hammer of known weight, the blow counts are recorded on the log and used to provide a relative density descriptor to the soil penetrated during the test.

The number of blows required to drive the sampler 6 in. by a 140-lb hammer falling 30 in. Fifty blow counts per 6-in drive is considered “refusal,” and sampling at this depth is usually terminated. In addition, a total of 100 blow counts per 18-in. drive, or no observed advance of the sampler during ten successive hammer blows, is also considered “refusal.” During coring, leave this section blank. Normally, the second and third 6-in. intervals are recorded and added as the number of blows per feet.

Sampler Type/Depth. Give sampler type by the letter code listed below and identify the depth at the top of the sampling interval in feet below ground surface (bgs).

Sampler type	Inside diameter (in.)	Code
Standard penetrometer	1.38	SP
Split-barrel (small)	2.0	SBS
Split-barrel (large)	2.5	SBL
HQ wireline core	2.3	PC

Those descriptors are as follows for coarse grained soils:

Very Loose	0 to 3 SPT Sampler	0 to 4 Mod CA Sampler
Loose	4 to 7 SPT Sampler	5 to 10 Mod CA Sampler
Medium Dense	8 to 23 SPT Sampler	11 to 30 Mod CA Sampler
Dense	24 to 38 SPT Sampler	31 to 50 Mod CA Sampler
Very Dense	> 38 SPT Sampler	>50 Mod CA Sampler

Relative Density Descriptors for fine grained soils are as follows:

Very Soft	<1 SPT Sampler	0 to 1 Mod CA Sampler
Soft	1 to 3 SPT Sampler	2 to 4 Mod CA Sampler
Firm	4 to 6 SPT Sampler	4 to 8 Mod CA Sampler
Stiff	7 to 12 SPT Sampler	8 to 15 Mod CA Sampler
Very Stiff	13 to 23 SPT Sampler	15 to 30 Mod CA Sampler
Hard	> 23 SPT Sampler	>30 Mod CA Sampler

Regardless of the degree of adherence to the ASTM Standard Method, split barrel samplers are used as the preferred method of undisturbed sample acquisition in a hollow stem auger drilling. Upon retrieval of the sampler from the borehole, the sampler should be opened without making contact with its interior contents and the logging personnel should record the percent recovery or length of the sample recovered. Sample containers should be removed with a clean gloved (gloves may not be needed, depending upon requirements of HASP) hand and placed in a clean, dry area for examination and logging. The sample will be described per the above. Any lithologic changes that may be observable in the exposed ends of the intact core over the sampled interval should be recorded on the log before any disturbance thereof. The depth of the lithologic changes should be estimated and recorded on the boring log. The least disturbed sample container of the two deeper six-inch sample increments should be secured with Teflon® or aluminum end sheets and snug fitting plastic end caps, sealed with silicon tape, depending upon testing, sampler may be filled with one inch rings instead of 6 inch. Sealing material should also be compatible with subsequent testing requirements.

Ambient Temperature Head-Space:

Organic vapor analyzers such as photoionization detectors (PIDs) or flame ionization detectors (FIDs) are generally used to assess the relative concentration of volatile hydrocarbons in the soil as the borehole is advanced and recorded as a value in parts per million on the boring log. This can be done by placing a uniform amount of soil in a Ziploc® bag, glass jar or other clean container, allowing the soil in the container to equilibrate to the ambient temperature, then inserting the probe of the PID or FID into the sealed container and recording the maximum PID or FID reading.

Non-Aqueous Phase Liquid (NAPL) Containing Soil

Appropriate observations of NAPL containing soil should include the following:

Appearance: If a separate phase liquid appears to be present, it might be described as "dark brown viscous fluid or liquid observed in the soil matrix." This remark should follow the lithologic description in the borehole log. Observations of color should be made such as "black streaks" or "mottled gray to "olive brown", however, it should not be inferred or remarked that the color is a necessary consequence of petroleum staining.

Odor: If the soil smells like petroleum it might be remarked that it has a "petroleum like" or "solvent like" odor. The use of terms like "strong" or "slight" should be avoided because there is no way to ensure that these terms can be applied uniformly in the field between various persons performing the logging (i.e. ,each persons olfactory sense is different). The use of terms like "chemical odor" should also be avoided as there is no common reference point. Notations regarding the type of petroleum distillate present (e.g., "diesel-like odor" or "gasoline odor") are inappropriate as these are determination s that can only be accurately made by laboratory analysis.

LOGGING REFUSE

This procedure applies to the logging of subsurface samples collected from a landfill or other waste disposal sites:

1. Observe refuse as it is brought up by the hollow stem auger, bucket auger, or backhoe.
2. If necessary, place the refuse in a plastic bag to examine the sample.
3. Record observations according to the following:
    a. Composition (by relative volume), e.g., paper, wood, plastic, cloth, cement, construction debris. Use such terms as "mostly" or "at least half." Do not use percentages.
    b. Moisture content: dry, damp, moist, wet.
    c. State of decomposition: highly decomposed, moderately decomposed, slightly decomposed, etc.
    d. Color: obvious mottling included.
    e. Texture: spongy, plastic (cohesive), friable.
    f. Odor.
    g. Combustible gas indicator readings (measure downhole).
    h. Miscellaneous: dates of periodicals and newspapers, degree of drilling effort (easy, difficult, very difficult).

REFERENCES

Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils. ASTM D1586-08A

Standard Practice for Description and Identification of Soils (Visual-Manual Procedure). ASTM D2488-06.

Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System. ASTM D2487-00

Standard Test Method for Determining Rock Quality Designation (RQD) of Rock Core. ASTM D6032-08.

Grain Size Scale Used by Engineers. ASTM D422-63 and ASTM D643-78.

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STANDARD OPERATING PROCEDURE

SOP-7: GROUNDWATER SAMPLING

INTRODUCTION

This Standard Operating Procedure (SOP) provides the procedures typically followed by Kennedy/Jenks Consultants personnel during the collection of groundwater samples from monitoring wells. Groundwater sampling from temporary boreholes (e.g., grab groundwater samples collected from direct push borings) is not addressed by this SOP. This SOP provides guidance on procedures that are generally consistent with standard practices used in environmental sampling. Federal, state and/or local regulatory agencies may require groundwater sampling procedures that differ from those described in this SOP and/or may require additional procedures. As guidance, this SOP does not constitute a specification of requirements for groundwater sampling. Deviations from, and additions to, the procedures described herein may be appropriate based on project-specific sampling objectives, site-specific conditions, and/or regulatory requirements. The user of this SOP should modify the sampling procedures used, as appropriate, to conform to the project-specific requirements and then document such deviations from this SOP in the project-specific documentation of groundwater sampling activities.

This SOP does not address Quality Assurance/Quality Control (QA/QC) procedures for groundwater sampling in detail. While some general QA/QC procedures are addressed, project-specific QA/QC procedures should be developed and presented in a Quality Assurance Project Plan (QAPP), field sampling and analysis work plan, or other project- or activity-specific document.

This SOP contains the following sections:

- Field Equipment/Material
- Typical Procedures for Monitoring Well purging and Groundwater Sampling
- Stabilization Criteria for Adequacy of Monitoring Well Purging
- Typical Procedures for Groundwater Sampling using Passive Diffusion Bags (PDBs)
- Quality Control Guidance
- Investigation-Derived Waste (IDW) Management
- References

FIELD EQUIPMENT/MATERIALS

Material/equipment typically required for the collection of groundwater samples from monitoring wells may include:

- Electric water-level monitoring probe
- Multi-phase interface monitoring probe

- Bladder pump, peristaltic pump, pre-cleaned, disposable, 2- or 4-inch bailers with disposable cord, inertial pump, submersible pump, passive diffusion bags or other suitable apparatus for purging the well and sampling
- Flexible discharge tubing [polyethylene (PE), Teflon™, or similar]
- Purge water collection container
- Multi-parameter water quality meter (temperature, pH, specific conductance, redox potential)
- Turbidity meter
- Flow-through cell
- Nitrocellulose filters (if conducting field filtering)
- Sample containers (laboratory-supplied) with appropriate preservatives
- Additional chemical preservatives (if necessary)
- Watch or stopwatch
- Sample labels, pens, field logbook, or other appropriate field forms (e.g., groundwater purge and sample forms, chain-of-custody forms), and access agreements and third-party sample receipts (if warranted)
- Previous purging and sampling data for monitoring wells to be sampled, including water levels, purging parameters, and laboratory analysis results.
- Monitoring well boring and construction log (including wellhead elevation survey and reference point information)
- Personnel and equipment decontamination supplies
- Sample shipping and packaging supplies
- Personal protective equipment as specified in the Health and Safety Plan (HASP).

TYPICAL PROCEDURES FOR MONITORING WELL PURGING AND GROUNDWATER SAMPLING

1. **Pre-Purging Data Collection and Purging Equipment Placement.** Record the data and information collected during this procedure on a groundwater purge and sample form. Perform the following prior to groundwater sampling:
   a. Calibrate the multi-parameter water quality meter, prior to beginning sampling and as necessary based on field conditions, in accordance with the instructions in the manufacturer's operation manual. Note that it may be appropriate to keep a written log of the calibration procedures and an instrument maintenance with the instrument.
   b. Examine the monitoring well to be sampled and associated protective surface enclosure for any structural damage, poorly fitting caps, and leaks into the inner casing. If notable conditions exist, they should be recorded on the sampling log for the well so that any necessary follow-up corrective actions can be planned and implemented.
   c. Record an initial measurement of the depth to water. Calculate the volume of water in the well casing if wetted-casing-volume-based purging is to be used to remove the so-called "stagnant water" from the well prior to sampling. The volume of water in the wetted well casing should be calculated using the formula: $V = (\pi\ r^2) \times L$ where r is one half of the inner diameter of the well casing/screen and L is the length of wetted casing/screen (calculated by subtracting the depth to water from the total well depth). Total well depth should not be measured at

the start of a sampling event (due to the potential to cause turbidity). Measure the total well depth after sample collection. Note that some regulatory agencies require that the calculated “stagnant water” volume include the water contained in the pores space of the wetted portion of the monitoring well filter pack in addition to the casing/screen. If this is a requirement, it should be defined in the project-specific sampling requirements.

d. If light non-aqueous phase liquid (LNAPL) is potentially present, measure the depth and thickness of the LNAPL and the static water level using a multiphase interface monitoring probe. Use one of the following devices for purging:
e. Bladder pump: adjust the pump intake at a depth approximately equal to the middle or just slightly below the middle of the well screen interval or water column unless another position is justified based on site-specific conditions.
f. Peristaltic pump: place the pump intake at a depth equal to the approximate middle or just slightly above the middle of the well screen interval or water column unless another position is justified based on site-specific conditions. Note: If degassing of water is occurring when sampling with a peristaltic pump, alternative types of sampling equipment should be used for volatile organic compound (VOC) or volatile petroleum hydrocarbon (VPH) sample collection.
g. Inertial pump: place the pump intake at a depth approximate to the middle or just slightly below the middle of the well screen interval or water column unless another position is justified based on site-specific conditions. Note: Some studies suggest that the use of inertial pumps for purging and/or sampling may produce a low bias when collecting samples for VOC and VPH analyses. This should be considered along with regulatory requirements when selecting an inertial pump for purging and/or sampling.
h. Submersible pump: place the pump intake at a depth approximate to the middle or just slightly below the middle of the well screen interval unless another position is justified based on site-specific conditions.
i. Pre-cleaned or disposable bailers. Note: The use of bailers for low-flow purging/sampling is not appropriate.
j. Another suitable purging/sampling device may be selected for use depending upon project requirements.

2. **Monitoring Well Purging and Sampling.** When purging of a monitoring well prior to sampling is appropriate and/or required, purge the well using either (a) wetted-casing-volume-based purging or (b) low-flow purging as described in the following sections. If a well exhibits evidence of slow recharge, or produces excessively silty water, etc., the well may need to be redeveloped.
   a. Wetted-casing-volume-based purging.
      (1) Establish a purging rate to pump or bail approximately three wetted-casing volumes of groundwater without dewatering the well.
      (2) If using a pump, set-up the discharge tubing, flow-through cell, water quality meter, and purge water collection container. If turbidity is measured, collect the sample for turbidity measurement after groundwater passes through the flow-through cell in the vial provided with the turbidity meter. If using a bailer, maintain a clean plastic container next to the well for collecting observation samples. Begin purging the well.
      (3) At the beginning of purging and periodically thereafter, record the following information and water quality parameters/observations on the groundwater

purge and sample form: As guidance, field parameters may be measured after one purge volume is removed and every ½ purge volume thereafter.
- Date and time
- Purge volume and/or flow rate
- Water depth
- Temperature
- pH
- Specific conductance
- Dissolved oxygen
- Oxidation-reduction potential (ORP)
- Other observations as appropriate (turbidity, color, presence of odors, sheen, etc).

(4) Continue purging until water quality parameters have stabilized (refer to "Stabilization Criteria for Adequacy of Monitoring Well Purging" below) and/or a minimum of three wetted-casing volumes of water have been removed from the well. If a well purges dry, let it recover to 80 percent of original water column, then sample. If the well takes a very long time to recover (i.e., longer than 2 hours), try to sample the well at the end of day or first thing the next day.

(5) Collect the sample in pre-cleaned sample containers suitable for the laboratory analyses to be performed.

(6) If sampling using a bailer, use a bottom-emptying device or other technique to avoid sample agitation. If the collected water is very turbid, or a bottom-emptying bailer is not used, properly transfer the water from the bailer into the appropriate sample containers. Be careful to avoid agitating the sample. When sampling for VOCs, turn the bottle upside down after filling the container to identify possible headspace. If bubbles are present, top off the sample container or resample.

b. Low-flow purging and sampling.

(1) Place the pump intake at a depth equal to the approximate middle or just slightly above the middle of the well screen interval or water column or otherwise as dictated by well-specific soil stratigraphy and project-specific requirements**.** For example, it may be appropriate that the pump intake be set opposite to any preferential flow pathways (i.e., zones of higher permeability).

(2) Place an electronic water-level indicator probe in the well, approximately 0.5 to 3 inches below the piezometric surface. If available, a transducer of sufficient accuracy can also be used to measure depth to water when purging.

(3) Connect the pump discharge tube to a flow-through cell housing a water quality parameter probe.

(4) Activate the pump for purging at a flow rate ranging from approximately 0.1 to 0.5 liters per minute (L/min) or other flow rate as dictated by project-specific and/or site-specific requirements. (Note: Some regulatory agencies may require specific flow rates). Determine the flow rate by timing the rate at which the flow-through cell is filled.

(5) During purging, monitor the water level in the well to evaluate potential drawdown. The goal is to minimize drawdown to less than approximately

4 inches. If drawdown is observed (especially rapid drawdown at the beginning of purging), decrease the pumping rate.

(6) Measure water quality parameters at approximately 3- to 5-minute intervals during purging. Continue purging until water quality parameters have stabilized (refer to "Stabilization Criteria for Adequacy of Monitoring Well Purging" below)

(7) Immediately after purging, collect the sample in pre-cleaned sampled containers suitable for the laboratory analyses to be performed using the same flow rate that was used during purging unless it is necessary to decrease the rate to minimize aeration or turbulent filling of sample containers. If sampling for VOCs or VPH reduce the flow rate to 0.1 L/min or less.

3. **Sampling with LNAPL Present in a Monitoring Well.** Wells containing LNAPL are typically not sampled for dissolved phase constituents in groundwater due to the potential for entrainment of LNAPL in the aqueous sample matrix. If such sampling is required, and purging is not required, make sure the pump intake is placed in the upper 2 feet of water column and collect the samples without purging in a manner that reduces the potential for mixing of the groundwater sample with air or LNAPL. If groundwater sampling is required from wells containing LNAPL for the purposes of characterizing VOCs, and purging is required, purge the well prior to sampling unless or until LNAPL becomes entrained in the sampling apparatus. If LNAPL will likely become entrained in the groundwater, the sample should be collected without purging. If LNAPL becomes entrained in the sampling apparatus then the sampling effort for VOCs should be aborted.
4. **Field Filtering Groundwater Samples.** Groundwater sample filtering and/or preservation should be performed in accordance with the requirements of the analytical method being specified and any other project-specific requirements. For example, samples collected for dissolved metals are typically filtered using a 0.45 µm filter.
5. **Sample Collection Considerations.** When multiple analyses will be performed, collect the samples in order of decreasing sensitivity to volatilization (i.e., VOC samples first and metals last). When sampling for VOCs, turn the sample container upside down after filling to identify possible headspace. If bubbles are present, top off the sample bottle or resample (do not reuse bottles, especially if they have been pre-preserved by the vendor or laboratory). If possible, the pump should not be moved or turned off between purging and sampling; however, the pump may need to be turned off for a very brief period (as a practical matter) so field personnel can handle samples and minimize the potential for water to splash on the ground surface. The ground surface should be protected from incidental splashing, especially if water from the well would be considered a hazardous waste for disposal purposes.
6. **Monitoring Wells with Slow Recharge.** If a well purges dry, let it recover to 80 percent of original water column, then sample. If the well takes a very long time to recover (i.e., longer than 2 hours), try to sample the well at the end of day or first thing the next day.
7. **Sample Container Filling and Shipping.** Fill the appropriate containers for the analyses to be requested and ensure that the required label information is completely and accurately filled in. Follow sampling packaging, shipping, and chain-of-custody procedures (see applicable SOP-18).

8. **Decontamination.** Follow personnel and equipment decontamination procedures (see applicable SOP-20 and SOP-19).

STABILIZATION CRITERIA FOR ADEQUACY OF MONITORING WELL PURGING

Environmental Investigations Standard Operating Procedures and Quality Assurance Manual (EPA 2001) states that "with respect to groundwater chemistry, an adequate purge is achieved when pH, specific conductance, and temperature of groundwater have stabilized and the turbidity has either stabilized or is below 10 Nephelometric Turbidity Units (NTUs). Wells should be considered stable when the criteria listed in the following table have been met for pH, specific conductance, temperature, and turbidity. Attempts should also be made to stabilize ORP and dissolved oxygen.

Field Parameters	Stabilization Criteria for Three or More Consecutive Readings	Notes
pH	Difference between three or more consecutive readings is within ±0.2 units	–
Temperature	Difference between three or more consecutive readings is constant	–
Specific Conductance	Difference between three or more consecutive readings is within ±3%	–
Turbidity	Difference between three or more consecutive readings is within ±10% or three consecutive readings below 10 NTUs	Generally, turbidity is the last parameter to stabilize. Attempts should be made to achieve stabilization; however, this may not be possible. It should be noted that natural turbidity in groundwater may exceed 10 NTUs. If turbidity is greater than 50 NTU, redevelopment of the well may be warranted.
ORP	Difference between three or more consecutive readings is within ±20mV	Very sensitive. Attempts should be made to achieve stabilization; however, due to parameter sensitivity this may not be possible.
Dissolved Oxygen	Difference between three or more consecutive readings is within ±10% or ±0.2 milligrams per liter (mg/L), whichever is greater	Very sensitive. Attempts should be made to achieve stabilization, especially when collecting samples of VOC analysis; however, due to parameter sensitivity this may not be possible.

Attempts should be made to achieve the stabilization criteria. Because of geochemical heterogeneities in the subsurface environment, stabilization of field parameters during purging may not always be achievable. If field parameter measurements do not indicate stabilization, continued conventional purging may be required until a minimum of three wetted-casing volumes have been removed. During low-flow purging of a well containing a large volume of casing water, it may be practical to discontinue low-flow purging and proceed with sampling if field parameters have not stabilized within a reasonable period. This judgment must be made on a site-specific/project-specific basis.

TYPICAL PROCEDURES FOR GROUNDWATER SAMPLING USING PASSIVE DIFFUSION BAGS (PDBS)

Groundwater sampling using water-filled passive diffusion bag (PDB) samplers may be suitable for obtaining samples for VOC analysis. The suggested application of the method is for long-term monitoring of VOCs in groundwater wells at well characterized sites. (Note: The use of PDBs may not be suitable for the assessment of Tertiary Amyl Methyl Ether, methyl tert-butly ether, methyl-isobutyl ketone, styrene, and acetone).The effectiveness of the use of a single PDB sampler in a well is dependent on the assumption that there is horizontal flow through the well screen and that the quality of the water in the well screen is representative of the groundwater in the aquifer directly adjacent to the screen. If there are vertical components of intrabore-hole flow, multiple intervals of the formation contributing to flow, or varying concentrations of VOCs vertically within the screened or open interval, then a multiple deployment of PDB samplers within a well may be more appropriate for sampling the well.

Typically PDB samplers should not be used in wells having screened or open intervals longer than10 feet. If PDB samplers are to be used in wells with screened intervals of greater than 10 feet, then they are generally used in conjunction with borehole flow meters or other techniques to characterize vertical variability in hydraulic conductivity and contaminant distribution or used strictly for qualitative reconnaissance purposes. In larger well screens or in wells that may have vertical flow, the use of baffles should be considered.

Following are the procedures for deploying a PDB sampler.

1. **Acquire PDBs.** Obtain the pre-filled PDB samplers from the analytical laboratory. (The PDB samplers are prefilled at the laboratory with laboratory-grade deionized water. Unfilled PDB samplers can be obtained and filled in the field but this is not recommended.)
2. **Deploy PDBs in Monitoring Wells.** To deploy the PDB sampler in the well:
   a. Measure the well depth and compare the measured depth with the reported depth to the bottom of the well screen from well-construction records. This is to check whether sediment has accumulated in the bottom of the well, whether there is a non-screened section of pipe (sediment sump) below the well screen, and the accuracy of well-construction records.
   b. Attach the PDB sampler to a weighted line. (Sufficient weight should be added to counterbalance the buoyancy of the PDB sampler.) (Note: Stainless-steel or Teflon-coated stainless-steel wire is preferable, but rope can be used if it is of sufficient strength, non-buoyant, and subject to minimal stretching. However, the rope should not be reused due to the potential for cross contamination.) Additionally, to prevent cross-contamination, the weighted lines should not be reused in different wells.
   c. To prevent cross-contamination, he PDB samplers should not contact non-aqueous phase liquid (NAPL) during deployment or retrieval.
   d. Calculate the distance from the bottom of the well, or top of the sediment in the well, up to the point where the PDB sampler is to be placed.
   e. Attach the PDB sampler to the weight or weighted line at the target depth.

1) For the field-fillable type of PDB sampler, the sampler is equipped with a hanger assembly and weight that can be slid over the sampler body until it rests securely near the bottom of the sampler.
2) If using a coated stainless-steel wire as a weighted line, make loops at appropriate points to attach the upper and lower ends of PDB sampler.
3) Where the PDB sampler position varies between sampling events, movable clamps with rings can be used.
4) When using rope as a weighted line, tie knots or attach clasps at the appropriate depths. Nylon cable ties or stainless-steel clips inserted through the knots can be used to attach the PDB samplers.

f. Lower the weight and weighted line down the well until the weight rests on the bottom of the well and the line above the weight is taut. The PDB samplers should now be positioned at the expected depth. (The depth can be checked by placing a knot or mark on the line at the correct distance from the top knot/loop of the PDB sampler to the top of the well casing and checking to make sure that the mark aligns with the lip of the casing after deployment.)
g. Secure the assembly. (A suggested method is to attach the weighted line to a hook on the inside of the well cap.)
h. Reattach the well cap. The well should be sealed in such a way as to prevent surface-water in-flow into the well.
i. Allow the system to remain undisturbed until the PDB sampler equilibrates. Laboratory and field data suggest that a 2-week equilibration time is probably adequate for most applications. Note: In less-permeable formations, longer equilibration times may be required.

3. **Recovering the PDBs.** Following the equilibration time, recover the PDB sampler from the monitoring well.
   a. Remove the PDB samplers from the well by using the attached line. The PDB samplers should not be exposed to heat or agitated.
   b. Examine the surface of the PDB sampler for evidence of algae, iron or other coatings, and for tears in the membrane. Note the observations in a sampling field book. If there are tears in the membrane, the sample should be rejected. If there is evidence that the PDB sampler exhibits a coating, then this should be noted in the report.
   c. Detach and remove the PDB sampler from the weighted line. Remove the excess liquid from the exterior of the bag to minimize the potential for cross contamination.
4. **Sample Container Filling and Shipping.** Transfer the water from the PDB sampler to sample container. This is typically accomplished by carefully cutting a small hole in the bag and directing the flow into the sample container. Some commercially available PDB samplers provide a discharge device that can be inserted into the sampler. When transferring the sample to the sample container, minimize agitation. Ensure that the required label information is completely and accurately filled in. Follow sampling packaging, shipping, and chain-of-custody procedures (see applicable SOP-18).
5. **Decontamination.** Follow personnel and equipment decontamination procedures (see applicable SOP-19 and SOP-20).

QUALITY CONTROL GUIDANCE

Follow the quality control requirements specified in the Quality Assurance Project Plan (QAPP), project-specific field sampling and analysis work plan, and/or project-specific regulatory requirements, as applicable. The following may be used as guidelines.

1. Approximately one duplicate sample should be obtained for each sampling event or for each batch of samples (a batch is typically defined as 20 samples). Collect duplicate samples immediately after the original samples are collected. Purging is not performed between original sample collection and collection of duplicate samples. Original and duplicate samples are collected sequentially, without appreciable delay between collection cycles. Duplicate samples are to be submitted to the laboratory blind (i.e., not identified as a duplicate sample).
2. Typically, at least one type of field blank sample (rinsate or transfer) should be collected per day of water sampling. All field blank samples are to be collected, preserved, labeled, and treated like any other sample. Field blank samples are to be sent blind to the laboratory (i.e., not identified as a field blank). Record in the field notebook the collection of any blank sample (rinsate, transfer, trip). The types of field blank samples are discussed below.
    a. Rinsate blank samples. If rinsate field blank samples are required, prepare the sample by pouring deionized water over, around, and through the various reusable sampling implements contacting a natural sample. Rinsate blanks need not be collected when dedicated sampling equipment is used for purging and sampling the well. Rinsate blank samples are to be analyzed for the same parameters as the environmental samples.
    b. Transfer blank samples. Transfer blank samples are routinely prepared when no rinsate blank samples are collected. (The purpose of a transfer blank sample is to monitor for entrainment of contaminants into the sample from existing atmospheric conditions at the sampling location during the sample collection process.) A transfer blank sample is prepared by filling a sample container(s) with distilled or deionized water at a given sampling location. Transfer blank samples are to be analyzed for the same parameters as the environmental samples.
    c. Trip blank samples. Trip blank samples are submitted for VOC analysis to monitor for possible sampling contamination during shipment as volatile organic samples are susceptible to contamination by diffusion of organic contaminants through the Teflon-faced silicone rubber septum of the sample vial. Trip blank samples are prepared by the laboratory by filling VOA vials from organic-free water and shipped with field sample containers. Trip blank samples accompany the sample bottles through collection and shipment to the laboratory and are stored with the samples. It is suggested that a trip blank sample be included in each cooler of samples submitted for VOC analysis.

INVESTIGATION-DERIVED WASTE (IDW) MANAGEMENT

Purge water is to be contained onsite in an appropriate labeled container for disposition by the client unless other project-specific procedures are defined. Other investigation-derived wastes, such as personal protective equipment, are to be properly handled and disposed. Preferably, PPE IDW should also be containerized and left onsite for disposal by the client. As a matter of practice, any waste, or potential waste, generated onsite, should remain onsite. Refer to the IDW SOP-21.

REFERENCES

ASTM International. 1999. Designation: D 6452 - 99. Standard Guide for Purging Methods for Wells Used for Ground-Water Quality Investigations. Copyright ASTM, West Conshocken, PA.

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Vroblesky, Dan A. 2001. U.S. Geological Survey, User's Guide for Polyethylene Based Passive Diffusion Bag Samplers to Obtain Volatile Organic Compound Concentrations in Wells. Part 1: Deployment, Recovery, Data Interpretation, and Quality Control and Assurance. Water-Resources Investigations Report 01-4060. Columbia, South Carolina.

STANDARD OPERATING PROCEDURE

SOP-8: MEASURING GROUNDWATER LEVELS

INTRODUCTION

This procedure describes the field procedure typically followed by Kennedy/Jenks Consultants when measuring groundwater levels. Groundwater levels in wells will be measured prior to commencing developing, purging, sampling, and pumping tests.

EQUIPMENT

- Electronic water level monitoring probe or other measuring device
- Decontamination supplies (e.g., buckets, Alconox, distilled water, squirt bottle)
- Field notebook
- Groundwater purge-and-sample form(s) if in conjunction with groundwater sampling
- Keys for locks (if necessary)
- Tools to open well covers (e.g., socket wrench, spanner wrench)
- Disposable gloves (as a minimum), and other protective clothing (as necessary).

TYPICAL PROCEDURE

1. If more than one well will be measured, begin depth measurement in the order in terms of lowest to highest chemical concentrations in the monitoring wells.
2. Remove well caps from all wells prior to initiation of water level measurement activities. This will allow wells to equilibrate, if necessary.
3. If the potential exists for floating product (LNAPL) to be present, use an electric oil-water interface probe or oil-sensitive paper to measure depth of the floating product and the electronic depth probe to measure the depth-to-water. Record both depths in field notebook and note the water depth as the "depth with oil layer present." Unless otherwise instructed, always measure depths to floating product layer and groundwater from the top of the north side of the well casing.
4. When floating product is not present, measure depth-to-water using a pre-cleaned water level probe from the top of the north side of the well casing, unless otherwise instructed.
5. Repeat measurements a minimum of three times or have field partner confirm measurement.
6. Record time of day the measurement was taken using military time (e.g., 16:00).
7. Decontaminate water level and/or oil-water interface probe and line prior to reuse (refer to SOP-19 for Equipment Decontamination).

STANDARD OPERATING GUIDELINE

SOP-9: WELL CONSTRUCTION AND DEVELOPMENT

INTRODUCTION

This procedure describes procedures used by Kennedy/Jenks Consultants personnel for well construction and development following completion of boring and soil sampling procedures (described in Standard Operating Procedure, Boring and Subsurface Soil Sampling).

WELL CONSTRUCTION MATERIALS

- 2-inch or 4-inch Schedule 40 PVC blank casing
- 2-inch or 4-inch Schedule 40 PVC slotted casing, of appropriate slot size
- 2-inch or 4-inch Schedule 40 PVC threaded and slip caps
- 2-inch or 4-inch Schedule 40 stainless steel blank casing
- 2-inch or 4-inch Schedule 40 stainless steel wire wrapped casing, of appropriate slot size
- 2-inch or 4-inch stainless steel threaded and slip caps
- Stainless steel well centralizers
- 12-inch x 0.25-inch mild steel isolation casing with welded centralizers
- Hasp-locking standpipes
- Ground-level traffic-rated watertight well housing enclosure
- Locking expansion plugs
- Combination or key lock
- Filter pack sand (refer to Standard Operating Guideline, Design of Filter Packs and Selection of Well Screens for Monitoring Wells)
- Type I or II Portland cement
- Concrete
- Bentonite powder
- 0.25-inch bentonite pellets or chips.

WELL DEVELOPMENT EQUIPMENT

- 2-inch or 4-inch-diameter vented surge block
- 1-inch dedicated PVC hose for monitoring well development and purging
- Centrifugal surface pump
- Submersible pump (4-inch-diameter wells or larger)
- 55-gallon DOT-approved drums
- Teflon, stainless steel or PVC bailer
- Teflon-coated bailer retrieval wire
- Airlift pump with foot valve and compressor
- Bladder pump (2-inch diameter wells only)

TYPICAL PROCEDURE

1. Following completion of selected borings, install the monitoring well casing through the center of the hollow stem auger, drive casing, or open boring. The monitoring well consists of a PVC Schedule 40 slotted well casing of appropriate diameter and a blank casing with a threaded bottom cap and a slip or threaded top cap or watertight expansion plug. The casing string must be held in tension during initial installation.

2. Place clean, well graded sand around the slotted section of the monitoring well to serve as the filter pack. The grade of sand is chosen on the basis of aquifer units encountered (refer to Standard Operating Procedure, SOP-11: Design of Filter Packs and Selection of Well Screens for Monitoring Wells). The filter pack is emplaced as the auger or temporary casing is removed from the boring.
3. Ensure that filter pack sand for the well extends to approximately 3 feet above the top of the screened interval.
4. If required in the well construction permit, notify the appropriate inspector prior to placing the well seal.
5. Place a 2- to 3-foot thick bentonite pellet seal above the sand pack, as the auger and/or casing is removed from the boring. If the seal is placed above the water table, the bentonite pellets must be hydrated with potable water prior to placement of the annular seal.
6. Fill the remainder of the annulus between the well casing and the borehole wall with cement/bentonite grout (with approximately 5 percent bentonite), or a high-solids bentonite slurry (11 to 13 pounds per gallon), to a depth of approximately 1 foot below ground surface. If the water level is higher than the seal, use a tremie pipe to place the grout.
7. Install either a threaded cap or a locking watertight expansion plug on the monitoring well. Place a steel hasp-locking well housing over the top of the well and cement it into the annulus of the boring.
8. Place a traffic-rated precast concrete or steel well enclosure approximately 1 to 2 inches above grade, and cement it into place with concrete. Have a concrete apron constructed around the well housing enclosure to facilitate runoff.
9. For aboveground completion, ensure that the well casing extends approximately 3 feet above ground surface. An 8-inch diameter hasp-locking steel well housing surrounds the well casing. Traffic bollards can be installed around the well housing as necessary.
10. Repeat Steps 1 through 9 for all monitoring wells at site.
11. Following the curing of the grout (approximately 24 hours), each monitoring well is developed. Prior to development activities, measure the depth in each well to static water level and total casing depth.
12. Also prior to well development, if applicable, check the water interface of each monitoring well for the presence of floating product (NAPL). Use a clear bailer or color indicator paste for the inspection.
13. If a monitoring well has a water level of less than 25 feet, it may be developed by using a centrifugal surface pump with dedicated 1-inch I.D. clear flex suction hose, placed with the hose intake placed temporarily at all levels of the screened interval. If the well is greater than 25 feet deep, a submersible pump or airlift pump with air filter is used for development. In either case, a surge block of appropriate size can be moved up and down inside the screened section of the well casing to create a surging action that hydraulically stresses the filter pack.
14. During development of each well, ensure that field parameters and observations are recorded on a Kennedy/Jenks Consultants purge and sample form (attached). Information to be recorded includes, but is not limited to, the following items:
    - Depth to water
    - Development time and volume
    - Development (flow) rate
    - pH, temperature, specific conductivity, and turbidity
    - Other observations, as appropriate (e.g., color, presence of odors, or sheen)
15. Develop each monitoring well until water of relatively low turbidity is removed from the casing.

16. When development of each well is discontinued, record the following field parameters/observations:
    - Depth to water
    - Temperature
    - pH
    - Specific conductance
    - Turbidity
    - Color.

INVESTIGATION-DERIVED WASTES

Place groundwater produced by well development in appropriately labeled containers for disposition by the client. Kennedy/Jenks Consultants is available to assist the client with options for disposition of groundwater.

STANDARD OPERATING PROCEDURE

SOP-10: MEASUREMENT OF FIELD PARAMETERS: pH, DISSOLVED OXYGEN, SPECIFIC CONDUCTANCE, TURBIDITY OXIDATION-REDUCTION POTENTIAL, AND TEMPERATURE

INTRODUCTION

This guideline describes the procedures typically used by Kennedy/Jenks Consultants personnel to measure the pH, dissolved oxygen, specific conductance, turbidity oxidation-reduction potential (ORP, also referred to as redox potential), and temperature of ground or surface water.

EQUIPMENT

- Multi-parameter water quality meter (YSI or similar)
- Peristaltic pump or other suitable pump and appropriate tubing
- Flow-through cell or plastic cup
- Transport/calibration cup
- Probe sensor guard
- Operations manual
- Spare batteries
- Standard conductivity calibration solutions [447, 1413, 2074, 8974 microSiemens per centimeter (μS/cm)]
- pH buffers (4.00, 7.00, 10.00)
- ORP calibration solution
- Pens, field logbook, and/or appropriate field forms (e.g., groundwater purge and sample form)
- Equipment and personnel decontamination supplies (refer to SOP-19 and SOP-20)
- Personal protective equipment as specified in the health and safety plan.

PROCEDURES

Calibrate multi-parameter water quality meter at the office prior to commencement of field activities to check instrument is in proper working order. At a minimum, calibrate before use each day (or more frequently as necessary) as indicated below. The initial daily calibration may be performed at the office (if located in proximity to the site), motel, or in the field.

1. Press the On/Off Key. Check the battery charge indicator located at the bottom of the liquid crystal display (LCD) screen. Replace batteries if the battery charge indicator is low.

2. Calibrate the meter according to the manufacturer's instructions for each parameter to be measured that day. Note: The meter must be calibrated for each field parameter in accordance with the instructions in the operations manual at the beginning of each sampling day. Additional calibrations may be performed during the day if deemed necessary.
3. Connect the probe sensor to the flow-through cell. If the flow cell is not used, make sure the probe sensor guard is installed.
4. Begin passing water into the flow-through cell. If the flow-through cell is not used, place the probe module into a sample of the water or directly into the body of water being evaluated. Be sure to completely immerse all sensors into the water.
5. Provide a constant flow of fresh water across the probe module to actuate readings.
6. Observe the meter's LCD display, and record the values on the groundwater purge and sample form or field logbook.
7. Remove the probe from the water and rinse (soak) with distilled water.
8. Place the probe sensor in the transport/calibration cup with 1/2 inch of potable water for short-term storage. The transport/calibration cup should be sealed to prevent evaporation.

INVESTIGATION-DERIVED WASTES

Investigation-derived waste (IDW), including decontamination wastes, must be contained and properly handled and disposed. See SOP-21 regarding handling and disposal of IDW.

STANDARD OPERATING PROCEDURE

SOP-11: COLLECTING FIELD DUPLICATES

INTRODUCTION

Duplicate analysis is a measure of precision for all sources of variability in the field and the laboratory. Laboratory replicates attempt to eliminate all sources external of imprecision, so that the difference between field duplicates and laboratory replicates is the error introduced by field techniques.

EQUIPMENT

Any equipment needed to collect samples is required. Additional containers for duplicates are needed. A system for generating and tracking blind field duplicates (a permanent notebook).

Sources of Imprecision in the Field

- Sampling techniques.
- Actual inhomogeneity of samples.

Sources of Imprecision in the Laboratory

- Sample preparation - how well mixed and measured out.
- Analysis - inherent noise of analytical procedure.

Separating Precision Errors

Field duplicates vs. laboratory replicates:

- Try to segregate sources of variation from field and laboratory.
- Laboratory replicates are known by the analyst to be similar (possible unconscious bias).
- Field duplicates should be "blind" to the laboratory.
- Laboratory replicates are deliberately homogenized.
- Field duplicates may be spatially or temporally separated, but logically connected - supposed to be same for some reason:
    - e.g., collecting a waste stream at different times of day
    - Collecting solids from different areas of a drum

TYPICAL PROCEDURES

Field duplicates and laboratory replicates should be collected as follows.

Collecting Duplicates and Replicates for Solids

1. Laboratory replicates should be collected:
    a. From same area - avoid obvious inhomogeneity.
    b. Fill one large container with enough sample for <u>triplicate</u> analysis (the lab does replicate and spike analysis).
    c. The laboratory analyst will remove large rocks, nuts and bolts, etc., and grind or screen the sample.

2. When collecting field duplicates:
   a. If sample is not homogenous, compositing will be performed before splitting into duplicates. Homogenization for compositing will be conducted by placing the soil in a decontaminated stainless steel bowl and mixing with a decontaminated stainless steel implement. Thorough homogenization is critical for compositing field duplicates when the analytes are metals. VOC samples will not be composited to avoid loss of volatile components.
   b. To ensure a "blind" sample to the laboratory:
      i. Use sample identification numbers for field duplicates that are similar to other samples.
      ii. Record the time of sampling for the original and duplicate sample with slightly different collection times.
      iii. Identify which sample the duplicate was collected from and document in a permanent notebook.

Collecting Duplicates and Replicates for Liquids

1. Laboratory replicates are actually collected in triplicates for spiking.
   a. Liquid samples are often collected in separate containers and the analysts do not mix the contents before analysis since liquids are typically homogenous, and because the volume is difficult to work with.
   b. Try to fill like containers from the same bailer pull, or the sample tap at the same time (e.g., line up and fill all VOC vials first, then all liters, etc.).
   c. List all samples with same identification and time (or time period) to avoid confusion at sample log in. Mark chain-of-custody and analysis request to indicate these samples are for "Lab QC".
2. Field duplicates have the same considerations as for solids above.
   a. You may want to use separate sampling equipment to prove there is no bias from contaminated device.
   b. You may also want to collect the sample at a different time (re-purging wells is an option, or you may want to determine if time of sampling after purging has an effect).
   c. Fill whole sets of containers for one sample, then fill duplicate set.
3. Spikes are rarely done in the field since there are too many potential sources of error to identify the reason for poor recoveries. But, consider using "travel spikes" for volatiles.

STANDARD OPERATING PROCEDURE

SOP-12: SAMPLE PACKAGING AND SHIPPING

INTRODUCTION

This procedure presents methods for shipping non-hazardous materials, including most environmental samples via United Parcel Service (UPS), Federal Express and Greyhound. Many local laboratories offer courier service as well.

EQUIPMENT

- Coolers or ice chests
- Sorbent material
- Bubble-wrap
- Strapping tape
- Labels and pens
- Chain-of-Custody forms
- Chain-of-Custody seals
- UPS, Federal Express, or Greyhound manifests.

Samples shipped to each analytical laboratory can be sent by UPS or Federal Express on a next-day basis unless other arrangements are made. Greyhound bus service should only be used if there is direct service (e.g., Sacramento or Bakersfield to San Francisco). Ice chests, used to refrigerate perishable items, can be used to convey non-hazardous samples to the analytical laboratory.

Absorbent pads should be placed in the bottom of the shipping container to absorb liquids in the event of sample container breakage. Transportation regulations require absorbent capacity of the material to equal the amount of liquid being shipped; each pad absorbs approximately 1 quart of liquid. Liquid samples in glass jars or bottles should also be wrapped in plastic bubble wrap. A small amount of air space is desirable in filled plastic containers. This often prevents the cap of the container from coming off should the container undergo compression. Volatile organics analysis (VOA) vials should be packed in sponge holders. Additionally, exposure of filled VOA vials to other types of sample containers, by placement in the same shipping container, is not recommended. Various non-VOA sample containers are solvent-rinsed which may contaminate the VOA vials before or after sample collection. Therefore, a separate shipping container for VOA vials is recommended. An equal weight of ice substitute should be used to keep the samples below 4 degrees Centigrade for the duration of the shipment (up to 48 hours). Care in choosing a method of sample chilling should be observed so that the collected samples are not physically or chemically damaged. Re-usable blue ice blocks, block ice, ice cubes, or dry-ice are suitable for keeping samples chilled. Labels of samples may get wet. Use of waterproof pens and labels is desirable for identification of sample containers. Use of clear tape to cover each affixed sample label is helpful in ensuring sample identification. Strong adhesive tape should be used to band the coolers closed. Additionally, it is recommended that the drain plug be covered with adhesive tape to prevent any liquid from escaping.

Specific requirements for packaging materials may apply if the samples being shipped are known to be hazardous materials as defined in 49 CFR 171.8 (samples are not considered hazardous waste and therefore manifest requirements do not apply). UPS holds shippers responsible for damage occurring in the event of accidents when a hazardous material is shipped as a non-hazardous material. Samples which obviously are hazardous materials should therefore be shipped as such, and samples which most likely are not hazardous materials should be shipped in coolers. Guidelines for shipping hazardous materials by UPS are provided in the *Guide for Shipping Hazardous Materials* available from UPS. Specific labels for shipping of hazardous materials are available.

Chain-of-custody documentation should accompany shipments of samples to the analytical laboratory. Often, the chain-of-custody document contains an analytical request section which may be completed following sample collection. Chronological listing of collected samples is desirable. A copy of the completed chain-of-custody form should be retained in the event that the original form is lost or destroyed.

It should be noted that samples retained by the analytical laboratory which are not chosen for analysis may be assessed a fee for disposal. Often a disposal fee is assigned to a sample, typically soil, that has been retained beyond standard analytical holding periods. Therefore, consultation with project management is recommended to determine which samples may be of interest. Contacting the selected analytical laboratory regarding disposal policies is also recommended. Arrangements may be made with the analytical laboratory for return of the unanalyzed samples for later disposal to the area of origin.

STANDARD OPERATING PROCEDURE

SOP-13: EQUIPMENT DECONTAMINATION

INTRODUCTION

This procedure describes field procedures typically followed by Kennedy/Jenks Consultants personnel during the decontamination of sampling and monitoring equipment. Proper decontamination procedures minimize the potential for cross-contamination among sampling points on a single site or between separate sites.

EQUIPMENT

- Two or three containers (e.g., 5-gallon buckets, or 5- or 10-gallon plastic tubs) for dip rinsing, washing, and collection of rinse water.
- Two or three utility brushes or test tube brushes for removal of visible contamination. A test tube brush (or similar) can be stapled to the end of a dowel and used to clean the inside of a bailer.
- Non-phosphate Alconox, Liquinox, or trisodiumphosphate (TSP) to be mixed with potable or distilled water.
- Rinse solutions, such as methyl alcohol (methanol), dilute nitric acid (0.1 molar), deionized or distilled water, and/or tap water. Deionized water is preferable to distilled water because the deionization process typically results in greater removal of organic compounds as discussed below:

    Acid rinse (inorganic desorption) 10% nitric or hydrochloric acid solution reagent grade nitric or hydrochloric acid and deionized water (1% to be used for low carbon steel equipment).
    Solvent rinse (organic desorption isopropanol, acetone, or methanol; pesticide grade).
    Deionized water is preferable to distilled water because the deionization process typically results in greater removal of organic compounds.
- Multi-gallon storage containers filled with potable water to be used for rinsing or washing.
- Spray bottles, squirt bottles, or garden sprayers to apply rinse liquid. A separate bottle should be used for each liquid.
- Solvex or neoprene gloves that extend, as a minimum, halfway up the forearm. In cooler weather, it is advisable to use different resistant chemicals neoprene gloves that provide better insulation against cold temperatures.
- Paper towels to wipe off gross contamination.
- Garbage bags, or other plastic bags, and aluminum foil to wrap clean sampling equipment after decontamination, to store sampling equipment or and to dispose of decontamination debris.
- Sample bottles for rinsate blanks. For these blanks, Laboratory Type II (millipore) water should be used. Purified water from the selected analytical laboratory is recommended. This water is often filtered and boiled to remove impurities.
- DOT-approved container (e.g., 55-gallon drum) to store contaminated wash and rinse water. Contained decontamination should be labeled appropriately.
- Steamcleaner with power source and water supply.

PROCEDURES

In most cases, the following procedures are adequate to remove contamination.

1. Preclean sampling equipment. If there is gross contamination on equipment, wipe it off with paper towels and/or rinse it off with water. Additional internal decontamination may be possible by circulation of water or cleaning solutions.

2. Wash all parts of equipment with detergent water and scrub with brushes. Take equipment apart when appropriate to remove visible contamination.
3. Steamclean sampling equipment. The steamcleaner is effective in removing contamination, especially volatile hydrocarbons. Steamcleaning is highly recommended in most cases and sometimes is the only method for decontaminating equipment that is grossly contaminated with hydrocarbons.
4. Rinse equipment by dipping in rinse solution, spraying, or pouring solution over it. Dip rinsing can introduce contaminants into solution. Spraying might not allow a thorough rinsing of the equipment, but it is a more efficient rinsing method because less rinse solution is used. Appropriate rinsing solutions are specified in the project sampling and analysis plan. Some typical solutions are indicated in the equipment section of this SOP.

    Methanol (used to remove organic compounds)

    Dilute acids (used to remove metals and other cations)

    Tap water

    Deionized/distilled water.
5. Rinse the sampler with generous amounts of deionized water. Pouring water over the sampler is best, although spraying or using a squirt bottle to apply rinse water might be adequate if you are trying to minimize waste.
6. Prepare rinsate blanks. To ensure proper decontamination, submit a rinsate blank for analysis. It is best to do this just before sampling. The blank should be analyzed for the same chemicals the samples are being checked for and for the chemical used to decontaminate equipment, if appropriate.

    [Note: The heading for this section indicates procedures to remove contamination.]

    To prepare a rinsate blank, pour millipore analyte-free water through or over the sampler. Collect the rinsate water in a clean bottle. Pour the collected rinsate water into the appropriate sample container(s). It is advisable to prepare one rinsate blank every day in the field. Use water specifically for blank preparation.
7. Wipe sampling equipment with a paper towel or allow it to air dry.
8. Place samplers in clean plastic bags or sealed containers, or wrap them in aluminum foil for storage in an undisturbed location that is free of contamination.

INVESTIGATION-DERIVED RESIDUALS

For details of handling investigation-derived residuals refer to the project sampling and analysis plan.

SPECIAL NOTES

- To reduce the potential for cross-contamination, samples should be collected so that the least contaminated stations areas are sampled first. Subsequent sampling should be completed in the order of increasing contamination. Areas that typically have lower levels of contamination include those upgradient of source, background areas, and the periphery of the contaminated area.

- Prepare rinsate blanks. To ensure proper decontamination, submit a rinsate blank for analysis. It is best to do this just before sampling. The blank should be analyzed for the same chemicals the samples are being checked for and for the chemical used to decontaminate equipment, if appropriate.
- To prepare a rinsate blank, pour analyte-free water through or into the sampler. Pour the collected rinsate water into the appropriate sample container(s). It is advisable to prepare one rinsate blank every day in the field. Use water specifically for blank preparation.
- Monitoring instruments that come into contact with sampled materials must be decontaminated, along with sampling devices. They should be washed, or at least rinsed before monitoring other sampling sites.
- As determined from analysis of rinsate blanks, decontamination using soap and water is adequate in removing detectable quantities of contaminants. This type of decontamination has been compared to laboratory procedures for decontaminating sampling bottles. Using methanol as a rinse does help in cases of contamination with organic compounds.

REFERENCES

U.S. Environmental Protection Agency. 1987. *Handbook: Groundwater*. U.S. Environmental Protection Agency, Office of Research and Development, Cincinnati, Ohio.

Washington Department of Ecology. 1982. *Methods for Obtaining Waste Samples*. Ch. 173-303 WAC. Washington State Department of Ecology, Olympia, Washington.

STANDARD OPERATING PROCEDURE

SOP-14: PERSONNEL DECONTAMINATION

INTRODUCTION

This procedure describes field procedures typically followed by Kennedy/Jenks Consultants for personnel decontamination. Decontamination of personnel is critical to health and safety during and after environmental fieldwork. It protects personnel from hazardous substances that can contaminate and eventually permeate protective clothing, respiratory equipment, tools, vehicles, and other equipment used onsite. Decontamination reduces exposure of site personnel to such substances by minimizing the transfer of harmful materials into clean areas and preventing the mixing of incompatible chemicals. It also protects the community by preventing uncontrolled transportation of contaminants from the site.

EQUIPMENT

The materials, equipment, and facilities described in the following list are not required in every case of personnel decontamination. However, they represent all that might be required for sites where maximum decontamination procedures are necessary.

- Drop cloths (plastic or other suitable material) on which heavily contaminated equipment and outer protective clothing can be deposited.
- Collection containers, such as drums or suitably lined trash cans, for storing disposable clothing, heavily contaminated personal protective clothing, or equipment that must be discarded.
- Lined box with absorbent for wiping or rinsing off gross contaminants and liquid contaminants.
- Large tubs to hold wash and rinse solutions; tubs should be at least large enough to hold a worker's booted foot and allow full access for washing.
- Non-phosphate wash solutions (e.g., Alconox, Liquinox) to wash off debris and chemicals and reduce hazards associated with any contaminants.
- Rinse solutions (e.g., potable or distilled water) to remove contaminants and contaminated wash solutions.
- Long-handled soft-bristled brushes to wash and rinse off contaminants.
- Paper or cloth towels for drying protective clothing and equipment.
- Lockers or containers for storage of decontaminated non-disposable clothing (e.g., hard hat, boots) and equipment.
- Department of Transportation (DOT)-approved containers for contaminated wash and rinse solutions.
- Plastic sheeting, sealed pads with drains, or other appropriate means of secondary containment of contaminated wash and rinse solutions that might be spilled during decontamination.

- Shower facilities for full body wash or, at a minimum, wash sinks available to personnel.
- Soap or wash solution, wash cloths, and towels for personnel.
- Lockers or containers for clean clothing and personal item storage.

DECONTAMINATION PROCEDURES

Level C

At a minimum, the following procedures apply when operating in a Level C exclusion zone:

1. Deposit items used onsite on plastic drop cloth. Segregation at the drop site reduces the probability of cross-contamination.
2. Scrub outer boots, gloves, and splash suit with decontamination solution or detergent water. Rinse items with generous amounts of water. Follow this step scrupulously for protective clothing that is not disposable.
3. Remove outer boots and gloves; deposit or discard them in container with plastic liner.
4. To continue decontamination outside the exclusion zone, change canister or mask when leaving the zone. Upon re-entering, remember to gear up again.
5. Remove boots, chemical-resistant splash suit, and inner gloves and deposit them in separate containers lined with plastic.
6. Remove respirator by taking off facepiece. Avoid touching the face with the fingers. Deposit the facepiece on a plastic sheet.
7. As a field wash, clean hands and face thoroughly and shower as soon as possible. Wash respirator facepiece with respirator cleaning solution.
8. Ensure that all decontamination procedures are in accordance with the project sampling and analysis plan.

Level D

If operating in a Level D area, perform the following procedures before leaving the site:

1. Wash and rinse all reusable equipment and garments. If gear is to be used elsewhere, wash it with detergent and then rinse with generous amounts of water.
2. If grossly contaminated, discard disposable protective clothing in appropriate container.
3. Wash hands and face thoroughly, and shower as soon as possible.

SPECIAL NOTES

When working in an exclusion zone, be sure that the decontamination area is placed in an upwind direction (plus or minus 20 degrees) from the site.

INVESTIGATION-DERIVED WASTES

Refer to the specific project sampling and analysis plan for details of disposition of investigation-derived wastes.

EMERGENCY DECONTAMINATION PROCEDURES

1. If the decontamination procedure is essential to the life-saving process, decontamination must be performed immediately.
2. If a heat-related illness develops, protective clothing should be removed as soon as possible. Protective clothing and equipment should be washed, rinsed, and/or cut off.
3. If medical treatment is required to save a life, decontamination should be delayed until the victim is stabilized or until decontamination will not interfere with medical treatment.
4. Dispose of contaminated clothing and equipment properly.
5. Alert medical personnel to the emergency.
6. Instruct medical personnel about potential contamination.
7. Instruct medical personnel about specific decontamination procedures.

REFERENCES

NIOSH/OSHA/USCG/EPA. 1985. *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*. Washington, DC. Federal Way.

U.S. Environmental Protection Agency. 1988. *Standard Operating Safety Guidelines*. United States Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, DC.

STANDARD OPERATING PROCEDURE

SOP-15: HANDLING AND DISPOSAL OF INVESTIGATION-DERIVED WASTE

INTRODUCTION

Environmental site investigations usually result in generation of some regulated waste, particularly if the project involves drilling and construction of monitoring wells. Any potentially hazardous or dangerous material that is generated during a site investigation must be handled and disposed of in accordance with applicable regulations (22 CCR, Chapter 30). This guideline provides a procedure to be used for dealing with investigation-derived wastes that have the potential of being classified as hazardous or dangerous, including soil cuttings, well development water, and decontamination water.

EQUIPMENT

- DOT-approved packaging (typically DOT 17E or 17H drums)
- Funnel
- Bushing wrench
- 15/16-inch socket wrench
- Shovel
- Appropriate markers (spray paint, paint pen)
- Plastic sheeting
- Drip pans
- Pallets.

TYPICAL PROCEDURES

Preparing Containers

1. Place each container on a pallet if it is to be moved with a fork lift after it is full.
2. Place plastic sheeting under containers for soil and drip pans under containers used to hold water.
3. Ensure that packaging materials are compatible with the wastes to be stored in them. Bung-type drums should be used to contain liquids. If a liquid is corrosive, a plastic or polymer drum should be used.
4. Solids should be placed in open-top drums. Liners are placed in the drums if the solid material is corrosive or contains free liquids. Gaskets are also used on open-top drums.

Storing Wastes

1. As waste materials are generated, place them directly into storage containers.
2. Do not fill storage drums completely. Provide sufficient outage so that the containers will not be overfull if their contents expand.
3. After filling a storage drum, seal it securely, using a bung wrench or socket wrench, for a bung-type or open-top drum, respectively.
4. Label drums or other packages containing hazardous or dangerous materials and mark them for storage or shipment. To comply with marking and labeling requirements, affix a properly filled out yellow hazardous waste marker and a DOT hazard class label to each waste container. Do not mark drums with Kennedy/Jenks Consultants' name. All waste belongs to the client. Mark accumulation start date.

5. During an ongoing investigation, use a paint marker to mark the contents, station number, date, and quantity of material on each drum or other container. Do not mix investigation-derived wastes with one another or with other materials. <u>Do not</u> place items such as Tyvek, gloves, equipment, or trash into drums containing soils or liquids, and <u>do not</u> mix water and soil. Disposable protective clothing, trash, soil, and water materials should be disposed of in separate containers.
6. Upon completion of field work, or the portion of the project that generates wastes, notify the client as to the location, number, contents, and waste type of waste containers. Remind the client of the obligation to dispose of wastes in a timely manner and in accordance with applicable regulations.

REGULATIONS

22 CCR, Chapter 30 *California Hazardous Waste Regulations*.

49 CFR 100-177, *Federal Transportation of Hazardous Materials Regulations*.

EPA Region X, Technical Assistance Team. 1984. *Manual for Sampling, Packaging, and Shipping Hazardous Materials*. Seattle, WA: EPA.

APPENDIX A

SITE-SPECIFIC SAMPLING AND ANALYSIS PLAN CHECKLIST

This checklist supplements the *Lower Duwamish Waterway – Site Hazard Assessment and Limited Investigation Sampling and Analysis Plan/Quality Assurance Project Plan* (SAP/QAPP) to support sampling activities for Site Hazards Assessments (SHAs) and limited site investigations for contaminated sites overseen by Washington State Department of Ecology (Ecology).

APPROVALS (PRINTED NAME, SIGNATURE, DATE):

Julia Schwarz 1/17/2017

Plan Preparer Date

PM/Reviewer Date

Ecology Date

SITE INFORMATION

Site Name: WA DOT Signals Maintenance

Site Address: 3700 9th Ave S, Seattle, 98134

Known contaminants of concern:
Gasoline- and diesel-range hydrocarbons, benzene, toluene, ethylbenzene, xylenes

Suspected contaminants of concern:
Lead, other fuel additives (MTBE, EDB, EDC, n-hexane), naphthalenes

PROJECT ORGANIZATION

Title/Responsibility	Name	Affiliation	Phone Number/Email
Ecology Point of Contact	Tamara Cardona-Marek	Washington State Department of Ecology	425-649-7058 Taca461@ecy.wa.gov
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Field Lead/SSO	Julia Schwarz	Kennedy/Jenks Consultants	253-835-6424/C:206-384-5944 juliaschwarz@kennedyjenks.com
Laboratory	Mark Beasley	ESC Lab Sciences	615-773-9672 mbeasley@esclabsciences.com
Subcontractors	Dale Abernathy	Holt Services (Driller)	253-604-4878/C:253-318-8996 Dabernathy@holtservicesinc.com
Subcontractors	Bill Phillips	APS Locates	206-571-1857 bphillips@apslocates.com

SAMPLING AND ANALYSIS SUMMARY

Describe the purpose and objective of field investigation:

Sampling Objectives:

- Advance soil borings and collect soil samples to delineate lateral and vertical extent of residual soil impacts.
- Use soil and reconnaissance groundwater sample results to evaluate additional actions needed for site NFA.

Brief Site History:
In 1991, petroleum-impacted soil was encountered at the site during upgrading of three USTs (two 5,000-gallon unleaded gasoline tanks and one 5,000-gallon diesel tank). The release was suspected to be associated with leaking gaskets, overfills, and a piping leak near the fuel dispenser. During tank retrofitting, approximately 250 cubic yards of soil were excavated and removed from the site. Five soil samples were collected from the around the tanks and beneath the fuel pump, and were analyzed for oil and grease (highest detected concentration of 770 mg/kg). Soil samples were not analyzed for gasoline or BTEX constituents. Groundwater was reportedly encountered in the excavation, but was not characterized.

In June 2015, the three USTs were decommissioned and removed from the site, along with the associated piping and pump island. Petroleum-impacted soil was reportedly observed in the excavation at depths between 2.5 and 8.5 feet bgs beneath the pump island and from approximately 11.5 to 12.5 feet bgs below the former USTs. The visually impacted soil was over-excavated. A total of approximately 562 tons of petroleum-impacted soil was excavated and removed from the site. Five confirmation soil samples were collected from the excavation limits and analyzed for gasoline-, diesel- and oil-range petroleum hydrocarbons, RCRA 8 metals, BTEX, PCBs, cPAHs, and Naphthalene. Diesel-range petroleum hydrocarbons (340 mg/kg), benzene, toluene, xylenes, barium, and chromium were detected above laboratory reporting limits, but below applicable cleanup levels. Groundwater was observed, but not characterized.

An ERTS report from 2015 suggests that some residual soil may remain along a utility corridor to the south of the UST excavation. However, one soil sample was collected within the utility corridor and did not contain concentrations of contaminants of concern above MTCA Method A cleanup levels.

Work Plan:
A Geoprobe drilling rig will be used to advance soil borings at the site to characterize the extent of residual soil impacts. The attached sampling map shows the proposed boring locations in the vicinity of the former UST excavation. Three borings will be advanced downgradient of the utility corridor, and nine borings will be advanced upgradient of the utility corridor, within and around the former UST excavation. Soil samples will be collected to assess residual soil impacts. Collection of a reconnaissance groundwater sample will be attempted at each boring location where evidence of groundwater is observed in the soil core. The actual locations and depths of the borings will be dependent on site conditions assessed during performance of the field activities (including underground utilities and other obstructions). Boring locations may be modified in the field in order to characterize the lateral and vertical distribution of impacts to soil and groundwater on the property. Additional borings may be added based on the conditions observed in the initial borings. If additional borings are added, they will only be advanced in

areas where underground utilities have been cleared using above ground-sensing techniques and only with the property owners' approval.

If field evidence of petroleum-impacted soil and/or groundwater is observed at the site, three to four permanent 2-inch monitoring wells may be installed at the site. The locations of these wells will be determined in the field based on the area of observed impacts. One well would be located in an assumed upgradient direction from the UST excavation and impacts, and other wells would be located in a downgradient direction to assess potential downgradient groundwater impacts.

INVESTIGATION DERIVED WASTE

What waste is anticipated?
☒Solid: 1 drum ☒Liquid: 1 drum ☐Mixed: ____________________

How will it be handled?
Waste will be drummed onsite in 55-gallon drums.
☒ 55-Gallon Drums ☐Other: ___________________

How will it be characterized?
Composite samples will be collected from each drum for disposal purposes; or, if no visual or olfactory impacts are observed, grab samples already collected for analysis may be used for waste characterization.

If waste is to remain on site, by what date will it be removed for disposal as a non-hazardous waste?
Waste will be removed by May 31, 2017.

If waste is to remain on site, who on site has been notified and serves as a contact?
Norm Payton (paytonN@wsdot.wa.gov) will be the primary contact; will contact Norm to see who should serve as the onsite contact.

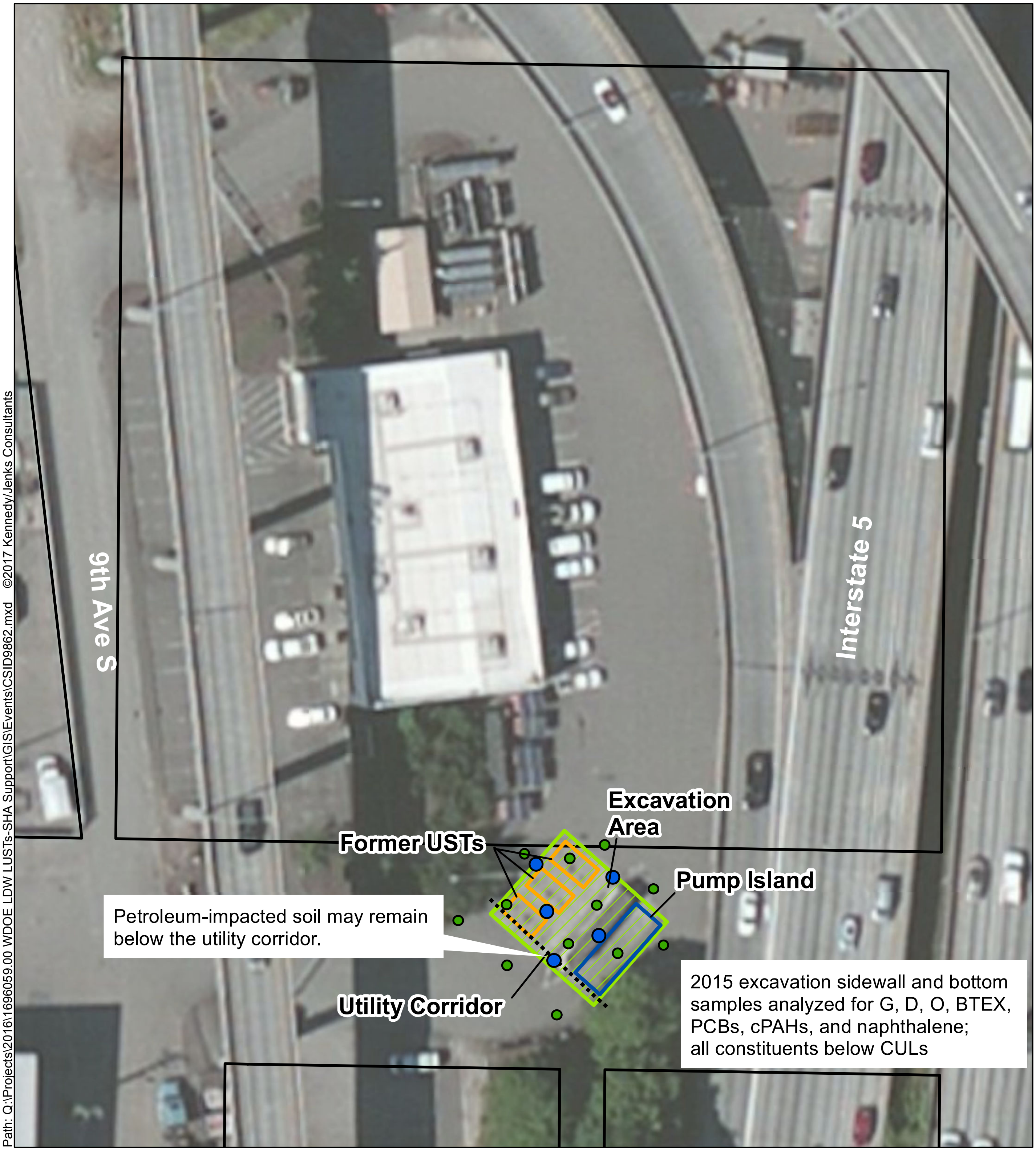
PRE-FIELD CHECKLIST

Activity	Date completed	Not applicable
Public utility locate requested by Kennedy/Jenks Consultants	Will call by Jan. 26	
Private utility locate coordinated by Kennedy/Jenks Consultants	Scheduled for week of Jan. 30	
Property owner/tenant coordination & access agreement		
Laboratory coordination	Will contact by week of Jan. 30.	
Subcontractor coordination	Drilling tentatively scheduled early February.	
Hospital route map (attach)	Attached.	
SHA/draft SHA for site (attach)	Attached.	
Sample location map (attach)	Attached.	
HASP Addendum (attach if necessary)		Not applicable.

TABLE A-1: SAMPLING AND ANALYSIS PLAN
SITE NAME: WA DOT Signals Maintenance

Sample Location/Designation (See Site Map)	Media	Sample Interval (Depth)	Blind Duplicate (X)	Analyses (X)									Description/Rationale/Comments (Include information such as sample type, e.g. discrete, composite; collection method, e.g. bailer, peristaltic pump; filter requirements; purge methods; frequency/duration, and leak test requirements for air and vapor samples)
				NWTPH-G	NWTPH-Dx	BTEX	PAHs	VOCs (incl. fuel additives)	RCRA Metals	Naphthalenes	PCBs	Lead (only)	
Analytical Samples	S = soil, GW = groundwater, SW = surface water, SD = sediment, IA = indoor air, AA = ambient air, SS = sub-slab soil gas, SG = soil gas												
Soil Boring Samples:													
From each soil boring, we will collect 1-3 samples. Samples will be collected at the depth of highest observed impacts, if any. If no impacts are observed, one sample will be collected from the 10-15 ft interval (approximate depth of observed tank impacts), and one from the bottom of the boring. Exact sample depths will be determined by field screening.													
ExampleBoring-01-6.5 (downgradient of utility corridor)	S	6.5-7		x	x	x							
ExampleBoring-01-12.5	S	12.5-13		x	x	x		x	x	x			Approximately 1-2 samples per boring (evidence of highest impacts) will be analyzed for VOCs (full list), naphthalenes, and RCRA metals.
ExampleBoring-01-17	S	17-17.5		x	x	x							
ExampleBoring-02-8 (Within former excavation)	S	8-8.5		x	x	x							For borings within the former excavation, one sample may be collected within the fill material. For the location nearest the former fuel dispenser, one sample will be collected within the depth of observed impacts (2.5 to 8.5 feet bgs).
ExampleBoring-02-14	S	14-14.5		x	x	x		x	x	x			One sample will be collected below the bottom of the excavation (approximately 12.5 feet bgs).
ExampleBoring-02-19.5	S	19.5-20		x	x	x							Sample collected at base, as warranted by field conditions.
DUP-01-20171011	S		x	x	x	x		x	x	x			One field duplicate will be collected per 20 soil samples.
Reconnaissance Groundwater Samples:													
ExampleReconGW-01	GW			x	x	x		x	x	x			One reconnaissance groundwater sample will be collected from each boring, as appropriate. The temporary wells are unlikely to produce enough water for a field duplicate, but if possible, one field duplicate of recon groundwater will be collected from a location with noted impacts (if applicable).
Potential Monitoring Wells													
For each monitoring well, we will collect 1-3 soil samples. Samples will be collected at the depth of highest observed impacts, if any. If no impacts are observed, samples will be collected from depth intervals where impacts were observed in adjacent soil borings. One soil sample will be collected from the bottom of the boring. Wells will be developed, and groundwater samples will be collected at least one week following development.													
MW-01-12.5	S	12.5-13		x	x	x		x	x	x			Approximately 1-2 samples per boring (evidence of highest impacts) will be analyzed for VOCs (full list), naphthalenes, and RCRA metals.
MW-01-19.5	S	19.5-20		x	x	x							
DUP-02-20170207	S			x	x	x		x	x	x			One field duplicate will be collected per 20 soil samples.
MW-01-20170215	W			x	x	x		x	x	x			One groundwater sample will be collected from each well using low-flow sampling techniques.
DUP-03-20170215	W			x	x	x		x	x	x			One field duplicate will be collected during each groundwater sampling event.
Other QC Samples (Rinsate Blanks, Temperature Blanks)													
Temperature Blank/Trip Blank	W (Provided by lab)					x		x					One for each cooler of samples.
MEDIA DESIGNATIONS	S = soil, GW = groundwater, SW = surface water, SD = sediment, IA = indoor air, AA = ambient air, SS = sub-slab soil gas, SG = soil gas												
See Table 1 of the SAP/QAPP for Analytical Methods, Sample Containers, Preservatives, and Holding Times													

Notes:
1. Boring locations may be modified/added based on field conditions.
2. All analyses will be confirmed with the Ecology project manager.



Path: Q:\Projects\2016\1696059.00 WDOE LDW LUSTs-SHA Support\GIS\Events\CSID9862.mxd ©2017 Kennedy/Jenks Consultants

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- Proposed Sampling and Reconnaissance Groundwater Sampling Locations
- 2015 Soil Sample
- Utility Corridor
- Pump Island
- Former UST
- Excavation Area
- Parcel

Note:
1. All locations are approximate.
2. ppm = parts per million

N

0 25 50

Scale: Feet

Kennedy/Jenks Consultants

WDOT Signals Maintenance
Seattle, Washington

DRAFT

Site Overview Map

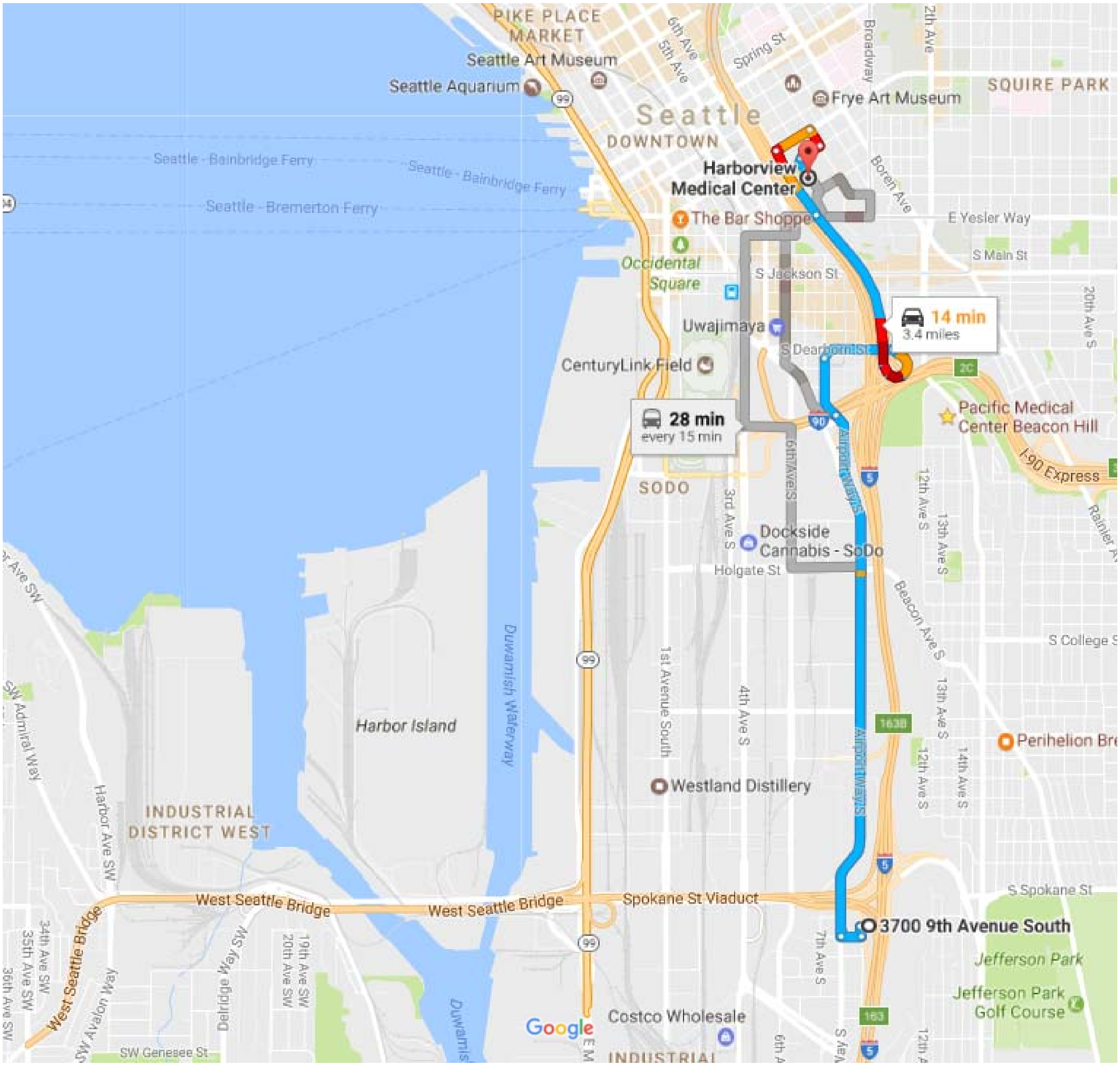
1696059*00
January 2017

Figure 1

Google Maps 3700 9th Ave S, Seattle, WA 98134 to Harborview Medical Center, Seattle, WA

CSID 9862

Drive 3.4 miles, 14 min



via Airport Way S

Best route, despite the usual traffic

14 min

3.4 miles

via Airport Way S and 6th Ave S

14 min

3.0 miles

3:50 PM—4:18 PM

24 / 27 / 33 / 124

28 min

Appendix E

2017 Soil Boring Logs

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Downgradient from excavation area - Furthest SE		**Boring Name**: B-1
DRILLING COMPANY: Holt Services, Inc	DRILLER: Mike Running	**Project Name**: WSDOT Signals Maintenance
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2.25"	**Project Number**: 1696059*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	MEAURING PT. ELEVATION: bgs / TOTAL DEPTH: 10.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 2/17/17 / DATE COMPLETED: 2/17/17
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): N/A
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: J. Sawdey
SEAL: 3/8" Bentonite chips - hydrated in place	FROM 0 TO 10 FT.	SAMPLING METHODS: MC-5 Continuous Core Sampler / WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE______ FT.
GROUT: N/A	FROM N/A TO N/A FT.	

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID / ST	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
			0–5	Water bearing sand on till					Air/Vac clearance to 5' bgs. Well graded sand and gravel, gravel up to 4" in diameter, fine to coarse sand, dry then wet @ 3'
U	5		5	B-1(5.0-6.0)		0.1 / NS		ML	**Sandy SILT with gravel** Greenish gray (Gley 1 5/10Y) very dense and stiff silt with sand and gravel, very hard, low to moderate plasticity, dry, no odor, no sheen
			10			0.1 / NS			

NOTES

1. ppm = parts per million
2. bgs = below ground surface
3. ST = sheen test; PID = photoionization detector (readings in ppm)
4. NS = no sheen, WS = weak sheen, MS = moderate sheen, SS = strong sheen
5. No odor or sheen observed in boring

KJ PNW SIGNAL.GPJ KJ PNW.GDT 6/7/17

F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION	Downgradient from excavation area - between B1 and B3
DRILLING COMPANY	Holt Services, Inc
DRILLER	Mike Running
DRILLING METHOD(S)	Direct-Push
DRILL BIT(S) SIZE	2.25"
Boring Name	B-2
Project Name	WSDOT Signals Maintenance
Project Number	1696059*00

		FROM	TO (FT.)
ISOLATION CASING	N/A	N/A	N/A
BLANK CASING	N/A	N/A	N/A
SLOTTED CASING	N/A	N/A	N/A
SIZE AND TYPE OF FILTER PACK	N/A	N/A	N/A
SEAL	3/8" Bentonite chips - hydrated in place	0	15
GROUT	N/A	N/A	N/A

MEAURING PT. ELEVATION	bgs
TOTAL DEPTH	15.0 ft. bgs
DATE STARTED	2/17/17
DATE COMPLETED	2/17/17
INITIAL WATER DEPTH (FT)	N/A
LOGGED BY	J. Sawdey
SAMPLING METHODS	MC-5 Continuous Core Sampler
WELL COMPLETION	☐ SURFACE HOUSING ☐ STAND PIPE______ FT.

SAMPLES: TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID / ST	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
			0–5						Air/Vac clearance to 5' bgs. Well graded sand and gravel, gravel up to 6" in diameter, fine to coarse sand, dry, no odor, no sheen
	5		5	B-2(5-6)		0.0 / NS			**Sandy SILT with gravel** Greenish gray (Gley 1 5/10Y) very dense and stiff silt with sand and gravel, moderately low plasticity, dry, no odor, no sheen
	5		10			0.0 / NS		ML	
			15			0.1 / NS			

NOTES
1. ppm = parts per million
2. bgs = below ground surface
3. ST = sheen test; PID = photoionization detector (readings in ppm)
4. NS = no sheen, WS = weak sheen, MS = moderate sheen, SS = strong sheen
5. No odor or sheen observed in boring

KJ PNW SIGNAL.GPJ KJ PNW.GDT 6/7/17

F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Downgradient from excavation area - Furthest NW		**Boring Name**: B-3
DRILLING COMPANY: Holt Services, Inc	DRILLER: Mike Running	**Project Name**: WSDOT Signals Maintenance
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2.25"	**Project Number**: 1696059*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	MEAURING PT. ELEVATION: bgs; TOTAL DEPTH: 17.5 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 2/17/17; DATE COMPLETED: 2/17/17
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): N/A
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: J. Sawdey
SEAL: 3/8" Bentonite chips - hydrated in place	FROM 0 TO 17.5 FT.	SAMPLING METHODS: MC-5 Continuous Core Sampler; WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE____ FT.
GROUT: N/A	FROM N/A TO N/A FT.	

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID / ST	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
			0–5						Air/Vac clearance to 5' bgs. Well graded sand and gravel, gravel up to 6" in diameter, fine to coarse sand, dry then wet @5', no odor, no sheen
U	5		5	B-3(5-6) B-3(20170217) B-3(6-7)	Water bearing sand on till	0.0 / NS			**Sandy SILT with gravel** Greenish gray (Gley 1 5/10Y) very dense and stiff silt with up to 15% sand and 15% gravel, moderately low plasticity, dry, no odor, no sheen
U	5		10			0.1 / NS		ML	As above, except more hard, dryer, more fines
U	5		15			0.0 / NS			Drilling refusal @ 17.5'
						0.1 / NS			

NOTES

1. ppm = parts per million
2. bgs = below ground surface
3. ST = sheen test; PID = photoionization detector (readings in ppm)
4. NS = no sheen, WS = weak sheen, MS = moderate sheen, SS = strong sheen
5. No odor or sheen observed in boring

KJ PNW SIGNAL.GPJ KJ PNW.GDT 6/7/17

F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Northwest of excation area			Boring Name: B-8
DRILLING COMPANY: Holt Services, Inc	DRILLER: Mike Running		Project Name: WSDOT Signals Maintenance
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2.25"		Project Number: 1696059*00
ISOLATION CASING: N/A	FROM N/A	TO N/A FT.	MEAURING PT. ELEVATION: bgs / TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A	TO N/A FT.	DATE STARTED: 2/17/17 / DATE COMPLETED: 2/17/17
SLOTTED CASING: N/A	FROM N/A	TO N/A FT.	INITIAL WATER DEPTH (FT): N/A
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A	TO N/A FT.	LOGGED BY: J. Sawdey
SEAL: 3/8" Bentonite chips - hydrated in place	FROM 0	TO 15 FT.	SAMPLING METHODS: MC-5 Continuous Core Sampler
GROUT: N/A	FROM N/A	TO N/A FT.	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE______ FT.

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID / ST	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
			0–5						Air/Vac clearance to 5' bgs. Well graded sand and gravel, gravel up to 4" in diameter, fine to coarse sand, dry
U			5			0.1 / NS		ML	**Sandy SILT with gravel** Greenish gray (Gley 1 5/10Y) very dense and stiff silt with sand and gravel, very hard, low to moderate plasticity, dry, no odor, no sheen
								CL/ ML	**Silty CLAY** Up to 40% silt, soft, high plasticity, damp, no odor, no sheen
									Sandy SILT with gravel Greenish gray (Gley 1 5/10Y) very dense and stiff silt with sand and gravel, very hard, low to moderate plasticity, dry, no odor, no sheen
U			10			0.0 / NS		ML	
									Fill material Brick layer, increased moistrure below brick
			15			0.0 / NS			

NOTES

1. ppm = parts per million
2. bgs = below ground surface
3. ST = sheen test; PID = photoionization detector (readings in ppm)
4. NS = no sheen, WS = weak sheen, MS = moderate sheen, SS = strong sheen
5. No odor or sheen observed in boring

KJ PNW SIGNAL.GPJ KJ PNW.GDT 6/7/17

F-40.1
(6-87) (3-88) (8-90)

Appendix F

Laboratory Analytical Reports and Chain-of-Custody Documentation

Kennedy/Jenks Consultants requested groundwater data be re-issued by the laboratory to report values between the reporting detection limit and method detection limit. In cases where soil and groundwater data were reported together in the original report, the original report is also attached with the groundwater data reported to the reporting detection limit.

ANALYTICAL REPORT

February 28, 2017

Kennedy/Jenks Consultants

Sample Delivery Group:	L891174
Samples Received:	02/18/2017
Project Number:	1696059-00/task06/04
Description:	WA DOT Signals Maintenance
Site:	SIGNALS
Report To:	Julia Schwarz 32001 32nd Ave. S.,Ste. 100 Federal Way, WA 98001

Entire Report Reviewed By:

Mark W. Beasley
Technical Service Representative

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

TABLE OF CONTENTS

B-3 L891174-01 GW

Collected by	Collected date/time	Received date/time
Alexander Lesher	02/17/17 10:40	02/18/17 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7470A	WG953872	1	02/20/17 10:58	02/21/17 10:59	NJB
Mercury by Method 7470A	WG953879	1	02/20/17 11:11	02/21/17 11:42	NJB
Metals (ICP) by Method 6010C	WG953281	1	02/21/17 16:47	02/22/17 10:04	LTB
Metals (ICP) by Method 6010C	WG953914	5	02/23/17 19:20	02/24/17 10:17	LTB
Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM	WG954491	1	02/22/17 13:46	02/23/17 15:26	FMB
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG954746	1	02/22/17 18:03	02/23/17 15:31	TRF
Volatile Organic Compounds (GC) by Method NWTPHGX	WG953706	1	02/24/17 04:56	02/24/17 04:56	JHH
Volatile Organic Compounds (GC/MS) by Method 8260C	WG954807	1	02/22/17 22:54	02/22/17 22:54	LRL

TB-1 L891174-02 GW

Collected by	Collected date/time	Received date/time
Alexander Lesher	02/17/17 10:40	02/18/17 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Volatile Organic Compounds (GC/MS) by Method 8260C	WG954807	1	02/22/17 20:38	02/22/17 20:38	LRL

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

Mark W. Beasley
Technical Service Representative

Mercury by Method 7470A

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Mercury	ND		0.000200	1	02/21/2017 10:59	WG953872
Mercury,Dissolved	ND		0.000200	1	02/21/2017 11:42	WG953879

Metals (ICP) by Method 6010C

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Arsenic	0.233		0.0500	5	02/24/2017 10:17	WG953914
Arsenic,Dissolved	ND		0.0100	1	02/22/2017 10:04	WG953281
Barium	2.65		0.0250	5	02/24/2017 10:17	WG953914
Barium,Dissolved	0.0220		0.00500	1	02/22/2017 10:04	WG953281
Cadmium	ND		0.0100	5	02/24/2017 10:17	WG953914
Cadmium,Dissolved	ND		0.00200	1	02/22/2017 10:04	WG953281
Chromium	1.22		0.0500	5	02/24/2017 10:17	WG953914
Chromium,Dissolved	ND		0.0100	1	02/22/2017 10:04	WG953281
Lead	0.310		0.0250	5	02/24/2017 10:17	WG953914
Lead,Dissolved	ND		0.00500	1	02/22/2017 10:04	WG953281
Selenium	ND		0.0500	5	02/24/2017 10:17	WG953914
Selenium,Dissolved	ND		0.0100	1	02/22/2017 10:04	WG953281
Silver	ND		0.0250	5	02/24/2017 10:17	WG953914
Silver,Dissolved	ND		0.00500	1	02/22/2017 10:04	WG953281

Volatile Organic Compounds (GC) by Method NWTPHGX

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Gasoline Range Organics-NWTPH	0.126		0.100	1	02/24/2017 04:56	WG953706
(S) a,a,a-Trifluorotoluene(FID)	*100*		*77.0-122*		*02/24/2017 04:56*	WG953706

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	ND		0.0500	1	02/22/2017 22:54	WG954807
Acrolein	ND	J4	0.0500	1	02/22/2017 22:54	WG954807
Acrylonitrile	ND		0.0100	1	02/22/2017 22:54	WG954807
Benzene	ND		0.00100	1	02/22/2017 22:54	WG954807
Bromobenzene	ND		0.00100	1	02/22/2017 22:54	WG954807
Bromodichloromethane	ND		0.00100	1	02/22/2017 22:54	WG954807
Bromoform	ND		0.00100	1	02/22/2017 22:54	WG954807
Bromomethane	ND	J4	0.00500	1	02/22/2017 22:54	WG954807
n-Butylbenzene	ND		0.00100	1	02/22/2017 22:54	WG954807
sec-Butylbenzene	ND		0.00100	1	02/22/2017 22:54	WG954807
tert-Butylbenzene	ND		0.00100	1	02/22/2017 22:54	WG954807
Carbon tetrachloride	ND		0.00100	1	02/22/2017 22:54	WG954807
Chlorobenzene	ND		0.00100	1	02/22/2017 22:54	WG954807
Chlorodibromomethane	ND		0.00100	1	02/22/2017 22:54	WG954807
Chloroethane	ND		0.00500	1	02/22/2017 22:54	WG954807
2-Chloroethyl vinyl ether	ND		0.0500	1	02/22/2017 22:54	WG954807
Chloroform	ND		0.00500	1	02/22/2017 22:54	WG954807
Chloromethane	ND		0.00250	1	02/22/2017 22:54	WG954807
2-Chlorotoluene	ND		0.00100	1	02/22/2017 22:54	WG954807
4-Chlorotoluene	ND		0.00100	1	02/22/2017 22:54	WG954807
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	02/22/2017 22:54	WG954807
1,2-Dibromoethane	ND		0.00100	1	02/22/2017 22:54	WG954807
Dibromomethane	ND		0.00100	1	02/22/2017 22:54	WG954807
1,2-Dichlorobenzene	ND		0.00100	1	02/22/2017 22:54	WG954807

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
1,3-Dichlorobenzene	ND		0.00100	1	02/22/2017 22:54	WG954807
1,4-Dichlorobenzene	ND		0.00100	1	02/22/2017 22:54	WG954807
Dichlorodifluoromethane	ND		0.00500	1	02/22/2017 22:54	WG954807
1,1-Dichloroethane	ND		0.00100	1	02/22/2017 22:54	WG954807
1,2-Dichloroethane	ND		0.00100	1	02/22/2017 22:54	WG954807
1,1-Dichloroethene	ND		0.00100	1	02/22/2017 22:54	WG954807
cis-1,2-Dichloroethene	ND		0.00100	1	02/22/2017 22:54	WG954807
trans-1,2-Dichloroethene	ND		0.00100	1	02/22/2017 22:54	WG954807
1,2-Dichloropropane	ND		0.00100	1	02/22/2017 22:54	WG954807
1,1-Dichloropropene	ND		0.00100	1	02/22/2017 22:54	WG954807
1,3-Dichloropropane	ND		0.00100	1	02/22/2017 22:54	WG954807
cis-1,3-Dichloropropene	ND		0.00100	1	02/22/2017 22:54	WG954807
trans-1,3-Dichloropropene	ND		0.00100	1	02/22/2017 22:54	WG954807
2,2-Dichloropropane	ND		0.00100	1	02/22/2017 22:54	WG954807
Di-isopropyl ether	ND		0.00100	1	02/22/2017 22:54	WG954807
Ethylbenzene	ND		0.00100	1	02/22/2017 22:54	WG954807
Hexachloro-1,3-butadiene	ND		0.00100	1	02/22/2017 22:54	WG954807
Isopropylbenzene	ND		0.00100	1	02/22/2017 22:54	WG954807
p-Isopropyltoluene	ND		0.00100	1	02/22/2017 22:54	WG954807
2-Butanone (MEK)	ND		0.0100	1	02/22/2017 22:54	WG954807
Methylene Chloride	ND		0.00500	1	02/22/2017 22:54	WG954807
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	02/22/2017 22:54	WG954807
Methyl tert-butyl ether	ND		0.00100	1	02/22/2017 22:54	WG954807
Naphthalene	ND		0.00500	1	02/22/2017 22:54	WG954807
n-Propylbenzene	ND		0.00100	1	02/22/2017 22:54	WG954807
Styrene	ND		0.00100	1	02/22/2017 22:54	WG954807
1,1,1,2-Tetrachloroethane	ND		0.00100	1	02/22/2017 22:54	WG954807
1,1,2,2-Tetrachloroethane	ND		0.00100	1	02/22/2017 22:54	WG954807
1,1,2-Trichlorotrifluoroethane	ND		0.00100	1	02/22/2017 22:54	WG954807
Tetrachloroethene	ND		0.00100	1	02/22/2017 22:54	WG954807
Toluene	ND		0.00100	1	02/22/2017 22:54	WG954807
1,2,3-Trichlorobenzene	ND		0.00100	1	02/22/2017 22:54	WG954807
1,2,4-Trichlorobenzene	ND		0.00100	1	02/22/2017 22:54	WG954807
1,1,1-Trichloroethane	ND		0.00100	1	02/22/2017 22:54	WG954807
1,1,2-Trichloroethane	ND		0.00100	1	02/22/2017 22:54	WG954807
Trichloroethene	ND		0.00100	1	02/22/2017 22:54	WG954807
Trichlorofluoromethane	ND		0.00500	1	02/22/2017 22:54	WG954807
1,2,3-Trichloropropane	ND		0.00250	1	02/22/2017 22:54	WG954807
1,2,4-Trimethylbenzene	ND		0.00100	1	02/22/2017 22:54	WG954807
1,2,3-Trimethylbenzene	ND		0.00100	1	02/22/2017 22:54	WG954807
1,3,5-Trimethylbenzene	ND		0.00100	1	02/22/2017 22:54	WG954807
Vinyl chloride	ND		0.00100	1	02/22/2017 22:54	WG954807
Xylenes, Total	ND		0.00300	1	02/22/2017 22:54	WG954807
(S) Toluene-d8	*98.3*		*80.0-120*		*02/22/2017 22:54*	WG954807
(S) Dibromofluoromethane	*105*		*76.0-123*		*02/22/2017 22:54*	WG954807
(S) 4-Bromofluorobenzene	*97.1*		*80.0-120*		*02/22/2017 22:54*	WG954807

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	ND		0.250	1	02/23/2017 15:31	WG954746
Residual Range Organics (RRO)	ND		0.500	1	02/23/2017 15:31	WG954746
(S) o-Terphenyl	*101*		*52.0-156*		*02/23/2017 15:31*	WG954746

Semi Volatile Organic Compounds (GC/MS) by Method 8270C-SIM

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Anthracene	ND		0.0000500	1	02/23/2017 15:26	WG954491
Acenaphthene	ND		0.0000500	1	02/23/2017 15:26	WG954491
Acenaphthylene	ND		0.0000500	1	02/23/2017 15:26	WG954491
Benzo(a)anthracene	ND		0.0000500	1	02/23/2017 15:26	WG954491
Benzo(a)pyrene	ND		0.0000500	1	02/23/2017 15:26	WG954491
Benzo(b)fluoranthene	ND		0.0000500	1	02/23/2017 15:26	WG954491
Benzo(g,h,i)perylene	ND		0.0000500	1	02/23/2017 15:26	WG954491
Benzo(k)fluoranthene	ND		0.0000500	1	02/23/2017 15:26	WG954491
Chrysene	ND		0.0000500	1	02/23/2017 15:26	WG954491
Dibenz(a,h)anthracene	ND		0.0000500	1	02/23/2017 15:26	WG954491
Fluoranthene	ND		0.0000500	1	02/23/2017 15:26	WG954491
Fluorene	ND	J4	0.0000500	1	02/23/2017 15:26	WG954491
Indeno(1,2,3-cd)pyrene	ND		0.0000500	1	02/23/2017 15:26	WG954491
Naphthalene	ND		0.000250	1	02/23/2017 15:26	WG954491
Phenanthrene	ND		0.0000500	1	02/23/2017 15:26	WG954491
Pyrene	ND		0.0000500	1	02/23/2017 15:26	WG954491
1-Methylnaphthalene	ND		0.000250	1	02/23/2017 15:26	WG954491
2-Methylnaphthalene	ND		0.000250	1	02/23/2017 15:26	WG954491
2-Chloronaphthalene	ND		0.000250	1	02/23/2017 15:26	WG954491
(S) Nitrobenzene-d5	*103*		*31.0-160*		*02/23/2017 15:26*	WG954491
(S) 2-Fluorobiphenyl	*111*		*48.0-148*		*02/23/2017 15:26*	WG954491
(S) p-Terphenyl-d14	*101*		*37.0-146*		*02/23/2017 15:26*	WG954491

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Acetone	ND		0.0500	1	02/22/2017 20:38	WG954807
Acrolein	ND	J4	0.0500	1	02/22/2017 20:38	WG954807
Acrylonitrile	ND		0.0100	1	02/22/2017 20:38	WG954807
Benzene	ND		0.00100	1	02/22/2017 20:38	WG954807
Bromobenzene	ND		0.00100	1	02/22/2017 20:38	WG954807
Bromodichloromethane	ND		0.00100	1	02/22/2017 20:38	WG954807
Bromoform	ND		0.00100	1	02/22/2017 20:38	WG954807
Bromomethane	ND	J4	0.00500	1	02/22/2017 20:38	WG954807
n-Butylbenzene	ND		0.00100	1	02/22/2017 20:38	WG954807
sec-Butylbenzene	ND		0.00100	1	02/22/2017 20:38	WG954807
tert-Butylbenzene	ND		0.00100	1	02/22/2017 20:38	WG954807
Carbon tetrachloride	ND		0.00100	1	02/22/2017 20:38	WG954807
Chlorobenzene	ND		0.00100	1	02/22/2017 20:38	WG954807
Chlorodibromomethane	ND		0.00100	1	02/22/2017 20:38	WG954807
Chloroethane	ND		0.00500	1	02/22/2017 20:38	WG954807
2-Chloroethyl vinyl ether	ND		0.0500	1	02/22/2017 20:38	WG954807
Chloroform	ND		0.00500	1	02/22/2017 20:38	WG954807
Chloromethane	ND		0.00250	1	02/22/2017 20:38	WG954807
2-Chlorotoluene	ND		0.00100	1	02/22/2017 20:38	WG954807
4-Chlorotoluene	ND		0.00100	1	02/22/2017 20:38	WG954807
1,2-Dibromo-3-Chloropropane	ND		0.00500	1	02/22/2017 20:38	WG954807
1,2-Dibromoethane	ND		0.00100	1	02/22/2017 20:38	WG954807
Dibromomethane	ND		0.00100	1	02/22/2017 20:38	WG954807
1,2-Dichlorobenzene	ND		0.00100	1	02/22/2017 20:38	WG954807
1,3-Dichlorobenzene	ND		0.00100	1	02/22/2017 20:38	WG954807
1,4-Dichlorobenzene	ND		0.00100	1	02/22/2017 20:38	WG954807
Dichlorodifluoromethane	ND		0.00500	1	02/22/2017 20:38	WG954807
1,1-Dichloroethane	ND		0.00100	1	02/22/2017 20:38	WG954807
1,2-Dichloroethane	ND		0.00100	1	02/22/2017 20:38	WG954807
1,1-Dichloroethene	ND		0.00100	1	02/22/2017 20:38	WG954807
cis-1,2-Dichloroethene	ND		0.00100	1	02/22/2017 20:38	WG954807
trans-1,2-Dichloroethene	ND		0.00100	1	02/22/2017 20:38	WG954807
1,2-Dichloropropane	ND		0.00100	1	02/22/2017 20:38	WG954807
1,1-Dichloropropene	ND		0.00100	1	02/22/2017 20:38	WG954807
1,3-Dichloropropane	ND		0.00100	1	02/22/2017 20:38	WG954807
cis-1,3-Dichloropropene	ND		0.00100	1	02/22/2017 20:38	WG954807
trans-1,3-Dichloropropene	ND		0.00100	1	02/22/2017 20:38	WG954807
2,2-Dichloropropane	ND		0.00100	1	02/22/2017 20:38	WG954807
Di-isopropyl ether	ND		0.00100	1	02/22/2017 20:38	WG954807
Ethylbenzene	ND		0.00100	1	02/22/2017 20:38	WG954807
Hexachloro-1,3-butadiene	ND		0.00100	1	02/22/2017 20:38	WG954807
Isopropylbenzene	ND		0.00100	1	02/22/2017 20:38	WG954807
p-Isopropyltoluene	ND		0.00100	1	02/22/2017 20:38	WG954807
2-Butanone (MEK)	ND		0.0100	1	02/22/2017 20:38	WG954807
Methylene Chloride	ND		0.00500	1	02/22/2017 20:38	WG954807
4-Methyl-2-pentanone (MIBK)	ND		0.0100	1	02/22/2017 20:38	WG954807
Methyl tert-butyl ether	ND		0.00100	1	02/22/2017 20:38	WG954807
Naphthalene	ND		0.00500	1	02/22/2017 20:38	WG954807
n-Propylbenzene	ND		0.00100	1	02/22/2017 20:38	WG954807
Styrene	ND		0.00100	1	02/22/2017 20:38	WG954807
1,1,1,2-Tetrachloroethane	ND		0.00100	1	02/22/2017 20:38	WG954807
1,1,2,2-Tetrachloroethane	ND		0.00100	1	02/22/2017 20:38	WG954807
1,1,2-Trichlorotrifluoroethane	ND		0.00100	1	02/22/2017 20:38	WG954807
Tetrachloroethene	ND		0.00100	1	02/22/2017 20:38	WG954807
Toluene	ND		0.00100	1	02/22/2017 20:38	WG954807
1,2,3-Trichlorobenzene	ND		0.00100	1	02/22/2017 20:38	WG954807

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

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
1,2,4-Trichlorobenzene	ND		0.00100	1	02/22/2017 20:38	WG954807
1,1,1-Trichloroethane	ND		0.00100	1	02/22/2017 20:38	WG954807
1,1,2-Trichloroethane	ND		0.00100	1	02/22/2017 20:38	WG954807
Trichloroethene	ND		0.00100	1	02/22/2017 20:38	WG954807
Trichlorofluoromethane	ND		0.00500	1	02/22/2017 20:38	WG954807
1,2,3-Trichloropropane	ND		0.00250	1	02/22/2017 20:38	WG954807
1,2,4-Trimethylbenzene	ND		0.00100	1	02/22/2017 20:38	WG954807
1,2,3-Trimethylbenzene	ND		0.00100	1	02/22/2017 20:38	WG954807
1,3,5-Trimethylbenzene	ND		0.00100	1	02/22/2017 20:38	WG954807
Vinyl chloride	ND		0.00100	1	02/22/2017 20:38	WG954807
Xylenes, Total	ND		0.00300	1	02/22/2017 20:38	WG954807
(S) Toluene-d8	*99.1*		*80.0-120*		*02/22/2017 20:38*	WG954807
(S) Dibromofluoromethane	*104*		*76.0-123*		*02/22/2017 20:38*	WG954807
(S) 4-Bromofluorobenzene	*101*		*80.0-120*		*02/22/2017 20:38*	WG954807

QUALITY CONTROL SUMMARY

Method Blank (MB)

(MB) R3198191-1 02/21/17 09:58

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury	U		0.000049	0.000200

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

(LCS) R3198191-2 02/21/17 10:00 • (LCSD) R3198191-3 02/21/17 10:02

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Mercury	0.00300	0.00272	0.00291	91	97	80-120			7	20

L891135-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L891135-03 02/21/17 10:09 • (MS) R3198191-4 02/21/17 10:11 • (MSD) R3198191-5 02/21/17 10:14

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	0.00300	U	0.00270	0.00280	90	93	1	75-125			4	20

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Method Blank (MB)

(MB) R3198267-1 02/21/17 11:08

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Mercury,Dissolved	U		0.000049	0.000200

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

(LCS) R3198267-6 02/21/17 14:39 • (LCSD) R3198267-3 02/21/17 11:13

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Mercury,Dissolved	0.00300	0.00335	0.00289	112	96	80-120			15	20

L891184-09 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L891184-09 02/21/17 11:15 • (MS) R3198267-4 02/21/17 11:17 • (MSD) R3198267-5 02/21/17 11:19

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury,Dissolved	0.00300	U	0.00309	0.00306	103	102	1	75-125			1	20

Method Blank (MB)

(MB) R3198492-7 02/22/17 12:31

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Arsenic,Dissolved	U		0.0065	0.0100
Barium,Dissolved	U		0.0017	0.00500
Cadmium,Dissolved	U		0.0007	0.00200
Chromium,Dissolved	U		0.0014	0.0100
Lead,Dissolved	U		0.0019	0.00500
Selenium,Dissolved	U		0.0074	0.0100
Silver,Dissolved	U		0.0028	0.00500

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

(LCS) R3198492-2 02/22/17 09:16 • (LCSD) R3198492-3 02/22/17 09:19

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Arsenic,Dissolved	1.00	0.980	0.965	98	97	80-120			1	20
Barium,Dissolved	1.00	1.00	0.988	100	99	80-120			1	20
Cadmium,Dissolved	1.00	0.977	0.964	98	96	80-120			1	20
Chromium,Dissolved	1.00	0.974	0.966	97	97	80-120			1	20
Lead,Dissolved	1.00	0.981	0.967	98	97	80-120			1	20
Selenium,Dissolved	1.00	0.985	0.969	98	97	80-120			2	20
Silver,Dissolved	0.200	0.174	0.173	87	87	80-120			1	20

L890674-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L890674-03 02/22/17 09:22 • (MS) R3198492-5 02/22/17 09:27 • (MSD) R3198492-6 02/22/17 09:29

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Arsenic,Dissolved	1.00	ND	0.998	1.01	100	101	1	75-125			1	20
Barium,Dissolved	1.00	0.0444	1.03	1.04	98	100	1	75-125			1	20
Cadmium,Dissolved	1.00	ND	0.980	0.994	98	99	1	75-125			1	20
Chromium,Dissolved	1.00	ND	0.965	0.981	97	98	1	75-125			2	20
Lead,Dissolved	1.00	ND	0.987	1.01	98	100	1	75-125			2	20
Selenium,Dissolved	1.00	ND	0.995	1.01	100	101	1	75-125			1	20
Silver,Dissolved	0.200	ND	0.176	0.179	88	90	1	75-125			2	20

Method Blank (MB)

(MB) R3199047-1 02/24/17 03:19

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Arsenic	U		0.0065	0.0100
Barium	U		0.0017	0.00500
Cadmium	U		0.0007	0.00200
Chromium	U		0.0014	0.0100
Lead	U		0.0019	0.00500
Selenium	U		0.0074	0.0100
Silver	U		0.0028	0.00500

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

(LCS) R3199047-2 02/24/17 03:22 • (LCSD) R3199047-3 02/24/17 03:24

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Arsenic	1.00	1.01	1.01	101	101	80-120			0	20
Barium	1.00	1.03	1.03	103	103	80-120			0	20
Cadmium	1.00	1.00	1.00	100	100	80-120			0	20
Chromium	1.00	0.996	0.996	100	100	80-120			0	20
Lead	1.00	1.01	1.02	101	102	80-120			0	20
Selenium	1.00	1.01	1.02	101	102	80-120			0	20
Silver	0.200	0.181	0.182	90	91	80-120			1	20

L891172-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L891172-03 02/24/17 03:27 • (MS) R3199047-5 02/24/17 03:32 • (MSD) R3199047-6 02/24/17 03:35

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Arsenic	1.00	U	1.03	1.05	103	105	1	75-125			1	20
Barium	1.00	0.0192	1.06	1.07	104	105	1	75-125			1	20
Cadmium	1.00	U	1.02	1.03	102	103	1	75-125			2	20
Chromium	1.00	U	1.01	1.02	101	102	1	75-125			1	20
Lead	1.00	U	1.03	1.04	103	104	1	75-125			1	20
Selenium	1.00	U	1.03	1.05	103	105	1	75-125			2	20
Silver	0.200	U	0.182	0.185	91	93	1	75-125			2	20

Method Blank (MB)

(MB) R3199311-2 02/23/17 23:03

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Gasoline Range Organics-NWTPH	U		0.0316	0.100
(S) a,a,a-Trifluorotoluene(FID)	*101*			*77.0-122*

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

(LCS) R3199311-1 02/23/17 22:18 • (LCSD) R3199311-3 02/23/17 23:47

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Gasoline Range Organics-NWTPH	5.50	6.40	6.23	116	113	72.0-134			2.70	20
(S) a,a,a-Trifluorotoluene(FID)				*103*	*102*	*77.0-122*				

L891116-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L891116-01 02/24/17 01:57 • (MS) R3199311-4 02/24/17 00:51 • (MSD) R3199311-5 02/24/17 01:13

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Gasoline Range Organics-NWTPH	5.50	0.841	3.32	3.40	45.0	46.6	1	23.0-159			2.48	20
(S) a,a,a-Trifluorotoluene(FID)					*100*	*101*		*77.0-122*				

Method Blank (MB)

(MB) R3198716-3 02/22/17 18:45

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Acetone	U		0.0100	0.0500
Acrolein	U		0.00887	0.0500
Acrylonitrile	U		0.00187	0.0100
Benzene	U		0.000331	0.00100
Bromobenzene	U		0.000352	0.00100
Bromodichloromethane	U		0.000380	0.00100
Bromoform	U		0.000469	0.00100
Bromomethane	U		0.000866	0.00500
n-Butylbenzene	U		0.000361	0.00100
sec-Butylbenzene	U		0.000365	0.00100
tert-Butylbenzene	U		0.000399	0.00100
Carbon tetrachloride	U		0.000379	0.00100
Chlorobenzene	U		0.000348	0.00100
Chlorodibromomethane	U		0.000327	0.00100
Chloroethane	U		0.000453	0.00500
2-Chloroethyl vinyl ether	U		0.00301	0.0500
Chloroform	U		0.000324	0.00500
Chloromethane	U		0.000276	0.00250
2-Chlorotoluene	U		0.000375	0.00100
4-Chlorotoluene	U		0.000351	0.00100
1,2-Dibromo-3-Chloropropane	U		0.00133	0.00500
1,2-Dibromoethane	U		0.000381	0.00100
Dibromomethane	U		0.000346	0.00100
1,2-Dichlorobenzene	U		0.000349	0.00100
1,3-Dichlorobenzene	U		0.000220	0.00100
1,4-Dichlorobenzene	U		0.000274	0.00100
Dichlorodifluoromethane	U		0.000551	0.00500
1,1-Dichloroethane	U		0.000259	0.00100
1,2-Dichloroethane	U		0.000361	0.00100
1,1-Dichloroethene	U		0.000398	0.00100
cis-1,2-Dichloroethene	U		0.000260	0.00100
trans-1,2-Dichloroethene	U		0.000396	0.00100
1,2-Dichloropropane	U		0.000306	0.00100
1,1-Dichloropropene	U		0.000352	0.00100
1,3-Dichloropropane	U		0.000366	0.00100
cis-1,3-Dichloropropene	U		0.000418	0.00100
trans-1,3-Dichloropropene	U		0.000419	0.00100
2,2-Dichloropropane	U		0.000321	0.00100
Di-isopropyl ether	U		0.000320	0.00100
Ethylbenzene	U		0.000384	0.00100

Method Blank (MB)

(MB) R3198716-3 02/22/17 18:45

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Hexachloro-1,3-butadiene	U		0.000256	0.00100
Isopropylbenzene	U		0.000326	0.00100
p-Isopropyltoluene	U		0.000350	0.00100
2-Butanone (MEK)	U		0.00393	0.0100
Methylene Chloride	U		0.00100	0.00500
4-Methyl-2-pentanone (MIBK)	U		0.00214	0.0100
Methyl tert-butyl ether	U		0.000367	0.00100
Naphthalene	U		0.00100	0.00500
n-Propylbenzene	U		0.000349	0.00100
Styrene	U		0.000307	0.00100
1,1,1,2-Tetrachloroethane	U		0.000385	0.00100
1,1,2,2-Tetrachloroethane	U		0.000130	0.00100
1,1,2-Trichlorotrifluoroethane	U		0.000303	0.00100
Tetrachloroethene	U		0.000372	0.00100
Toluene	U		0.000412	0.00100
1,2,3-Trichlorobenzene	U		0.000230	0.00100
1,2,4-Trichlorobenzene	U		0.000355	0.00100
1,1,1-Trichloroethane	U		0.000319	0.00100
1,1,2-Trichloroethane	U		0.000383	0.00100
Trichloroethene	U		0.000398	0.00100
Trichlorofluoromethane	U		0.00120	0.00500
1,2,3-Trichloropropane	U		0.000807	0.00250
1,2,4-Trimethylbenzene	U		0.000373	0.00100
1,2,3-Trimethylbenzene	U		0.000321	0.00100
1,3,5-Trimethylbenzene	U		0.000387	0.00100
Vinyl chloride	U		0.000259	0.00100
Xylenes, Total	U		0.00106	0.00300
(S) Toluene-d8	*97.6*			*89.0-112*
(S) Dibromofluoromethane	*105*			*80.0-119*
(S) 4-Bromofluorobenzene	*99.5*			*85.0-114*

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

(LCS) R3198716-1 02/22/17 16:51 • (LCSD) R3198716-2 02/22/17 17:14

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	0.125	0.119	0.120	95.6	95.8	10.0-160			0.210	23
Acrolein	0.125	0.287	0.290	230	232	10.0-160	J4	J4	0.850	20
Acrylonitrile	0.125	0.128	0.131	102	105	60.0-142			2.69	20

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

(LCS) R3198716-1 02/22/17 16:51 • (LCSD) R3198716-2 02/22/17 17:14

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	0.0253	0.0253	101	101	69.0-123			0.340	20
Bromobenzene	0.0250	0.0246	0.0251	98.3	100	79.0-120			2.13	20
Bromodichloromethane	0.0250	0.0243	0.0246	97.2	98.5	76.0-120			1.34	20
Bromoform	0.0250	0.0269	0.0272	107	109	67.0-132			1.27	20
Bromomethane	0.0250	0.0439	0.0401	175	160	18.0-160	J4		9.10	20
n-Butylbenzene	0.0250	0.0255	0.0258	102	103	72.0-126			0.960	20
sec-Butylbenzene	0.0250	0.0249	0.0257	99.5	103	74.0-121			3.08	20
tert-Butylbenzene	0.0250	0.0257	0.0262	103	105	75.0-122			1.93	20
Carbon tetrachloride	0.0250	0.0253	0.0275	101	110	63.0-122			8.35	20
Chlorobenzene	0.0250	0.0268	0.0275	107	110	79.0-121			2.32	20
Chlorodibromomethane	0.0250	0.0274	0.0277	110	111	75.0-125			1.02	20
Chloroethane	0.0250	0.0274	0.0278	110	111	47.0-152			1.40	20
2-Chloroethyl vinyl ether	0.125	0.138	0.141	111	112	10.0-160			1.51	22
Chloroform	0.0250	0.0251	0.0251	101	101	72.0-121			0.0100	20
Chloromethane	0.0250	0.0232	0.0247	92.9	98.8	48.0-139			6.14	20
2-Chlorotoluene	0.0250	0.0256	0.0260	102	104	74.0-122			1.60	20
4-Chlorotoluene	0.0250	0.0260	0.0265	104	106	79.0-120			1.78	20
1,2-Dibromo-3-Chloropropane	0.0250	0.0279	0.0282	112	113	64.0-127			0.840	20
1,2-Dibromoethane	0.0250	0.0273	0.0274	109	110	77.0-123			0.420	20
Dibromomethane	0.0250	0.0260	0.0265	104	106	78.0-120			1.85	20
1,2-Dichlorobenzene	0.0250	0.0271	0.0273	109	109	80.0-120			0.570	20
1,3-Dichlorobenzene	0.0250	0.0261	0.0267	104	107	72.0-123			2.14	20
1,4-Dichlorobenzene	0.0250	0.0258	0.0260	103	104	77.0-120			0.850	20
Dichlorodifluoromethane	0.0250	0.0353	0.0351	141	140	49.0-155			0.740	20
1,1-Dichloroethane	0.0250	0.0255	0.0256	102	102	70.0-126			0.310	20
1,2-Dichloroethane	0.0250	0.0275	0.0275	110	110	67.0-126			0.0400	20
1,1-Dichloroethene	0.0250	0.0262	0.0266	105	107	64.0-129			1.47	20
cis-1,2-Dichloroethene	0.0250	0.0250	0.0253	100	101	73.0-120			1.00	20
trans-1,2-Dichloroethene	0.0250	0.0255	0.0264	102	106	71.0-121			3.60	20
1,2-Dichloropropane	0.0250	0.0249	0.0250	99.7	99.9	75.0-125			0.190	20
1,1-Dichloropropene	0.0250	0.0270	0.0273	108	109	71.0-129			1.09	20
1,3-Dichloropropane	0.0250	0.0269	0.0267	108	107	80.0-121			0.770	20
cis-1,3-Dichloropropene	0.0250	0.0274	0.0275	110	110	79.0-123			0.390	20
trans-1,3-Dichloropropene	0.0250	0.0259	0.0259	103	104	74.0-127			0.170	20
2,2-Dichloropropane	0.0250	0.0252	0.0251	101	100	60.0-125			0.530	20
Di-isopropyl ether	0.0250	0.0239	0.0241	95.6	96.2	59.0-133			0.590	20
Ethylbenzene	0.0250	0.0267	0.0271	107	108	77.0-120			1.57	20
Hexachloro-1,3-butadiene	0.0250	0.0270	0.0272	108	109	64.0-131			1.00	20
Isopropylbenzene	0.0250	0.0261	0.0265	104	106	75.0-120			1.51	20
p-Isopropyltoluene	0.0250	0.0266	0.0272	106	109	74.0-126			2.15	20

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

(LCS) R3198716-1 02/22/17 16:51 • (LCSD) R3198716-2 02/22/17 17:14

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
2-Butanone (MEK)	0.125	0.135	0.137	108	110	37.0-158			1.42	20
Methylene Chloride	0.0250	0.0233	0.0235	93.2	94.1	66.0-121			1.02	20
4-Methyl-2-pentanone (MIBK)	0.125	0.145	0.147	116	118	59.0-143			1.41	20
Methyl tert-butyl ether	0.0250	0.0244	0.0241	97.5	96.5	64.0-123			1.03	20
Naphthalene	0.0250	0.0270	0.0275	108	110	62.0-128			2.06	20
n-Propylbenzene	0.0250	0.0260	0.0267	104	107	79.0-120			2.46	20
Styrene	0.0250	0.0278	0.0281	111	112	78.0-124			0.950	20
1,1,1,2-Tetrachloroethane	0.0250	0.0251	0.0256	101	102	75.0-122			1.87	20
1,1,2,2-Tetrachloroethane	0.0250	0.0243	0.0245	97.3	98.1	71.0-122			0.810	20
1,1,2-Trichlorotrifluoroethane	0.0250	0.0296	0.0305	119	122	61.0-136			2.86	20
Tetrachloroethene	0.0250	0.0267	0.0271	107	109	70.0-127			1.71	20
Toluene	0.0250	0.0250	0.0255	100	102	77.0-120			1.72	20
1,2,3-Trichlorobenzene	0.0250	0.0262	0.0266	105	106	61.0-133			1.70	20
1,2,4-Trichlorobenzene	0.0250	0.0271	0.0271	108	108	69.0-129			0.220	20
1,1,1-Trichloroethane	0.0250	0.0266	0.0267	106	107	68.0-122			0.340	20
1,1,2-Trichloroethane	0.0250	0.0256	0.0258	102	103	78.0-120			0.970	20
Trichloroethene	0.0250	0.0260	0.0268	104	107	78.0-120			3.14	20
Trichlorofluoromethane	0.0250	0.0292	0.0299	117	120	56.0-137			2.24	20
1,2,3-Trichloropropane	0.0250	0.0252	0.0260	101	104	72.0-124			3.00	20
1,2,4-Trimethylbenzene	0.0250	0.0261	0.0267	104	107	75.0-120			2.18	20
1,2,3-Trimethylbenzene	0.0250	0.0256	0.0262	103	105	75.0-120			2.03	20
1,3,5-Trimethylbenzene	0.0250	0.0258	0.0261	103	104	75.0-120			0.990	20
Vinyl chloride	0.0250	0.0284	0.0295	114	118	64.0-133			3.83	20
Xylenes, Total	0.0750	0.0792	0.0803	106	107	77.0-120			1.38	20
(S) Toluene-d8				*101*	*102*	*89.0-112*				
(S) Dibromofluoromethane				*102*	*102*	*80.0-119*				
(S) 4-Bromofluorobenzene				*103*	*102*	*85.0-114*				

Method Blank (MB)

(MB) R3198877-1 02/23/17 12:15

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Diesel Range Organics (DRO)	U		0.0833	0.250
Residual Range Organics (RRO)	U		0.167	0.500
(S) o-Terphenyl	*117*			*52.0-156*

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

(LCS) R3198877-2 02/23/17 12:31 • (LCSD) R3198877-3 02/23/17 12:47

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Diesel Range Organics (DRO)	0.750	0.837	0.817	112	109	50.0-150			2.41	20
Residual Range Organics (RRO)	0.750	0.818	0.820	109	109	50.0-150			0.280	20
(S) o-Terphenyl				*123*	*118*	*52.0-156*				

Method Blank (MB)

(MB) R3199144-2 02/23/17 14:17

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Anthracene	U		0.0000140	0.0000500
Acenaphthene	U		0.0000100	0.0000500
Acenaphthylene	U		0.0000120	0.0000500
Benzo(a)anthracene	0.00000725	J	0.00000410	0.0000500
Benzo(a)pyrene	U		0.0000116	0.0000500
Benzo(b)fluoranthene	0.00000376	J	0.00000212	0.0000500
Benzo(g,h,i)perylene	0.00000410	J	0.00000227	0.0000500
Benzo(k)fluoranthene	U		0.0000136	0.0000500
Chrysene	U		0.0000108	0.0000500
Dibenz(a,h)anthracene	U		0.00000396	0.0000500
Fluoranthene	U		0.0000157	0.0000500
Fluorene	U		0.00000850	0.0000500
Indeno(1,2,3-cd)pyrene	U		0.0000148	0.0000500
Naphthalene	0.0000341	J	0.0000198	0.000250
Phenanthrene	U		0.00000820	0.0000500
Pyrene	U		0.0000117	0.0000500
1-Methylnaphthalene	U		0.00000821	0.000250
2-Methylnaphthalene	U		0.00000902	0.000250
2-Chloronaphthalene	U		0.00000647	0.000250
(S) Nitrobenzene-d5	*113*			*31.0-160*
(S) 2-Fluorobiphenyl	*116*			*48.0-148*
(S) p-Terphenyl-d14	*125*			*37.0-146*

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

(LCS) R3199144-3 02/23/17 14:40 • (LCSD) R3199144-1 02/23/17 13:54

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Anthracene	0.00200	0.00255	0.00232	128	116	64.0-142			9.59	20
Acenaphthene	0.00200	0.00254	0.00217	127	108	66.0-132			15.9	20
Acenaphthylene	0.00200	0.00259	0.00218	129	109	65.0-132			17.3	20
Benzo(a)anthracene	0.00200	0.00264	0.00224	132	112	59.0-134			16.3	20
Benzo(a)pyrene	0.00200	0.00271	0.00225	135	113	61.0-145			18.4	20
Benzo(b)fluoranthene	0.00200	0.00261	0.00222	131	111	57.0-136			16.0	20
Benzo(g,h,i)perylene	0.00200	0.00280	0.00243	140	122	54.0-140			13.9	20
Benzo(k)fluoranthene	0.00200	0.00274	0.00226	137	113	57.0-141			19.3	20
Chrysene	0.00200	0.00255	0.00218	128	109	63.0-140			15.5	20
Dibenz(a,h)anthracene	0.00200	0.00282	0.00243	141	121	49.0-141			15.0	20
Fluoranthene	0.00200	0.00266	0.00243	133	122	65.0-143			9.01	20

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

(LCS) R3199144-3 02/23/17 14:40 • (LCSD) R3199144-1 02/23/17 13:54

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Fluorene	0.00200	0.00264	0.00219	132	110	64.0-129	J4		18.6	20
Indeno(1,2,3-cd)pyrene	0.00200	0.00280	0.00244	140	122	53.0-141			13.7	20
Naphthalene	0.00200	0.00233	0.00199	117	99.6	68.0-129			15.7	20
Phenanthrene	0.00200	0.00251	0.00232	125	116	62.0-132			7.59	20
Pyrene	0.00200	0.00259	0.00220	130	110	58.0-156			16.4	20
1-Methylnaphthalene	0.00200	0.00257	0.00212	129	106	68.0-137			19.1	20
2-Methylnaphthalene	0.00200	0.00237	0.00197	118	98.5	68.0-134			18.3	20
2-Chloronaphthalene	0.00200	0.00246	0.00205	123	103	65.0-129			18.0	20
(S) Nitrobenzene-d5				*126*	*115*	*31.0-160*				
(S) 2-Fluorobiphenyl				*131*	*111*	*48.0-148*				
(S) p-Terphenyl-d14				*129*	*114*	*37.0-146*				

Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.

Qualifier	Description
J	The identification of the analyte is acceptable; the reported value is an estimate.
J4	The associated batch QC was outside the established quality control range for accuracy.

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

State Accreditations

Alabama	40660
Alaska	UST-080
Arizona	AZ0612
Arkansas	88-0469
California	01157CA
Colorado	TN00003
Conneticut	PH-0197
Florida	E87487
Georgia	NELAP
Georgia [1]	923
Idaho	TN00003
Illinois	200008
Indiana	C-TN-01
Iowa	364
Kansas	E-10277
Kentucky [1]	90010
Kentucky [2]	16
Louisiana	AI30792
Maine	TN0002
Maryland	324
Massachusetts	M-TN003
Michigan	9958
Minnesota	047-999-395
Mississippi	TN00003
Missouri	340
Montana	CERT0086
Nebraska	NE-OS-15-05
Nevada	TN-03-2002-34
New Hampshire	2975
New Jersey–NELAP	TN002
New Mexico	TN00003
New York	11742
North Carolina	Env375
North Carolina [1]	DW21704
North Carolina [2]	41
North Dakota	R-140
Ohio–VAP	CL0069
Oklahoma	9915
Oregon	TN200002
Pennsylvania	68-02979
Rhode Island	221
South Carolina	84004
South Dakota	n/a
Tennessee [1,4]	2006
Texas	T 104704245-07-TX
Texas [5]	LAB0152
Utah	6157585858
Vermont	VT2006
Virginia	109
Washington	C1915
West Virginia	233
Wisconsin	9980939910
Wyoming	A2LA

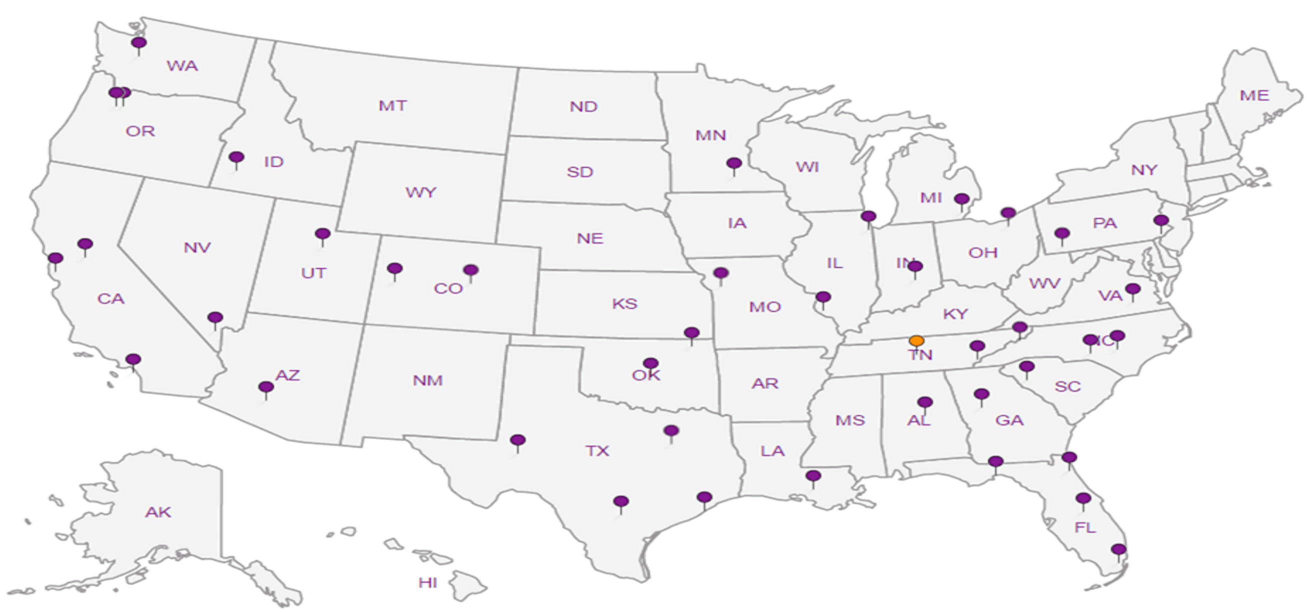
Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01
A2LA – ISO 17025 [5]	1461.02
Canada	1461.01
EPA–Crypto	TN00003
AIHA	100789
DOD	1461.01
USDA	S-67674

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

Our Locations

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



Chain of Custody Page 2 of 2

ESC LAB SCIENCES

YOUR LAB OF CHOICE

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

L# 891174

D212

Acctnum: KENJENWMT
Template: T120216
Prelogin: P587713
TSR: 134 - Mark W. Beasley
PB: 2-8-17
Shipped Via: FedEX Ground

Kennedy/Jenks Consultants

32001 32nd Ave. S., Ste. 100
Federal Way, WA 98001

Billing Information:
Accounts Payable
32001 32nd Ave. S., Ste. 100
Federal Way, WA 98001

Pres Chk

Email To: juliaschwarz@kennedyjenks.com

Report to: Julia Schwarz

Project Description: WA DOT Signals Maintenance

City/State Collected: Seattle, WA

Phone: 253-835-6400
Fax:

Client Project # 1696059-00/task06/04

Lab Project # KENJENWMT-WADOTSIGNA

Collected by (print): Alexander Lesher

Site/Facility ID # Signals

P.O. #

Collected by (signature):

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Quote #

Date Results Needed

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	Dissolved MDRCRA8 250mlHDPE-NoPres	NWTPHDXLVI- No SGT 40mlAmb-HCl-BT	NWTPHGX 40mlAmb HCl	PAHSIMLVI (Naph) 40mlAmb-NoPres-WT	Total MRCRA8 250mlHDPE-HNO3	V8260C 40mlAmb-HCl				Rem./Contaminant	Sample # (lab only)
B-3	G	GW		2-17-17	1040	16	X	X	X	X	X	X					01
TB-1		GW				1											02
		GW															
		GW															
		GW															
		GW															
		GW															
		GW															
		GW															
		GW															

* Matrix:
SS - Soil AIR - Air
GW - Groundwater
WW - WasteWater
DW - Drinking Water
OT - Other ______

Remarks:

pH ______ Temp ______
Flow ______ Other ______

FedEx

Samples returned via: __ UPS __ FedEx __ Courier ______

Tracking #

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

Relinquished by: (Signature)	Date: 2-17-17	Time: 1300	Received by: (Signature)	Trip Blank Received: Yes / No; HCL / MeoH; TBR	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Temp: 2.9 MWA; Bottles Received: 10	If preservation required by Login: Date/Time
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: 2/18/17; Time: 8:00	Hold: ; Condition: NCF / OK

Matt Shacklock

ESC Lab Sciences
Non-Conformance Form

Login #791174	Client: KENJENWMT	Date:2/18	Evaluated by:Matt S

Non-Conformance (check applicable items)

	Sample Integrity		Chain of Custody Clarification		
	Parameter(s) past holding time	x	Login Clarification Needed		**If Broken Container:**
	Improper temperature		Chain of custody is incomplete		Insufficient packing material around contai
	Improper container type		Please specify Metals requested.		Insufficient packing material inside cooler
	Improper preservation		Please specify TCLP requested.		Improper handling by carrier (FedEx / UPS
	Insufficient sample volume.		Received additional samples not listed on coc.		Sample was frozen
	Sample is biphasic.		Sample ids on containers do not match ids on coc		Container lid not intact
	Vials received with headspace.		Trip Blank not received.		**If no Chain of Custody:**
	Broken container		Client did not "X" analysis.		Received by:
	Broken container:		Chain of Custody is missing		Date/Time:
	Sufficient sample remains				Temp./Cont. Rec./pH:
					Carrier:
					Tracking#

Login Comments: TB not marked

Client informed by:		Call		Email		Voice Mail		Date: 2/18/17	Time: 1730
TSR Initials: JCR	Client Contact:								

Login Instructions:

Analyze Trip Blank

<L891174 KENJENWMT NCF MS.pdf>

ESC LAB SCIENCES
YOUR LAB OF CHOICE

ANALYTICAL REPORT

February 28, 2017

myESC
REAL TIME DATA ACCESS

Kennedy/Jenks Consultants

Sample Delivery Group:	L891176
Samples Received:	02/18/2017
Project Number:	1696059-00/task06/04
Description:	WA DOT Signals Maintenance
Site:	SIGNALS
Report To:	Julia Schwarz 32001 32nd Ave. S.,Ste. 100 Federal Way, WA 98001

Entire Report Reviewed By:

Mark W. Beasley
Technical Service Representative

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

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B-1 5-6 L891176-01 Solid

Collected by	Collected date/time	Received date/time
Alexander Lesher	02/17/17 11:50	02/18/17 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG954497	1	02/24/17 23:54	02/27/17 16:36	ACM
Total Solids by Method 2540 G-2011	WG954384	1	02/22/17 09:28	02/22/17 09:37	MEL
Volatile Organic Compounds (GC) by Method NWTPHGX	WG954851	1	02/17/17 11:50	02/23/17 02:32	DWR
Volatile Organic Compounds (GC/MS) by Method 8260C	WG954982	1	02/17/17 11:50	02/24/17 06:33	JHH

B-2 5-6 L891176-02 Solid

Collected by	Collected date/time	Received date/time
Alexander Lesher	02/17/17 11:50	02/18/17 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG954497	1	02/24/17 23:54	02/27/17 16:49	ACM
Total Solids by Method 2540 G-2011	WG954384	1	02/22/17 09:28	02/22/17 09:37	MEL
Volatile Organic Compounds (GC) by Method NWTPHGX	WG954851	1	02/17/17 11:50	02/23/17 02:53	DWR
Volatile Organic Compounds (GC/MS) by Method 8260C	WG954982	1	02/17/17 11:50	02/24/17 06:53	JHH

B-8 5-7 L891176-03 Solid

Collected by	Collected date/time	Received date/time
Alexander Lesher	02/17/17 11:50	02/18/17 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7471A	WG954191	1	02/21/17 12:32	02/22/17 09:20	NJB
Metals (ICP) by Method 6010C	WG954552	1	02/22/17 09:21	02/22/17 15:41	ST
Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM	WG954473	1	02/22/17 03:18	02/22/17 19:25	CLG
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG954497	1	02/24/17 23:54	02/27/17 17:02	ACM
Total Solids by Method 2540 G-2011	WG954384	1	02/22/17 09:28	02/22/17 09:37	MEL
Volatile Organic Compounds (GC) by Method NWTPHGX	WG954851	1.03	02/17/17 11:50	02/23/17 03:14	DWR
Volatile Organic Compounds (GC/MS) by Method 8260C	WG954985	1	02/17/17 11:50	02/25/17 18:54	BMB

DUP-1 L891176-04 Solid

Collected by	Collected date/time	Received date/time
Alexander Lesher	02/17/17 11:50	02/18/17 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Mercury by Method 7471A	WG954191	1	02/21/17 12:32	02/22/17 09:23	NJB
Metals (ICP) by Method 6010C	WG954552	1	02/22/17 09:21	02/22/17 15:44	ST
Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM	WG954473	1	02/22/17 03:18	02/22/17 19:47	CLG
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG954497	1	02/24/17 23:54	02/27/17 17:16	ACM
Total Solids by Method 2540 G-2011	WG954387	1	02/21/17 15:43	02/21/17 16:02	KDW
Volatile Organic Compounds (GC) by Method NWTPHGX	WG954851	1	02/17/17 11:50	02/23/17 03:35	DWR
Volatile Organic Compounds (GC/MS) by Method 8260C	WG954985	1	02/17/17 11:50	02/25/17 19:11	BMB

B-3 5-6 L891176-05 Solid

Collected by	Collected date/time	Received date/time
Alexander Lesher	02/17/17 11:50	02/18/17 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG954497	1	02/24/17 23:54	02/27/17 17:29	ACM
Total Solids by Method 2540 G-2011	WG954387	1	02/21/17 15:43	02/21/17 16:02	KDW
Volatile Organic Compounds (GC) by Method NWTPHGX	WG954851	1	02/17/17 11:50	02/23/17 03:56	DWR
Volatile Organic Compounds (GC/MS) by Method 8260C	WG954982	1	02/17/17 11:50	02/24/17 07:23	JHH

B-3 6-7 L891176-06 Solid

Collected by	Collected date/time	Received date/time
Alexander Lesher	02/17/17 11:50	02/18/17 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst
Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT	WG954497	1	02/24/17 23:54	02/27/17 17:42	ACM
Total Solids by Method 2540 G-2011	WG954387	1	02/21/17 15:43	02/21/17 16:02	KDW
Volatile Organic Compounds (GC) by Method NWTPHGX	WG954851	1	02/17/17 11:50	02/23/17 04:17	DWR
Volatile Organic Compounds (GC/MS) by Method 8260C	WG954982	1	02/17/17 11:50	02/24/17 07:43	JHH

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

Mark W. Beasley
Technical Service Representative

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	84.6		1	02/22/2017 09:37	WG954384

Volatile Organic Compounds (GC) by Method NWTPHGX

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Gasoline Range Organics-NWTPH	ND		0.118	1	02/23/2017 02:32	WG954851
(S) a,a,a-Trifluorotoluene(FID)	*98.1*		*77.0-120*		*02/23/2017 02:32*	WG954851

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

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Benzene	ND		0.00118	1	02/24/2017 06:33	WG954982
Toluene	ND		0.00591	1	02/24/2017 06:33	WG954982
Ethylbenzene	ND		0.00118	1	02/24/2017 06:33	WG954982
Total Xylenes	ND		0.00355	1	02/24/2017 06:33	WG954982
(S) Toluene-d8	*113*		*80.0-120*		*02/24/2017 06:33*	WG954982
(S) Dibromofluoromethane	*108*		*74.0-131*		*02/24/2017 06:33*	WG954982
(S) a,a,a-Trifluorotoluene	*98.5*		*80.0-120*		*02/24/2017 06:33*	WG954982
(S) 4-Bromofluorobenzene	*81.1*		*64.0-132*		*02/24/2017 06:33*	WG954982

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	ND		4.73	1	02/27/2017 16:36	WG954497
Residual Range Organics (RRO)	ND		11.8	1	02/27/2017 16:36	WG954497
(S) o-Terphenyl	*110*		*18.0-148*		*02/27/2017 16:36*	WG954497

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	86.6		1	02/22/2017 09:37	WG954384

Volatile Organic Compounds (GC) by Method NWTPHGX

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Gasoline Range Organics-NWTPH	ND		0.115	1	02/23/2017 02:53	WG954851
(S) a,a,a-Trifluorotoluene(FID)	*98.3*		*77.0-120*		*02/23/2017 02:53*	WG954851

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

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Benzene	ND		0.00115	1	02/24/2017 06:53	WG954982
Toluene	ND		0.00577	1	02/24/2017 06:53	WG954982
Ethylbenzene	ND		0.00115	1	02/24/2017 06:53	WG954982
Total Xylenes	ND		0.00346	1	02/24/2017 06:53	WG954982
(S) Toluene-d8	*112*		*80.0-120*		*02/24/2017 06:53*	WG954982
(S) Dibromofluoromethane	*109*		*74.0-131*		*02/24/2017 06:53*	WG954982
(S) a,a,a-Trifluorotoluene	*98.6*		*80.0-120*		*02/24/2017 06:53*	WG954982
(S) 4-Bromofluorobenzene	*82.7*		*64.0-132*		*02/24/2017 06:53*	WG954982

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	ND		4.62	1	02/27/2017 16:49	WG954497
Residual Range Organics (RRO)	ND		11.5	1	02/27/2017 16:49	WG954497
(S) o-Terphenyl	*115*		*18.0-148*		*02/27/2017 16:49*	WG954497

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	93.8		1	02/22/2017 09:37	WG954384

Mercury by Method 7471A

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Mercury	0.0228		0.0213	1	02/22/2017 09:20	WG954191

Metals (ICP) by Method 6010C

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Arsenic	2.19		2.13	1	02/22/2017 15:41	WG954552
Barium	71.1		0.533	1	02/22/2017 15:41	WG954552
Cadmium	ND		0.533	1	02/22/2017 15:41	WG954552
Chromium	35.7		1.07	1	02/22/2017 15:41	WG954552
Lead	5.48		0.533	1	02/22/2017 15:41	WG954552
Selenium	ND		2.13	1	02/22/2017 15:41	WG954552
Silver	ND		1.07	1	02/22/2017 15:41	WG954552

Volatile Organic Compounds (GC) by Method NWTPHGX

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Gasoline Range Organics-NWTPH	ND		0.110	1.03	02/23/2017 03:14	WG954851
(S) a,a,a-Trifluorotoluene(FID)	*99.0*		*77.0-120*		*02/23/2017 03:14*	WG954851

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

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Acetone	ND		0.0533	1	02/25/2017 18:54	WG954985
Acrylonitrile	ND		0.0107	1	02/25/2017 18:54	WG954985
Benzene	ND		0.00107	1	02/25/2017 18:54	WG954985
Bromobenzene	ND		0.00107	1	02/25/2017 18:54	WG954985
Bromodichloromethane	ND		0.00107	1	02/25/2017 18:54	WG954985
Bromoform	ND		0.00107	1	02/25/2017 18:54	WG954985
Bromomethane	ND		0.00533	1	02/25/2017 18:54	WG954985
n-Butylbenzene	ND		0.00107	1	02/25/2017 18:54	WG954985
sec-Butylbenzene	ND		0.00107	1	02/25/2017 18:54	WG954985
tert-Butylbenzene	ND	J4	0.00107	1	02/25/2017 18:54	WG954985
Carbon tetrachloride	ND		0.00107	1	02/25/2017 18:54	WG954985
Chlorobenzene	ND	J4	0.00107	1	02/25/2017 18:54	WG954985
Chlorodibromomethane	ND		0.00107	1	02/25/2017 18:54	WG954985
Chloroethane	ND		0.00533	1	02/25/2017 18:54	WG954985
2-Chloroethyl vinyl ether	ND		0.0533	1	02/25/2017 18:54	WG954985
Chloroform	ND		0.00533	1	02/25/2017 18:54	WG954985
Chloromethane	ND		0.00267	1	02/25/2017 18:54	WG954985
2-Chlorotoluene	ND		0.00107	1	02/25/2017 18:54	WG954985
4-Chlorotoluene	ND		0.00107	1	02/25/2017 18:54	WG954985
1,2-Dibromo-3-Chloropropane	ND		0.00533	1	02/25/2017 18:54	WG954985
1,2-Dibromoethane	ND		0.00107	1	02/25/2017 18:54	WG954985
Dibromomethane	ND		0.00107	1	02/25/2017 18:54	WG954985
1,2-Dichlorobenzene	ND		0.00107	1	02/25/2017 18:54	WG954985
1,3-Dichlorobenzene	ND		0.00107	1	02/25/2017 18:54	WG954985
1,4-Dichlorobenzene	ND		0.00107	1	02/25/2017 18:54	WG954985
Dichlorodifluoromethane	ND		0.00533	1	02/25/2017 18:54	WG954985
1,1-Dichloroethane	ND		0.00107	1	02/25/2017 18:54	WG954985

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

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
1,2-Dichloroethane	ND		0.00107	1	02/25/2017 18:54	WG954985
1,1-Dichloroethene	ND		0.00107	1	02/25/2017 18:54	WG954985
cis-1,2-Dichloroethene	ND		0.00107	1	02/25/2017 18:54	WG954985
trans-1,2-Dichloroethene	ND		0.00107	1	02/25/2017 18:54	WG954985
1,2-Dichloropropane	ND		0.00107	1	02/25/2017 18:54	WG954985
1,1-Dichloropropene	ND		0.00107	1	02/25/2017 18:54	WG954985
1,3-Dichloropropane	ND		0.00107	1	02/25/2017 18:54	WG954985
cis-1,3-Dichloropropene	ND		0.00107	1	02/25/2017 18:54	WG954985
trans-1,3-Dichloropropene	ND		0.00107	1	02/25/2017 18:54	WG954985
2,2-Dichloropropane	ND		0.00107	1	02/25/2017 18:54	WG954985
Di-isopropyl ether	ND		0.00107	1	02/25/2017 18:54	WG954985
Ethylbenzene	ND		0.00107	1	02/25/2017 18:54	WG954985
Hexachloro-1,3-butadiene	ND		0.00107	1	02/25/2017 18:54	WG954985
Isopropylbenzene	ND		0.00107	1	02/25/2017 18:54	WG954985
p-Isopropyltoluene	ND	J4	0.00107	1	02/25/2017 18:54	WG954985
2-Butanone (MEK)	ND		0.0107	1	02/25/2017 18:54	WG954985
Methylene Chloride	ND		0.00533	1	02/25/2017 18:54	WG954985
4-Methyl-2-pentanone (MIBK)	ND		0.0107	1	02/25/2017 18:54	WG954985
Methyl tert-butyl ether	ND		0.00107	1	02/25/2017 18:54	WG954985
Naphthalene	ND		0.00533	1	02/25/2017 18:54	WG954985
n-Propylbenzene	ND		0.00107	1	02/25/2017 18:54	WG954985
Styrene	ND	J4	0.00107	1	02/25/2017 18:54	WG954985
1,1,1,2-Tetrachloroethane	ND		0.00107	1	02/25/2017 18:54	WG954985
1,1,2,2-Tetrachloroethane	ND		0.00107	1	02/25/2017 18:54	WG954985
1,1,2-Trichlorotrifluoroethane	ND		0.00107	1	02/25/2017 18:54	WG954985
Tetrachloroethene	ND		0.00107	1	02/25/2017 18:54	WG954985
Toluene	ND		0.00533	1	02/25/2017 18:54	WG954985
1,2,3-Trichlorobenzene	ND		0.00107	1	02/25/2017 18:54	WG954985
1,2,4-Trichlorobenzene	ND		0.00107	1	02/25/2017 18:54	WG954985
1,1,1-Trichloroethane	ND		0.00107	1	02/25/2017 18:54	WG954985
1,1,2-Trichloroethane	ND		0.00107	1	02/25/2017 18:54	WG954985
Trichloroethene	ND		0.00107	1	02/25/2017 18:54	WG954985
Trichlorofluoromethane	ND		0.00533	1	02/25/2017 18:54	WG954985
1,2,3-Trichloropropane	ND		0.00267	1	02/25/2017 18:54	WG954985
1,2,4-Trimethylbenzene	ND		0.00107	1	02/25/2017 18:54	WG954985
1,2,3-Trimethylbenzene	ND		0.00107	1	02/25/2017 18:54	WG954985
Vinyl chloride	ND		0.00107	1	02/25/2017 18:54	WG954985
1,3,5-Trimethylbenzene	ND		0.00107	1	02/25/2017 18:54	WG954985
Xylenes, Total	ND		0.00320	1	02/25/2017 18:54	WG954985
(S) Toluene-d8	*97.6*		*80.0-120*		*02/25/2017 18:54*	WG954985
(S) Dibromofluoromethane	*100*		*74.0-131*		*02/25/2017 18:54*	WG954985
(S) 4-Bromofluorobenzene	*106*		*64.0-132*		*02/25/2017 18:54*	WG954985

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	ND		4.27	1	02/27/2017 17:02	WG954497
Residual Range Organics (RRO)	ND		10.7	1	02/27/2017 17:02	WG954497
(S) o-Terphenyl	*112*		*18.0-148*		*02/27/2017 17:02*	WG954497

Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Anthracene	ND		0.00640	1	02/22/2017 19:25	WG954473
Acenaphthene	ND		0.00640	1	02/22/2017 19:25	WG954473
Acenaphthylene	ND		0.00640	1	02/22/2017 19:25	WG954473
Benzo(a)anthracene	ND		0.00640	1	02/22/2017 19:25	WG954473
Benzo(a)pyrene	ND		0.00640	1	02/22/2017 19:25	WG954473
Benzo(b)fluoranthene	ND		0.00640	1	02/22/2017 19:25	WG954473
Benzo(g,h,i)perylene	ND		0.00640	1	02/22/2017 19:25	WG954473
Benzo(k)fluoranthene	ND		0.00640	1	02/22/2017 19:25	WG954473
Chrysene	ND		0.00640	1	02/22/2017 19:25	WG954473
Dibenz(a,h)anthracene	ND		0.00640	1	02/22/2017 19:25	WG954473
Fluoranthene	ND		0.00640	1	02/22/2017 19:25	WG954473
Fluorene	ND		0.00640	1	02/22/2017 19:25	WG954473
Indeno(1,2,3-cd)pyrene	ND		0.00640	1	02/22/2017 19:25	WG954473
Naphthalene	ND		0.0213	1	02/22/2017 19:25	WG954473
Phenanthrene	ND		0.00640	1	02/22/2017 19:25	WG954473
Pyrene	ND		0.00640	1	02/22/2017 19:25	WG954473
1-Methylnaphthalene	ND		0.0213	1	02/22/2017 19:25	WG954473
2-Methylnaphthalene	ND		0.0213	1	02/22/2017 19:25	WG954473
2-Chloronaphthalene	ND		0.0213	1	02/22/2017 19:25	WG954473
(S) Nitrobenzene-d5	*76.2*		*14.0-149*		*02/22/2017 19:25*	WG954473
(S) 2-Fluorobiphenyl	*76.2*		*34.0-125*		*02/22/2017 19:25*	WG954473
(S) p-Terphenyl-d14	*74.5*		*23.0-120*		*02/22/2017 19:25*	WG954473

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	93.6		1	02/21/2017 16:02	WG954387

Mercury by Method 7471A

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Mercury	ND		0.0214	1	02/22/2017 09:23	WG954191

Metals (ICP) by Method 6010C

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Arsenic	6.22		2.14	1	02/22/2017 15:44	WG954552
Barium	102		0.534	1	02/22/2017 15:44	WG954552
Cadmium	ND		0.534	1	02/22/2017 15:44	WG954552
Chromium	48.7		1.07	1	02/22/2017 15:44	WG954552
Lead	7.85		0.534	1	02/22/2017 15:44	WG954552
Selenium	ND		2.14	1	02/22/2017 15:44	WG954552
Silver	ND		1.07	1	02/22/2017 15:44	WG954552

Volatile Organic Compounds (GC) by Method NWTPHGX

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Gasoline Range Organics-NWTPH	ND		0.107	1	02/23/2017 03:35	WG954851
(S) a,a,a-Trifluorotoluene(FID)	*98.4*		*77.0-120*		*02/23/2017 03:35*	WG954851

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

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Acetone	ND		0.0534	1	02/25/2017 19:11	WG954985
Acrylonitrile	ND		0.0107	1	02/25/2017 19:11	WG954985
Benzene	ND		0.00107	1	02/25/2017 19:11	WG954985
Bromobenzene	ND		0.00107	1	02/25/2017 19:11	WG954985
Bromodichloromethane	ND		0.00107	1	02/25/2017 19:11	WG954985
Bromoform	ND		0.00107	1	02/25/2017 19:11	WG954985
Bromomethane	ND		0.00534	1	02/25/2017 19:11	WG954985
n-Butylbenzene	ND		0.00107	1	02/25/2017 19:11	WG954985
sec-Butylbenzene	ND		0.00107	1	02/25/2017 19:11	WG954985
tert-Butylbenzene	ND	J4	0.00107	1	02/25/2017 19:11	WG954985
Carbon tetrachloride	ND		0.00107	1	02/25/2017 19:11	WG954985
Chlorobenzene	ND	J4	0.00107	1	02/25/2017 19:11	WG954985
Chlorodibromomethane	ND		0.00107	1	02/25/2017 19:11	WG954985
Chloroethane	ND		0.00534	1	02/25/2017 19:11	WG954985
2-Chloroethyl vinyl ether	ND		0.0534	1	02/25/2017 19:11	WG954985
Chloroform	ND		0.00534	1	02/25/2017 19:11	WG954985
Chloromethane	ND		0.00267	1	02/25/2017 19:11	WG954985
2-Chlorotoluene	ND		0.00107	1	02/25/2017 19:11	WG954985
4-Chlorotoluene	ND		0.00107	1	02/25/2017 19:11	WG954985
1,2-Dibromo-3-Chloropropane	ND		0.00534	1	02/25/2017 19:11	WG954985
1,2-Dibromoethane	ND		0.00107	1	02/25/2017 19:11	WG954985
Dibromomethane	ND		0.00107	1	02/25/2017 19:11	WG954985
1,2-Dichlorobenzene	ND		0.00107	1	02/25/2017 19:11	WG954985
1,3-Dichlorobenzene	ND		0.00107	1	02/25/2017 19:11	WG954985
1,4-Dichlorobenzene	ND		0.00107	1	02/25/2017 19:11	WG954985
Dichlorodifluoromethane	ND		0.00534	1	02/25/2017 19:11	WG954985
1,1-Dichloroethane	ND		0.00107	1	02/25/2017 19:11	WG954985

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

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
1,2-Dichloroethane	ND		0.00107	1	02/25/2017 19:11	WG954985
1,1-Dichloroethene	ND		0.00107	1	02/25/2017 19:11	WG954985
cis-1,2-Dichloroethene	ND		0.00107	1	02/25/2017 19:11	WG954985
trans-1,2-Dichloroethene	ND		0.00107	1	02/25/2017 19:11	WG954985
1,2-Dichloropropane	ND		0.00107	1	02/25/2017 19:11	WG954985
1,1-Dichloropropene	ND		0.00107	1	02/25/2017 19:11	WG954985
1,3-Dichloropropane	ND		0.00107	1	02/25/2017 19:11	WG954985
cis-1,3-Dichloropropene	ND		0.00107	1	02/25/2017 19:11	WG954985
trans-1,3-Dichloropropene	ND		0.00107	1	02/25/2017 19:11	WG954985
2,2-Dichloropropane	ND		0.00107	1	02/25/2017 19:11	WG954985
Di-isopropyl ether	ND		0.00107	1	02/25/2017 19:11	WG954985
Ethylbenzene	ND		0.00107	1	02/25/2017 19:11	WG954985
Hexachloro-1,3-butadiene	ND		0.00107	1	02/25/2017 19:11	WG954985
Isopropylbenzene	ND		0.00107	1	02/25/2017 19:11	WG954985
p-Isopropyltoluene	ND	J4	0.00107	1	02/25/2017 19:11	WG954985
2-Butanone (MEK)	ND		0.0107	1	02/25/2017 19:11	WG954985
Methylene Chloride	ND		0.00534	1	02/25/2017 19:11	WG954985
4-Methyl-2-pentanone (MIBK)	ND		0.0107	1	02/25/2017 19:11	WG954985
Methyl tert-butyl ether	ND		0.00107	1	02/25/2017 19:11	WG954985
Naphthalene	ND		0.00534	1	02/25/2017 19:11	WG954985
n-Propylbenzene	ND		0.00107	1	02/25/2017 19:11	WG954985
Styrene	ND	J4	0.00107	1	02/25/2017 19:11	WG954985
1,1,1,2-Tetrachloroethane	ND		0.00107	1	02/25/2017 19:11	WG954985
1,1,2,2-Tetrachloroethane	ND		0.00107	1	02/25/2017 19:11	WG954985
1,1,2-Trichlorotrifluoroethane	ND		0.00107	1	02/25/2017 19:11	WG954985
Tetrachloroethene	ND		0.00107	1	02/25/2017 19:11	WG954985
Toluene	ND		0.00534	1	02/25/2017 19:11	WG954985
1,2,3-Trichlorobenzene	ND		0.00107	1	02/25/2017 19:11	WG954985
1,2,4-Trichlorobenzene	ND		0.00107	1	02/25/2017 19:11	WG954985
1,1,1-Trichloroethane	ND		0.00107	1	02/25/2017 19:11	WG954985
1,1,2-Trichloroethane	ND		0.00107	1	02/25/2017 19:11	WG954985
Trichloroethene	ND		0.00107	1	02/25/2017 19:11	WG954985
Trichlorofluoromethane	ND		0.00534	1	02/25/2017 19:11	WG954985
1,2,3-Trichloropropane	ND		0.00267	1	02/25/2017 19:11	WG954985
1,2,4-Trimethylbenzene	ND		0.00107	1	02/25/2017 19:11	WG954985
1,2,3-Trimethylbenzene	ND		0.00107	1	02/25/2017 19:11	WG954985
Vinyl chloride	ND		0.00107	1	02/25/2017 19:11	WG954985
1,3,5-Trimethylbenzene	ND		0.00107	1	02/25/2017 19:11	WG954985
Xylenes, Total	ND		0.00321	1	02/25/2017 19:11	WG954985
(S) Toluene-d8	*100*		*80.0-120*		*02/25/2017 19:11*	WG954985
(S) Dibromofluoromethane	*98.7*		*74.0-131*		*02/25/2017 19:11*	WG954985
(S) 4-Bromofluorobenzene	*104*		*64.0-132*		*02/25/2017 19:11*	WG954985

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	ND		4.28	1	02/27/2017 17:16	WG954497
Residual Range Organics (RRO)	ND		10.7	1	02/27/2017 17:16	WG954497
(S) o-Terphenyl	*119*		*18.0-148*		*02/27/2017 17:16*	WG954497

Semi Volatile Organic Compounds (GC/MS) by Method 8270D-SIM

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Anthracene	ND		0.00641	1	02/22/2017 19:47	WG954473
Acenaphthene	ND		0.00641	1	02/22/2017 19:47	WG954473
Acenaphthylene	ND		0.00641	1	02/22/2017 19:47	WG954473
Benzo(a)anthracene	ND		0.00641	1	02/22/2017 19:47	WG954473
Benzo(a)pyrene	ND		0.00641	1	02/22/2017 19:47	WG954473
Benzo(b)fluoranthene	ND		0.00641	1	02/22/2017 19:47	WG954473
Benzo(g,h,i)perylene	ND		0.00641	1	02/22/2017 19:47	WG954473
Benzo(k)fluoranthene	ND		0.00641	1	02/22/2017 19:47	WG954473
Chrysene	ND		0.00641	1	02/22/2017 19:47	WG954473
Dibenz(a,h)anthracene	ND		0.00641	1	02/22/2017 19:47	WG954473
Fluoranthene	ND		0.00641	1	02/22/2017 19:47	WG954473
Fluorene	ND		0.00641	1	02/22/2017 19:47	WG954473
Indeno(1,2,3-cd)pyrene	ND		0.00641	1	02/22/2017 19:47	WG954473
Naphthalene	ND		0.0214	1	02/22/2017 19:47	WG954473
Phenanthrene	ND		0.00641	1	02/22/2017 19:47	WG954473
Pyrene	ND		0.00641	1	02/22/2017 19:47	WG954473
1-Methylnaphthalene	ND		0.0214	1	02/22/2017 19:47	WG954473
2-Methylnaphthalene	ND		0.0214	1	02/22/2017 19:47	WG954473
2-Chloronaphthalene	ND		0.0214	1	02/22/2017 19:47	WG954473
(S) Nitrobenzene-d5	*79.4*		*14.0-149*		*02/22/2017 19:47*	WG954473
(S) 2-Fluorobiphenyl	*85.0*		*34.0-125*		*02/22/2017 19:47*	WG954473
(S) p-Terphenyl-d14	*83.8*		*23.0-120*		*02/22/2017 19:47*	WG954473

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	95.2		1	02/21/2017 16:02	WG954387

Volatile Organic Compounds (GC) by Method NWTPHGX

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Gasoline Range Organics-NWTPH	ND		0.105	1	02/23/2017 03:56	WG954851
(S) a,a,a-Trifluorotoluene(FID)	*98.7*		*77.0-120*		*02/23/2017 03:56*	WG954851

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

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Benzene	ND		0.00105	1	02/24/2017 07:23	WG954982
Toluene	ND		0.00525	1	02/24/2017 07:23	WG954982
Ethylbenzene	ND		0.00105	1	02/24/2017 07:23	WG954982
Total Xylenes	ND		0.00315	1	02/24/2017 07:23	WG954982
(S) Toluene-d8	*113*		*80.0-120*		*02/24/2017 07:23*	WG954982
(S) Dibromofluoromethane	*112*		*74.0-131*		*02/24/2017 07:23*	WG954982
(S) a,a,a-Trifluorotoluene	*93.0*		*80.0-120*		*02/24/2017 07:23*	WG954982
(S) 4-Bromofluorobenzene	*84.2*		*64.0-132*		*02/24/2017 07:23*	WG954982

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	ND		4.20	1	02/27/2017 17:29	WG954497
Residual Range Organics (RRO)	ND		10.5	1	02/27/2017 17:29	WG954497
(S) o-Terphenyl	*106*		*18.0-148*		*02/27/2017 17:29*	WG954497

Total Solids by Method 2540 G-2011

Analyte	Result %	Qualifier	Dilution	Analysis date / time	Batch
Total Solids	82.4		1	02/21/2017 16:02	WG954387

Volatile Organic Compounds (GC) by Method NWTPHGX

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Gasoline Range Organics-NWTPH	ND		0.121	1	02/23/2017 04:17	WG954851
(S) a,a,a-Trifluorotoluene(FID)	*98.5*		*77.0-120*		*02/23/2017 04:17*	WG954851

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

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Benzene	ND		0.00121	1	02/24/2017 07:43	WG954982
Toluene	ND		0.00607	1	02/24/2017 07:43	WG954982
Ethylbenzene	ND		0.00121	1	02/24/2017 07:43	WG954982
Total Xylenes	ND		0.00364	1	02/24/2017 07:43	WG954982
(S) Toluene-d8	*114*		*80.0-120*		*02/24/2017 07:43*	WG954982
(S) Dibromofluoromethane	*107*		*74.0-131*		*02/24/2017 07:43*	WG954982
(S) a,a,a-Trifluorotoluene	*96.7*		*80.0-120*		*02/24/2017 07:43*	WG954982
(S) 4-Bromofluorobenzene	*82.7*		*64.0-132*		*02/24/2017 07:43*	WG954982

Semi-Volatile Organic Compounds (GC) by Method NWTPHDX-NO SGT

Analyte	Result (dry) mg/kg	Qualifier	RDL (dry) mg/kg	Dilution	Analysis date / time	Batch
Diesel Range Organics (DRO)	ND		4.85	1	02/27/2017 17:42	WG954497
Residual Range Organics (RRO)	ND		12.1	1	02/27/2017 17:42	WG954497
(S) o-Terphenyl	*114*		*18.0-148*		*02/27/2017 17:42*	WG954497

Method Blank (MB)

(MB) R3198677-1 02/22/17 09:37

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.00110			

L891156-02 Original Sample (OS) • Duplicate (DUP)

(OS) L891156-02 02/22/17 09:37 • (DUP) R3198677-3 02/22/17 09:37

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	75.3	76.0	1	0.949		5

Laboratory Control Sample (LCS)

(LCS) R3198677-2 02/22/17 09:37

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

Method Blank (MB)

(MB) R3198447-1 02/21/17 16:02

Analyte	MB Result %	MB Qualifier	MB MDL %	MB RDL %
Total Solids	0.00120			

L891102-02 Original Sample (OS) • Duplicate (DUP)

(OS) L891102-02 02/21/17 16:02 • (DUP) R3198447-3 02/21/17 16:02

Analyte	Original Result %	DUP Result %	Dilution	DUP RPD %	DUP Qualifier	DUP RPD Limits %
Total Solids	84.8	84.8	1	0.0342		5

Laboratory Control Sample (LCS)

(LCS) R3198447-2 02/21/17 16:02

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

Method Blank (MB)

(MB) R3198463-1 02/22/17 08:58

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Mercury	U		0.0028	0.0200

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

(LCS) R3198463-2 02/22/17 09:00 • (LCSD) R3198463-3 02/22/17 09:03

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Mercury	0.300	0.276	0.262	92	87	80-120			5	20

L891185-14 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L891185-14 02/22/17 09:05 • (MS) R3198463-4 02/22/17 09:08 • (MSD) R3198463-5 02/22/17 09:18

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Mercury	0.300	ND	0.282	0.255	94	85	1	75-125			10	20

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Method Blank (MB)

(MB) R3198624-1 02/22/17 14:24

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Arsenic	U		0.65	2.00
Barium	0.204	J	0.17	0.500
Cadmium	U		0.07	0.500
Chromium	U		0.14	1.00
Lead	U		0.19	0.500
Selenium	U		0.74	2.00
Silver	U		0.28	1.00

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

(LCS) R3198624-2 02/22/17 14:26 • (LCSD) R3198624-3 02/22/17 14:29

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Arsenic	100	100	101	100	101	80-120			1	20
Barium	100	103	104	103	104	80-120			1	20
Cadmium	100	100	101	100	101	80-120			1	20
Chromium	100	101	102	101	102	80-120			0	20
Lead	100	100	101	100	101	80-120			1	20
Selenium	100	99.8	101	100	101	80-120			1	20
Silver	20.0	17.9	18.1	90	91	80-120			1	20

L890920-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L890920-01 02/22/17 14:32 • (MS) R3198624-6 02/22/17 14:40 • (MSD) R3198624-7 02/22/17 14:43

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Arsenic	1.00	ND	112	91.1	112	91	100	75-125			0	20
Barium	1.00	142	227	233	86	91	100	75-125			2	20
Cadmium	1.00	ND	98.9	97.7	99	98	100	75-125			1	20
Chromium	1.00	ND	106	107	106	107	100	75-125			1	20
Lead	1.00	314	379	396	65	82	100	75-125	J6		4	20
Selenium	1.00	ND	79.4	ND	79	0	100	75-125		J6	0	20
Silver	0.200	ND	ND	ND	0	0	100	75-125	J6	J6	0	20

Method Blank (MB)

(MB) R3198916-3 02/22/17 19:28

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
TPHG C6 - C12	U		0.0339	0.100
(S) a,a,a-Trifluorotoluene(FID)	*100*			*77.0-120*

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

(LCS) R3198916-1 02/22/17 18:25 • (LCSD) R3198916-2 02/22/17 18:46

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPHG C6 - C12	5.50	5.14	5.25	93.4	95.4	70.0-133			2.20	20
(S) a,a,a-Trifluorotoluene(FID)				*101*	*101*	*77.0-120*				

L891145-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L891145-05 02/23/17 00:47 • (MS) R3198916-4 02/23/17 01:08 • (MSD) R3198916-5 02/23/17 01:29

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
TPHG C6 - C12	5.50	ND	0.100	0.188	1.82	3.42	1	10.0-146	J6	J3 J6	61.0	30
(S) a,a,a-Trifluorotoluene(FID)					*98.1*	*97.6*		*77.0-120*				

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

Method Blank (MB)

(MB) R3199095-3 02/23/17 23:52

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Benzene	U		0.000270	0.00100
Ethylbenzene	U		0.000297	0.00100
Toluene	U		0.000434	0.00500
Xylenes, Total	U		0.000698	0.00300
(S) Toluene-d8	*108*			*80.0-120*
(S) Dibromofluoromethane	*100*			*74.0-131*
(S) a,a,a-Trifluorotoluene	*89.1*			*80.0-120*
(S) 4-Bromofluorobenzene	*76.9*			*64.0-132*

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

(LCS) R3199095-1 02/23/17 22:13 • (LCSD) R3199095-2 02/23/17 22:33

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Benzene	0.0250	0.0261	0.0268	104	107	71.0-124			2.67	20
Ethylbenzene	0.0250	0.0219	0.0223	87.7	89.2	77.0-120			1.70	20
Toluene	0.0250	0.0257	0.0262	103	105	77.0-120			2.11	20
Xylenes, Total	0.0750	0.0646	0.0648	86.1	86.4	77.0-120			0.310	20
(S) Toluene-d8				*111*	*111*	*80.0-120*				
(S) Dibromofluoromethane				*95.1*	*95.5*	*74.0-131*				
(S) a,a,a-Trifluorotoluene				*98.6*	*96.9*	*80.0-120*				
(S) 4-Bromofluorobenzene				*87.7*	*86.0*	*64.0-132*				

Method Blank (MB)

(MB) R3199406-3 02/25/17 13:59

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Acetone	U		0.0100	0.0500
Acrylonitrile	U		0.00179	0.0100
Benzene	U		0.000270	0.00100
Bromobenzene	U		0.000284	0.00100
Bromodichloromethane	U		0.000254	0.00100
Bromoform	U		0.000424	0.00100
Bromomethane	U		0.00134	0.00500
n-Butylbenzene	U		0.000258	0.00100
sec-Butylbenzene	U		0.000201	0.00100
tert-Butylbenzene	U		0.000206	0.00100
Carbon tetrachloride	U		0.000328	0.00100
Chlorobenzene	U		0.000212	0.00100
Chlorodibromomethane	U		0.000373	0.00100
Chloroethane	U		0.000946	0.00500
2-Chloroethyl vinyl ether	U		0.00234	0.0500
Chloroform	U		0.000229	0.00500
Chloromethane	U		0.000375	0.00250
2-Chlorotoluene	U		0.000301	0.00100
4-Chlorotoluene	U		0.000240	0.00100
1,2-Dibromo-3-Chloropropane	U		0.00105	0.00500
1,2-Dibromoethane	U		0.000343	0.00100
Dibromomethane	U		0.000382	0.00100
1,2-Dichlorobenzene	U		0.000305	0.00100
1,3-Dichlorobenzene	U		0.000239	0.00100
1,4-Dichlorobenzene	U		0.000226	0.00100
Dichlorodifluoromethane	U		0.000713	0.00500
1,1-Dichloroethane	U		0.000199	0.00100
1,2-Dichloroethane	U		0.000265	0.00100
1,1-Dichloroethene	U		0.000303	0.00100
cis-1,2-Dichloroethene	U		0.000235	0.00100
trans-1,2-Dichloroethene	U		0.000264	0.00100
1,2-Dichloropropane	U		0.000358	0.00100
1,1-Dichloropropene	U		0.000317	0.00100
1,3-Dichloropropane	U		0.000207	0.00100
cis-1,3-Dichloropropene	U		0.000262	0.00100
trans-1,3-Dichloropropene	U		0.000267	0.00100
2,2-Dichloropropane	U		0.000279	0.00100
Di-isopropyl ether	U		0.000248	0.00100
Ethylbenzene	U		0.000297	0.00100
Hexachloro-1,3-butadiene	U		0.000342	0.00100

Method Blank (MB)

(MB) R3199406-3 02/25/17 13:59

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Isopropylbenzene	U		0.000243	0.00100
p-Isopropyltoluene	U		0.000204	0.00100
2-Butanone (MEK)	U		0.00468	0.0100
Methylene Chloride	U		0.00100	0.00500
4-Methyl-2-pentanone (MIBK)	U		0.00188	0.0100
Methyl tert-butyl ether	U		0.000212	0.00100
Naphthalene	U		0.00100	0.00500
n-Propylbenzene	U		0.000206	0.00100
Styrene	U		0.000234	0.00100
1,1,1,2-Tetrachloroethane	U		0.000264	0.00100
1,1,2,2-Tetrachloroethane	U		0.000365	0.00100
Tetrachloroethene	U		0.000276	0.00100
Toluene	U		0.000434	0.00500
1,1,2-Trichlorotrifluoroethane	U		0.000365	0.00100
1,2,3-Trichlorobenzene	U		0.000306	0.00100
1,2,4-Trichlorobenzene	U		0.000388	0.00100
1,1,1-Trichloroethane	U		0.000286	0.00100
1,1,2-Trichloroethane	U		0.000277	0.00100
Trichloroethene	U		0.000279	0.00100
Trichlorofluoromethane	U		0.000382	0.00500
1,2,3-Trichloropropane	U		0.000741	0.00250
1,2,3-Trimethylbenzene	U		0.000287	0.00100
1,2,4-Trimethylbenzene	U		0.000211	0.00100
1,3,5-Trimethylbenzene	U		0.000266	0.00100
Vinyl chloride	U		0.000291	0.00100
Xylenes, Total	U		0.000698	0.00300
(S) Toluene-d8	*98.1*			*80.0-120*
(S) Dibromofluoromethane	*93.7*			*74.0-131*
(S) 4-Bromofluorobenzene	*104*			*64.0-132*

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

(LCS) R3199406-1 02/25/17 13:07 • (LCSD) R3199406-2 02/25/17 13:24

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Acetone	0.125	0.0603	0.0543	48.3	43.4	11.0-160			10.6	23
Acrylonitrile	0.125	0.112	0.106	89.3	84.5	61.0-143			5.51	20
Benzene	0.0250	0.0228	0.0229	91.2	91.5	71.0-124			0.340	20
Bromobenzene	0.0250	0.0255	0.0268	102	107	78.0-120			5.06	20

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

(LCS) R3199406-1 02/25/17 13:07 • (LCSD) R3199406-2 02/25/17 13:24

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Bromodichloromethane	0.0250	0.0235	0.0234	93.9	93.8	75.0-120			0.0600	20
Bromoform	0.0250	0.0275	0.0295	110	118	65.0-133			7.01	20
Bromomethane	0.0250	0.0308	0.0300	123	120	26.0-160			2.62	20
n-Butylbenzene	0.0250	0.0246	0.0225	98.4	90.0	73.0-126			8.92	20
sec-Butylbenzene	0.0250	0.0288	0.0301	115	120	75.0-121			4.48	20
tert-Butylbenzene	0.0250	0.0295	0.0317	118	127	74.0-122		J4	6.93	20
Carbon tetrachloride	0.0250	0.0252	0.0255	101	102	66.0-123			1.13	20
Chlorobenzene	0.0250	0.0291	0.0309	116	124	79.0-121		J4	6.14	20
Chlorodibromomethane	0.0250	0.0284	0.0307	114	123	74.0-128			7.93	20
Chloroethane	0.0250	0.0301	0.0297	121	119	51.0-147			1.49	20
2-Chloroethyl vinyl ether	0.125	0.181	0.185	145	148	10.0-160			1.82	22
Chloroform	0.0250	0.0244	0.0242	97.5	96.8	73.0-123			0.730	20
Chloromethane	0.0250	0.0204	0.0199	81.5	79.6	51.0-138			2.35	20
2-Chlorotoluene	0.0250	0.0285	0.0297	114	119	72.0-124			4.33	20
4-Chlorotoluene	0.0250	0.0276	0.0281	110	112	78.0-120			1.98	20
1,2-Dibromo-3-Chloropropane	0.0250	0.0249	0.0250	99.4	99.8	65.0-126			0.410	20
1,2-Dibromoethane	0.0250	0.0281	0.0297	112	119	78.0-122			5.38	20
Dibromomethane	0.0250	0.0257	0.0268	103	107	79.0-120			4.05	20
1,2-Dichlorobenzene	0.0250	0.0259	0.0265	104	106	80.0-120			2.28	20
1,3-Dichlorobenzene	0.0250	0.0297	0.0297	119	119	72.0-123			0.280	20
1,4-Dichlorobenzene	0.0250	0.0246	0.0238	98.3	95.2	77.0-120			3.12	20
Dichlorodifluoromethane	0.0250	0.0224	0.0217	89.4	86.7	49.0-155			3.09	20
1,1-Dichloroethane	0.0250	0.0228	0.0227	91.3	90.9	70.0-128			0.420	20
1,2-Dichloroethane	0.0250	0.0236	0.0236	94.4	94.2	69.0-128			0.150	20
1,1-Dichloroethene	0.0250	0.0317	0.0305	127	122	63.0-131			3.78	20
cis-1,2-Dichloroethene	0.0250	0.0238	0.0237	95.4	95.0	74.0-123			0.400	20
trans-1,2-Dichloroethene	0.0250	0.0239	0.0234	95.4	93.6	72.0-122			1.99	20
1,2-Dichloropropane	0.0250	0.0235	0.0243	93.9	97.2	75.0-126			3.44	20
1,1-Dichloropropene	0.0250	0.0241	0.0235	96.4	94.1	72.0-130			2.49	20
1,3-Dichloropropane	0.0250	0.0266	0.0283	106	113	80.0-121			6.50	20
cis-1,3-Dichloropropene	0.0250	0.0262	0.0261	105	104	80.0-125			0.460	20
trans-1,3-Dichloropropene	0.0250	0.0255	0.0249	102	99.7	75.0-129			2.23	20
2,2-Dichloropropane	0.0250	0.0217	0.0213	86.7	85.4	60.0-129			1.56	20
Di-isopropyl ether	0.0250	0.0208	0.0200	83.2	80.2	62.0-133			3.66	20
Ethylbenzene	0.0250	0.0273	0.0289	109	116	77.0-120			5.62	20
Hexachloro-1,3-butadiene	0.0250	0.0273	0.0254	109	102	68.0-128			7.01	20
Isopropylbenzene	0.0250	0.0273	0.0291	109	116	75.0-120			6.45	20
p-Isopropyltoluene	0.0250	0.0307	0.0314	123	126	74.0-125		J4	2.31	20
2-Butanone (MEK)	0.125	0.0863	0.0832	69.1	66.6	37.0-159			3.71	20
Methylene Chloride	0.0250	0.0222	0.0217	88.9	86.9	67.0-123			2.26	20

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

(LCS) R3199406-1 02/25/17 13:07 • (LCSD) R3199406-2 02/25/17 13:24

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
4-Methyl-2-pentanone (MIBK)	0.125	0.130	0.131	104	105	60.0-144			0.850	20
Methyl tert-butyl ether	0.0250	0.0220	0.0212	87.8	84.7	66.0-125			3.64	20
Naphthalene	0.0250	0.0250	0.0248	99.9	99.3	64.0-125			0.610	20
n-Propylbenzene	0.0250	0.0277	0.0285	111	114	78.0-120			2.63	20
Styrene	0.0250	0.0298	0.0317	119	127	78.0-124		J4	6.17	20
1,1,1,2-Tetrachloroethane	0.0250	0.0291	0.0308	116	123	74.0-124			5.85	20
1,1,2,2-Tetrachloroethane	0.0250	0.0246	0.0261	98.4	105	73.0-120			6.03	20
Tetrachloroethene	0.0250	0.0282	0.0299	113	119	70.0-127			5.76	20
Toluene	0.0250	0.0238	0.0249	95.3	99.4	77.0-120			4.25	20
1,1,2-Trichlorotrifluoroethane	0.0250	0.0310	0.0305	124	122	64.0-135			1.53	20
1,2,3-Trichlorobenzene	0.0250	0.0271	0.0254	109	102	68.0-126			6.49	20
1,2,4-Trichlorobenzene	0.0250	0.0276	0.0245	110	98.2	70.0-127			11.8	20
1,1,1-Trichloroethane	0.0250	0.0240	0.0239	96.1	95.6	69.0-125			0.550	20
1,1,2-Trichloroethane	0.0250	0.0262	0.0277	105	111	78.0-120			5.57	20
Trichloroethene	0.0250	0.0278	0.0286	111	115	79.0-120			2.95	20
Trichlorofluoromethane	0.0250	0.0286	0.0273	114	109	59.0-136			4.34	20
1,2,3-Trichloropropane	0.0250	0.0287	0.0308	115	123	73.0-124			7.13	20
1,2,3-Trimethylbenzene	0.0250	0.0246	0.0247	98.6	99.0	76.0-120			0.390	20
1,2,4-Trimethylbenzene	0.0250	0.0281	0.0294	113	118	75.0-120			4.37	20
1,3,5-Trimethylbenzene	0.0250	0.0282	0.0294	113	117	75.0-120			4.01	20
Vinyl chloride	0.0250	0.0254	0.0244	102	97.7	63.0-134			3.97	20
Xylenes, Total	0.0750	0.0818	0.0863	109	115	77.0-120			5.35	20
(S) Toluene-d8				*98.7*	*97.6*	*80.0-120*				
(S) Dibromofluoromethane				*95.9*	*95.5*	*74.0-131*				
(S) 4-Bromofluorobenzene				*99.0*	*105*	*64.0-132*				

L891177-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L891177-01 02/25/17 19:29 • (MS) R3199406-4 02/25/17 19:46 • (MSD) R3199406-5 02/25/17 20:03

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Acetone	0.160	ND	30.8	38.2	38.1	47.3	505	10.0-160			21.4	36
Acrylonitrile	0.160	ND	64.6	70.9	80.0	87.8	505	14.0-160			9.31	33
Benzene	0.0320	ND	13.7	13.8	84.9	85.2	505	13.0-146			0.300	27
Bromobenzene	0.0320	ND	15.9	16.1	98.8	99.8	505	10.0-149			1.07	33
Bromodichloromethane	0.0320	ND	14.0	14.5	86.5	90.0	505	15.0-142			3.93	28
Bromoform	0.0320	ND	17.1	17.8	106	110	505	10.0-147			3.89	31
Bromomethane	0.0320	ND	18.5	17.7	115	110	505	10.0-160			4.46	32
n-Butylbenzene	0.0320	ND	14.9	14.5	92.4	89.9	505	10.0-154			2.74	37

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

L891177-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L891177-01 02/25/17 19:29 • (MS) R3199406-4 02/25/17 19:46 • (MSD) R3199406-5 02/25/17 20:03

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
sec-Butylbenzene	0.0320	ND	18.2	17.8	112	109	505	10.0-151			2.50	36
tert-Butylbenzene	0.0320	ND	18.9	18.7	117	116	505	10.0-152			1.02	35
Carbon tetrachloride	0.0320	ND	15.0	14.6	93.1	90.6	505	13.0-140			2.73	30
Chlorobenzene	0.0320	ND	18.1	19.0	112	118	505	10.0-149			5.05	31
Chlorodibromomethane	0.0320	ND	17.9	18.5	111	115	505	12.0-147			3.09	29
Chloroethane	0.0320	ND	17.6	17.4	109	108	505	10.0-159			1.22	33
2-Chloroethyl vinyl ether	0.160	ND	110	114	136	141	505	10.0-160			3.87	32
Chloroform	0.0320	ND	14.8	14.7	91.4	91.1	505	18.0-148			0.410	28
Chloromethane	0.0320	ND	11.7	11.3	72.4	69.9	505	10.0-146			3.43	29
2-Chlorotoluene	0.0320	ND	17.8	18.1	110	112	505	10.0-151			1.46	35
4-Chlorotoluene	0.0320	ND	17.0	17.3	105	107	505	10.0-150			1.82	35
1,2-Dibromo-3-Chloropropane	0.0320	ND	15.8	15.7	97.7	97.1	505	10.0-149			0.570	34
1,2-Dibromoethane	0.0320	ND	17.5	18.4	108	114	505	14.0-145			5.00	28
Dibromomethane	0.0320	ND	16.0	16.6	99.0	103	505	18.0-144			3.98	27
1,2-Dichlorobenzene	0.0320	ND	16.2	16.2	100	100	505	10.0-153			0.280	34
1,3-Dichlorobenzene	0.0320	ND	18.1	18.4	112	114	505	10.0-150			1.66	35
1,4-Dichlorobenzene	0.0320	ND	15.1	15.3	93.6	94.5	505	10.0-148			0.930	34
Dichlorodifluoromethane	0.0320	ND	12.9	13.3	79.7	82.4	505	10.0-160			3.37	30
1,1-Dichloroethane	0.0320	ND	13.9	13.6	85.9	84.3	505	19.0-148			1.83	28
1,2-Dichloroethane	0.0320	ND	14.3	15.1	88.3	93.2	505	17.0-147			5.47	27
1,1-Dichloroethene	0.0320	ND	19.1	18.5	118	114	505	10.0-150			3.38	31
cis-1,2-Dichloroethene	0.0320	ND	14.5	14.4	89.5	89.2	505	16.0-145			0.410	28
trans-1,2-Dichloroethene	0.0320	ND	14.3	13.9	88.3	86.3	505	11.0-142			2.24	29
1,2-Dichloropropane	0.0320	ND	14.9	14.7	92.4	91.0	505	17.0-148			1.56	28
1,1-Dichloropropene	0.0320	ND	14.5	14.4	89.9	89.4	505	10.0-150			0.580	30
1,3-Dichloropropane	0.0320	ND	16.5	17.4	102	108	505	16.0-148			5.07	27
cis-1,3-Dichloropropene	0.0320	ND	15.5	16.4	96.3	102	505	13.0-150			5.61	28
trans-1,3-Dichloropropene	0.0320	ND	14.9	16.2	92.3	100	505	10.0-152			8.09	29
2,2-Dichloropropane	0.0320	ND	13.4	13.1	83.2	81.2	505	16.0-143			2.52	30
Di-isopropyl ether	0.0320	ND	12.4	12.3	77.0	76.4	505	16.0-149			0.740	28
Ethylbenzene	0.0320	ND	17.1	17.9	104	109	505	10.0-147			4.50	31
Hexachloro-1,3-butadiene	0.0320	ND	14.9	14.7	92.6	90.8	505	10.0-154			1.90	40
Isopropylbenzene	0.0320	ND	17.3	17.6	107	109	505	10.0-147			1.95	33
p-Isopropyltoluene	0.0320	ND	19.3	19.1	118	117	505	10.0-156			0.670	37
2-Butanone (MEK)	0.160	ND	49.4	55.5	61.2	68.7	505	10.0-160			11.7	33
Methylene Chloride	0.0320	ND	13.2	12.8	81.6	79.0	505	16.0-139			3.21	29
4-Methyl-2-pentanone (MIBK)	0.160	ND	82.4	84.6	102	105	505	12.0-160			2.67	32
Methyl tert-butyl ether	0.0320	ND	13.2	13.4	81.8	83.3	505	21.0-145			1.85	29
Naphthalene	0.0320	265	275	286	60.5	130	505	10.0-153	E	E	4.01	36

L891177-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L891177-01 02/25/17 19:29 • (MS) R3199406-4 02/25/17 19:46 • (MSD) R3199406-5 02/25/17 20:03

Analyte	Spike Amount (dry) mg/kg	Original Result (dry) mg/kg	MS Result (dry) mg/kg	MSD Result (dry) mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
n-Propylbenzene	0.0320	ND	17.5	17.5	108	108	505	10.0-151			0.110	34
Styrene	0.0320	ND	18.6	19.2	116	119	505	10.0-155			2.95	34
1,1,1,2-Tetrachloroethane	0.0320	ND	18.4	18.7	114	116	505	10.0-147			1.70	30
1,1,2,2-Tetrachloroethane	0.0320	ND	15.9	16.8	98.6	104	505	10.0-155			5.49	31
Tetrachloroethene	0.0320	ND	17.4	17.8	108	110	505	10.0-144			1.99	32
Toluene	0.0320	ND	14.8	15.1	91.9	93.4	505	10.0-144			1.62	28
1,1,2-Trichlorotrifluoroethane	0.0320	ND	18.6	18.2	115	113	505	10.0-153			1.87	33
1,2,3-Trichlorobenzene	0.0320	ND	15.2	16.2	94.4	100	505	10.0-153			5.81	40
1,2,4-Trichlorobenzene	0.0320	ND	15.5	15.6	96.1	96.6	505	10.0-156			0.570	40
1,1,1-Trichloroethane	0.0320	ND	14.6	14.2	90.7	88.0	505	18.0-145			3.00	29
1,1,2-Trichloroethane	0.0320	ND	16.1	17.4	100	108	505	12.0-151			7.61	28
Trichloroethene	0.0320	ND	17.1	16.7	106	104	505	11.0-148			2.37	29
Trichlorofluoromethane	0.0320	ND	17.1	16.4	106	101	505	10.0-157			4.64	34
1,2,3-Trichloropropane	0.0320	ND	18.6	19.3	115	120	505	10.0-154			4.04	32
1,2,3-Trimethylbenzene	0.0320	1.26	16.4	16.3	93.7	93.4	505	10.0-150			0.320	33
1,2,4-Trimethylbenzene	0.0320	1.63	19.1	19.0	108	108	505	10.0-151			0.440	34
1,3,5-Trimethylbenzene	0.0320	ND	18.1	18.0	109	108	505	10.0-150			0.530	33
Vinyl chloride	0.0320	ND	14.9	14.4	92.4	89.0	505	10.0-150			3.74	29
Xylenes, Total	0.0959	ND	51.8	53.1	105	107	505	10.0-150			2.44	31
(S) Toluene-d8					*98.6*	*98.4*		*80.0-120*				
(S) Dibromofluoromethane					*94.1*	*96.0*		*74.0-131*				
(S) 4-Bromofluorobenzene					*103*	*103*		*64.0-132*				

Method Blank (MB)

(MB) R3199602-1 02/27/17 12:25

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Diesel Range Organics (DRO)	U		1.33	4.00
Residual Range Organics (RRO)	U		3.33	10.0
(S) o-Terphenyl	*92.4*			*20.0-142*

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

(LCS) R3199602-2 02/27/17 12:39 • (LCSD) R3199602-3 02/27/17 12:52

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Diesel Range Organics (DRO)	30.0	25.2	27.7	84.0	92.2	50.0-150			9.28	20
Residual Range Organics (RRO)	30.0	19.2	20.8	63.9	69.3	50.0-150			8.07	20
(S) o-Terphenyl				*96.4*	*101*	*20.0-142*				

Method Blank (MB)

(MB) R3198616-3 02/22/17 15:24

Analyte	MB Result mg/kg	MB Qualifier	MB MDL mg/kg	MB RDL mg/kg
Anthracene	U		0.000600	0.00600
Acenaphthene	U		0.000600	0.00600
Acenaphthylene	U		0.000600	0.00600
Benzo(a)anthracene	U		0.000600	0.00600
Benzo(a)pyrene	U		0.000600	0.00600
Benzo(b)fluoranthene	U		0.000600	0.00600
Benzo(g,h,i)perylene	U		0.000600	0.00600
Benzo(k)fluoranthene	U		0.000600	0.00600
Chrysene	U		0.000600	0.00600
Dibenz(a,h)anthracene	U		0.000600	0.00600
Fluoranthene	U		0.000600	0.00600
Fluorene	U		0.000600	0.00600
Indeno(1,2,3-cd)pyrene	U		0.000600	0.00600
Naphthalene	0.00207	J	0.00200	0.0200
Phenanthrene	U		0.000600	0.00600
Pyrene	U		0.000600	0.00600
1-Methylnaphthalene	U		0.00200	0.0200
2-Methylnaphthalene	U		0.00200	0.0200
2-Chloronaphthalene	U		0.00200	0.0200
(S) p-Terphenyl-d14	*77.6*			*23.0-120*
(S) Nitrobenzene-d5	*79.4*			*14.0-149*
(S) 2-Fluorobiphenyl	*84.4*			*34.0-125*

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

(LCS) R3198616-1 02/22/17 14:40 • (LCSD) R3198616-2 02/22/17 15:02

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Anthracene	0.0800	0.0651	0.0689	81.4	86.1	50.0-125			5.64	20
Acenaphthene	0.0800	0.0642	0.0659	80.3	82.4	52.0-120			2.65	20
Acenaphthylene	0.0800	0.0645	0.0667	80.7	83.4	51.0-120			3.33	20
Benzo(a)anthracene	0.0800	0.0602	0.0600	75.2	75.0	46.0-121			0.290	20
Benzo(a)pyrene	0.0800	0.0619	0.0631	77.3	78.9	42.0-121			1.97	20
Benzo(b)fluoranthene	0.0800	0.0568	0.0613	71.0	76.6	42.0-123			7.65	20
Benzo(g,h,i)perylene	0.0800	0.0612	0.0619	76.5	77.4	43.0-128			1.09	20
Benzo(k)fluoranthene	0.0800	0.0633	0.0628	79.1	78.6	45.0-128			0.660	20
Chrysene	0.0800	0.0611	0.0622	76.4	77.8	48.0-127			1.80	20
Dibenz(a,h)anthracene	0.0800	0.0618	0.0630	77.3	78.7	43.0-132			1.80	20
Fluoranthene	0.0800	0.0647	0.0676	80.9	84.5	49.0-129			4.30	20

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

(LCS) R3198616-1 02/22/17 14:40 • (LCSD) R3198616-2 02/22/17 15:02

Analyte	Spike Amount mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Fluorene	0.0800	0.0641	0.0658	80.2	82.3	50.0-120			2.63	20
Indeno(1,2,3-cd)pyrene	0.0800	0.0631	0.0644	78.8	80.4	44.0-131			2.04	20
Naphthalene	0.0800	0.0634	0.0659	79.2	82.4	50.0-120			3.94	20
Phenanthrene	0.0800	0.0599	0.0647	74.8	80.9	48.0-120			7.74	20
Pyrene	0.0800	0.0607	0.0609	75.9	76.2	48.0-135			0.340	20
1-Methylnaphthalene	0.0800	0.0667	0.0694	83.3	86.8	52.0-122			4.10	20
2-Methylnaphthalene	0.0800	0.0634	0.0657	79.2	82.2	52.0-120			3.67	20
2-Chloronaphthalene	0.0800	0.0637	0.0663	79.6	82.9	50.0-120			4.11	20
(S) p-Terphenyl-d14				*84.4*	*79.0*	*23.0-120*				
(S) Nitrobenzene-d5				*92.4*	*77.8*	*14.0-149*				
(S) 2-Fluorobiphenyl				*90.8*	*87.1*	*34.0-125*				

L889642-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L889642-06 02/22/17 21:15 • (MS) R3198616-4 02/22/17 21:37 • (MSD) R3198616-5 02/22/17 21:59

Analyte	Spike Amount mg/kg	Original Result mg/kg	MS Result mg/kg	MSD Result mg/kg	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Anthracene	0.0800	0.0102	0.0776	0.0764	84.3	82.8	1	20.0-136			1.55	24
Acenaphthene	0.0800	0.00153	0.0632	0.0645	77.1	78.7	1	29.0-124			2.03	20
Acenaphthylene	0.0800	U	0.0651	0.0667	81.4	83.4	1	35.0-120			2.44	20
Benzo(a)anthracene	0.0800	0.00430	0.0689	0.0672	80.7	78.7	1	13.0-132			2.39	27
Benzo(a)pyrene	0.0800	0.00236	0.0593	0.0602	71.2	72.3	1	14.0-138			1.42	27
Benzo(b)fluoranthene	0.0800	0.00502	0.0731	0.0677	85.1	78.3	1	10.0-129			7.64	31
Benzo(g,h,i)perylene	0.0800	0.0103	0.0458	0.0536	44.3	54.1	1	10.0-133			15.7	30
Benzo(k)fluoranthene	0.0800	U	0.0561	0.0601	70.2	75.2	1	15.0-131			6.91	27
Chrysene	0.0800	0.00832	0.0712	0.0661	78.6	72.3	1	15.0-137			7.35	25
Dibenz(a,h)anthracene	0.0800	0.00177	0.0450	0.0531	54.0	64.1	1	15.0-132			16.4	27
Fluoranthene	0.0800	0.0106	0.0919	0.0819	102	89.1	1	13.0-139			11.4	28
Fluorene	0.0800	0.00238	0.0683	0.0676	82.4	81.5	1	27.0-122			1.04	22
Indeno(1,2,3-cd)pyrene	0.0800	0.00287	0.0442	0.0533	51.7	63.0	1	11.0-133			18.6	29
Naphthalene	0.0800	0.0125	0.0825	0.0751	87.4	78.2	1	18.0-136			9.35	21
Phenanthrene	0.0800	0.0337	0.124	0.0972	113	79.3	1	15.0-133			24.2	25
Pyrene	0.0800	0.00851	0.0626	0.0580	67.6	61.9	1	11.0-146			7.57	29
1-Methylnaphthalene	0.0800	0.0247	0.109	0.0913	105	83.3	1	24.0-137			17.3	22
2-Methylnaphthalene	0.0800	0.0344	0.127	0.0974	116	78.8	1	23.0-136		J3	26.2	22
2-Chloronaphthalene	0.0800	U	0.0649	0.0664	81.1	83.0	1	36.0-120			2.36	20
(S) p-Terphenyl-d14					*71.8*	*76.5*		*23.0-120*				
(S) Nitrobenzene-d5					*73.4*	*70.7*		*14.0-149*				
(S) 2-Fluorobiphenyl					*81.1*	*87.2*		*34.0-125*				

Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
(dry)	Results are reported based on the dry weight of the sample. [this will only be present on a dry report basis for soils].
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
(S)	Surrogate (Surrogate Standard) - Analytes added to every blank, sample, Laboratory Control Sample/Duplicate and Matrix Spike/Duplicate; used to evaluate analytical efficiency by measuring recovery. Surrogates are not expected to be detected in all environmental media.
Rec.	Recovery.

Qualifier	Description
E	The analyte concentration exceeds the upper limit of the calibration range of the instrument established by the initial calibration (ICAL).
J	The identification of the analyte is acceptable; the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.
J4	The associated batch QC was outside the established quality control range for accuracy.
J6	The sample matrix interfered with the ability to make any accurate determination; spike value is low.

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

State Accreditations

Alabama	40660
Alaska	UST-080
Arizona	AZ0612
Arkansas	88-0469
California	01157CA
Colorado	TN00003
Conneticut	PH-0197
Florida	E87487
Georgia	NELAP
Georgia [1]	923
Idaho	TN00003
Illinois	200008
Indiana	C-TN-01
Iowa	364
Kansas	E-10277
Kentucky [1]	90010
Kentucky [2]	16
Louisiana	AI30792
Maine	TN0002
Maryland	324
Massachusetts	M-TN003
Michigan	9958
Minnesota	047-999-395
Mississippi	TN00003
Missouri	340
Montana	CERT0086
Nebraska	NE-OS-15-05

Nevada	TN-03-2002-34
New Hampshire	2975
New Jersey–NELAP	TN002
New Mexico	TN00003
New York	11742
North Carolina	Env375
North Carolina [1]	DW21704
North Carolina [2]	41
North Dakota	R-140
Ohio–VAP	CL0069
Oklahoma	9915
Oregon	TN200002
Pennsylvania	68-02979
Rhode Island	221
South Carolina	84004
South Dakota	n/a
Tennessee [1,4]	2006
Texas	T 104704245-07-TX
Texas [5]	LAB0152
Utah	6157585858
Vermont	VT2006
Virginia	109
Washington	C1915
West Virginia	233
Wisconsin	9980939910
Wyoming	A2LA

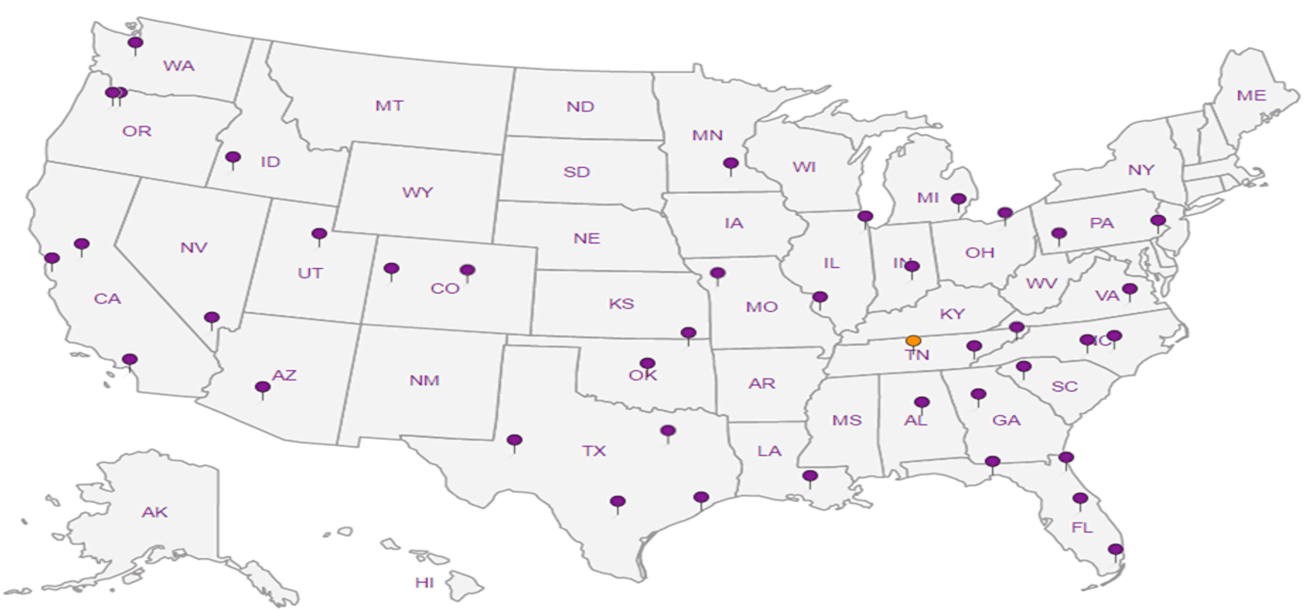
Third Party & Federal Accreditations

A2LA – ISO 17025	1461.01
A2LA – ISO 17025 [5]	1461.02
Canada	1461.01
EPA–Crypto	TN00003
AIHA	100789
DOD	1461.01
USDA	S-67674

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

Our Locations

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



Kennedy/Jenks Consultants 32001 32nd Ave. S.,Ste. 100 Federal Way, WA 98001	Billing Information: Accounts Payable 32001 32nd Ave. S.,Ste. 100 Federal Way, WA 98001
Report to: Julia Schwarz	Email To: juliaschwarz@kennedyjenks.com
Project Description: WA DOT Signals Maintenance	City/State Collected: Seattle, WA
Phone: 253-835-6400 Fax:	Client Project # 1696059-00/task06/04
Lab Project # KENJENWMT-WADOTSIGNA	P.O. #
Collected by (print): Alexander Lesher	Site/Facility ID # Signals
Collected by (signature):	Quote #
Immediately Packed on Ice N ___ Y X	Date Results Needed

Pres Chk

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Chain of Custody Page 1 of 2

ESC
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L# 891176
D211
Acctnum: KENJENWMT
Template: T120215
Prelogin: P587712
TSR: 134 - Mark W. Beasley
PB: 2-8-17
Shipped Via: FedEX Ground

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	MRCRA8 4ozClr-NoPres	NWTPHDX- No SGT 4ozClr-NoPres	SV8270PAHSIM (Naph) 4ozClr-NoPres	V8260BTEX only, Gx 40ml/NaHS04/Syr/MeOH	V8260C Full List, Gx 40ml/NaHS04/Syr/MeOH	Rem./Contaminant	Sample # (lab only)
B-1 (5-6)	G	SS	5-6	2-17-17	1150	5		X		X			01
B-2 (5-6)	G	SS	5-6		1055	5		X		X			02
B-8 (5-7)	G	SS	5-7		1215	7	X	X	X	X	X		03
DUP-1	G	SS	—		—	7	X	X	X	X	X		04
B-3 (5-6)	G	SS	5-6		1000	5		X		X			05
B-3 (6-7)	G	SS	6-7		1030	5		X		X			06
		SS											
		SS											
		SS											
		SS											

* Matrix:
SS - Soil AIR - Air
GW - Groundwater
WW - WasteWater
DW - Drinking Water
OT - Other

Remarks: fedEx

pH ____ Temp ____
Flow ____ Other ____

Samples returned via: ___ UPS ___ FedEx ___ Courier ___

Tracking #

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

Relinquished by : (Signature)	Date: 2-17-17	Time: 1300	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received by: (Signature)
Relinquished by : (Signature)	Date:	Time:	Received for lab by: (Signature)

Trip Blank Received: Yes / No
HCL / MeOH
TBR

Temp: 2.9 MWK Bottles Received: 31

Date: 2-18-17 Time: 9:00

If preservation required by Login: Date/Time

Hold:

Condition: NCF / OK

Appendix G

Data Validation Summaries

DATA VALIDATION SUMMARY – L891174
FEBRUARY 2017 SAMPLING EVENT
WA DOT Signals Maintenance

Laboratory Report included in Data Validation	Report Date	Sample IDs
ESC L891174 Includes: NWTPHGX, VOCs, total and dissolved RCRA metals, NWTPHDX, and SVOCs A revised report was issued to report the analytical results to the method detection limit.	17 April 2017	Aqueous Sample: B-3 Trip Blank: TB-1

Criteria	(Yes or No)	Comment
Chain-of-Custody – Chain-of-custody protocol followed?	Yes	No analyses were requested on the chain-of-custody. The client was contacted and VOC were requested.
Temperature Blank – Sample temperature criteria met?	Yes	Samples arrived at a temperature of 2.9 degrees Celsius (°C), which is within the recommended temperature of 4°C ± 2°C.
Holding times – Samples analyzed within specified holding time?	Yes	
Laboratory method blank samples – Analytes present in method blank samples?	Yes	See Note 1 below.
Field/Equipment blank samples – Analytes present in field/equipment blank samples?	Not applicable	No field/equipment blank samples were submitted with this batch of samples.
Trip blank samples – Analytes present in trip blank samples?	No	
Matrix spikes/matrix spike duplicate samples – Control limits met?	Yes	
Surrogate percent recoveries – Control limits met?	Yes	
Laboratory control sample – Control limits met?	No	See Note 2 below.
Laboratory duplicate samples (if applicable) – Control limits met?	Not applicable	No laboratory duplicate samples were analyzed with this batch of samples.
Field duplicate samples (if submitted) – Relative percent differences within control limits?	Not applicable	No field duplicate samples were submitted with this batch of samples.

NOTES:

1. Benzo(a)anthracene, benzo(b)fluoranthene, benzo(g,h,i)perylene, and naphthalene were detected in the SVOC method blank sample for batch WG954491 at concentrations of 0.00725J, 0.00376J, 0.00410J, and 0.0341J µg/L, respectively. Benzo(b)fluoranthene, benzo(g,h,i)perylene, and naphthalene were detected in sample B-3 at concentrations of 0.00369J, 0.00514J, and 0.0365J µg/L, respectively. As these concentrations are below the reporting limit and near the method blank concentrations, the benzo(b)fluoranthene, benzo(g,h,i)perylene, and naphthalene concentrations for sample B-3 have been qualified as “U” (undetected) at the reported concentration.

DATA VALIDATION SUMMARY – L891174
FEBRUARY 2017 SAMPLING EVENT
WA DOT Signals Maintenance

2. The percent recoveries of bromomethane and acrolein in the VOC laboratory control sample for batch WG954807 were above the laboratory control limits. As these compounds were not detected in the associated samples, no action was taken.
   The percent recoveries of fluorene in the SVOC laboratory control sample for batch WG954491 was slightly above the laboratory control limit. As this compound was not detected in the associated sample, no action was taken.

SUMMARY

Overall, the findings with respect to the quality assurance/quality control (QA/QC) data do not adversely affect the use of the analytical results.

DATA VALIDATION SUMMARY – L891176
FEBRUARY 2017 SAMPLING EVENT
WA DOT Signals Maintenance

Laboratory Report included in Data Validation	Report Date	Sample IDs
ESC L891176 Includes: NWTPHGX, VOCs, RCRA metals, NWTPHDX, and SVOCs	28 February 2017	Soil Samples: B-1 5-6, B-2 5-6, B-8 5-7, B-3 5-6, B-3 6-7 Field Duplicate: DUP-1

Criteria	(Yes or No)	Comment
Chain-of-Custody – Chain-of-custody protocol followed?	Yes	
Temperature Blank – Sample temperature criteria met?	Yes	Samples arrived at a temperature of 3.1 degrees Celsius (°C), which is within the recommended temperature of 4°C ± 2°C.
Holding times – Samples analyzed within specified holding time?	Yes	
Laboratory method blank samples – Analytes present in method blank samples?	Yes	See Note 1 below.
Field/Equipment blank samples – Analytes present in field/equipment blank samples?	Not applicable	No field/equipment blank samples were submitted with this batch of samples.
Trip blank samples – Analytes present in trip blank samples?	Not applicable	No trip blank samples were submitted with this batch of samples.
Matrix spikes/matrix spike duplicate samples – Control limits met?	No	See Note 2 below.
Surrogate percent recoveries – Control limits met?	Yes	
Laboratory control sample – Control limits met?	No	See Note 3 below.
Laboratory duplicate samples (if applicable) – Control limits met?	Not applicable	No laboratory duplicate samples were analyzed with this batch of samples.
Field duplicate samples (if submitted) – Relative percent differences within control limits?	Yes	Sample DUP-1 is a duplicate of sample B-8 5-7. Relative percent differences were less than 50 percent.

NOTES:

1. Barium was detected in the metals method blank sample for batch WG954552 at a concentration of 0.204J mg/kg. As barium in the associated samples were much greater than the method blank concentration, no action was taken.
   Naphthalene was detected in the metals method blank sample for batch WG954473 at a concentration of 0.00207J mg/kg. As naphthalene was not detected in the associated samples, no action was taken.
2. The percent recoveries for lead, selenium, and silver in the metals matrix spike and/or matrix spike duplicate sample for batch WG954552 were outside the laboratory control limits. The calculation of the lead recovery is not applicate as the lead concentration is much greater than the spiking concentration. As the spiked sample was not a site-specific sample and the percent recoveries of the other metals for the laboratory control samples were within the control limits, no action was taken.
   The percent recovery of TPHG in the matrix spike samples for batch WG954851 was below the laboratory control limit; the relative percent difference was also above the control limit. As the spiked sample was not a site-specific sample and the percent recovery of TPHG for the laboratory samples was within the control limit, no action was taken.

DATA VALIDATION SUMMARY – L891176
FEBRUARY 2017 SAMPLING EVENT
WA DOT Signals Maintenance

The relative percent difference for 2-methylnaphthalene in the SVOC matrix spike samples was above the laboratory control limit. As the percent recovery of this compound in the matrix spike samples was within the control limit, no action was taken.

3. The percent recoveries of tert-butylbenzene, chlorobenzene, p-isopropyltoluene, and styrene in the VOC laboratory control duplicate sample for batch WG954985 were above the laboratory control limits. As these compounds were not detected in the associated samples, no action was taken.

SUMMARY

Overall, the findings with respect to the quality assurance/quality control (QA/QC) data do not adversely affect the use of the analytical results.

Appendix H

Waste Disposal Documentation

***FOR 24 HOUR EMERGENCY RESPONSE INFORMATION, CALL (877) 577-2669 ***
2780888

NON-HAZARDOUS WASTE MANIFEST	1. Generator's US EPA ID No. EXE	Manifest Doc. No. 517148-17	2. Page 1 of 1

3. Generator's Name and Mailing Address
Washington State DOE
3700 9th Ave South
SEATTLE WA 98134

4. Generator's Phone ((425)649-7058

5. Transporter 1 Company Name	6. US EPA ID Number	A. Transporter's Phone
BURLINGTON ENVIRONMENTAL, LLC	WAR000001743	(253)383-3044
7. Transporter 2 Company Name	8. US EPA ID Number	B. Transporter's Phone ( )
9. Designated Facility Name and Site Address	10. US EPA ID Number	C. Facility's Phone
BURLINGTON ENVIRONMENTAL, LLC. KENT 20245 77th Avenue South KENT , WA 98032	WAD991281767	(253) 872-8030

11.	HM	Waste Shipping Name and Description	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol
a.		MATERIAL NOT REGULATED BY DOT (NON-HAZARDOUS)	1	DM	150	P
b.		MATERIAL NOT REGULATED BY DOT (NON-HAZARDOUS)	1	DM	70	P
c.						
d.						

D. Additional Descriptions for Materials Listed Above
a) 846585-00 - NON-HAZARDOUS WASTE SOLIDS - LF01 (1) b) 846586-00 - NON-HAZARDOUS WASTE LIQUID - WAT05 (2)

E. Handling Codes for Wastes Listed Above
a) b)

15. Special Handling Instructions and Additional Information
PLEASE MAIL MANIFESTS TO ATTN: KYLE SATTERTHWAITE, CASCADE DRILLING, 35100 PACIFIC HWY SOUTH, FEDERAL WAY, WA 98003

16. GENERATOR'S CERTIFICATION: "I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packaged, marked and labelled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations." I also certify that all times listed above are true and correct.

Printed/Typed Name	Signature	Month	Day	Year
DALE MYERS	D. C. My	5	25	17

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year
Eugene Lee	Eugene L	6	1	17

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of waste materials covered by this manifest except as noted in item 19.

Printed/Typed Name	Signature	Month	Day	Year

GENERATOR'S COPY

Cascade - IDW

17270 Woodinville Redmond Rd NE
Woodinville, WA 98072
425-527-9700 - Office

Date Sent
4/13/2017

Generator Name:	Washington State Department of Ecology
Site Address:	3700 9th Ave S Seattle, WA 98134
Generator Mailing Address:	Department of Ecology Attn: Tamara Cardona, PhD 3190 160th Ave SE Bellevue, WA 98008
Type of Site:	WSDOT Maintenance Facility
# of Soil Drums:	1
# of Water Drums	1
Are drums on hard and flat ground, accessible with a drum dolly?	Yes

Generator's Waste Profile 846586-00

Stericycle Environmental Solutions

Status : PENDING

Starts : 14 APR 2017
Expires : 31 JUL 2017

Sales Rep 1036 Seneca Benson
Acct Mngr 985 Chris Hunter

A: GENERATOR (573372) SITE INFORMATION

Washington State DOE
3700 9th Ave South
SEATTLE, WA 98134
> **Contact** Tamara Cardona
TSDF Approval List No

EPA EXE
NAICS 811121 **Neshap** N
Phone (425) 649-7058

B: CUSTOMER (30281) INFORMATION

CASCADE DRILLING LP
PO Box 1184
WOODINVILLE, WA 98072

C: WASTE INFORMATION

On File > **MSDS** No **Analysis** Yes **Sample** No

Waste Name NON-HAZARDOUS WASTE LIQUID
Process INVESTIGATION DERIVED WASTE FROM AN AUTO MAINTENANCE SHOP.
Unused Commercial Product No **Spill Residue** No

D: PHYSICAL CHARACTERISTICS OF WASTE

Phys States L-Liq

Top Color	Brown	**Odor**	None	**PH Range**	4-10
Mid Color		**Layers**	Single Phased	**Free Liq %**	100
Bot Color		**Spec Grav**	0.8-1.0	**Flash Test**	Gen Knowledge
% Ash	0	**BTU/Lbs**	0	**Flash Rnge**	NO FLASH
% Water	100	**% Halogens**	0	**Viscosity**	Low
				Pumpable	Yes

E: CHEMICAL COMPOSITION OF WASTE

Water (95 - 100 %) Soil (0 - 5 %)

PCB's 0 **Cyanides** 0 **Phenolics** 0 **Sulfides** 0 **Dioxins** 0
TOC >1% **VOC** <500 PPM **Information Provided By** Laboratory

F: METALS METHOD Gen Knowledge

		Cadmium	<1	**Chromium**	<5	**Silver**	<5	**Zinc**	0
Arsenic	<5	**Merc TCLP**	<0.2	**Selenium**	<1	**Nickel**	0	**Copper**	0
Barium	<100	**Lead**	<5	**Merc Tot**	<260	**Thallium**	0	**Chrome-6**	

G: OTHER CHARACTERISTICS OF WASTE

Ign. Solid No **Oxidizer** No **Explosive** No **Shock Sensitive** No **Cyanide Reactive** No **Sulfide Reactive** No
Explosive N/A **Asbestos** N/A **Radioactive** No **Water Reactive** No **Reactive (Other)** No
Herbicides 0 **Pesticides** 0 **Ammonia** 0 **Infectious** No **Medical** No

H: EPA / STATE WASTE IDENTIFICATION

EPA Waste No **State Waste** No **TSCA** No **Waste Water** No **Universal Waste** No
Form W219 **Source** G49 **Origin** 1 **SubPart CC** No **NESHAPS** No **CERCLA** No **Debris** No **Reg. Organics** No

EPA Codes
State Codes
UHC
Categorical Discharge Standards No **CTW Category** Oils **DW/EHW:**

I: SHIPPING INFORMATION

Marine Pollutant No

Containers DM Metal Drum **Qty to Ship Now** 1 **Projected Volume** 1x55/Onetime
DOT Descrip MATERIAL NOT REGULATED BY DOT (NON-HAZARDOUS)

J: SPECIAL DISPOSAL INSTRUCTIONS

PLEASE PROCESS AS WAT05
Waste Categs WAT05

Generator's Waste Profile 846586-00

Stericycle
Environmental Solutions

Starts : 14 APR 2017
Expires : 31 JUL 2017

Status : PENDING
Sales Rep 1036 Seneca Benson
Acct Mngr 985 Chris Hunter

GENERATOR CERTIFICATION

I hereby represent and warrant that I have personally examined and am familiar with the information contained and submitted on this waste profile and all attached documents. Based on my inquiry and personal knowledge of those individuals responsible for supplying or obtaining the information, the information contained herein is true, accurate, and complete to the best of my knowledge and belief. Furthermore, no material fact has been omitted as to make this misleading. I understand that others may rely on this representation and warranty in the handling and processing of the waste material described herein. By signing this waste profile, I am certifying that I am authorized to sign such documentation on behalf of the generator.

Signature	Printed Name	Title	Date
Dale Myers	DALE MYERS	Project Manager	5-23-17

Burlington Environmental, LLC maintains the appropriate permits for and will accept the dangerous waste the generator is shipping as required by WAC 173-303-290(3).