

# FOCUSED ENVIRONMENTAL INVESTIGATION WORK PLAN

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RAPLEE PROPERTY  
STANWOOD, WASHINGTON

REMEDIAL ACTION GRANT AGREEMENT  
NO. TCPRA-2018-STANWO-00027



MAUL  
FOSTER  
ALONGI

*Prepared for*  
**CITY OF STANWOOD**  
STANWOOD, WASHINGTON  
*November 21, 2018*  
*Project No. 1030.01.04*

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*The material and data in this work plan were prepared  
under the supervision and direction of the undersigned.*

MAUL FOSTER & ALONGI, INC.



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## ACRONYMS AND ABBREVIATIONS

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BTEX	benzene, toluene, ethylbenzene, and total xylenes
the City	City of Stanwood
COI	chemical of interest
CSM	conceptual site model
CUL	cleanup level
DRO	diesel range organics
Ecology	Washington State Department of Ecology
FEI	focused environmental investigation
GPR	ground-penetrating radar
GRO	gasoline range organics
Leidos	Leidos Engineering, LLC
MFA	Maul Foster & Alongi, Inc.
MTCA	Model Toxics Control Act
NWTPH	Northwest Total Petroleum Hydrocarbon
ORO	heavy oil range organics
Pinnacle	Pinnacle GeoSciences, Inc.
the Property	9816 271st Street NW, Stanwood, Washington
SAIC	Science Applications International Corporation
SAP	sampling and analysis plan
UST	underground storage tank

# 1 INTRODUCTION

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The City of Stanwood (the City) is evaluating redevelopment of the Raplee Property at 9816 271st Street NW in Stanwood, Washington (the Property) (Figure 1-1). Historically, the Property was used for retail automotive fuel operations, including a filling station and a service station. The Property is currently vacant.

Maul Foster & Alongi, Inc. (MFA) has prepared this focused environmental investigation (FEI) work plan on behalf of the City, to provide environmental information about the Property to consider as part of redevelopment planning.

## 1.1 Regulatory Framework

This work plan has been prepared in accordance with remedial action grant agreement No. TCPRA-2018-Stanwo-00027, dated July 6, 2018, between the Washington State Department of Ecology (Ecology) and the City. The agreement provides funding under Ecology's Integrated Planning Grant program.

The FEI work will be conducted in general accordance with the Model Toxics Control Act (MTCA) (Washington Administrative Code 173-340).

## 1.2 Purpose and Objectives

The purpose of the FEI is to evaluate existing environmental reports and gather environmental information in the field to enable subsequent development and evaluation of potential cleanup actions. To this end, specific objectives of the FEI are to:

- Summarize existing environmental data for the Property
- Generate groundwater data from existing wells of sufficient quality for risk screening
- Compare analytical results to associated cleanup levels (CULs) and identify potential sources of contamination
- Confirm the contents of existing underground storage tanks located in the alley south of the Property, if feasible
- Develop a preliminary conceptual site model (CSM)
- Evaluate potential risk to current and reasonably likely future human and ecological receptors
- Prepare a FEI report that will enable redevelopment and evaluation of potential cleanup options

## 1.3 Work Plan Organization

The rest of this work plan is organized as follows:

- **Section 2** presents background information and the physical setting of the Property.
- **Section 3** describes the preliminary CSM.
- **Section 4** describes the focused field data collection.
- **Section 4** describes the focused environmental investigation report.
- **Section 5** describes the project management plan.

The sampling and analysis plan (SAP), included as Appendix A, describes the standard field operating procedures for groundwater sample collection, analytical methods, equipment decontamination, management of investigation-derived waste, laboratory and field analytical quality procedures, and quality assurance and quality control requirements for sampling and analysis. If procedures differ from the SAP, deviations will be documented in the site characterization report. A health and safety plan specific to the activities described in this work plan is provided as Appendix B.

# 2 BACKGROUND AND PHYSICAL SETTING

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The background and physical setting information summarized below has been obtained from a review of historical sampling results and reports completed for the Property.

## 2.1 Property Description

The Property is located in the southeast quarter of section 24, township 32 north, and range 3 east of the Willamette Meridian (Figure 1-1). The approximately 0.21-acre Property is relatively level, sloping slightly to the northwest. Access to the Property is from 271st Street NW or 270th Street NW, adjacent north and east of the Property, respectively.

The physical address of the Property is 9816 271st Street NW in Stanwood, Washington. The Property is bordered by 271st Street NW, residences, and law offices to the north; the intersection of 271st Street NW and 270th Street NW to the east; an alleyway and restaurant parking lot to the south; and the Stanwood Fannie Mae Duplex to the west. A hardware and lumber store, J E Hamilton & Sons, is adjacent to and southeast of the Property. The Stillaguamish River is approximately 0.2 mile southwest of the Property. The Property is zoned as Mainstreet business but is currently vacant.

The Property, surrounded by a chain-link fence, contains grassy areas and partially intact asphalt and concrete surfaces, along with asphalt and concrete rubble and debris from a prior building demolition.

## 2.2 Property History

According to previous environmental reports, the first recorded sale of the Property was in 1924, when the Lien family sold the Property to J. Norin Hafstad (Science Applications International Corporation [SAIC], 2006). In 1939, Mr. Hafstad sold the Property to Mr. Ed Peterson and his wife. In 1958, Standard Oil obtained a lease on the Property. The Property was the location of a Standard Oil (now Chevron Corporation) service station from approximately 1958 to 1970, when the lease expired. From 1970 to 1998, the Property's ownership passed through many parties. In 1984, the portion of the Property with the south-bounding alleyway was sold to the City. In 1998, Kathleen Raplee purchased the Property (SAIC, 2006).

Based SAIC's review of a 1941 Sanborn map, the Property had been developed into a filling station by that time, with at least two underground storage tanks (USTs) in the northeast portion of the Property, a greasing facility in the eastern portion of the station structure, and a store in the western section. Therefore, the Property had been developed into a filling station prior to the Standard Oil lease in 1958 (SAIC, 2006).

## 2.3 Previous Environmental Investigations

In 2005, Glacier Environmental Services, Inc., decommissioned and removed three USTs in the south-central portion of the Property (see Figure 2-1). During the decommissioning process, Pinnacle GeoSciences, Inc. (Pinnacle) collected soil samples from the sidewalls and the bottom of the excavation area, as well as soil samples from below former product piping, dispenser islands, and stockpiles. Results from the excavation soil samples identified concentrations of gasoline range organics (GRO); heavy oil range organics (ORO); and benzene, toluene, ethylbenzene, and total xylenes (BTEX) above their respective MTCA Method A CULs. In addition to the excavation exceedances, concentrations of lead and diesel range organics (DRO) were identified above their respective MTCA Method A CULs in stockpile samples (Pinnacle, 2005).

In 2006, SAIC performed a site assessment of the Property and identified soil and groundwater impacted by GRO, DRO, ORO, and BTEX near the former UST area (SAIC, 2006). During this assessment, Apollo Geophysics conducted a ground-penetrating radar (GPR) survey of the Property to identify any anomalies in the subsurface (e.g., USTs). Based on Figure 2 in the 2005 Pinnacle report, the GPR survey showed anomalies in two areas on and adjacent to the Property indicative of in-place USTs (see Figure 2-1). The first GPR anomaly identified two USTs to the south of the Property in the alleyway right-of-way, directly under a 4-inch-diameter, high-pressure, steel natural gas line. The presence of these USTs was confirmed with an air-knife excavation. SAIC observed that the USTs contained liquid petroleum mixed with water (SAIC, 2006). The second GPR anomaly identified one UST in the west-central portion of the Property, as confirmed by SAIC while excavating soil from the area (SAIC, 2006).

From April 2006 to July 2014, Gettler-Ryan Inc., on behalf of Leidos Engineering, LLC (Leidos; formerly SAIC), performed groundwater monitoring at four wells located on the Property (see Figure 2-1) (Leidos, 2014). The groundwater samples were analyzed for GRO, DRO, ORO, and BTEX. According to the most recent available groundwater monitoring report, only one of the four

monitoring wells, MW-4, had concentrations of DRO and ORO above their respective MTCA Method A CULs. Additionally, MW-4 had measurable free product during sampling events between January 2012 and July 2014 and was not sampled during those events (Leidos, 2014). There is no available documentation of groundwater monitoring conducted at the Property since the July 2014 groundwater monitoring event.

Historical data and screening results from these previous investigations is included in Appendix C. These data will be incorporated into the FEI report, along with data collected as part of the effort described in this work plan.

## 2.4 Geology and Hydrogeology

The Property is located in the Snohomish River valley. According to the Geologic Map of the Stanwood Quadrangle, the Property and its vicinity are located on Quaternary younger alluvial and estuarine deposits (Minard, 1985). SAIC encountered subsurface soils consisting primarily of gray silt or a silt/clay mixture during well installation in 2006 (SAIC, 2006). Because of the low hydraulic conductivity of the soil, the monitoring wells on the Property have poor groundwater recharge and initially pumped dry during purging (SAIC, 2006). SAIC reported the presence of fill consisting of brown medium sand and sandy silt with fine gravel with trace rounded cobbles in the upper 4 feet of the borings (SAIC, 2006). Therefore, it is likely during initial development of the Property, fill was placed to raise the grade above flood level.

According to previous environmental investigations, shallow groundwater at the Property is typically encountered less than 5 feet below ground surface and likely is associated with a shallow, unconfined aquifer. The groundwater at the Property flows northwest, consistent with topography. The groundwater gradient is relatively shallow, with less than 2 feet of groundwater elevation difference across the Property (SAIC, 2006).

# 3 PRELIMINARY CONCEPTUAL SITE MODEL

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A CSM describes potential chemical sources, release mechanisms, environmental transport processes, exposure routes, and receptors. The primary purpose of the CSM is to describe pathways by which human and ecological receptors could be exposed to site-related chemicals. A complete exposure pathway consists of four necessary elements: (1) a source and mechanism of chemical release to the environment, (2) an environmental transport medium for a released chemical, (3) a point of potential contact with the impacted medium (referred to as the exposure point), and (4) an exposure route (e.g., groundwater ingestion) at the exposure point. The potential release mechanisms and pathways are described below.

### 3.1 Potential Sources and Release Mechanisms

Based on documented historical uses described by SAIC and data obtained from subsurface investigations, it appears that the following historical operations/uses at the Property and/or at adjoining properties may have contributed to contamination at the Property:

- Former leaking USTs on the Property
- Abandoned-in-place USTs on and adjacent to the Property
- Former filling station operations on the Property

### 3.2 Contaminants and Media

Based on the previous investigations described in Section 4, GRO, ORO, and BTEX are present in soil. DRO, ORO, and free product are present in groundwater.

### 3.3 Fate and Transport Processes

The primary mechanisms likely to influence the fate and transport of chemicals at the Property include natural biodegradation of organic chemicals, sorption to soil, advection and dispersion in groundwater, volatilization of volatile chemicals from soil or groundwater to air, transformation under changing chemical conditions, and leaching of chemicals from soil to groundwater. The relative importance of these processes varies, depending on the chemical and physical properties of the released contaminant. The properties of soil and the dynamics of groundwater flow also affect contaminant fate and transport.

The Property contains grassy areas and partially intact asphalt and concrete surfaces. It is possible that precipitation may infiltrate down into the soil through unpaved ground surfaces at the Property into the vadose-zone soil. Leaching of near-surface soil impacts during precipitation events could result in impacts to shallow groundwater at the Property.

Volatile contaminants may partition to the vapor phase in the source areas or downgradient of the source areas via groundwater transport of dissolved-phase contamination. Contaminant vapors partitioning from contaminated soil or groundwater could result in impacts to indoor and outdoor air quality.

### 3.4 Potential Exposure Scenarios

The following are potential current or future exposure pathways:

- Incidental ingestion of soil or groundwater
- Incidental contact with soil or groundwater
- Inhalation of air vapors emanating from soil or groundwater

- Ingestion, contact, and inhalation via use of groundwater as drinking water

These potential exposure pathways will be revisited upon completion of the focused field data collection described in this FEI work plan.

### 3.5 Potential Receptors

The Property is currently vacant but is zoned for Mainstreet business. Therefore, if the Property is redeveloped, expanded use may include commercial or private businesses. The following current and future human and ecological receptors may potentially be exposed to chemicals originating from the Property:

- Visitors
- Occupational workers
- Construction workers
- Off-property residents/visitors/workers
- Terrestrial plants, wildlife and soil biota

## 4 FOCUSED FIELD DATA COLLECTION

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This section describes the objectives and scope of work for the focused field data collection effort. The data collection will be conducted in general accordance with the methods and procedures described in the SAP (see Appendix A).

### 4.1 Objectives

The objectives of the focused field data collection effort include the following:

- Generate groundwater data from each existing monitoring well of sufficient quality for risk screening
- Confirm the contents of the abandoned-in-place USTs, if feasible

The proposed scope of work is intended to meet these objectives as they relate to the chemicals of interest (COIs) identified in the next section.

### 4.2 Scope of Work

The scope of work for the focused field data collection effort includes groundwater monitoring at the four existing monitoring wells on the Property, as well as the inspection of abandoned-in-place USTs in the alleyway to the south of the Property, if feasible.

## 4.2.1 Groundwater Sampling

Concentrations of GRO, DRO, ORO, and BTEX were detected in groundwater at the Property during previous groundwater monitoring events (Leidos, 2014). The most recent groundwater sampling event identified free product in MW-4. Given the length of time since the last groundwater monitoring event, redevelopment of existing monitoring wells is proposed to ensure a clean sand-pack and a strong connection to the aquifer.

MFA will collect groundwater samples from all existing monitoring wells on the Property, MW-1 through MW-4. Groundwater sampling will be conducted using the methods and protocol outlined in the SAP (Appendix A). Groundwater samples will be analyzed for the following COIs at each monitoring well:

- GRO by Northwest Total Petroleum Hydrocarbon (NWTPH) method NWTPH-Gx
- DRO and ORO by NWTPH-Dx
- BTEX by U.S. Environmental Protection Agency Method 8021B

Groundwater analytical results will be compared to the preliminary screening levels identified in Section 4.3 of this work plan.

## 4.2.2 Abandoned-In-Place USTs

Liquid petroleum product and water were found in the abandoned-in-place USTs located in the alley to the south of the Property (SAIC 2006). The USTs lie directly under a 4-inch-diameter, high-pressure, steel natural gas line. If MFA is able to utilize existing fill ports or other existing access points, an attempt to confirm the tank contents will be conducted by placing tubing down the access point, then using a peristaltic pump to remove tank contents to the extent feasible. Contents will be collected for visual and olfactory observations. All qualitative observations and conclusions regarding UST contents will be recorded in the field notebook. Any contents that are removed from the USTs will be properly labeled, characterized and disposed of off Property. If the abandoned USTs are deemed inaccessible without utilizing an air-knife and/or other ground-disturbing excavation equipment, the contents will not be evaluated as a part of this scope of work. In this case, UST inspection may be performed at a later date.

## 4.3 Preliminary Screening Levels

Analytical data from groundwater will be compared to MTCA Method A criteria. Groundwater samples collected at the Property will be tested for GRO, DRO, ORO, and BTEX. Preliminary screening levels for groundwater are shown in Table 4-1.

Screening levels may vary based on laboratory results (i.e. absence of benzene affects GRO CUL).

# 5 FOCUSED ENVIRONMENTAL REPORT

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Following data collection and analysis, MFA will prepare a report summarizing findings from the environmental investigation. This section describes the objectives for the FEI report.

## 5.1 Objectives

The objectives of the FEI report include the following:

- Summarize findings from previous investigations at the Property through report review
- Present analytical laboratory results for samples collected during the focused field data collection effort
- Compare analytical laboratory results to preliminary screening levels
- Update the preliminary CSM to include findings from the investigation
- Perform risk screening by assessing risk posed by the COIs to human and ecological health completed in accordance with MTCA requirements for the potentially complete pathways identified in the updated preliminary CSM
- Discuss data gaps and implications for developing potential cleanup options
- Evaluate feasibility of remedial cleanup options and recommend a permanent remedy – e.g. treatment or removal, unless proven impractical through cost analysis

# 6 PROJECT MANAGEMENT PLAN

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The following describes the roles of key personnel on the project.

**Ms. Patricia Love** will be the project director for the City. Ms. Love will be kept informed of the status of the project and of project activities. Ms. Love will be provided with data, reports, and other project-related documents prepared by MFA before their submittal to Ecology. She will be responsible for communicating with City staff, will participate in discussions with Ecology, and will coordinate on-site activities with MFA.

**Mr. Phil Wiescher** will be the project manager for MFA. Mr. Wiescher will coordinate with project task leaders and will communicate with Ms. Love. He will be responsible for allocating the resources necessary to ensure that the objectives of the site assessment are met. Mr. Wiescher will also serve as senior environmental scientist and will be responsible for managing the overall completion of the site assessment and for communication of project status to the project director and the Ecology project

manager. Mr. Wiescher will review data, reports, and other project-related documents prepared by MFA before their submittal to the City or to Ecology. Mr. Wiescher will also assist project staff with technical issues.

**Ms. Carolyn Wise** will be responsible for technical assistance to assigned staff; assist with resolution of technical or logistical challenges that may be encountered during the investigation; assist with field activities and write and review reports; and participate in discussions with Ecology at the request of the City. Ms. Wise will also coordinate with project task leaders and be responsible for allocating the resources necessary to ensure that the objectives of the site assessment are met.

**Ms. Blair Paulik** will be responsible for technical assistance on groundwater characterization and will also perform the baseline human health and ecological risk screening and overall data management. Ms. Paulik will participate in discussions with Ecology at the request of the City.

**Ms. Amanda Bixby** will assist in field activities and will write and review reports.

## 6.1 Schedule

Task	Start Date	Completion Time Frame (calendar weeks)
Complete work plan	Week of October 1, 2018.	6
Fieldwork	After Ecology approval of the work plan. Time frame includes fieldwork and laboratory analyses and appropriate follow-up analyses.	10
Draft FEI report	After completion of fieldwork and receipt of final data packages.	4
Final FEI report	Receipt of Ecology comments on draft Focused Environmental Investigation report.	2

The time frames for the work to be performed may change, based on changes to the scope of work and issues involving site access, and subject to subcontractor availability and Ecology approval.

## LIMITATIONS

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The services undertaken in completing this work plan were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This work plan is solely for the use and information of our client unless otherwise noted. Any reliance on this work plan by a third party is at such party's sole risk.

Opinions and recommendations contained in this work plan apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this work plan.

## REFERENCES

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Leidos. 2014. Second semiannual 2014 groundwater monitoring and sampling report. Leidos Engineering, LLC. Bothell, Washington. August 27.

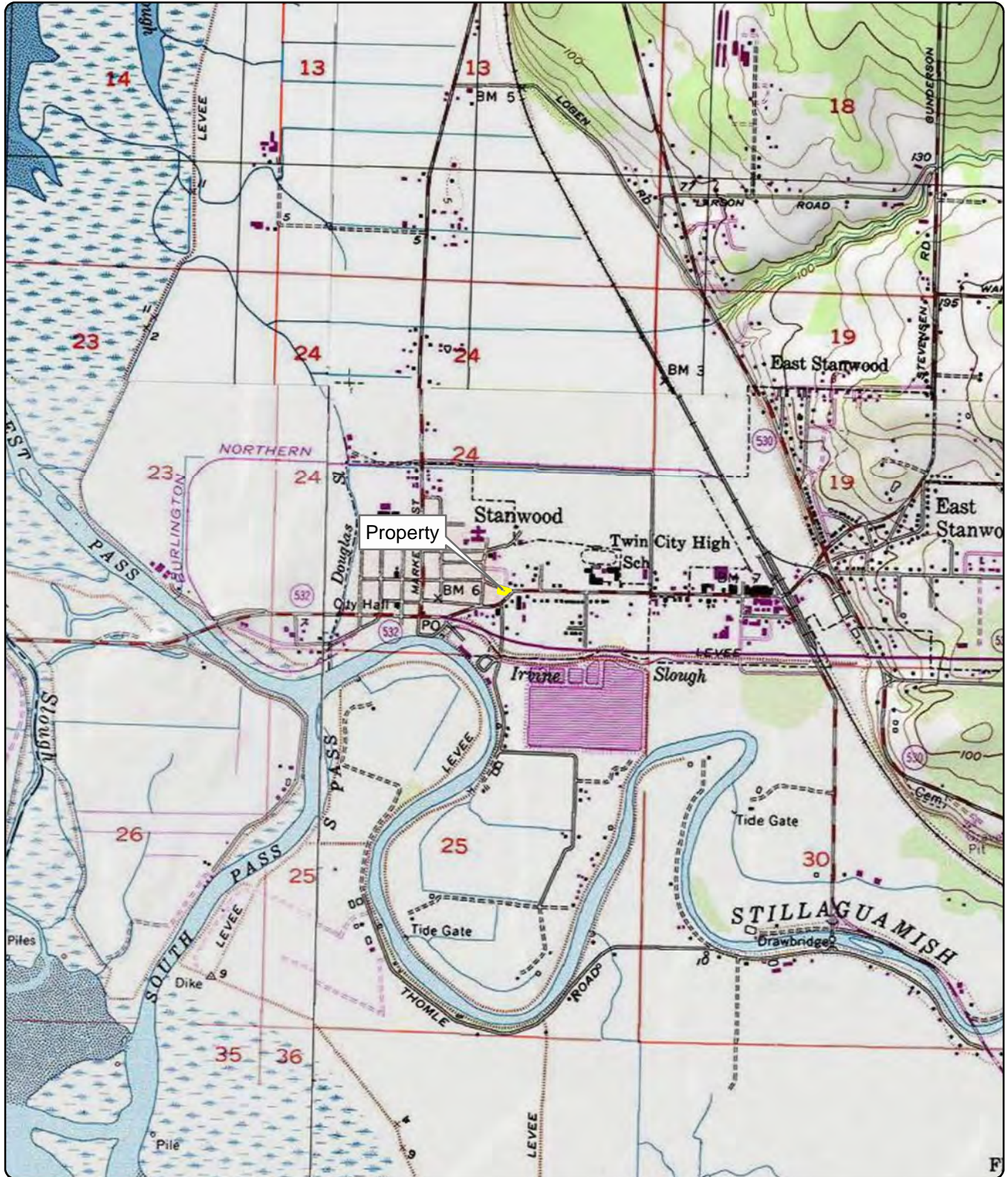
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Pinnacle. 2005. UST decommissioning observation and site check/site assessment gasoline and waste oil USTs. Pinnacle GeoSciences, Inc., Bellevue, Washington. March 11.

SAIC. 2006. Site assessment report for Chevron Corporation. Science Applications International Corporation, Bothell, Washington. May 5.

# FIGURES





Source: US Geological Survey (1969) 7.5-minute topographic quadrangle: Stanwood  
 SE corner of Section 24, Township 32 North, Range 3 East  
 Property boundary obtained from Snohomish County GIS.

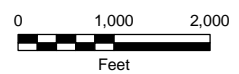
**Legend**  
 Property Parcel

**Figure 1-1**  
**Property Location**

Raplee Property  
 Stanwood, Washington



This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.





**Figure 2-1**  
**Property Features**  
 Raplee Property  
 Stanwood, Washington

**Legend**

- Monitoring Well
- Former Product Lines
- Approximate Groundwater Flow Direction (Leidos, 2014)
- Existing UST (SAIC, 2006)
- Former Building
- Former Service Island
- Former UST (Pinnacle, 2005)
- Property Parcel
- Parcels

Notes:  
 All property feature locations are approximate.  
 UST = underground storage tank.



Source: Aerial photograph obtained from Mapbox. Property boundary obtained from Snohomish County GIS.

# TABLE



**Table 4-1  
Groundwater MTCA Method A CULs  
Raplee Property  
Stanwood, Washington**

Analyte	MTCA Method A CUL (ug/L)
Benzene	5
Ethylbenzene	700
Toluene	1000
Xylenes	1000
Gasoline range organics (benzene present)	800
Diesel range organics	500
Heavy oil range organics	500
<p>NOTES:            MTCA method A CULs were obtained from Washington Administrative Code 173-340-900.            CUL = cleanup level.            MTCA = Model Toxics Control Act            ug/l = micrograms per liter.</p>	

# APPENDIX A

## SAMPLING AND ANALYSIS PLAN



# SAMPLING AND ANALYSIS PLAN

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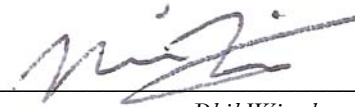
*1329 N State Street, Suite 301, Bellingham, WA 98225*

SAMPLING AND ANALYSIS PLAN  
RAPLEE PROPERTY  
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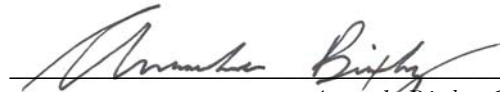
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## ACRONYMS AND ABBREVIATIONS

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bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and total xylenes
the City	City of Stanwood
COC	chain of custody
DRO	diesel-range organics
DQO	data quality objectives
Ecology	Washington State Department of Ecology
FSDS	field sampling data sheet
GRO	gasoline-range organics
IDW	investigation-derived waste
LCS	laboratory control sample
LDS	laboratory duplicate sample
MFA	Maul Foster & Alongi, Inc.
MS/MSD	matrix spike and matrix spike duplicate
ORO	heavy-oil-range organics
Property	Raplee property at 9816 271st Street NW in Stanwood, Washington
QA	quality assurance
QC	quality control
SAP	sampling and analysis plan
USEPA	U.S. Environmental Protection Agency
VOC	volatile organic compound

# 1 INTRODUCTION

---

## 1.1 Objectives

This sampling and analysis plan (SAP), which combines the elements of a field sampling plan and quality assurance project plan, has been designed to guide groundwater monitoring activities and laboratory analytical activities supporting the environmental investigation of the Raplee property (the Property) at 9816 271st Street NW in Stanwood, Washington. This SAP was prepared by Maul Foster & Alongi, Inc. (MFA) consistent with the requirements of Washington Administrative Code 173-340-820 for SAPs.

## 1.2 Regulatory Framework

MFA prepared this SAP on behalf of the City of Stanwood (the City), in accordance with remedial action grant agreement No. TCPRA-2018-Stanwo-00027 between the City and the Washington State Department of Ecology (Ecology). The agreement provides funding under Ecology's Integrated Planning Grant program.

## 1.3 Scope and Purpose

The purpose of this SAP is to describe the requirements for field sampling and laboratory analytical activities associated with monitoring existing groundwater wells. This SAP supplements and is provided as an appendix to the work plan, which provides Property-specific background information, summarizes areas of concern identified through prior investigations, discusses preliminary screening levels, and defines the scope of the groundwater monitoring to be completed.

If an unforeseen change in methodology requires modification to this SAP, an addendum describing the specific revision(s), or the alternative procedures used, will be prepared and documented in the focused environmental investigation report. Procedures are provided that will be used to direct the investigation process so that the following conditions are met:

- Data collected are of high quality, representative, and verifiable.
- Data can be used to support development and evaluation of cleanup options.

This SAP describes methods that will be used for sampling environmental media, decontaminating equipment, and managing investigation-derived waste (IDW). It also includes procedures for collecting, analyzing, evaluating, and reporting useful data. This SAP includes quality assurance (QA) procedures for field activities; quality control (QC) procedures; and data validation information.

## 1.4 Report Organization

This document is organized as follows:

- **Section 2** describes access and site preparation for fieldwork.
- **Section 3** presents groundwater monitoring procedures to be followed during the environmental investigation.
- **Section 4** describes the chemicals of interest and the laboratory test methods.
- **Section 5** describes the sample handling procedures.
- **Section 6** presents field and laboratory QC practices.
- **Section 7** summarizes the review processes to ensure data usability.
- **Section 8** defines data quality objectives (DQO) specific to the environmental investigation.
- **Section 9** summarizes the reporting objectives.

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## 2 ACCESS AND SITE PREPARATION

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### 2.1 Access

The current Property owner, Kathleen Raplee, has signed an agreement granting reasonable access to perform the fieldwork described in this plan. The City of Stanwood has granted access to the alley right-of-way.

### 2.2 Preparation and Coordination

Invasive subsurface investigation work is not anticipated at this time. However, if additional characterization efforts are proposed, public and private utility-locating services will be used to check for underground utilities near the proposed sample locations. MFA will coordinate fieldwork with the City to define the locations of possible on-site utilities or other subsurface features. MFA will notify the City and Ecology a minimum of 48 hours before field activities begin.

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## 3 GROUNDWATER MONITORING

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The four existing groundwater monitoring wells to be sampled on the Property are shown on Figure 2-1 of the work plan, to which this SAP is the appendix.

### 3.1 Groundwater Elevations

Water level measurements to the nearest 0.01 foot will be taken with an electronic water level indicator. The depth of each monitoring well will also be confirmed. The depth to water will be measured from the top of the well casing (polyvinyl chloride riser pipe) at a reference point that will be surveyed and marked so that future readings are measured from the same reference point. In addition, the well condition, including the condition of the lock, monument integrity, and legibility of well labels, will be recorded for each location. Gauging equipment will be decontaminated between wells in accordance with the procedures outlined in Section 3.6.

### 3.2 Well Surveying

Given the length of time since the last sampling event, the locations of monitoring wells will be surveyed by a licensed surveyor. The latitude and longitude, ground surface elevation, and top-of-casing elevation at each well will be surveyed.

### 3.3 Well Redevelopment

As the monitoring wells on the Property have not been sampled since 2014, all the wells on the Property will be redeveloped prior to sampling. This process will use surging, bailing, and/or pumping to remove sediment that may have accumulated during installation and to improve the hydraulic connection with the water-bearing zone. Groundwater sampling will occur no sooner than 24 hours after monitoring well redevelopment has been completed.

### 3.4 Sampling Procedure

If a peristaltic pump is used, standard low-flow sampling techniques will be used to collect groundwater samples from monitoring wells. If possible, groundwater samples should be collected from the middle of the screened interval or, if the water level is below the top of the screen, from the middle of the water column. New, disposable tubing will be used at each monitoring location.

Before collection of groundwater samples, the water level will be measured and the well will be purged. If a peristaltic pump is used, the well should be purged at a low flow rate (e.g., 0.1 to 0.5 liter per minute). A minimum of one well volume will be purged prior to sample collection or until selected water quality field parameters (e.g., temperature, specific conductance, pH, turbidity) have stabilized. If the well goes dry during purging, a sample can be collected once the well recharges enough water for the sample volume requirements. During purging, the flow rates, water levels, and water quality parameters will be recorded on the field sampling data sheet (FSDS) and in the field notes. Groundwater will be transferred directly into laboratory-supplied containers specific to the analysis required.

### 3.5 Sample Nomenclature

Groundwater samples will be labeled with a prefix to describe the sampling location identification number, a “GW” to indicate a water sample matrix, and sample depth (midpoint of the screen interval

or midpoint of the water column) in feet below ground surface (bgs). For example, a groundwater sample collected from a monitoring well at location MW04 and with a screen from 30 feet to 35 feet bgs will have the sample nomenclature of MW04-GW-32.5.

Duplicate groundwater samples will replace the location number with “DUP,” and the sample will have the same sample time as the primary sample. Duplicate samples shall not be collected from the same depth on the same date and at the same time. A duplicate sample of the abovementioned sample would appear as MWDUP-GW-32.5.

Relevant sample information will be documented on the FSDS (see Appendix); documentation may include items such as the screened interval or open space, equipment used, water quality field parameters, and the amount of water purged before sampling.

### 3.6 Sampling Equipment Decontamination

Nondisposable sampling equipment and reusable materials that contact the soil or water will be decontaminated on site and before and after each sample is collected. Decontamination will consist of the following:

- Tap-water rinse (may consist of an equivalent high-pressure or hot-water rinse). Visible soil to be removed by scrubbing.
- Nonphosphate detergent wash, consisting of a dilute mixture of Liqui-Nox® (or equivalent) and tap water.
- Distilled-water rinse.
- Methanol solution rinse (1:1 solution of methanol with distilled water).
- Distilled-water rinse.

Decontamination fluids will be transferred to drums and managed as described in Section 3.7.

### 3.7 Management of Investigation-Derived Waste

IDW may include items such as purged groundwater, decontamination fluids, sampling debris, and personal protective equipment. The IDW will be segregated into solids, liquids, and sampling debris (e.g., personal protective equipment, tubing, bailers). IDW will be stored in a designated area on the Property in drums.

Drums will be labeled with their contents, the approximate volume of material, the date of collection, and the origin of the material. The drums will be sealed, secured, and transferred to a designated area on the Property, pending characterization. Analytical data from the groundwater-sampling activities previously described may be used to characterize purge water and decontamination fluids generated during groundwater sampling.

## 4 ANALYTICAL METHODS

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### 4.1 Chemicals of Interest

Gasoline-range organics (GRO), diesel-range organics (DRO); heavy oil-range organics (ORO); and/or benzene, toluene, ethylbenzene, and total xylenes (BTEX) were detected in subsurface soil and groundwater during previous environmental investigations (Leidos, 2014; SAIC, 2006). These chemicals are considered chemicals of interest for this assessment.

### 4.2 Laboratory Test Methods and Reporting Limits

In accordance with the QA/QC requirements set forth in this SAP, a laboratory accredited by the State of Washington and the National Environmental Laboratory Accreditation will test groundwater samples for the GRO, DRO, ORO, and BTEX. Laboratory reporting limits, methods, sample containers, preservation, and holding time requirements are summarized in Table 4-1.

## 5 SAMPLE HANDLING

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### 5.1.1 Preservation

Groundwater samples will be collected in laboratory-supplied containers, as generally specified (see the summary provided in Table 4-1). The groundwater samples will be stored in iced coolers at approximately 4 degrees Celsius. Sample containers will be supplied by the laboratory.

### 5.1.2 Sample Packaging and Shipping

Groundwater samples will be stored in iced shipping containers or a refrigerator designated for samples, and then transported to the analytical laboratory. Air samples will be transported to the analytical laboratory in shipping containers or boxes.

### 5.2 Sample Custody

Sample custody will be tracked from point of origin through analysis and disposal, using a chain of custody (COC) form filled out with the appropriate sample and analytical information after samples are collected. The following items will be recorded on the COC form:

- Project name
- Project number

- MFA project manager
- Sampler name(s)
- Sample number, date and time collected, media, number of bottles submitted
- Requested analyses for each sample
- Type of data package required
- Turnaround requirements
- Signature, printed name, and organization name of persons having custody of samples, and date and time of transfer
- Additional instructions or considerations that would affect analysis (nonaqueous layers, archiving, etc.)

Persons in possession of the samples will be required to sign and date the COC form whenever samples are transferred between individuals or organizations. The COC will be included in the shipping containers. The laboratory will implement its in-house custody procedures, which begin when sample custody is transferred to laboratory personnel.

If samples are shipped via air or ground transportation (by a third party), the following custody procedures will be followed. The COC will be signed and custody will be relinquished to the carrier. The signed COC(s) will be packed in shipping containers with the samples, and a custody seal will be placed on the container. The shipping documentation will be used by the carrier to document custody of the package while it is in transit to the laboratory.

At the analytical laboratory, a designated sample custodian will accept custody of the samples and will verify that the COC form matches the samples received. The shipping container or set of containers is given a laboratory identification number, and each sample is assigned a unique sequential identification number.

## 6 QUALITY CONTROL

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### 6.1 Field Quality Control Samples

QC samples collected in the field include field equipment rinse blanks, trip blanks, and field duplicates. Field QC samples will be identified on the FSDSs. Field and trip blank results may indicate possible contamination introduced by field or laboratory procedures; field duplicates indicate precision in both field and laboratory procedures. Field QC samples will be used to assess the accuracy and precision of the field sample collection and handling activities.

## 6.1.1 Assessment of Field Contamination (Blanks)

The occurrence of field contamination will be assessed through the analysis of a variety of sample blanks described below.

### 6.1.1.1 Equipment Rinsate Blanks

Analyses of equipment rinsate blanks will be used to assess the efficiency of field equipment decontamination procedures in preventing cross-contamination of samples. Rinsate blanks used to assess the efficiency of field equipment decontamination procedures will be collected at the end of each day of field sampling. Equipment rinsate blanks will be collected by pouring certified distilled or deionized water over or through decontaminated (clean) sampling equipment used in the collection of investigative samples and subsequently collected in prepared sampling containers. Additives or preservatives will be included in the equipment rinsate blanks as required for analysis. The rinsate blank will be shipped with the associated field samples.

For each sample matrix, a rinsate blank will be collected and analyzed at a minimum frequency of one equipment rinsate blank per 20 samples for each day of sample collection. Rinsate blanks will also be collected from precleaned, disposable equipment for each lot of disposable equipment used to demonstrate the cleanliness of the equipment lot. Rinsate blanks will not be required if dedicated equipment is used for sampling. The rinsate blanks will be analyzed for the same parameters as the investigative samples.

### 6.1.1.2 Filter Blanks

Filter blanks are collected to assess the contamination of aqueous samples from target analytes in the filters used to collect samples for dissolved analyses during field filtration. Filter blank samples are collected by filtering deionized water into a prepared sample container. Filters will be selected from the same manufacturing lot of filters used for the associated investigative samples. Filter blanks will be collected at a frequency of one filter blank per 20 field-filtered samples.

### 6.1.1.3 Trip Blanks

Trip blanks are collected for volatile organic compound (VOC) sample analysis to assess the contamination of samples during transport to the Property, sampling collection, and transport to the laboratory. Trip blanks are prepared in the laboratory, using analyte-free water. Trip blanks should be inspected for air bubbles by both the laboratory (before shipping) and the field team. Any vials containing visible air bubbles should be discarded. One trip blank is included for each sample cooler collected for analysis of VOCs and shipped to the laboratory. The criterion for trip blanks is that target analyte concentrations must be below the method reporting limits. Consistent with U.S. Environmental Protection Agency (USEPA) data validation guidelines, analytical results for investigative samples will be qualified if the target analyte is detected in the trip blank.

#### 6.1.1.4 Temperature Blanks

Temperature blanks are prepared by the laboratory, using analyte-free (reagent) water. Temperature blanks are used by the laboratory to record the temperature of each cooler used to transport samples from the field to the laboratory. Each cooler containing samples that require temperature preservation will contain a temperature blank. The laboratory will verify that the temperature blank measurement is within the acceptable range specific to the analytical method.

#### 6.1.2 Assessment of Field Variability (Field Duplicates)

Field duplicate samples are collected to assess reproducibility of field procedures. One duplicate sample will be collected per 20 samples per sample matrix. For nonaqueous matrices, sample heterogeneity may affect the measured precision for the duplicate sample.

### 6.2 Laboratory Quality Control Samples

In the laboratory, QC samples may include matrix spike and matrix spike duplicate (MS/MSD) samples, laboratory control samples (LCSs), surrogate spike samples, and method blanks, as well as other QC samples and procedures as required by the individual methods.

#### 6.2.1 Calibration Verification

Instruments will initially be calibrated at the start of the project or sample run, as required, and when any ongoing calibration does not meet control criteria. The number of points used in the initial calibration is defined in the analytical method. Calibration will be continued as specified in the analytical method to track instrument performance. If a continuing calibration does not meet control limits, analysis of project samples will be suspended until the source of the control failure is either eliminated or reduced to within control specifications.

#### 6.2.2 Matrix Spike/Matrix Spike Duplicate

MS samples are analyzed to assess the matrix effects on the accuracy of analytical measurements. MS/MSD samples will be prepared by spiking investigative samples with known amounts of analytes before extraction and preparation and analysis. The recoveries for the MS/MSD samples will be used to assess the accuracy and precision in the analytical method by measuring how well the analytical method recovers the target compounds in the investigative matrices. For each matrix type, at least one set of MS/MSD samples will be analyzed for each batch of samples for every 20 (or fewer) samples received.

#### 6.2.3 Surrogate Spikes

Surrogate spiking consists of adding reference compounds to samples before sample preparation for organic analysis. Surrogate compound spiking is used to assess method accuracy on a sample-specific basis. Surrogate compounds will be added to samples in accordance with the analytical method requirements. Surrogate recoveries will be reported by the laboratory along with method-based or

method performance-based surrogate percent recovery acceptance limits. The laboratory will not correct sample results using these recoveries.

#### 6.2.4 Method Blanks

Method blanks are prepared using analyte-free (reagent) water and are processed with the same methodology (e.g., extraction, digestion) as the associated investigative samples. Method blanks are used to document contamination resulting in the laboratory from the analytical process. A method blank shall be prepared and analyzed in every analytical batch. The method blank results are used to verify that reagents and preparation do not impart unacceptable bias to the investigative sample results. The presence of analytes in the method blank sample will be evaluated against method-specific thresholds. If analytes are present in the method blank above the method-specific threshold, corrective action will be taken to eliminate the source of contamination before proceeding with analysis. Investigative samples of an analytical batch associated with method blank results outside acceptance limits will be qualified as appropriate by the data validation contractor.

#### 6.2.5 Laboratory Control Samples

LCSs are prepared by spiking laboratory-certified, reagent-grade water with the analytes of interest or a certified reference material that has been prepared and analyzed. The result for percent recovery of the LCS is a data quality indicator of the accuracy of the analytical method and laboratory performance.

### 6.3 Instrumentation

#### 6.3.1 Field Instrumentation Calibration and Maintenance

Field instruments will be used during the investigations. The following field equipment may require calibration before use and periodically during sampling activities:

- pH meter
- Conductivity meter
- Dissolved-oxygen meter
- Oxygen/reduction potential meter
- Turbidity meter
- Thermometer
- Electronic water-level probe

Field-instrument calibration and preventive maintenance will follow the manufacturers' guidelines, and deviations from the established guidelines will be documented. Generally, field instruments should be calibrated daily before work begins. Field personnel may decide to calibrate more than once a day if inconsistent or unusual readings occur, or if conditions warrant more frequent calibration. Calibration activities should be recorded in logbooks or field notebooks. To ensure that field

instruments are properly calibrated and remain operable, the following procedures will be used, at a minimum:

- Operation, maintenance, and calibration will be performed in accordance with the instrument manufacturers' specifications.
- Standards used to calibrate field instruments will meet the minimum requirements for source and purity recommended in the equipment operation manual. Standards will be checked for expiration dates that may be printed on the bottle. Standards that have expired should not be used.
- Acceptable criteria for calibration will be based on the limits set in the operations manual.
- Users of the equipment should be trained in the proper calibration and operation of the instrument.
- Operation and maintenance manuals for each field instrument should be available to persons using the equipment.
- Field instruments will be inspected before they are taken to the site.
- Field instruments will be calibrated at the start of each workday. Meters will be recalibrated, as necessary, during the work period.
- Calibration procedures (including items such as time, standards used, and calibration results) should be recorded in a field notebook. The information should be available if problems are encountered.

Preventive maintenance of field instruments and equipment will follow the operations manuals. A schedule of preventive-maintenance activities should be followed to minimize downtime and ensure the accuracy of measurement systems. Maintenance will be documented in the field notebook.

### 6.3.2 Laboratory Instrumentation Calibration and Maintenance

Specific laboratory instrument calibration procedures, frequency of calibration, and preparation of calibration standards will be according to the method requirements as developed by the USEPA, following procedures presented in SW-846 (USEPA, 2015).

Preventive maintenance of laboratory equipment will be the responsibility of the laboratory personnel and analysts. This maintenance includes routine care and cleaning of instruments and inspection and monitoring of carrier gases, solvents, and glassware used in analyses. The preventive-maintenance approach for specific equipment should follow the manufacturers' specifications, good laboratory practices, and industry standard techniques.

Precision and accuracy data will be examined for trends and excursions beyond control limits to determine evidence of instrument malfunction. Maintenance should be performed when an instrument begins to change, as indicated by the degradation of peak resolution, shift in calibration curves, decrease in sensitivity, or failure to meet any QC criterion.

## 6.4 Laboratory Quality Assurance and Quality Control Samples

The laboratory QC samples will be used to assess the accuracy and precision of the laboratory analysis. Each category of laboratory QA/QC will be performed by the laboratory as required by method-specific guidelines. The acceptance criteria presented in the guidelines will be adhered to and samples that do not meet the criteria will be reanalyzed or qualified as appropriate.

### 6.4.1.1 Laboratory Duplicate Samples

Laboratory duplicate samples (LDSs) are prepared by the laboratory by splitting an investigative sample into two separate aliquots and performing separate sample preparation and analysis on each aliquot. The results for relative percent difference of the primary investigative sample and the respective LDSs are used to measure precision in the analytical method and laboratory performance. For nonaqueous matrices, sample heterogeneity may affect the measured precision for the LDSs.

# 7 DATA REDUCTION, VALIDATION, AND REPORTING

The analytical laboratory will submit analytical data packages that include laboratory QA/QC results to permit independent and conclusive determination of data quality. MFA will determine data quality, using the data evaluation procedures described in this section. The results of the MFA evaluation will be used to determine if the project data quality objectives are met.

## 7.1.1 Field Data Reduction

Daily internal QC checks will be performed for field activities. Checks will consist of reviewing field notes and field activity memoranda to confirm that the specified measurements, calibrations, and procedures are being followed. The need for corrective action will be assessed on an ongoing basis, in consultation with the project manager.

## 7.1.2 Laboratory Evaluation

Initial data reduction, evaluation, and reporting at the analytical laboratory will be carried out as described in USEPA SW-846 manuals for analyses, as appropriate. Additional laboratory data qualifiers may be defined and reported to further explain the laboratory's QC concerns about a particular sample result. Additional data qualifiers will be defined in the laboratory's case narrative reports.

## 7.1.3 Data Deliverables

Laboratory data deliverables are listed below. Electronic deliverables will contain the same data that are presented in the hard-copy report.

- Transmittal cover letter
- Case narrative
- Analytical results
- COC
- Surrogate recoveries
- Method blank results
- MS/MSD results
- Laboratory duplicate results

## 7.1.4 MFA Data Evaluation

### 7.1.4.1 Data QA/QC Review

MFA will evaluate the laboratory data for precision, completeness, accuracy, and compliance with the analytical method. MFA will review data according to applicable sections of USEPA inorganics and organics procedures (USEPA, 2017a,b), as well as appropriate laboratory, method-specific guidelines (USEPA, 2015).

Data qualifiers, as defined by the USEPA, are used to classify sample data according to their conformance to QC requirements. Common qualifiers are listed below:

- J—Estimate, qualitatively correct but quantitatively suspect.
- R—Reject, data not suitable for any purpose.
- U—Not detected at a specified reporting limit.

Poor surrogate recovery, blank contamination, or calibration problems, among other things, can require qualification of the sample data. The reasons for sample qualification should be stated in the data evaluation report.

QC criteria not defined in the guidelines for evaluating analytical data are adopted, where appropriate, from the analytical method.

The following information will be reviewed during data evaluation, as applicable:

- Sampling locations and blind sample numbers
- Sampling dates
- Requested analysis
- COC documentation

- Sample preservation
- Holding times
- Method blanks
- Surrogate recoveries
- MS/MSD results
- Laboratory duplicates (if analyzed)
- Field duplicates
- Field blanks
- LCSs
- Method reporting limits above requested levels
- Additional comments or difficulties reported by the laboratory
- Overall assessment

The results of the data evaluation review will be summarized for each data package. Data qualifiers will be assigned to sample results on the basis of USEPA guidelines, as applicable.

#### 7.1.4.2 Data Management and Reduction

MFA uses a database (e.g., EQuIS™) to manage laboratory data. The laboratory will provide the analytical results in electronic, EQuIS-compatible format. Following data evaluation, data qualifiers will be entered into the database.

Data may be reduced to summarize particular data sets and to aid interpretation of the results. Statistical analyses may also be applied to results. Data reduction QC checks will be performed on hand-entered data, calculations, and data graphically displayed. Data may be further reduced and managed using one or more of the following computer software applications:

- Microsoft Excel (spreadsheet)
- EQuIS (database)
- Microsoft Access (database)
- AutoCad and/or ArcGIS (graphics)
- USEPA ProUCL (statistical software)

# 8 DATA QUALITY OBJECTIVES

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The DQO are used to establish performance and acceptance criteria, which serve as the basis for designing a plan for collecting data of sufficient quality and quantity to support the goals of the study (USEPA, 2006). The seven steps of the DQO process outlined by the USEPA are as follows:

- **State the problem**—Define the problem; identify members of the planning team; define the budget and schedule
- **Identify the goal of the study**—State how environmental data will be used to meet study objectives and solve the problem; identify study questions; define alternative outcomes
- **Identify information inputs**—Identify data and information needed to answer study questions
- **Define the boundaries of the study**—Specify target population and characteristics of interest; define spatial and temporal limits; define scale of inference
- **Develop the analytic approach**—Define parameters of interest; specify type of inference; develop logic for drawing conclusions from findings
- **Specify performance or acceptance criteria**—Specify criteria for new data collection (performance metrics) and decision making (probability limits)
- **Develop the plan for obtaining data**—Develop the SAP

This SAP for environmental data collection was developed using the DQO process and presents performance metrics for collection and analysis for soil and water that will be sampled.

Decision criteria will be identified and based on comparison of analytical laboratory results to applicable screening and action levels. Screening and action levels may include MTCA cleanup levels, and USEPA maximum contaminant levels or regional background values. Applicable cleanup levels are presented in the Table 8-1.

## 8.1 Data Precision

Precision is the measure of agreement among repeated measurements of the same property under identical or substantially similar conditions, calculated as either the range or the standard deviation (USEPA, 2002). Precision is measured by making repeated analyses on the same analytical instrument (laboratory duplicates) or replicate collections of samples in the field (field duplicates). Precision criteria are expressed as the relative percent difference (RPD) between the primary and duplicate samples. The acceptance limits for RPD are based on the sample matrix and the analytical method used.

The RPD is calculated using the equation:

$$RPD = \frac{2(x_s - x_d)}{x_s + x_d} \times 100\%$$

Where:

$x_s$  = result for primary sample

$x_d$  = result for duplicate sample

## 8.2 Data Bias

Bias is defined as the systematic or persistent distortion of a measurement process that causes error in one direction (USEPA, 2002). Data bias is addressed in the field and the laboratory through equipment calibration, collection and analysis of QC blank samples, and analysis of QC standard samples.

## 8.3 Data Accuracy

Accuracy is defined as the measure of the overall agreement of a measurement to a known value, and includes a combination of random error (precision) and systematic error (bias) components of both sampling and analytical operations (USEPA, 2002). Since the “true” concentration of sampled media is not known, the degree of accuracy in the measurement is inferred from recovery data determined by sample spiking and/or the analyses of reference standards. The criterion for accuracy is expressed as the percent recovery of the sample spiking. The acceptance limits for percent recovery are based on the analytical method used.

Percent recovery is calculated using the equation:

$$\text{Percent Recovery} = \frac{x_{ss} - x_s}{T} \times 100\%$$

Where:

$x_{ss}$  = result for spiked sample

$x_s$  = result for sample

$T$  = true value of added spike

## 8.4 Data Completeness

Data completeness is defined as a measure of the amount of valid data needed from a measurement system (USEPA, 2002). It is measured as the total number of samples collected for which the valid analytical data are obtained divided by the total number of samples collected and multiplied by 100.

## 8.5 Data Representativeness

Data representativeness is a qualitative term that expresses “the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process

condition, or an environmental condition” (USEPA, 2002). Data representativeness is evaluated by assessing the accuracy and precision of the sampling program. The criterion for evaluating representativeness will be satisfied by confirming that the sample collection procedures are consistently followed.

## 8.6 Data Comparability

Data comparability is a qualitative term expressing the measure of confidence with which one data set can be compared to another and can be combined for decision-making purposes (USEPA, 2002). Data comparability will be achieved by using standard sampling and operating procedures and analytical methods. Data comparability will be assessed using documentation of QA/QC procedures.

## 8.7 Data Sensitivity

Data sensitivity is defined as the capability of a method or instrument to discriminate between measurement responses representing different levels of the variable of interest (USEPA, 2002). The method reporting limits specified through the DQO process are provided in Table 8-1. Results measured between the reporting limits and method detection limits will be reported for all analytes and assigned the appropriate qualifier.

# 9 REPORTING

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After the data are received, MFA will generate a data report, which will summarize and compare the data against the preliminary screening levels identified in the work plan. Under the remedial action grant agreement General Terms and Conditions, No. 11 Environmental Data Standards, environmental data will also be submitted to Ecology using the Environmental Information Management System.

## LIMITATIONS

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The services undertaken in completing this plan were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This plan is solely for the use and information of our client, unless otherwise noted. Any reliance on this plan by a third party is at such party's sole risk.

Opinions and recommendations contained in this plan apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others or the use of segregated portions of this plan.

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# TABLES



**Table 4-1  
Groundwater Sample Summary  
Raplee Property  
Stanwood, Washington**

Analyte	Reporting Limit (ug/L)	Method	Suggested Volume (mL)	Container	Number of Containers	Preservative	Storage Temperature	Holding Time from Collection
DRO	50	NWTPH-Dx	500	Amber Glass	2	HCl pH < 2	4 degrees C	14 days
ORO	250							
GRO	100	NWTPH-Gx	40	VOA	3	HCl pH < 2	4 degrees C	14 days
Benzene	1	USEPA 8021B						
Toluene	1							
Ethylbenzene	1							
Xylenes, Total	3							
<p>NOTES:  C = Celsius.  DRO = diesel-range organics.  GRO = gasoline-range organics.  HCl = hydrochloric acid.  NWTPH = Northwest Total Petroleum Hydrocarbon.  ORO = heavy oil-range organics.  USEPA = U.S. Environmental Protection Agency.  VOA = volatile organic analysis vial.</p>								

**Table 8-1  
Analytical Methods and Performance Criteria  
Raplee Property  
Stanwood, Washington**

Analyte	MTCA A CUL (ug/L)	MRL (ug/L)	Preferred Analytical Method	MS Accuracy (Percent) <sup>a</sup>	Precision (RPD) <sup>b</sup>	LCS Accuracy (Percent) <sup>a</sup>	Completeness (Percent)
<b>Petroleum Hydrocarbons</b>							
Gasoline-range organics	800/1000 <sup>d</sup>	100	NWTPH-Gx	70-130	20	70-130	90
Diesel-range organics	500	50	NWTPH-Dx	70-130	20	70-130	90
Lube oil-range organics	500	250	NWTPH-Dx	70-130	20	70-130	90
<b>VOCs</b>							
Benzene	5.0	1.0	EPA 8021B	70-130	20	70-130	90
Ethylbenzene	700	1.0	EPA 8021B	70-130	20	70-130	90
Toluene	1000	1.0	EPA 8021B	70-130	20	70-130	90
Xylenes (total)	1000	3.0	EPA 8021B	70-130	20	70-130	90
<p>NOTES:</p> <p>CUL = cleanup level.</p> <p>EPA = Environmental Protection Agency.</p> <p>LCS = laboratory control sample.</p> <p>MRL = method reporting limit.</p> <p>MS = matrix spike.</p> <p>MTCA = model toxics control act.</p> <p>RPD = relative percent difference.</p> <p>ug/L = micrograms per liter.</p> <p><sup>a</sup>MS and LCS acceptance criteria are calculated based on historical recovery data; acceptance criteria may be periodically updated by laboratory.</p> <p><sup>b</sup>Laboratory duplicate sample precision is not evaluated when results are less than five times the MRL.</p> <p><sup>c</sup>NWTPH-HCID results are qualitative; reporting limits and precision/accuracy performance criteria are not applicable.</p> <p><sup>d</sup>MTCA A cleanup level for gasoline is 800 ug/L when benzene is present; 1000 ug/L when not present.</p>							

# APPENDIX

## FIELD SAMPLING DATA FORM



# Maul Foster & Alongi, Inc.

109 East 13th Street, Vancouver, WA 98660 (360) 694-2691 Fax. (360) 906-1958

## Water Field Sampling Data Sheet

<b>Client Name</b>		<b>Sample Location</b>	
<b>Project #</b>		<b>Sampler</b>	
<b>Project Name</b>		<b>Sampling Date</b>	
<b>Sampling Event</b>		<b>Sample Name</b>	
<b>Sub Area</b>		<b>Sample Depth</b>	
<b>FSDS QA:</b>		<b>Easting</b>	<b>Northing</b>
			<b>TOC</b>

### Hydrology/Level Measurements

Date	Time	DT-Bottom	DT-Product	DT-Water	(Product Thickness)	(Water Column)	(Gallons/ft x Water Column)
					DTP-DTW	DTB-DTW	Pore Volume

(0.75" = 0.023 gal/ft) (1" = 0.041 gal/ft) (1.5" = 0.092 gal/ft) (2" = 0.163 gal/ft) (3" = 0.367 gal/ft) (4" = 0.653 gal/ft) (6" = 1.469 gal/ft) (8" = 2.611 gal/ft)

### Water Quality Data

Purge Method	Time	Purge Vol (gal)	Flowrate l/min	pH	Temp (C)	E Cond (uS/cm)	DO (mg/L)	EH	Turbidity
Final Field Parameters									

Methods: (1) Submersible Pump (2) Peristaltic Pump (3) Disposable Bailer (4) Vacuum Pump (5) Dedicated Bailer (6) Inertia Pump (7) Other (specify)

### Water Quality Observations:

### Sample Information

Sampling Method	Sample Type	Sampling Time	Container Code/Preservative	#	Filtered
	Groundwater		VOA-Glass		
			Amber Glass		
			White Poly		
			Yellow Poly		
			Green Poly		
			Red Total Poly		
			Red Dissolved Poly		
			Total Bottles	0	

### General Sampling Comments

Signature \_\_\_\_\_

# APPENDIX B

## HEALTH AND SAFETY PLAN



# HEALTH AND SAFETY PLAN

---

RAPLEE PROPERTY  
STANWOOD, WASHINGTON

REMEDIAL ACTION GRANT AGREEMENT  
NO. TCPRA-2018-STANWO-00027



*Prepared for*  
**CITY OF STANWOOD**  
STANWOOD, WASHINGTON  
*November 21, 2018*  
*Project No. 1030.01.04*

*Prepared by*  
*Maul Foster & Alongi, Inc.*  
*1329 N State Street, Suite 301, Bellingham WA 98225*

HEALTH AND SAFETY PLAN  
RAPLEE PROPERTY  
STANWOOD, WASHINGTON

REMEDIAL ACTION GRANT AGREEMENT  
NO. TCPRA-2018-STANWO-00027

*The material and data in this plan were prepared  
under the supervision and direction of the undersigned.*

MAUL FOSTER & ALONGI, INC.



---

*Phil Wiescher, PhD  
Senior Environmental Scientist*



---

*Amanda Bixby, GIT  
Staff Geologist*

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# 1 NEAREST HOSPITAL/EMERGENCY MEDICAL CENTER

---

## 1.1 Nearest Hospital

Skagit Valley Hospital: Emergency Room

300 Hospital Parkway

Mt Vernon, WA 98273

Phone: (360) 424-4111

Distance: 13.5 miles

Travel Time: 20 minutes

## 1.2 Route to Hospital from Property

See map on first page of this document.

### 1.2.1 Driving Directions to Hospital from Property

1. Take Old Pacific Hwy to Pioneer Hwy. 2.6 mi.
2. Follow Pioneer Hwy and I-5 N to S 13th St in Mount Vernon. 10.6 mi.
3. Continue on S 13th St to your destination. 0.3 mi.

## 1.3 Emergency Phone Numbers

Ambulance, Police, Fire	Dial 911
<b>Phil Wiescher</b> Project Manager	Phone: 503 501 5209 Cell: 503 407 1036
<b>Mike Stringer</b> Project Director	Phone: 206 498 9147 Cell: 206 858 7617
<b>Bill Beadie</b> Health and Safety Coordinator	Phone: 360 947 2200 Cell: 503 740 6847

## 2 PLAN SUMMARY

---

This health and safety plan (HASP) was developed to describe the procedures and practices necessary for protecting the health and safety of Maul Foster & Alongi, Inc. (MFA) employees conducting activities at 9816 271st Street NW (the Property). Other employers, including contractors and subcontractors, are expected to develop and implement their own HASPs to manage the health and safety of their personnel.

MFA personnel conducting activities at the Property are responsible for understanding and adhering to this HASP. Before fieldwork begins, a site safety officer (SSO) who is familiar with health and safety procedures and with the Property will be designated by the field personnel. Safety deficiencies should be immediately communicated to the SSO and, if necessary, to MFA's health and safety coordinator (HSC).

All contractors and subcontractors have the primary responsibility for the safety of their own personnel on the Property. All personnel on the Property have "stop work" authority if they observe conditions that they believe create an imminent danger.

If MFA employees work on the Property for more than a year, this HASP will be reviewed at least annually. The plan will be updated as necessary to ensure that it reflects the known hazards, conditions, and requirements associated with the Property.

**MFA personnel who will be working on the Property are required to read and understand this HASP. MFA personnel entering the work area must sign the Personnel Acknowledgment Sheet (Section 15), certifying that they have read and that they understand this HASP and agree to abide by it.**

## 3 KEY PROJECT PERSONNEL

---

Name	Responsibility
Mike Stringer	Project Director
Phil Wiescher	Project Manager
Amanda Bixby	Field Personnel
Carolyn Wise	Field Personnel
Bill Beadie	Health and Safety Coordinator

# 4 PROPERTY DESCRIPTION AND BACKGROUND

---

## 4.1 Type of Property

The Raplee property is located at 9816 271st Street NW in Stanwood, Washington (the Property). The Property is currently vacant, but was historically used as a filling station.

## 4.2 Building/Structures

The vacant Property is surrounded by a chain-link fence and contains grassy areas and partially intact asphalt and concrete surfaces, along with asphalt and concrete rubble and debris from a prior building demolition.

## 4.3 Topography

The Property is relatively level, sloping slightly to the northwest.

## 4.4 General Geologic/Hydrologic Setting

The Property is located in the Snohomish River valley. According to the Geologic Map of the Stanwood Quadrangle, the Property and its vicinity are located on Quaternary younger alluvial and estuarine deposits.<sup>1</sup> SAIC encountered subsurface soils consisting primarily of gray silt or a silt/clay mixture during well installation in 2006. Because of the low hydraulic conductivity of the local sediment, the monitoring wells on the Property have poor groundwater recharge and initially pumped dry during purging.<sup>2</sup>

During development of the Property, fill was placed to raise the grade above flood level. SAIC reported the presence of fill consisting of brown medium sand and sandy silt with fine gravel with trace rounded cobbles in the upper four feet of the borings.<sup>2</sup>

According to previous environmental investigations, shallow groundwater at the Property is typically encountered less than five feet below ground surface and likely is associated with a shallow, unconfined aquifer. The groundwater at the Property flows northwest, consistent with topography. The groundwater gradient is relatively shallow, with less than 2 feet of groundwater elevation difference across the Property.<sup>2</sup>

---

<sup>1</sup>J.P. Minard. Geologic map of the Stanwood Quadrangle, Snohomish County, Washington. U.S. Geological Survey. 1985.

<sup>2</sup>SAIC. Site assessment report for Chevron Corporation. Science Applications International Corporation. 2006.

## 4.5 Property Status

The Property is vacant.

## 4.6 General Property History

From the early 1940s to the 1970s, numerous filling stations and service stations operated on the Property. In 1998, Kathleen Raplee purchased the Property. The Property is currently vacant.

---

# 5 HAZARD EVALUATION

---

## 5.1 Property Tasks and Operations

MFA has completed job hazard analyses (JHAs) for specific tasks that likely could be completed on the Property, depending on the scope of work. These tasks are provided in Appendix A. The following list generally summarizes planned tasks and operations:

- Collecting groundwater samples
- Working near traffic

The control measures that field personnel must use to eliminate or minimize these hazards, such as air monitoring, personal protective equipment (PPE), and decontamination procedures, are detailed in the JHAs and in subsequent sections of this plan.

## 5.2 Chemical Hazard Evaluation

Chemicals of potential concern (COPCs) and detected concentrations on the Property are summarized in Appendix B.

## 5.3 Physical Hazards

The specific physical hazards and associated controls for work on the Property are described in Appendix A, JHAs.

---

# 6 HEALTH AND SAFETY TRAINING

---

MFA personnel working on Property and who could be exposed to COPCs will have completed training consistent with the HAZWOPER requirements in 29 Code of Federal Regulations (CFR) 1910.120(e). The training will include:

- Identity of safety and health personnel
- Safety and health hazards identified on the Property
- Proper use of required PPE
- Safe work practices required on the Property, e.g., fall protection, confined space entry procedures, hot work permits, general safety rules
- Safe use of engineering controls and equipment on the Property
- Medical surveillance requirements, including the recognition of signs and symptoms that might indicate overexposure to hazards
- The emergency response plan/spill containment plan

The HSC will oversee training for field personnel. Training records, including an outline, sign-offs, and competency records, will be maintained by the HSC.

## 7 SAFETY EQUIPMENT

---

### 7.1 Personal Protective Equipment

- PPE must be worn by individuals on the Property to protect against physical hazards. PPE required on the Property is modified Level D, which consists of: High-visibility vest
- Work boots
- Safety glasses with side shields
- Nitrile gloves or equivalent when handling known or potentially impacted media
- Work gloves (if handling materials that that might have sharp edges, protrusions, or splinters)

Additional PPE may be necessary for specific tasks with additional hazards. The SSO will be responsible for designating additional PPE for specific tasks. Depending on the activity, additional PPE may include:

- Type 1 hard hat
- Hearing protection (during high-noise tasks)
- Chemical-resistant clothing, e.g., Tyvek® coveralls
- Chemical-resistant boots
- Chemical-resistant goggles
- Chemical-resistant gloves
- Faceshield
- Respiratory protection

Additional PPE may be required if workers discover unexpected contamination. Characteristics of unexpected contamination could include unusual odors, discolored media, a visible sheen, etc. The

SSO and, if necessary, the HSC will be contacted as soon as possible after the discovery of unexpected contamination, and the SSO and/or the HSC will determine the need for additional controls and/or training.

PPE used at the Property must meet the requirements of recognized consensus standards (e.g., American National Standards Institute, National Institute for Occupational Safety and Health [NIOSH]), and respiratory protection shall comply with the requirements set forth in 29 CFR 1910.134.

Project personnel are not permitted to reduce the level of specified PPE without approval from the SSO or the HSC.

## 7.2 Safety Equipment

The SSO will be responsible for ensuring that the following safety equipment is available and is properly inspected and maintained:

- Soap and water for decontamination
- Caution tape, traffic cones, and/or barriers
- First-aid kit
- Fire extinguisher
- Fluids for hydration, e.g., drinking water or sports drink

## 7.3 Communications Equipment

MFA personnel should have a mobile phone or a radio available in case of emergency.

# 8 DECONTAMINATION PROCEDURES

---

## 8.1 Partial Decontamination Procedure

MFA employees will implement the following partial decontamination procedures when exiting the exclusion zone but remaining on the Property, as applicable.

- Wash and rinse boots and outer gloves in containers in the contamination-reduction zone.
- Remove outer gloves. Inspect and discard in a container labeled for disposable items if ripped or damaged.
- Wash hands and face with soap and water.

## 8.2 Full Decontamination Procedures

MFA employees will follow the full decontamination procedures listed below when exiting the exclusion zone and leaving the Property, e.g., at the end of the work shift.

- Wash and rinse boots and outer gloves in containers in the contamination-reduction zone.
- Remove outer gloves and Tyvek suit and deposit in a container labeled for disposable items.
- Remove respirator and discard used cartridges at the frequency dictated by the SSO.
- Wash and rinse respirator in a “respirators only” decontamination container.
- Remove work boots and put on street shoes. Place work boots in a plastic bag or container for later reuse.
- Remove inner gloves and deposit in a container labeled for disposable items.
- Wash hands and face with soap and water.
- Shower as soon after the work shift as practicable.

---

# 9 MEDICAL SURVEILLANCE

---

MFA will ensure that its employees who meet the following criteria are enrolled in a medical surveillance program consistent with 29 CFR 1910.120(f):

- The employees are, or may be, exposed to hazardous substances or health hazards at or above established permissible exposure limits for 30 or more days per year.
- The employees are required to wear a respirator for 30 or more days per year.

MFA employees who exhibit signs or symptoms consistent with overexposure to contaminants will be offered medical surveillance consistent with Washington Administrative Code (WAC) 296-843-21005).

MFA will ensure that its employees who are authorized to wear respirators are medically evaluated consistent with the respiratory protection standard (29 CFR 1910.134). The HSC or administrative designee (e.g., human resources manager) will maintain medical evaluation records.

---

# 10 PROPERTY CONTROL MEASURES

---

Access to the Property will be controlled as part of the fieldwork preparation. Control measures may include fencing, gates, and signs limiting access to everyone except authorized personnel.

MFA requires the “buddy system” if personnel conduct operations that may involve exposure to hazards. The buddy system may involve working with non-MFA personnel.

## 11 EMERGENCY RESPONSE / SPILL CONTAINMENT / CONFINED SPACE

---

MFA employees will follow the emergency response, spill response, and confined space procedures described in the MFA Health and Safety Manual. Incidents will be documented on the incident report form included with Appendix C.

## 12 PRE-ENTRY BRIEFING

---

MFA employees will conduct pre-entry briefings, e.g., tailgate meetings, before starting work on the Property and/or as the scope of work changes throughout the project to ensure that employees are familiar with the HASP and that the plan is being followed. Attendance and discussion topics will be documented on sign-in sheets, which will be maintained by the SSO.

## 13 PERIODIC EVALUATION

---

The project manager or designee will evaluate the effectiveness of this HASP. As part of the evaluation, the project manager or designee will track ongoing health and safety feedback from field personnel working on the project. This feedback will be reviewed and incorporated into either immediate or annual updates of the HASP. HASPs will be reviewed and updated at least annually. Updating the plan as necessary ensures that it reflects the known hazards, conditions, and requirements associated with the Property. MFA will maintain periodic evaluation records and will track all HASP revisions.

## 14 SAFE WORK PRACTICES

---

The following safe work practices are provided to supplement the other information included with this HASP.

1. Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of materials is prohibited in areas with potentially contaminated materials.
2. Field personnel will, whenever practicable, remain upwind of drilling rigs, open excavations, and other land-disturbing activities.
3. Subsurface work shall not be performed at any location until the area has been confirmed by a utility-locator firm to be free of underground utilities or other obstructions.

# 15 ACKNOWLEDGMENT

---

MFA cannot guarantee the health or safety of any person entering the Property. Because of the potentially hazardous nature of field visits, it is not possible to discover, evaluate, and provide protection against all possible hazards that may be encountered. Strict adherence to the health and safety guidelines set forth herein will reduce, but not eliminate, the potential for injury and illness at the Property. The health and safety guidelines in this plan were prepared specifically for the Property and should not be used on any other property without prior evaluation by trained health and safety personnel.

MFA personnel who will work at the Property are to read, understand, and agree to comply with the specific practices and guidelines described in this HASP regarding field safety and health hazards.

This HASP has been developed for the exclusive use of MFA personnel. MFA may make this plan available for review by contracted or subcontracted personnel for information only. This plan does not cover the activities performed by employees of any other employer on the Property. All contracted or subcontracted personnel are responsible for implementing their own health and safety program, including generating and using their own plan.

I have read and I understand this HASP and all attachments, and agree to comply with the requirements described herein:

Name	Title	Date
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

# APPENDIX A

## JOB HAZARD ANALYSES



## Job Hazard Analysis (JHA)

Task/Operation: Work Near Traffic		
<b>Project Number:</b> 1030.01.04	<b>Location/Site where Task/Operation Performed:</b> 9816 271st Street NW, Stanwood, WA	
<b>Date Prepared:</b> 10/12/2018	<b>Employee Preparing this JHA:</b> Amanda Bixby	
<b>Date Reviewed:</b> 10/15/2018	<b>Employee Reviewing and Certifying this JHA:</b> Carolyn Wise	
Job/Task Description		
Employees will conduct groundwater sampling from existing monitoring wells on the Site. The Site is located adjacent to an active roadway.		
Physical Hazards		
Hazard/Risk	Source of Hazard/Risk	Hazard/Risk Mitigation
Bodily injury	Vehicles moving around site.	Wear a reflective safety vest for enhanced visibility. Use cones and/or barriers to designate traffic patterns.
Biological and Chemical Hazards		
Hazard/Risk	Source of Hazard/Risk	Hazard/Risk Mitigation
None	None specific to this JHA. Chemical hazards related to the site are described in the Chemical Hazards Summary Table.	None
Additional Control Measures and Guidance		
<b>Engineering Controls:</b> No engineering controls specified.		
<b>General Safe-Work Practices and Guidance:</b> Personnel will stay upwind and out of heavy traffic areas, if feasible. Cones, signage, barrier tape, or other equivalent methods will be used to establish traffic-control patterns, if feasible. Personnel should monitor traffic hazards before entering locations with potential vehicle movement.		
<b>Personal Protective Equipment (PPE):</b> Steel-toe work boots, high-visibility safety vest or outer garment, safety glasses with side shields, and nitrile gloves.		

## Job Hazard Analysis (JHA)

Task/Operation: Groundwater Sampling		
<b>Project Number:</b> 1030.01.04	<b>Location/Site where Task/Operation Performed:</b> 9816 271st Street NW, Stanwood, WA	
<b>Date Prepared:</b> 10/12/2018	<b>Employee Preparing this JHA:</b> Amanda Bixby	
<b>Date Reviewed:</b> 10/15/2018	<b>Employee Reviewing and Certifying this JHA:</b> Carolyn Wise	
Job/Task Description		
Employees will conduct groundwater sampling from existing monitoring wells.		
Physical Hazards		
Physical Hazard/Risk	Source of Hazard/Risk	Hazard/Risk Mitigation
Heat/Cold/Sunburn	Weather	Wear sunscreen on exposed skin. Stop work if an employee feels symptoms of dehydration, overheating, or heat stroke. Move to a shaded area and consume water. During cold conditions, wear adequate clothing to reduce the potential for hypothermia.
Eye injury	Construction debris and splashes (e.g., soil, water) coming into contact with eyes.	Wear eye protection with side shields.
Physical Stress	Heavy lifting of equipment and bailing water.	Use proper lifting techniques and take breaks and rest as needed.
Accidents with equipment/tools	Sample-collection equipment/tools.	Only use appropriate equipment for its intended use. Secure equipment in vehicle with netting or straps—do not leave loose.
Biological/Chemical Hazards		
Biological/Chemical Risk	Source of Hazard/Risk	Hazard/Risk Mitigation
Chemical	Chemicals of interest in groundwater include petroleum products and related constituents as noted in Appendix B.	The personal protective equipment (PPE) described below should be used during groundwater sampling to minimize direct contact with groundwater.
Biological—Animals	Biting or stinging insects, spiders and snakes.	When necessary, use bug repellent. Use snake chaps or shin guards when grass is above the ankle. Use a bar to clear spiders and/or snakes from objects and/or vegetation.

**Task/Operation: Groundwater Sampling**

**Additional Control Measures and Guidance**

**Engineering Controls:** No engineering controls specified.

**Chemical or Biological Concerns Specific to this JHA:** None.

**General Safe-Work Practices and Guidance:**

- Do not eat or drink in the immediate area where sampling is being conducted.
- Wash hands and face before eating or drinking.
- Dispose of used nitrile gloves in an appropriate container.
- Avoid working with breathing zone directly above the opening of the well casing. When possible, work upwind of the well casing.
- If work is conducted in or near traffic areas, wear high visibility vests. Use cones, flagging, or other devices to mark out the work area.
- Always carry a cellular phone while working in remote areas.

**Personal Protective Equipment (PPE):** Work boots, high-visibility vest, safety glasses with side shields, and disposable nitrile gloves. Avoid direct contact with groundwater.

# APPENDIX B

## CHEMICALS HAZARD SUMMARY



**Table B-1  
Chemical Hazards  
Raplee Property  
Stanwood, Washington**

	OSHA PEL (TWA)	ACGIH TLV (TWA)	NIOSH IDLH	LEL (%)	IP (eV)	Other Hazard
TPH						
Gasoline-Range Organics (TPH-G)	NA	300 ppm	NA	1.4	NA	C, E, F, P
Diesel-Range Organics (TPH-D)	NA	100 mg/m <sup>3</sup>	NA	NA	NA	E, F, P
Residual-Range Organics (TPH-O)	NA	NA	NA	NA	NA	E, F, P
Additional						
Benzene	1 ppm	5 ppm	500 ppm	1.2	9.24	F, C, P, R
Ethylbenzene	100 ppm	125 ppm	800 ppm	0.8	8.76	F, P
Toluene	100 ppm	150 ppm	500 ppm	1.1	8.82	E, F, P, R
Xylenes	100 ppm	150 ppm	900 ppm	0.9	8.44-8.56	F, P
<p>NOTES:</p> <p>IDLH values taken from <a href="http://www.cdc.gov/niosh/idlh/intridl4.html">http://www.cdc.gov/niosh/idlh/intridl4.html</a>.</p> <p>ACGIH = American Conference of Governmental Industrial Hygienists. ®</p> <p>C = carcinogen.</p> <p>Ce = ceiling concentration.</p> <p>E = explosive.</p> <p>F = flammable.</p> <p>IDLH = immediately dangerous to life and health.</p> <p>IP (eV) = ionization potential.</p> <p>LEL = lower explosive limit.</p> <p>NA = not available.</p> <p>NIOSH = National Institute for Occupational Safety and Health.</p> <p>OSHA = Occupational Safety and Health Administration.</p> <p>P = poison.</p> <p>PEL = permissible exposure level.</p> <p>R = reactive.</p> <p>TLV = threshold limit value.</p> <p>TPH = total petroleum hydrocarbons.</p> <p>TWA = time-weighted average.</p>						

# APPENDIX C

## INCIDENT REPORT FORM





# MAUL FOSTER & ALONGI, INC. HEALTH & SAFETY INCIDENT REPORT

**THIS REPORT MUST BE COMPLETED IN FULL AND SUBMITTED  
WITHIN 24 HOURS TO THE MFA HEALTH AND SAFETY COORDINATOR**

Project Name: \_\_\_\_\_

Project Number: \_\_\_\_\_

Date of Incident: \_\_\_\_\_

Time of Incident: \_\_\_\_\_

Location: \_\_\_\_\_

Type of Incident (Check all applicable items)

- Illness
- Injury
- Property Damage
- Other (describe): \_\_\_\_\_
- Health & Safety Infraction
- Fire, Explosion, Flash
- Unexpected Exposure
- Vehicular Accident
- Electric Shock
- Near Miss

## DESCRIPTION OF INCIDENT

*(Describe what happened and the possible cause of the incident. Identify individual(s) involved, witnesses, and their affiliations. Describe emergency or corrective action taken. Attach additional sheets, drawings, or photographs as needed.)*

## INCIDENT REPORTER

PRINT NAME	SIGNATURE	DATE
------------	-----------	------

Site Safety Officer must deliver this report to the Health & Safety Coordinator within 24 hours. Reviewed by:

PRINT NAME MFA Health & Safety Coordinator	SIGNATURE MFA Health & Safety Coordinator	DATE
---	--	------

# APPENDIX D

## TAILGATE SAFETY MEETING CHECKLIST



# Tailgate Safety Meeting Checklist



MAUL FOSTER ALONG I

<b>Client Name:</b>	City of Stanwood
<b>Project No.:</b>	1030.01.04
<b>Communicated By:</b>	Amanda Bixby
<b>Date:</b>	

Yes	NA	Information Reviewed
<input type="checkbox"/>	<input type="checkbox"/>	Emergency Procedures and Site Evacuation Routes
<input type="checkbox"/>	<input type="checkbox"/>	Route to Hospital
<input type="checkbox"/>	<input type="checkbox"/>	HASP Review and Location
<input type="checkbox"/>	<input type="checkbox"/>	Key Project Personnel
<input type="checkbox"/>	<input type="checkbox"/>	Emergency Phone Numbers
<input type="checkbox"/>	<input type="checkbox"/>	Stop-Work Authority
<input type="checkbox"/>	<input type="checkbox"/>	General Site Description/History and Chemical Hazards
<input type="checkbox"/>	<input type="checkbox"/>	For Active Sites - Site Activities and Vehicular/Equipment Traffic
<input type="checkbox"/>	<input type="checkbox"/>	Site-Specific Physical Hazards
<input type="checkbox"/>	<input type="checkbox"/>	Required Personal Protective Equipment
<input type="checkbox"/>	<input type="checkbox"/>	Available Safety Equipment and Location
<input type="checkbox"/>	<input type="checkbox"/>	Daily Scope of Work (Reference JHAs as applicable)
<input type="checkbox"/>	<input type="checkbox"/>	Decontamination Procedures
<input type="checkbox"/>	<input type="checkbox"/>	Identify Work Zones, Exclusion Zones, and Decontamination Zones
<input type="checkbox"/>	<input type="checkbox"/>	Hazardous Atmospheres
<input type="checkbox"/>	<input type="checkbox"/>	Air Monitoring Equipment and Procedures
<input type="checkbox"/>	<input type="checkbox"/>	Identify Potential Site-Specific Slip, Trip, and Fall Hazards
<input type="checkbox"/>	<input type="checkbox"/>	Dust and Vapor Control
<input type="checkbox"/>	<input type="checkbox"/>	Confined Space(s)
<input type="checkbox"/>	<input type="checkbox"/>	Open Pits and Excavation
<input type="checkbox"/>	<input type="checkbox"/>	Extreme Temperatures
<input type="checkbox"/>	<input type="checkbox"/>	Incident Reporting
<input type="checkbox"/>	<input type="checkbox"/>	Other: _____

Suggestions to Improve HS Practices		

Attendees		
Name	Signature	Company
1)		
2)		
3)		
4)		
5)		
6)		
7)		
8)		

# APPENDIX C

## HISTORICAL DATA



TABLE 2 (page 1 of 2)  
 SUMMARY OF SOIL SAMPLE ANALYTICAL DATA <sup>1</sup>  
 UST REMOVAL SOIL ASSESSMENT  
 FORMER SERVICE STATION  
 STANWOOD, WASHINGTON

Sample Number <sup>2</sup>	Benzene <sup>3</sup> (mg/Kg) <sup>D</sup> <sub>Q</sub>	Toluene <sup>3</sup> (mg/Kg) <sup>D</sup> <sub>Q</sub>	Ethylbenzene <sup>3</sup> (mg/Kg) <sup>D</sup> <sub>Q</sub>	Xylenes <sup>3</sup> (mg/Kg) <sup>D</sup> <sub>Q</sub>	GRO <sup>4</sup> (mg/Kg) <sup>D</sup> <sub>Q</sub>	DRO <sup>5</sup> (mg/Kg) <sup>D</sup> <sub>Q</sub>	HO <sup>5</sup> (mg/Kg) <sup>D</sup> <sub>Q</sub>	MTBE <sup>3</sup> (mg/Kg) <sup>D</sup> <sub>Q</sub>	Lead <sup>7</sup> (mg/Kg) <sup>D</sup> <sub>Q</sub>
<b>UST EXCAVATION</b>									
G-1-7.5	0.4	0.05 U	0.2	0.6	21	46	120	0.1 U	35
G-2-8.0	0.9	0.05 U	0.5	1.2	23	25 U	50 U	0.1 U	12
G-3-8.0 <sup>8</sup>	1.5	0.1	1.6	7.1	55	25 U	50 U	0.1 U	6.4
G-4-4.5 <sup>8</sup>	3.7	0.4	8.3	43	370	870	3,500	0.5 U	--
G-5-4.5	2.7	0.2 U	1.5	7.7	250	130	850	0.4 U	--
G-6-4.5	2.4	0.1 U	1.3	9.9	200	350	1,500	0.2 U	--
G-7-4.5	4.3	0.3	7.0	18	240	440	2,200	0.4 U	--
G-8-4.5	11	0.8	17	91	770	640	2,500	1.0 U	--
G-9-4.5	15	1.8	28	130	1,100	900	3,300	1.0 U	--
<b>PRODUCT LINES AND SERVICE ISLAND</b>									
PL-1-1.0	2.4	1.0 U	4.2	23	910	--	--	2.0 U	--
SI-1-1.5	0.2 U	0.4	1.0	2.1	300	--	--	0.5 U	--
<b>STOCKPILE</b>									
SP-1 <sup>8</sup>	0.4	0.1 U	0.4	5.1	120	400	2,200	0.2 U	38
SP-2	0.9	0.3	2.0	18	400	1,400	6,500	0.5 U	220
SP-3 <sup>8</sup>	7.1	1.5	16	77	1,900	3,300	12,000	2.0 U	1,600
MTCA Method A Soil Cleanup Level <sup>9</sup>	0.03	7.0	6.0	9.0	30/100 <sup>10</sup>	2,000	2,000	0.1	250

Pinnacle. 2005. UST decommissioning observation and site check/site assessment gasoline and waste oil USTs. Pinnacle GeoSciences, Inc., Bellevue, Washington. March 11. p. 11.

TABLE 2 (page 2 of 2)  
SUMMARY OF SOIL SAMPLE ANALYTICAL DATA <sup>1</sup>  
UST REMOVAL SOIL ASSESSMENT  
FORMER SERVICE STATION  
STANWOOD, WASHINGTON

**Notes:**

<sup>1</sup> Samples analyzed by North Creek Analytical, Inc. of Bothell, Washington.

<sup>2</sup> Soil sample locations are shown on Figure 2. The number following the second hyphen is the depth, in feet and tenths of feet, that the sample was obtained from.

<sup>3</sup> By EPA Method 8021B.

<sup>4</sup> By Ecology Method NWTPH-G.

<sup>5</sup> By Ecology Method NWTPH-Dx.

<sup>6</sup> By EPA Method 8260B.

<sup>7</sup> Total lead by EPA Method 6010.

<sup>8</sup> Samples were also tested for halogenated volatile organic compounds. HVOCs were not detected, with the exception of chlorobenzene. Chlorobenzene was detected in sample G-3-8.0 at a concentration of 740 µg/Kg, in sample G-4-4.5 at a concentration of 1,900 µg/Kg, in sample SP-1 at a concentration of 540 µg/Kg, and in sample SP-3 at a concentration of 8,000 µg/Kg.

<sup>9</sup> MTCA Method A Soil Cleanup Level for Unrestricted Land Uses.

<sup>10</sup> The MTCA Method A Soil Cleanup Level for GRO is 100 mg/Kg for mixtures without benzene and where the total of ethylbenzene, toluene and xylenes is less than 1% of the mixture, and 30 mg/Kg for all other mixtures.

mg/Kg = milligrams per kilogram

"-" = not tested

DQ = data qualifier

U = not detected at or above the specified concentration

J = estimated concentration outside instrument calibration range

Stippled concentrations exceed the MTCA Method A soil cleanup levels.

Pinnacle. 2005. UST decommissioning observation and site check/site assessment gasoline and waste oil USTs. Pinnacle GeoSciences, Inc., Bellevue, Washington. March 11. p. 12.

Table 1  
Summary of Soil Chemical Analytical Data  
CVX #30-5192  
Stanwood, Washington

Sample I.D. <sup>1</sup>	Sample Depth (feet bgs)	Sample Date	Benzene <sup>2</sup> (mg/kg)	Toluene <sup>2</sup> (mg/kg)	Ethylbenzene <sup>2</sup> (mg/kg)	Total Xylenes <sup>2</sup> (mg/kg)	TPH-G <sup>3</sup> (mg/kg)	TPH-D <sup>4</sup> (mg/kg)	TPH-LO <sup>4</sup> (mg/kg)	Total Lead <sup>5</sup> (mg/kg)
SB-2-3	3	2/7/2006	0.3	< 0.08	0.1	2.1	340	1200	8700	--
SB-2-14	14	2/7/2006	0.2	< 0.02	0.01	0.2	48	140	970	6.85
SB-2-18	18	2/7/2006	< 0.006	< 0.006	< 0.006	< 0.02	< 1.1	< 3.0	< 10	--
SB-3-6	6	2/7/2006	< 0.005	< 0.005	< 0.005	< 0.2	< 1.1	15	150	6.03
SB-3-15	15	2/7/2006	< 0.005	< 0.005	< 0.005	< 0.01	< 0.9	< 3.0	< 10	--
SB-5-18	18	2/7/2006	< 0.005	< 0.005	< 0.005	< 0.02	< 1.0	< 3.0	< 10.0	--
SB-6-6	6	2/7/2006	< 0.006	< 0.006	< 0.006	< 0.02	< 1.2	< 3.0	< 10	--
SB-6-14	14	2/7/2006	< 0.005	< 0.005	< 0.005	< 0.02	< 1.0	< 3.0	< 10	--
SB-8-6	6	2/7/2006	< 0.005	< 0.005	< 0.005	< 0.01	< 0.9	< 3.0	17	--
SB-10-6	6	2/7/2006	< 0.008	< 0.008	< 0.008	< 0.02	< 1.6	< 3.0	< 10	--
SB-10-16	16	2/7/2006	< 0.004	< 0.004	< 0.004	< 0.01	< 0.9	< 3.0	< 10	--
SB-11-4	4	2/7/2006	23	25	44	240	2000	68	230	--
SB-11-6	6	2/7/2006	3.6	0.5	0.9	9.7	65	7.2	37	4.4
SB-11-14	14	2/7/2006	5.6	0.2	0.4	2.0	18	< 3.0	13	--
SB-11-19	19	2/7/2006	< 0.005	< 0.005	< 0.005	< 0.02	< 1.0	< 3.0	< 10	--
SB-12-17	17	2/7/2006	< 0.005	< 0.005	< 0.005	< 0.01	< 0.9	< 3.0	11	--
SB-13-10	10	2/7/2006	0.007	< 0.004	< 0.004	0.03	5.1	27	190	--
SB-13-20	20	2/7/2006	< 0.004	< 0.004	< 0.004	< 0.01	< 0.9	< 3.0	< 10	--
SB-14-4	4	2/7/2006	0.02	0.012	0.003	0.006	19	25	73	35.4
SB-14-17	17	2/7/2006	< 0.005	< 0.005	< 0.005	< 0.01	< 0.9	< 3.0	11	--
SB-15-14	14	2/7/2006	< 0.007	< 0.007	< 0.007	< 0.02	< 1.4	< 3.0	< 10	--
SB-16-4	4	2/7/2006	< 0.006	< 0.006	< 0.006	< 0.02	< 1.3	< 3.0	< 10	--

SAIC. 2006. Site assessment report for Chevron Corporation. Science Applications International Corporation, Bothell, Washington. May 5. p. 23.

Table 1  
Summary of Soil Chemical Analytical Data  
CVX #30-5192  
Stanwood, Washington

Sample I.D. <sup>1</sup>	Sample Depth (feet bgs)	Sample Date	Benzene <sup>2</sup> (mg/kg)	Toluene <sup>2</sup> (mg/kg)	Ethylbenzene <sup>2</sup> (mg/kg)	Total Xylenes <sup>2</sup> (mg/kg)	TPH-G <sup>3</sup> (mg/kg)	TPH-D <sup>4</sup> (mg/kg)	TPH-LO <sup>4</sup> (mg/kg)	Total Lead <sup>5</sup> (mg/kg)
SB-16-14	14	2/7/2006	< 0.005	< 0.005	< 0.005	< 0.02	< 1.0	< 3.0	< 10	--
SB-18-4	4	2/7/2006	< 0.005	< 0.005	< 0.005	< 0.02	1.5	< 3.0	< 10	--
SB-18-14	14	2/7/2006	< 0.005	< 0.005	< 0.005	< 0.02	< 1.0	< 3.0	< 10	--
SB-19-4	4	2/7/2006	< 0.006	< 0.006	< 0.006	< 0.02	< 1.1	--	--	--
SB-19-12	12	2/7/2006	< 0.005	< 0.005	< 0.005	< 0.02	< 1.0	< 3.0	< 10	--
SB-20-6	6	2/7/2006	< 0.005	< 0.005	< 0.005	< 0.02	< 1.0	< 3.0	< 10	--
SB-20-14	14	2/7/2006	< 0.006	< 0.006	< 0.006	< 0.02	< 1.1	< 3.0	< 10	--
SB-21-6	6	2/7/2006	< 0.005	< 0.005	< 0.005	< 0.02	< 1.1	< 3.0	< 10	--
SB-22-14	14	2/7/2006	< 0.005	< 0.005	< 0.005	< 0.02	< 1.0	< 3.0	< 10	--
SB-23-5	5	4/5/2006	1.6	<0.052	0.39	3.2	45	40	170	--
MTCA Method A Cleanup Level			0.03	7.0	6.0	9.0	30	2,000	2,000	250

**Notes:**

1 = Approximate sample locations are shown on Figure 2.

2 = Reported value for BTEX is greatest value obtained by WA-VPH, EPA 8021B or EPA Method 8260B.

3 = Gasoline-range total petroleum hydrocarbons (TPH-G) by NWTPH-Gx.

4 = Diesel- (TPH-D), Lube oil- (TPH-O) range hydrocarbons by NWTPH-Dx with a acid/silica gel cleanup.

5 = Total lead by EPA 6010B.

6 = Sample also analyzed for EPH, VPH, n-hexane, naphthalenes, MTBE, cPAHs, EDB, and EDC. MTBE, EDB, EDC and cPAHs (except for chrysene) were not detected. Naphthalenes = 4.44 mg/kg, chrysene = 0.088 mg/kg, and n-Hexane = 51 mg/kg. See chemical analytical report for EPH and VPH detections and Appendix C for Method B calculations. Naphthalenes, chrysene and n-Hexane detections were below the applicable cleanup levels for that analyte.

< = Analyte not detected at or above the reported value; bgs = below ground surface; mg/kg = milligrams per kilogram.

**Bold = value shown exceeds WDOE MTCA Method A cleanup level.**

**TABLE 1**  
**GROUNDWATER MONITORING DATA AND ANALYTICAL RESULTS<sup>1</sup>**  
**FORMER STANDARD OIL SERVICE STATION NO. 305192**  
**9816 271st Street Northwest**  
**Stanwood, Washington**  
**Concentrations reported in µg/L**

Well ID/ Date	Purge Method	TOC <sup>2</sup> (ft.)	DTP (ft.)	DTW (ft.)	SPHT (ft.)	GWE <sup>3</sup> (ft.)	TPH-DRO	TPH-HRO	TPH-GRO	Benzene	Toluene	Ethyl- benzene	Total Xylenes	MTBE	D. Lead
<b>MW-1</b>															
04/10/06		98.32	--	1.81	--	96.51	--	--	--	--	--	--	--	--	--
05/03/06		98.32	--	--	--	--	310	120	<240	<2.5	<2.5	4.7	11	<13	<0.87
08/02/06	PER	98.32	--	2.96	--	95.36	260	330	<48	<0.5	<0.5	<0.5	<1.5	<2.5	--
10/10/06	PER	98.32	--	2.55	--	95.77	150	<100	<48	<0.5	<0.5	<0.5	<1.5	<2.5	--
01/15/07	PER	98.32	--	1.64	--	96.68	<160	<200	<240	<2.5	<2.5	<2.5	<7.5	<13	--
04/25/07	PER	98.32	--	1.58	--	96.74	190	130	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
07/15/07	PER	98.32	--	2.58	--	95.74	<81	<100	<500	<5.0	<5.0	<5.0	<15	<25	--
10/03/07	PER	98.32	--	3.00	--	95.32	130	<100	<250	<2.5	<2.5	<2.5	<7.5	<13	--
01/03/08		98.32	--	2.51	--	95.81	130	<100	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
02/28/09	LFP	98.32	--	3.27	--	95.05	<b>610</b>	<b>610</b>	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
07/22/09	LFP	98.32	--	4.43	--	93.89	<b>650</b>	<b>720</b>	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
01/08/10	LFP	98.32	--	3.32	--	95.00	350	160	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
07/20/10	LFP	98.32	--	3.02	--	95.30	130	100	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
01/21/11	LFP	98.32	--	1.71	--	96.61	<160	<b>650</b>	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
08/05/11	LFP	98.32	--	1.90	--	96.42	190	130	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
01/27/12	LFP	98.32	--	3.55	--	94.77	<30	<69	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
07/02/12	LFP	98.32	--	2.37	--	95.95	<29	<68	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
01/11/13	LFP	98.32	--	1.80	--	96.52	<29	<67	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
07/12/13	LFP	98.32	--	2.63	--	95.69	<29	<68	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
01/10/14	LFP	98.32	--	1.77	--	96.55	<29	<67	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
07/16/14	LFP	98.32	--	2.58	--	95.74	<29	<67	<50	<0.5	<0.5	<0.5	<1.5	--	--
<b>MW-2</b>															
04/10/06		99.58	--	2.29	--	97.29	--	--	--	--	--	--	--	--	--
05/03/06		99.58	--	--	--	--	<b>1,400</b>	<b>560</b>	<240	<b>13</b>	<2.5	<2.5	<7.5	<13	<0.87
08/02/06	PER	99.58	--	2.98	--	96.60	<b>2,000</b>	<b>1,800</b>	220	<b>20</b>	<0.5	<0.5	1.6	<2.5	--
10/10/06	PER	99.58	--	3.64	--	95.94	<b>1,400</b>	<b>790</b>	<240	<b>16</b>	<2.5	<2.5	<7.5	<13	--
01/15/07	PER	99.58	--	2.08	--	97.50	<b>810</b>	270	<240	<b>9.3</b>	<2.5	<2.5	<7.5	<13	--
04/25/07	PER	99.58	--	2.16	--	97.42	<b>830</b>	480	250	<b>13</b>	<0.5	<0.5	<1.5	<2.5	--
07/15/07	PER	99.58	--	2.95	--	96.63	<b>7,800</b>	<1,000	<500	<b>13</b>	<5.0	<5.0	<15	<25	--
10/03/07	PER	99.58	--	3.44	--	96.14	<b>1,600</b>	<b>1,100</b>	<250	<b>4.9</b>	<2.5	<2.5	<7.5	<13	--
01/03/08		99.58	--	2.32	--	97.26	<b>1,400</b>	<b>800</b>	460	<b>6.7</b>	1.0	<0.5	<1.5	<2.5	--
02/28/09	LFP	99.58	--	2.89	--	96.69	<b>2,700</b>	<b>2,800</b>	450	2.5	0.6	<0.5	<1.5	<2.5	--
07/22/09	LFP	99.58	--	3.33	--	96.25	<b>2,500</b>	<b>4,000</b>	360	1.1	0.8	<0.5	1.5	<2.5	--
01/08/10	LFP	99.58	--	2.90	--	96.68	<b>1,800</b>	<b>1,400</b>	470	<0.5	0.5	0.7	<1.5	<2.5	--
07/20/10	LFP	99.58	--	2.88	--	96.70	<b>2,000</b>	<b>1,600</b>	420	<0.5	0.8	<0.5	<1.5	<2.5	--
01/21/11	LFP	99.58	--	2.07	--	97.51	<b>2,000</b>	<b>1,900</b>	390	<0.5	<0.5	0.6	<1.5	<2.5	--

Leidos. 2014. Second semiannual 2014 groundwater monitoring and sampling report. Leidos Engineering, LLC. Bothell, Washington. August 27. p. 7.



**TABLE 1**  
**GROUNDWATER MONITORING DATA AND ANALYTICAL RESULTS<sup>1</sup>**  
**FORMER STANDARD OIL SERVICE STATION NO. 305192**  
**9816 271st Street Northwest**  
**Stanwood, Washington**  
**Concentrations reported in µg/L**

Well ID/ Date	Purge Method	TOC <sup>2</sup> (ft.)	DTP (ft.)	DTW (ft.)	SPHT (ft.)	GWE <sup>3</sup> (ft.)	TPH-DRO	TPH-HRO	TPH-GRO	Benzene	Toluene	Ethyl- benzene	Total Xylenes	MTBE	D. Lead
<b>MW-2 (cont.)</b>															
08/05/11	LFP	99.58	--	1.97	--	97.61	<b>830</b>	<b>880</b>	<250	<2.5	<2.5	<2.5	<7.5	<13	--
01/27/12	LFP	99.58	--	3.45	--	96.13	<29	<68	56	<0.5	<0.5	<0.5	<1.5	<2.5	--
07/02/12	LFP	99.58	--	3.11	--	96.47	31	110	<250	<2.5	<2.5	<2.5	<7.5	<13	--
01/11/13	LFP	99.58	--	3.14	--	96.44	32	160	130	<0.5	<0.5	0.6	<1.5	<2.5	--
07/12/13	LFP	99.58	--	3.02	--	96.56	<29	<68	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
01/10/14	LFP	99.58	--	2.12	--	97.46	<29	<67	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
07/16/14	LFP	99.58	--	2.98	--	96.60	<30	<69	<50	<2.0	<0.5	<0.5	<1.5	--	--
<b>MW-3</b>															
04/10/06		99.16	--	0.40	--	98.76	--	--	--	--	--	--	--	--	--
05/03/06		99.16	--	--	--	--	<b>580</b>	240	<240	<2.5	<2.5	<2.5	<7.5	<13	<0.87
08/02/06	PER	99.16	--	2.61	--	96.55	350	380	<48	<0.5	<0.5	<0.5	<1.5	<2.5	--
10/10/06	PER	99.16	--	2.75	--	96.41	310	140	<48	<0.5	<0.5	<0.5	<1.5	<2.5	--
01/15/07	PER	99.16	--	0.50	--	98.66	250	<100	<240	<2.5	<2.5	<2.5	<7.5	<13	--
04/25/07	PER	99.16	--	0.84	--	98.32	260	110	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
07/15/07	PER	99.16	--	2.16	--	97.00	250	150	<500	<5.0	<5.0	<5.0	<15	<25	--
10/03/07	PER	99.16	--	2.68	--	96.48	330	260	<250	<2.5	<2.5	<2.5	<7.5	<13	--
01/03/08		99.16	--	1.62	--	97.54	280	210	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
02/28/09	LFP	99.16	--	1.56	--	97.60	290	190	<50	<0.5	<0.5	<0.5	1.6	<2.5	--
07/22/09	LFP	99.16	--	3.11	--	96.05	<b>780</b>	<b>830</b>	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
01/08/10	LFP	99.16	--	2.83	--	96.33	<b>680</b>	360	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
07/20/10	LFP	99.16	--	1.92	--	97.24	330	190	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
01/21/11	LFP	99.16	--	1.63	--	97.53	<160	<b>630</b>	<50	<0.5	<0.5	<1.5	<1.5	<2.5	--
08/05/11	LFP	99.16	--	1.70	--	97.46	230	210	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
01/27/12	LFP	99.16	--	2.60	--	96.56	<30	<70	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
07/02/12	LFP	99.16	--	1.75	--	97.41	<29	<67	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
01/11/13	LFP	99.16	--	2.82	--	96.34	<28	<66	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
07/12/13	LFP	99.16	--	2.22	--	96.94	<29	<68	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
01/10/14	LFP	99.16	--	2.79	--	96.37	<29	<68	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
07/16/14	LFP	99.16	--	2.16	--	97.00	<29	<68	<50	<2.0	<0.5	<0.5	<1.5	--	--
<b>MW-4</b>															
04/10/06		100.00	--	2.08	--	97.92	--	--	--	--	--	--	--	--	--
05/03/06		100.00	--	--	--	--	<b>7,900</b>	<1,000	<240	<2.5	<2.5	<2.5	<7.5	<13	<0.87
08/02/06	PER	100.00	--	3.57	--	96.43	<b>7,300</b>	<1,000	73	<0.5	<0.5	<0.5	2.8	<2.5	--
10/10/06	PER	100.00	--	4.28	--	95.72	<b>7,900</b>	<b>2,200</b>	<48	<0.5	<0.5	<0.5	<1.5	<2.5	--
01/15/07	PER	100.00	--	2.98	--	97.02	<b>8,300</b>	<b>3,000</b>	<240	<2.5	<2.5	<2.5	<7.5	<13	--
04/25/07	PER	100.00	--	4.35	--	95.65	<b>9,300</b>	<b>2,000</b>	89	<0.5	<0.5	<0.5	<1.5	<2.5	--

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**TABLE 1**  
**GROUNDWATER MONITORING DATA AND ANALYTICAL RESULTS<sup>1</sup>**  
**FORMER STANDARD OIL SERVICE STATION NO. 305192**  
**9816 271st Street Northwest**  
**Stanwood, Washington**  
**Concentrations reported in µg/L**

Well ID/ Date	Purge Method	TOC <sup>2</sup> (ft.)	DTP (ft.)	DTW (ft.)	SPHT (ft.)	GWE <sup>3</sup> (ft.)	TPH-DRO	TPH-HRO	TPH-GRO	Benzene	Toluene	Ethyl- benzene	Total Xylenes	MTBE	D. Lead
<b>MW-4 (cont.)</b>															
07/15/07	PER	100.00	--	4.06	--	95.94	850	320	<500	<5.0	<5.0	<5.0	<15	<25	--
10/03/07	PER	100.00	--	4.22	--	95.78	8,500	<2,100	<250	<2.5	<2.5	<2.5	<7.5	<13	--
01/03/08		100.00	--	3.98	--	96.02	9,100	2,200	61	<0.5	<0.5	<0.5	<1.5	<2.5	--
02/28/09	LFP	100.00	--	3.44	--	96.56	5,400	2,100	56	<0.5	<0.5	<0.5	<1.5	<2.5	--
07/22/09	LFP	100.00	--	3.30	--	96.70	14,000	7,600	100	<0.5	<0.5	<0.5	<1.5	<2.5	--
01/08/10	LFP	100.00	--	3.51	--	96.49	13,000	18,000	75	<0.5	<0.5	<0.5	<1.5	<2.5	--
07/20/10	LFP	100.00	--	4.31	--	95.69	12,000	13,000	69	<0.5	<0.5	<0.5	<1.5	<2.5	--
01/21/11	LFP	100.00	--	2.71	--	97.29	14,000	<1,800	50	<0.5	<0.5	<0.5	<1.5	<2.5	--
08/05/11	LFP	100.00	4.34	4.36	0.02	95.66	UNABLE TO SAMPLE DUE TO PRESENCE OF SPH					--	--	--	--
01/27/12		100.00	2.85	3.00	0.15	97.12	UNABLE TO SAMPLE DUE TO PRESENCE OF SPH					--	--	--	--
07/02/12		100.00	3.10	3.20	0.10	96.88	UNABLE TO SAMPLE DUE TO PRESENCE OF SPH					--	--	--	--
01/11/13		100.00	2.83	2.92	0.09	97.15	UNABLE TO SAMPLE DUE TO PRESENCE OF SPH					--	--	--	--
07/12/13		100.00	3.96	3.99	0.03	96.03	UNABLE TO SAMPLE DUE TO PRESENCE OF SPH					--	--	--	--
01/10/14		100.00	2.80	2.86	0.06	97.19	UNABLE TO SAMPLE DUE TO PRESENCE OF SPH					--	--	--	--
07/16/14		100.00	3.91	3.88	0.03	96.14	UNABLE TO SAMPLE DUE TO PRESENCE OF SPH					--	--	--	--
<b>TRIP BLANK QA</b>															
05/03/06		--	--	--	--	--	--	--	<48	<0.5	<0.5	<0.5	<1.5	<2.5	--
08/02/06		--	--	--	--	--	--	--	<48	<0.5	<0.5	<0.5	<1.5	<2.5	--
10/10/06		--	--	--	--	--	--	--	<48	<0.5	<0.5	<0.5	<1.5	<2.5	--
01/15/07		--	--	--	--	--	--	--	<48	<0.5	<0.5	<0.5	<1.5	<2.5	--
04/25/07		--	--	--	--	--	--	--	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
07/15/07		--	--	--	--	--	--	--	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
10/03/07		--	--	--	--	--	--	--	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
01/03/08		--	--	--	--	--	--	--	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
02/28/09		--	--	--	--	--	--	--	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
07/22/09		--	--	--	--	--	--	--	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
01/08/10		--	--	--	--	--	--	--	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
07/20/10		--	--	--	--	--	--	--	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
01/21/11		--	--	--	--	--	--	--	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
08/05/11		--	--	--	--	--	--	--	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
01/27/12		--	--	--	--	--	--	--	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
07/02/12		--	--	--	--	--	--	--	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--
01/11/13		--	--	--	--	--	--	--	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--

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**TABLE 1**  
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**FORMER STANDARD OIL SERVICE STATION NO. 305192**  
**9816 271st Street Northwest**  
**Stanwood, Washington**  
**Concentrations reported in µg/L**

Well ID/ Date	Purge Method	TOC <sup>2</sup> (ft.)	DTP (ft.)	DTW (ft.)	SPHT (ft.)	GWE <sup>3</sup> (ft.)	TPH-DRO	TPH-HRO	TPH-GRO	Benzene	Toluene	Ethyl- benzene	Total Xylenes	MTBE	D. Lead	
<b>TRIP BLANK QA (cont.)</b>																
07/12/13		--		--		--	--	--	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--	
01/10/14		--		--		--	--	--	<50	<0.5	<0.5	<0.5	<1.5	<2.5	--	
07/16/14		--		--		--	--	--	<50	<0.5	<0.5	<0.5	<1.5	--	--	
Standard Laboratory Reporting Limits:							--	--	50	0.5	0.5	0.5	1.5	2.5	0.001	
MTCA Method A Cleanup Levels:							500	500	800/1,000	5	1,000	700	1,000	20	--	
							Current Method <sup>4</sup> : NWTPH-Dx + Extended <sup>5</sup>		NWTPH-Gx	USEPA 8021B					USEPA 7421	

**Abbreviations:**

D. Lead = Dissolved Lead  
DTP = Depth to Product  
DTW = Depth to Water  
(ft.) = Feet  
GWE = Groundwater Elevation  
LFP = Low Flow Purge  
MTBE = Methyl Tertiary Butyl Ether

MTCA = Model Toxics Control Act  
PER = Peristaltic Pump  
QA = Quality Assurance/Trip Blank  
SPH = Separate-Phase Hydrocarbons  
SPHT = SPH Thickness  
TOC = Top of Casing  
TPH = Total Petroleum Hydrocarbons

TPH-DRO = TPH as Diesel-Range Organics  
TPH-GRO = TPH as Gasoline-Range Organics  
TPH-HRO = TPH as Heavy Oil-Range Organics  
USEPA = United States Environmental Protection Agency  
µg/L = Micrograms per liter  
-- = Not Measured/Not Analyzed

**Notes:**

- 1 Analytical results in bold font indicate concentrations exceed MTCA Method A cleanup levels.
- 2 TOC elevations are expressed in feet relative to an arbitrary datum.
- 3 GWE has been corrected for the presence of SPH; correction factor: [(TOC - DTW) + (SPHT x 0.80)].
- 4 Laboratory analytical methods for historical data may not be consistent with list of current analytical methods. When necessary, consult original laboratory reports to verify methods used.
- 5 Analyzed with silica-gel cleanup.

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