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December 15, 2014

Mr. Surjit Singh
P.O. Box 1994
Oroville, WA 98844

SUBJECT: SITE INVESTIGATION WORK PLAN
BIG B MINI MART, 1611 CANYON ROAD, ELLENSBURG, WA

Dear Mr. Singh:

Floyd|Snider is please to present this work plan to conduct a site investigation at the Big B Mini Mart, as shown on Figure 1. The work described below was discussed with the Washington State Department of Ecology (Ecology) during a meeting on October 15, 2014. Ecology requested to review the work plan and provide comment.

The purpose of the site investigation is to delineate the lateral extent of soil impacts beneath the property in order to determine the volume of impacted soil that needs remediation. In addition, we plan to determine current groundwater conditions, both within the site and also along the down- and sidegradient property boundaries. Using these data, the need for additional investigations, either on-site or off-site, will be determined mutually with Ecology. Ideally, however, the data collected during this site investigation would be sufficient to prepare a feasibility study for an expedited site cleanup that is coordinated with station redevelopment.

BACKGROUND

The property is approximately 1.5 acres and includes two pump islands, a convenience store, two 10,000-gallon steel underground storage tanks (USTs), a 4,000-gallon steel UST on the north side of the store, and a 12,000-gallon baffled steel UST (8,000-gallons of diesel and 4,000-gallons of unleaded gasoline) on the south end of the property. The service station is closed temporarily, with station upgrades planned for the near future. These upgrades envision removal of all tanks, dispensers, and product lines and replacement with upgraded tanks, lines, and dispensers.

Based upon our review of existing reports (Seacor 1991), the surficial geology of the site generally consists primarily of unconsolidated silty sandy gravel and gravelly sand with cobbles down to 15 feet below ground surface (bgs). Along the southern border of the property, silty sand and sandy silt are encountered in the top 5 feet. Groundwater is first encountered between 4 and 6 feet bgs and flows to the south-southeast.

In 1990, soil impacts and light non-aqueous phase liquid (LNAPL) were observed within a test pit (TP-1) north of the northern UST basin. Subsequently, a fuel leak in the fiberglass diesel line near the northern pump island was discovered and repaired. In December 1990, approximately 420 cubic yards of impacted soil was excavated between the 10,000-gallon diesel UST and the

northern pump island (refer to Figure 1). Diesel-range hydrocarbons at concentrations exceeding the Model Toxics Control Act (MTCA) Method A cleanup level were detected in western and southern sidewalls of the excavation. The extent of the excavation was limited due to utilities to the east, the property boundary to the west, the pump island to the north, and the UST basin to the south. Clean fill was transported to the site and used to backfill the excavation. Impacted soil was stockpiled in an area located approximately 150 feet to the north of the northern pump island and eventually disposed of off-site.

Between October 1990 and April 1991, the previous operator and Ecology installed six monitoring wells on the property, MW-1 through MW-6 (Seacor 1991, DPRA Incorporated and SAIC 1991). Soil samples were collected prior to well installation. Soil analytical results for monitoring wells MW-4, MW-5, and MW-6 were less than their respective laboratory detection limits. Soil results for MW-2 contained gasoline-range hydrocarbons and total xylene concentrations exceeding their respective MTCA Method A cleanup levels. Groundwater analytical results indicate the presence of gasoline- and diesel-range hydrocarbons, benzene, toluene, ethylbenzene, and xylenes (BTEX), and lead. However, available soil data from the site do not provide insight to nature, extent, and volume of contamination remaining. Existing groundwater data are either too old or, in the case of the 2011 data, poorly documented as to how samples were collected to be considered representative of current conditions.

Only two monitoring wells (MW-2 and MW-3) were located during the October 2014 site walk. It is possible that the wells that were not located are either (1) covered over with a newer layer of asphalt, or (2) destroyed. We also confirmed that Monitoring Well MW-2 contains LNAPL; using an interface probe, a LNAPL thickness of 0.04 feet (0.6 inches) was measured in that well. The LNAPL appeared to us to be gasoline.

SCOPE OF WORK

The scope of work will consist of the following:

1. Digging 21 test pits
2. Attempting to locate missing monitoring wells
3. Installing up to four new monitoring wells
4. Developing new monitoring wells and existing wells
5. Collecting groundwater samples
6. Analyzing selected soil samples
7. Analyzing a product sample from Monitoring Well MW-2
8. Conducting a survey
9. Preparing a site investigation report

Proposed exploration locations are shown on Figure 1.

HEALTH AND SAFETY

Safety is the highest priority on this project. A Health and Safety Plan (HASP) has been prepared (Appendix A) pertaining to the proposed test pit and drilling activities within the property boundaries. Prior to the start of the project, that portion of the property under investigation will be fenced off from the public. At the start of each field day, the field manager will conduct an initial safety briefing for all parties working on the site to inform site workers of site risks.

UTILITY LOCATE

A public utility locate notification will be completed in accordance with state law at least 3 business days prior to the start of the investigation. Public utility locate information will be provided to the drilling contractor prior to the start of work. In addition, a private locate will be performed to define the location of the UST piping.

TEST PITS

Due to the lithology beneath the site, it is our judgment that it would be difficult to collect soil samples using a Geoprobe or split-spoon method. Therefore, due to the shallow depth to groundwater, and the unutilized nature of the site, we propose to dig 21 test pits in locations shown on Figure 1 to grossly delineate the nature and extent of soil impacts. At each test pit location, field screening observations will be recorded along the entire exposed soil column and samples will be collected of representative contamination. Field screening will consist of headspace vapor screening, sheen testing, staining observations, and odor. Field observations will help determine if gasoline- or diesel-range hydrocarbon impacts are present and laboratory results will be used to confirm the presence or absence of impacts. In general, the test pits will be dug until the water table is reached and soil is free of visible smear zone contamination.

Field observations will be vital in determining the smear zone thickness, the extent of clean overburden, the presence of impacts in the vadose zone, and whether or not LNAPL is present within each test pit. If all field screening indications are negative, then a single soil sample will be collected just above the groundwater surface. If contamination is observed at the water table, additional samples may be collected in the saturated zone to define the bottom of the smear zone, if there is no evidence of vadose contamination. The collection of additional soil samples within the saturated zone will be based on the professional judgment of field personnel at the time of sampling.

Soil samples will be collected per Ecology guidance and U.S. Environmental Protection Agency (USEPA) Method 5035A when analyzing for gasoline-range hydrocarbons and BTEX. Samples for diesel and other analytes will be collected in a 4-ounce jar. Depending on field screening results and location of test pits, selected soil samples will be analyzed for the following:

- Hydrocarbon identification (HCID) by NWTPH-HCID
- Gasoline-range hydrocarbons by NWTPH-Gx

- Diesel- and heavy oil-range hydrocarbons by NWTPH-Dx
- Total lead by USEPA Method 6020
- BTEX, ethanol, methyl tert-butyl ether (MTBE), naphthalene, n-hexane, ethylene dibromide (EDB), and ethylene dichloride (EDC) by USEPA Method 8260

Given that the site contains impacts from former diesel and gasoline sources, the NWTPH-HCID methodology will be used first to determine the presence (or absence) and type of petroleum product that exists in each test pit. If the value of the analysis for gasoline or diesel, or both, exceed the reporting limits, then the appropriate analytical method will be analyzed for the product type detected. Additional analyses for petroleum additives will be conducted on up to five selected soil samples with high petroleum impacts based on field screening observations.

MONITORING WELL LOCATION AND INSTALLATION

The property appears to have been repaved since the installation of the monitoring wells in 1991. If so, then some existing wells that we were unable to locate may be found using a metal detector (i.e., MW-1, MW-4, MW-5, and MW-6). If any of these wells are found, necessary repairs will be made and redevelopment activities will be conducted. Monitoring Wells MW-4 and MW-5, located along the downgradient property boundary, and one upgradient well (MW-1 or MW-6) are essential to either locate or, if unable to be located, reinstall. One new well, MW-7, is proposed to better define groundwater flow direction and side gradient contaminant conditions. Therefore, up to four monitoring wells (MW-1A or MW-6A, MW-4A, MW-5A, and MW-7) may be installed. Wells will be installed by a licensed driller using a hollow-stem auger in accordance with applicable regulations. Soil samples will be collected every 5 feet to a total depth of 15 feet using a split-spoon sampler and logged by field personnel under the direction of a licensed geologist. All down-hole drilling equipment will be decontaminated before use and between drilling locations.

The wells will be constructed of 2-inch-diameter Schedule 40 PVC pipe with a flush threaded riser, including a threaded end plug and a machine-slotted 10-foot-long, 10-slot well screen. The wells will be screened from 4 to 14 feet bgs. There are no available data that indicate the range of seasonal fluctuation; therefore, 10-foot screen lengths will be installed to span the water table and ensure that wells do not go dry. The annular space around the screen zone of each well will be backfilled with clean silica sand. The annular space above the sandpack will be sealed with bentonite chips. Bentonite placed above the water table will be hydrated with potable water. All materials will be placed concurrently with auger withdrawal. The surface of each well will be completed with a flush-mounted, traffic grade, steel monument, and the well will be secured by a lockable gasket cap.

As-built construction details, including the total depth of each boring and the placement depths of the filter sandpack, the bentonite seal, and the surface completion will be measured to the nearest 0.1 foot. Well logs, including soil sample description and as-built construction details, will be prepared after well completion.

All existing and new wells on the property will be developed by surging with a bailer or surge block followed by purging with an electric whaler pump. Surging and purging will be repeated until evacuated water is visibly clean and essentially sand-free. Well development will proceed until field parameters stabilize to within ±10 percent on three consecutive measurements or until 10 well volumes have been purged. All down-hole well development tools will be decontaminated prior to use for each well.

LOW-FLOW GROUNDWATER SAMPLING

Groundwater samples will be collected from up to six monitoring wells; however, wells with measurable LNAPL thickness (i.e., MW-2) will not be sampled for dissolved-phase constituents (refer to section on product sampling below). Depth to groundwater and LNAPL measurements will be collected during groundwater sampling events. Groundwater sampling will be completed approximately 24 hours after well installation/redevelopment.

Groundwater sampling will be conducted in accordance with standard industry practice and Floyd|Snider Standard Operating Procedures (SOPs) for low-flow sampling. All wells will be purged and sampled using low-flow procedures to achieve the lowest turbidity practicable with a peristaltic pump and disposable polyethylene tubing. The tubing intake will be set at mid-screen in each well. Prior to and during sampling, depth to water will be measured to the nearest 0.01 foot using a water level indicator. The monitoring well will be purged prior to sampling at a maximum rate of 0.5 liters per minute. During purging, field parameters (i.e., temperature, pH, specific conductivity, and turbidity) will be recorded at 3- to 5-minute intervals using a multiparameter groundwater meter. Purging will continue until temperature, pH, turbidity, and specific conductivity are approximately stable (within 10 percent) for three consecutive readings, or a maximum of 30 minutes of purging has elapsed.

After the well has been purged, the groundwater sample will be collected by directly filling the laboratory-provided bottles from the pump discharge line at the same flow rate that was used for purging. Groundwater samples will be analyzed for the following constituents:

- Diesel-range hydrocarbons by Method NWTPH-Dx
- Gasoline-range hydrocarbons by NWTPH-Gx
- BTEX, MTBE, EDC, naphthalene, and ethanol by USEPA Method 8260
- EDB by USEPA Method 8011
- Total lead by USEPA Method 6020

Additional analyses for petroleum additives, such as MTBE, EDC, and EDB, will be conducted on up to five selected groundwater samples from locations most likely to exhibit contamination and/or downgradient wells.

PRODUCT SAMPLING

LNAPL from Monitoring Well MW-2 will be collected using a disposable bailer and analyzed for the following constituents:

- HCID by NWTPH-HCID (to establish product type)
- Total lead by USEPA Method 6020
- EDB by USEPA Method 8011
- Ethanol, BTEX, MTBE, naphthalene, n-hexane, and EDC by USEPA Method 8260

BAIL-DOWN TEST

After collecting the product sample, a bail-down test will be conducted to measure the recovery time for LNAPL to recharge to Monitoring Well MW-2. A decontaminated 2-inch acrylic bailer will be used to remove any remaining LNAPL. Once the LNAPL is completely removed, the recharge rate of LNAPL will be monitored with the interface probe. The bail-down test will be completed once the well has recovered the initial LNAPL thickness or after 8 hours of recovery time, whichever is sooner.

SURVEY

A licensed surveyor will locate all service station structures, property boundaries, test pits, and monitoring wells after installation and survey of the top of well casing to the nearest 0.01 foot in the horizontal and vertical directions. Test pit and monitoring well coordinates will be reported relative to the in North American Datum of 1983 (NAD 83) Washington State Plane South. Elevations will be reported relative to the North American Vertical Datum of 1988 (NAVD 88). Well logs will include the Washington State Plane South coordinates of the well and the top of well casing elevation. The coordinate and elevation reference systems will be noted on the well log.

INVESTIGATION-DERIVED WASTE

During test pit digging, visibly impacted soil will be stockpiled separately from otherwise clean soil. Only clean overburden soil from test pits will be placed back into the test pit and compacted following completion of test pit sampling. Visibly contaminated soil from all the test pits will be combined into a single stockpile along with soil from the monitoring well installation activities. The stockpiled soil will be covered with plastic and surrounded by a straw waddle, then sampled for disposal according to the 1995 Guidance for Remediation Petroleum Contaminated Soil.

Decontamination, purged, and development water will be contained in 55-gallon drums approved by the Washington State Department of Transportation for temporary storage pending profiling. A composite sample of drummed water will be collected and analyzed in order to determine proper disposal methods in accordance with applicable laws. The site will be broom swept prior to our departure.

Work can start within 3 weeks following Ecology approval of this work plan. The length of time estimated to complete field activities is 3 days.

REFERENCES

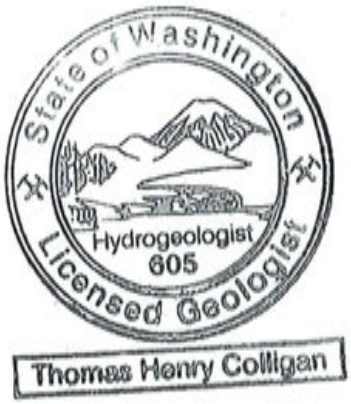
DPRA Incorporated and Science Applications International Corporation (SAIC). 1991. *Draft Site Hazard Assessment (SHA) Report, Exxon Big "B" Mini Mart*. Prepared for Washington Department of Ecology. May.

Seacor. 1991. *Soil and Groundwater Investigation Report Big "B" Mini Mart/Exxon Station, Ellensburg, Washington*. Job No. 0078-001-01. Prepared for Balbir Singh. 21 May.

Sincerely yours,
FLOYD | SNIDER

Tom Colligan, LHG
Sr. Hydrogeologist/Associate Principal

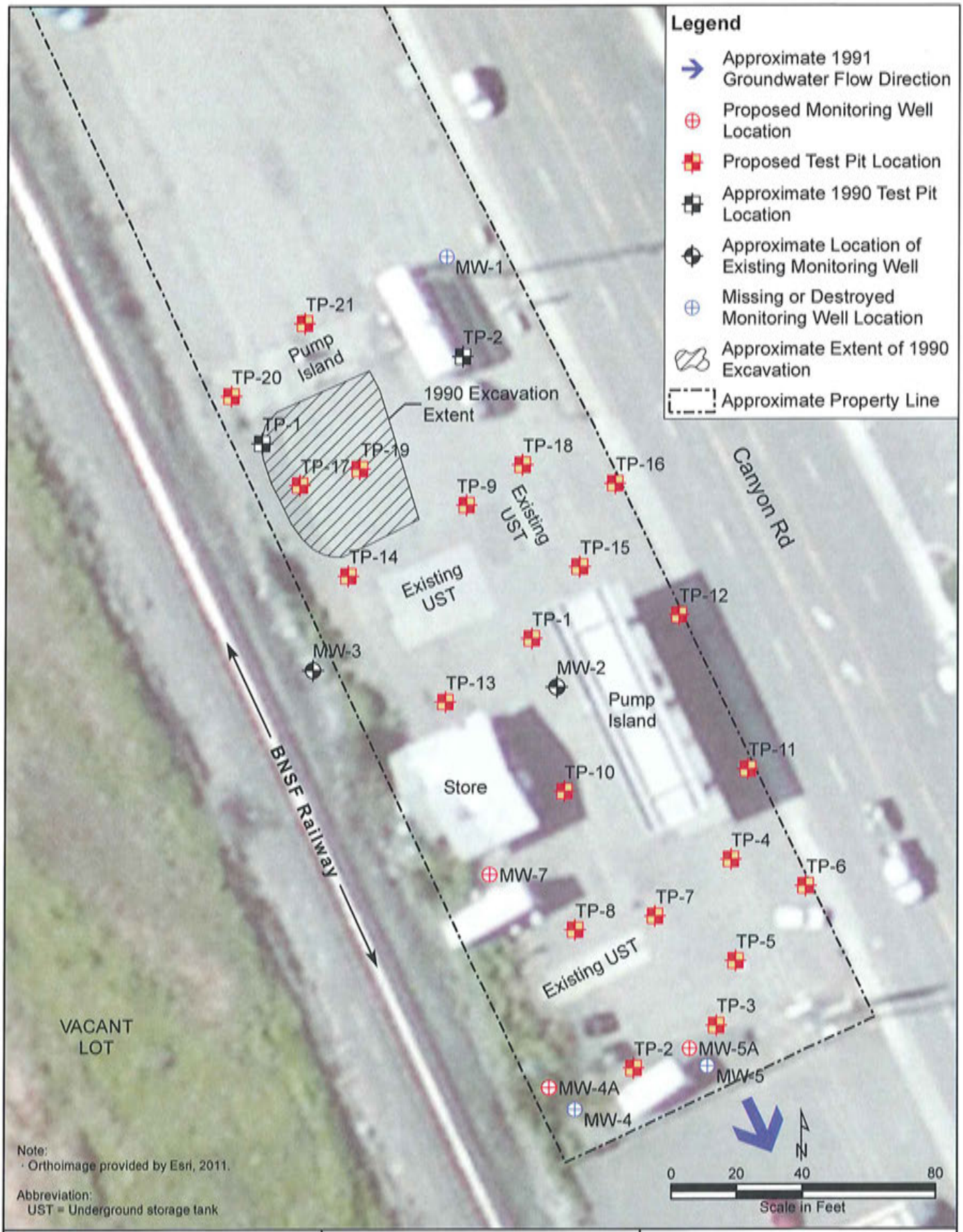
Encl.: Figure 1 – Proposed Well and Test Pit Locations
Appendix A – Health and Safety Plan
Appendix B – Sampling and Analysis Plan/Quality Assurance Project Plan



Big B Mini Mart

Site Investigation Work Plan

Figure



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Site Investigation Work Plan
Big B Mini Mart
Ellensburg, Washington

Figure 1
Proposed Well and Test Pit Locations

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12/8/2014

Big B Mini Mart

Site Investigation Work Plan

Appendix A
Health and Safety Plan

Big B Mini Mart

Site Investigation Work Plan
Health and Safety Plan

December 15, 2014

Table of Contents

List of Appendices

List of Acronyms and Abbreviations

Acronym/ Abbreviation	Definition
CNS	Central nervous system
CRZ	Contamination reduction zone
Ecology	Washington State Department of Ecology
EZ	Exclusion zone
GI	Gastrointestinal
HSO	Health and Safety Officer
HASP	Health and Safety Plan
HAZWOP	Hazardous Waste Operations
PEL	Permissible exposure limit
PID	Photoionization detector

Acronym/ Abbreviation	Definition
PM	Project Manager
PPE	Personal protective equipment
SS	Site Supervisor
SSO	Site Safety Officer
STEL	Short-Term Exposure Limit
SZ	Support zone
TVL	Threshold Value Limit
TWA	Time-Weighted Average
VOC	Volatile organic compound
WAC	Washington Administrative Code
WSDOT	Washington State Department of Transportation

1.0 Plan Objectives and Applicability

This Health and Safety Plan (HASP) has been written to comply with the standards prescribed by the Occupational Safety and Health Act (OSHA) and the Washington Industrial Safety and Health Act (WISHA).

The purpose of this HASP is to establish protection standards and mandatory safe practices and procedures for all personnel involved with investigation activities at Big B Mini Mart Service Station (Site). This HASP assigns responsibilities, establishes standard operating procedures, and provides for contingencies that may occur during field work activities. This plan consists of site descriptions, a summary of work activities, an identification and evaluation of chemical and physical hazards, monitoring procedures, personnel responsibilities, a description of site zones, decontamination and disposal practices, emergency procedures, and administrative requirements.

The provisions and procedures outlined by this HASP apply to all Floyd|Snider personnel on-site. Contractors, subcontractors, other oversight personnel, and all other persons involved with the field work activities described herein are required to develop and comply with their own HASP. All Floyd|Snider staff conducting field activities are required to read this HASP and indicate that they understand its contents by signing the Health and Safety Officer/Site Supervisors' (HSO/SS') copy of this plan.

It should be noted that this HASP is based on information that was available as of the date indicated on the title page. It is possible that additional hazards that are not specifically addressed by this HASP may exist at the work site, or may be created as a result of on-site activities. It is the firm belief of Floyd|Snider that active participation in health and safety procedures and acute awareness of on-site conditions by all workers is crucial to the health and safety of everyone involved. Should project personnel identify a site condition that is not addressed by this HASP and have any questions or concerns about site conditions, they should immediately notify the HSO/SS and an addendum will be provided to this HASP.

The HSO/SS has field responsibility for ensuring that the provisions outlined herein adequately protect worker health and safety and that the procedures outlined by this HASP are properly implemented. In this capacity, the HSO/SS will conduct regular site inspections to ensure that this HASP remains current with potentially changing site conditions. The HSO/SS has the authority to make health and safety decisions that may not be specifically outlined in this HASP, should site conditions warrant such actions. In the event that the HSO/SS leaves the site while work is in progress, an alternate Site Safety Officer (SSO) will be designated. Personnel responsibilities are further described in Section 4.0.

This HASP has been reviewed by the Project Manager (PM) and the HSO/SS prior to commencement of work activities. All Floyd|Snider personnel shall review the plan and be familiar with on-site health and safety procedures. A copy of the HASP will be on-site at all times.

2.0 Emergency Contacts and Information

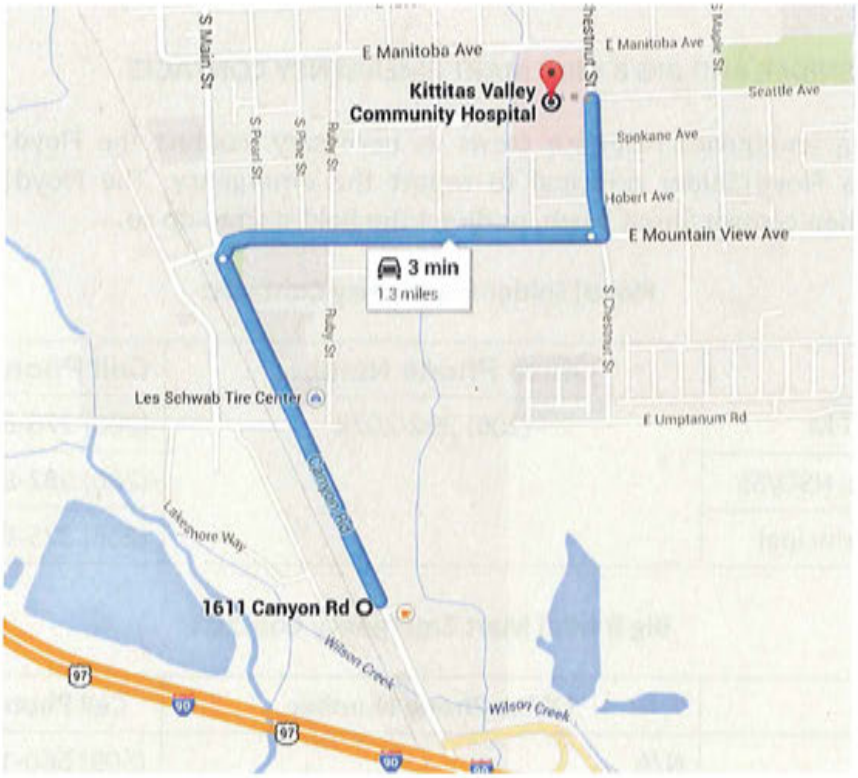
2.1 DIAL 911

In the event of any emergency, dial 911 to reach fire, police, and first aid.

2.2 HOSPITAL AND POISON CONTROL

Nearest Hospital Location and Telephone: Refer to Figure 1 below for map and directions to the hospital.	Kittitas Valley Community Hospital 603 South Chestnut Street Ellensburg, WA 98926 (509) 962-9841
Washington Poison Control Center:	(800) 222-1222

Figure 1 - Hospital Directions



1. Start at: 1611 Canyon Road in Ellensburg, WA 98926
2. Head north-northwest on Canyon Road toward Umptanum Road 0.5 mi
3. Turn right onto W Mountain View Ave 0.5 mi
4. Turn left onto S Chestnut Street 0.2 mi
5. Arrive at: Kittitas Valley Community Hospital-ER; 603 S Chestnut Street, Ellensburg, Washington

2.3 PROVIDE INFORMATION TO EMERGENCY PERSONNEL

All Floyd|Snider project personnel should be prepared to give the following information:

Information to Give to Emergency Personnel	
Site Location:	Big B Mini Mart Service Station 1611 Canyon Road Ellensburg, WA 98926 **Nearest Cross Street:** I-90 to the south or Umptanum Rd to the north
Number that You are Calling from:	This information can be found on the phone you are calling from.
Type of Accident or Type(s) of Injuries:	Describe accident and/or incident and number of personnel needing assistance.

2.4 FLOYD|SNIDER AND BIG B MINI MART EMERGENCY CONTACTS

After contacting emergency response crews as necessary, contact the Floyd|Snider project manager and a Floyd|Snider principal to report the emergency. The Floyd|Snider project manager may then contact Surgit Singh, or direct the field staff to do so.

Floyd|Snider Emergency Contacts:

Contact	Office Phone Number	Cell Phone Number
Tom Colligan, PM	(206) 292-2078	(206) 276-8527
Gabe Cisneros, HSO/SS		(206) 582-8223
Kate Snider, Principal		(206) 375-0762

Big B Mini Mart Emergency Contacts:

Contact	Office Phone Number	Cell Phone Number
Surgit Singh	N/A	(509) 560-1111

Utility Company Emergency Contacts:

Contact	Normal Business Hours Phone Numbers (8 a.m. to 5 p.m.)	After Hours Emergency Phone Number
Puget Sound Energy – Electric	(888) 728-9343	(888) 225-5773
Puget Sound Energy – Natural Gas	(888) 728-9343	(888) 225-5773
City of Ellensburg – Water, Gas, Electric	(509) 962-7230	(509) 962-7230
Ellensburg Energy SVCS	(509) 962-7124	(509) 962-7224
Ellensburg Telephone	(509) 985-1203	(509) 925-1425

3.0 Background Information

3.1 SITE BACKGROUND

The property is located at 1611 Canyon Road in Ellensburg, WA and is currently a temporarily closed gasoline service station with upgrades planned for the near future. The property is approximately 1.5 acres and includes two pump islands, a convenience store, two steel 10,000-gallon underground storage tanks (USTs), a 4,000-gallon steel UST on the north side of the store, and a 12,000-gallon baffled steel UST (8,000 gallons of diesel and 4,000 gallons of unleaded gasoline) on the south end of the property. The planned upgrades envision the removal of all tanks, dispensers, and product lines and replacement with upgraded tanks, lines, and dispensers.

The property is on the west side of Canyon Road, just north of Interstate 90, and is surrounded by commercial use properties to the north, south, and east, and a BNSF railway to the west. An Astro gasoline service station is adjacent to the south and a Shell station is located across Canyon Road to the east. Canyon Road is a four-lane major throughway with off- and on-ramp access to I-90, just southeast of the property. Entrances to the property are located northeast and southeast of the fuel dispensers along Canyon Road. The property includes a large undeveloped area on the north side; however, truckers use this portion of the property to park their rigs and containers.

3.2 SCOPE OF WORK

The purpose of the site investigation is to delineate the lateral extent of soil impacts beneath the property in order to determine the volume of impacted soil that needs remediation. In addition, we plan to determine current groundwater conditions, both within the site and also along the down- and sidegradient property boundaries. Data collected during this site investigation will be used to prepare a feasibility study for an expedited site cleanup that will be coordinated with station redevelopment. Floyd|Snider will perform the following scope of work:

- Oversight of up to 21 test pits
- Collect soil samples for analysis
- Attempt to locate missing monitoring wells
- Install up to four new monitoring wells
- Develop new monitoring wells and existing wells
- Collect groundwater samples and a product sample
- Conduct oversight of a survey

4.0 Primary Responsibilities and Requirements

4.1 PROJECT MANAGER

The PM will have overall responsibility for the completion of the project, including the implementation and review of this HASP. The PM will review health and safety issues as needed and as consulted, and will have authority to allocate resources and personnel to safely accomplish the field work.

The PM will direct all Floyd|Snider personnel involved in field work at the Site. If the project scope changes, the PM will notify the HSO/SS so that the appropriate addendum will be included in the HASP. The PM will ensure that all Floyd|Snider personnel on-site have received the required training, are familiar with the HASP, and understand the procedures to follow should an accident and/or incident occur on-site.

4.2 HEALTH AND SAFETY OFFICER AND SITE SUPERVISOR

The HSO/SS will approve this HASP and any amendments thereof, and will ultimately be responsible for full implementation of all elements of the HASP.

The HSO/SS will advise the PM and project personnel on all potential health and safety issues of the field investigation activities to be conducted at the site. The HSO/SS will specify required exposure monitoring to assess site health and safety conditions, modify the site HASP based on field assessment of health and safety accidents and/or incidents, and recommend corrective action if needed. The HSO/SS will report all accidents and/or incidents to the PM. If the HSO/SS observes unsafe working conditions by Floyd|Snider personnel or any contractor personnel, the HSO/SS will suspend all work until the hazard has been addressed.

4.3 SITE SAFETY OFFICER

The SSO may be a person dedicated to assisting the HSO/SS during field work activities. The SSO will ensure that all personnel have appropriate personal protective equipment (PPE) on-site and PPE is properly used. The SSO will assist the HSO/SS in field observation of Floyd|Snider personnel safety. If a health or safety hazard is observed, the SSO shall suspend all work activity. The SSO will conduct on-site safety meetings daily before work commences. All health and safety equipment will be calibrated daily and records kept in the daily field logbook. The SSO may perform exposure monitoring if needed and will ensure that equipment is properly maintained.

4.4 FLOYD|SNIDER PROJECT PERSONNEL

All Floyd|Snider project personnel involved in field work activities will take precautions to prevent accidents and/or incidents from occurring to themselves and others in the work areas. Employees will report all accidents and/or incidents or other unsafe working conditions to the HSO/SS or SSO immediately. Employees will inform the HSO/SS or SSO of any physical conditions that could impact their ability to perform field work.

4.5 TRAINING REQUIREMENTS

All Floyd|Snider project personnel must comply with applicable regulations specified in WAC Chapter 296-843, Hazardous Waste Operations (HAZWOP), administered by the Washington State Department of Labor and Industries (L&I). Project personnel will be 40-hour HAZWOP trained and maintain their training with an annual 8-hour refresher. Personnel with limited tasks and minimal exposure potential will be required to have 24-hour training and a site hazard briefing and be escorted by a trained employee. Personnel with defined tasks that do not include potential contact with disturbed site soils, waste, groundwater, or dust (e.g., surveying, utility locating) are not required to have any level of hazardous waste training beyond a site emergency briefing and hazard orientation by HSO/SS. Floyd|Snider project personnel will fulfill the medical surveillance program requirements.

In addition to the 40-hour course and 8-hour refreshers, the HSO/SS will have completed an 8-hour HAZWOP Supervisor training as required by WAC 296-843-20015. At least one person on-site during field work will have current CPR/First Aid certification. All field personnel will have a minimum of 3 days of hazardous materials field experience under the direction of a skilled supervisor. Documentation of all required training will be maintained on site.

Additional site-specific training that covers on-site hazards, PPE requirements, use and limitations, decontamination procedures, and emergency response information as outlined in this HASP will be given by the HSO/SS before on-site work activities begin. Daily health and safety meetings will be documented on the Daily Tailgate Safety Meeting Form included in this HASP as Appendix A.

4.6 MEDICAL SURVEILLANCE

All Floyd|Snider field personnel are required to participate in Floyd|Snider's medical surveillance program, which includes biennial audiometric and physical examinations for employees involved in HAZWOP projects. The program requires medical clearance before respirator use or participating in HAZWOP activities. Medical examinations must be completed before conducting field work activities and on a biennial basis. These medical monitoring programs must be in compliance with all applicable worker health and safety regulations.

5.0 Hazard Evaluation and Risk Analysis

In general, there are three broad hazard categories that may be encountered during site work: chemical exposure hazards, fire/explosion hazards, and physical hazards. Sections 5.1 through 5.3 discuss the specific hazards that fall within each of these broad categories.

5.1 CHEMICAL EXPOSURE HAZARDS

This section describes potential chemical hazards associated with soil sample collection. Based on previous site investigation information, the chemicals present at this site that have been retained as site contaminants of concern (COCs) are gasoline and diesel range hydrocarbons in soil and gasoline and diesel range hydrocarbons, benzene, toluene, and total xylenes in groundwater.

Human health hazards are presented in the table below. This information covers potential toxic effects that might occur if relatively significant acute and/or chronic exposure were to happen. This information does not mean that such effects will occur from the planned site activities. Potential routes of exposure include inhalation, dermal contact, ingestion, and eye contact. The primary exposure route of concern during site work is ingestion of contaminated soil, though such exposure is considered unlikely and highly preventable. In general, the chemicals that may be encountered at this site are not expected to be present at concentrations that could produce significant exposures. The types of planned work activities and use of monitoring procedures and protective measures will limit potential exposures at this site. The use of appropriate PPE and decontamination practices will assist in controlling exposure through all pathways to the contaminants listed in the table below.

Chemical Hazard	Department of Safety and Health Permissible Exposure Limits (8-hr TWA/STEL)	Highest Concentration	Routes of Exposure	Potential Toxic Effects
Gasoline Range Hydrocarbons	300 ppm/500 ppm	900 mg/kg in soil. 166,000 µg/L in groundwater.	Inhalation, skin absorption, ingestion, skin/eye contact	Irritation to eyes, skin, mucus membranes; headache; fatigue; blurred vision; dizziness; slurred speech; confusion; convulsions; liver, kidney damage.

Chemical Hazard	Department of Safety and Health Permissible Exposure Limits (8-hr TWA/STEL)	Highest Concentration	Routes of Exposure	Potential Toxic Effects
Diesel Range Hydrocarbons	N/A	3,700 mg/kg in soil. 22,900,000 µg/L in groundwater.	Inhalation, skin absorption, ingestion, skin/eye contact	Irritation to eyes, skin, mucus membranes; headache; fatigue; blurred vision; dizziness; slurred speech; confusion; convulsions; liver, kidney damage.
Benzene	1 ppm/5 ppm	580 µg/L in groundwater.	Inhalation, skin absorption, ingestion, skin/eye contact	Irritation to eyes, skin, mucus membranes, resp. sys.; headache; fatigue; nausea, staggered gait; blurred vision; dizziness; slurred speech; bone marrow cancer [carc.]
Toluene	200 ppm/300 ppm	1,240 µg/L in groundwater.	Inhalation, skin absorption, ingestion, skin/eye contact	Irritation to eyes, skin, mucus membranes, resp. sys.; confusion; headache; euphoria; dilated pupils; dizziness; anxiety; insomnia; liver and kidney damage
Xylenes	100 ppm/150 ppm	14,500 µg/L in groundwater.	Inhalation, skin absorption, ingestion, skin/eye contact	Irritation to eyes, skin, nose, throat; excitement; drowsy; staggered gait; nausea; vomit; abdomen pain; liver and kidney damage

5.2 FIRE AND EXPLOSION HAZARDS

Flammable and combustible liquid hazards may occur from buried in-place USTs. When on-site storage is necessary, such material will be stored in containers approved by WSDOT in a location not exposed to strike hazards and provided with secondary containment. A minimum 2-A:20-B fire extinguisher will be located within 25 feet of the storage location and where refueling occurs. Any subcontractors bringing flammable and combustible liquid hazards to the site are responsible for providing appropriate material for containment and spill response, and the handling of these provisions should be addressed in their respective HASP. Transferring of flammable liquids (e.g., gasoline) will occur only after making positive metal-to-metal connection between the containers, which may be achieved by using a bonding strap. Storage of ignition and combustible materials will be kept away from fueling operations.

5.3 PHYSICAL HAZARDS

When working in or around any hazardous, or potentially hazardous, substances or situations, all site personnel should plan all activities before starting any task. Site personnel shall identify health and safety hazards involved with the work planned and consult with the HSO/SS as to how the task can be performed in the safest manner, and if personnel have any reasons for concern or uncertainty.

All field personnel will adhere to general safety rules including wearing appropriate PPE—hard hats, steel-toed boots, high-visibility vests, safety glasses, gloves, and hearing protection, as appropriate. Eating, drinking, and/or use of tobacco or cosmetics will not be permitted in work areas. Personnel will prevent splashing of liquids containing chemicals and minimize dust emissions.

The following table summarizes a variety of physical hazards that may be encountered at the Site during work activities. For convenience, these hazards have been categorized into several general groupings with recommended preventative measures.

Hazard	Cause	Preventative Measures
Head strike	Falling and/or sharp objects, bumping hazards.	Hard hats will be worn by all personnel at all times when overhead hazards exist, such as during drilling activities and around large, heavy equipment.
Foot/ankle twist, crush, slip/trip/fall	Sharp objects, dropped objects, uneven, and/or slippery surfaces.	Steel-toed boots must be worn at all times on-site while heavy equipment is present. Pay attention to footing on uneven or wet terrain and do not run. Keep work areas organized and free from unmarked trip hazards.

Hazard	Cause	Preventative Measures
Hand cuts, splinters, and chemical contact	Hands or fingers pinched or crushed, chemical hazards including dermal exposure to laboratory sample preservatives. Cut or splinters from handling sharp/rough objects and tools.	Nitrile safety gloves will be worn to protect the hands from dust and chemicals. Leather or cotton outer gloves will be used when handling sharp-edged rough materials or equipment. Do not collect soil samples from the excavator bucket until the bucket is resting on the ground at least 6 feet away from the test pit, the thumb on the bucket is lowered, eye contact is made with the operator, and the operator's hands are off the controls. Refer to preventive measures for mechanical hazards below.
Eye damage from flying materials, or splash hazards	Sharp objects, poor lighting, exposure due to flying debris or splashes.	Safety glasses will be worn at all times on-site. Care will be taken during decontamination procedures to avoid splashing, or dropping equipment into decontamination water. Face shields may be worn over safety glasses if splashing is occurring during sampling or decontamination.
Electrical hazards	Underground utilities, overhead utilities. Electrical cord hazards, such as well development pumps.	Utility locator service will be used prior to any investigation to locate all underground utilities. Visual inspection of work areas will be conducted prior to starting work. Whenever possible, avoid working under overhead high voltage lines. Make sure that no damage to extension cords occurs. If an extension cord is used, make sure it is the proper size for the load that is being served and rated SJOW or STOW (an "-A" extension is acceptable for either) and inspected prior to use for defects. The plug connection on each end should be of good integrity. Insulation must be intact and extend to the plugs at either end of the cord.
Mechanical hazards	Heavy equipment such as drill rigs, excavator, service trucks, etc. Conducting work in road right-of-ways (on the road shoulder).	Ensure the use of competent operators, backup alarms, "kill" switches, regular maintenance, daily mechanical checks on all hoses and cables, and proper guards. Verify that "whip checks" or similar securing devices are installed on "quick-connections," where the failure of high-pressure connections could lead to the whipping of hoses. Discuss the need for plastic sheeting or other methods to contain drips (hydraulic oil, motor oil, etc.) to determine if measures are needed to prevent releases to the ground. Subcontractors will supply their own HASP. All project personnel will make eye contact with operator and obtain a clear OK before approaching or working within swing radius of heavy equipment, staying clear of swing radius. Obey on-site speed limits.

Hazard	Cause	Preventative Measures
Traffic hazards	Vehicle traffic and hazards when working near right-of-ways.	Multiple field staff will work together (buddy system) and spot traffic for each other. Avoid working with your back to traffic whenever possible. Set up fencing to prevent third parties from entering site.
Noise damage to hearing	Machinery creating more than 85 decibels TWA, less than 115 decibels continuous noise, or peak at less than 140 decibels.	Wear earplugs or protective ear covers when a conversational level of speech is difficult to hear at a distance of 3 feet or if an employee must shout to be understood by nearby coworkers; when in doubt, a sound level meter may be used on-site to document noise exposure.
Strains from improper lifting	Injury due to improper lifting techniques, over-reaching/overextending, lifting overly heavy objects.	Use proper lifting techniques and mechanical devices where appropriate. The proper lifting procedure first involves testing the weight of the load by tipping it. If in doubt, ask for help. Do not attempt to lift a heavy load alone. Take a good stance and plant your feet firmly with legs apart, one foot farther back than the other. Turn the forward foot and point it in the direction of the eventual movement. Make sure you stand on a level area with no slick spots or loose gravel. Use as much of your hands as possible, not just your fingers. Keep your back straight, almost vertical. Bend at the hips, holding load close to your body. Keep the weight of your body over your feet for good balance. Use large leg muscles to lift. Push up with the foot positioned in the rear as you start to lift. Avoid quick, jerky movements and twisting motions. Never try to lift more than you are accustomed to lifting.
Cold stress	Cold temperatures and related exposure.	Workers will wear appropriate clothing, and take breaks in a heated environment when working in cold temperatures. **Further detail on cold stress is provided in Section 5.3.1.**
Accidents due to inadequate lighting	Improper illumination.	Work will proceed during daylight hours only, or under sufficient artificial light.

5.3.1 Cold Stress

Field work is expected to be completed in winter or spring months; therefore, exposure to cold temperatures may occur. Exposure to moderate levels of cold can cause the body's internal temperature to drop to a dangerously low level, causing hypothermia. Symptoms of hypothermia include: slow, slurred speech; mental confusion; forgetfulness; memory lapses; lack of coordination; and drowsiness.

To prevent hypothermia, site personnel will stay dry and avoid exposure. Site personnel will have access to a warm, dry area, such as a vehicle, to take breaks from the cold weather and warm up. Site personnel will be encouraged to wear sufficient clothing in layers such that outer clothing is wind- and waterproof and inner layers retain warmth (wool or polypropylene), if applicable. Personnel will wear water-protective gear, such as rain coats and pants, during sediment sampling to avoid getting clothing wet. Site personnel will keep hands and feet well-protected at all times. The signs and symptoms and treatment for hypothermia are summarized below.

Signs and Symptoms

- Mild hypothermia (body temperature of 98–90 °F)
  - Shivering
  - Lack of coordination, stumbling, fumbling hands
  - Slurred speech
  - Memory loss
  - Pale, cold skin
- Moderate hypothermia (body temperature of 90–86 °F)
  - Shivering stops
  - Unable to walk or stand
  - Confused and irrational
- Severe hypothermia (body temperature of 86–78 °F)
  - Severe muscle stiffness
  - Very sleepy or unconscious
  - Ice cold skin
  - Death

Treatment of Hypothermia—Proper Treatment Depends on the Severity of the Hypothermia

- Mild hypothermia
  - Move to warm area.
  - Stay active.
  - Remove wet clothes and replace with dry clothes or blankets and cover the head.
  - Drink warm (not hot) sugary drinks.
- Moderate hypothermia
  - All of the above, plus:
    - call 911 for an ambulance.
    - cover all extremities completely.
    - place very warm objects, such as hot packs or water bottles, on the victim's head, neck, chest, and groin.

- Severe hypothermia
  - Call 911 for an ambulance.
  - Treat the victim very gently.
  - Do not attempt to re-warm—the victim should receive treatment in a hospital.

Frostbite

Frostbite occurs when the skin freezes and loses water. In severe cases, amputation of the frostbitten area may be required. While frostbite usually occurs when the temperatures are 30 °F or lower, wind chill factors can allow frostbite to occur in above-freezing temperatures. Frostbite typically affects the extremities, particularly the feet and hands. Frostbite symptoms include cold, tingling, stinging, or aching feeling in the frostbitten area followed by numbness and skin discoloration from red to purple, then white or very pale skin. Should any of these symptoms be observed, wrap the area in soft cloth, do not rub the affected area, and seek medical assistance. Call 911 if the condition is severe.

Protective Clothing

Wearing the right clothing is the most important way to avoid cold stress. The type of fabric also makes a difference. Cotton loses its insulation value when it becomes wet. Wool, on the other hand, retains its insulation even when wet. The following are recommendations for working in cold environments:

- Wear *at least three layers* of clothing.
  - An outer layer to break the wind and allow some ventilation (like Gortex or nylon)
  - A middle layer of down or wool to absorb sweat and provide insulation even when wet
  - An inner layer of cotton or synthetic weave to allow ventilation
- Wear a hat—up to 40 percent of body heat can be lost when the head is left exposed.
- Wear insulated boots.
- Keep a change of dry clothing available in case work clothes become wet.
- Do not wear tight clothing—loose clothing allows better ventilation.

Work Practices

- Drinking—Drink plenty of liquids, avoiding caffeine and alcohol. It is easy to become dehydrated in cold weather. Workers will be provided access to at least 1 quart of drinking water per hour.
- Work Schedule—If possible, heavy work should be scheduled during the warmer parts of the day. Take breaks out of the cold in heated vehicles.
- Buddy System—Try to work in pairs to keep an eye on each other and watch for signs of cold stress.

5.3.2 Biohazards

Bees and other insects may be encountered during the field work tasks. Persons with allergies to bees will make the HSO/SS aware of their allergies and will avoid areas where bees are identified. Controls such as repellents, hoods, nettings, masks, or other PPE may be used. Report any insect bites or stings to the HSO/SS and seek first aid, if necessary. Inspect the work area for hazardous plants, medical waste (syringes and similar items), and indications of hazardous organisms, and avoid such areas if possible.

Site personnel will maintain a safe distance from any urban wildlife encountered, including stray dogs, raccoons, and rodents, to preclude a bite from a sick or injured animal.

5.3.3 Traffic Hazards

For work being conducted near or alongside a roadway, signs, signals, and barricades should be utilized. Because signs, signals, and barricades do not always provide appropriate protection, spotters will be used to ensure traffic is monitored during work activities along roadways. All workers will wear high visibility reflective neon/orange vests. Although lane closures are not anticipated for off-site work, traffic control plans and city-issued permits will be required for any lane closures. If lane closures are required, an addendum to this HASP will be required to document the health and safety procedures associated with lane closure and use of flaggers.

6.0 Site Monitoring

The following sections describe site monitoring techniques and equipment that are to be used during site field activities. The HSO/SS, or a designated alternate, is responsible for site control and monitoring activities.

6.1 SITE MONITORING

All noise-generating activities will be conducted during the allowable noise-generating hours as stated by the City of Ellensburg. Construction Noise Hours for the City of Ellensburg are between 7:00 a.m. and 9:00 p.m. Monday through Friday.

Visual monitoring for dust will be conducted by the HSO/SS to ensure that inhalation of contaminated soil particles does not occur. If visible dust is present in the work area, either work will cease, and the area will be cleared until the dust settles, or dust masks will be worn. Water may be used to suppress any dust clouds generated during work activities.

A photoionization detector (PID) will be used on-site for characterization of soil samples collected. This PID will also be used to monitor vapor concentrations in breathing air of total volatile organic compounds (VOCs) in parts per million. Should the PID read a sustained concentration of total VOCs greater than 5 parts per million (ppm) over a period of 1 minute, the HSO/SS will stop work and evacuate the area until vapor concentrations return to background levels. If necessary, actions may be taken to reduce vapor concentrations in the work area by covering exposed soil in drums, or drilling cuttings, or using fans to dissipate vapors from the work area.

The HSO/SS will visually inspect the work site at least daily to identify any new potential hazards. If new potential hazards are identified, immediate measures will be taken to eliminate or reduce the risks associated with these hazards.

7.0 Hazard Analysis by Task

The following section identifies potential hazards associated with each task listed in Section 3.2 of this HASP.

Task	Potential Hazard
Oversight of test pits with an excavator	Exposure to loud noise; overhead hazards; head, foot, ankle, hand, and eye hazards; electrical and mechanical hazards; lifting hazards; dust inhalation hazards; potential dermal or eye exposure to site contaminants in soil; fall hazards; engulfment; traffic hazards; being struck by heavy equipment (excavator bucket, company vehicles); and heat and cold exposure hazards. Other hazards may include contact with utilities or damage to utilities, incorrectly functioning excavator/fluid release from equipment, pinch points from handling tools and equipment, falling equipment, malfunctioning high-pressure fittings (whip checks) and hydraulic lines, biological hazards, and third parties being in close proximity to work zones.
Collection of soil samples from the excavator bucket	Chemical hazards include potential dermal or eye exposure to site contaminants in soil. Physical hazards include slip, trip, or fall hazards, failing and engulfment into a test pit with excavation collapse, falling equipment, being struck by moving or mobile equipment, pinch points, noise hazards, malfunctioning high pressure pneumatic and hydraulic lines; heat and cold exposure hazards; and biological hazards.
Oversight of drilling activities and installation of monitoring wells	Exposure to loud noise; overhead hazards; head, foot, ankle, hand, and eye hazards; electrical and mechanical hazards; lifting hazards; dust inhalation hazards; potential dermal or eye exposure to site contaminants in soil; fall hazards; engulfment; traffic hazards; being struck by heavy equipment (drill rig, company vehicles); and heat and cold exposure hazards. Other hazards may include contact with utilities or damage to utilities, incorrectly functioning excavator/fluid release from equipment, pinch points from handling tools and equipment, falling equipment, malfunctioning high-pressure fittings (whip checks) and hydraulic lines, exposure to chemicals; biological hazards, and third parties being in close proximity to work zones.
Development of monitoring wells	Being struck by vehicles, encroachment of the work zone by third parties, pinch points, slip, trip falls, cuts and contusions from handling/moving equipment, lifting hazards and musculoskeletal injuries, electric shock from the use of corded electrical tools and equipment; potential dermal or eye exposure to site contaminants in groundwater; accidental release to ground.
Collection of groundwater and floating product samples	Being struck by vehicles, encroachment of the work zone by third parties, pinch points, slip, trip falls, cuts and contusions from handling sample bottles or moving equipment, lifting hazards and musculoskeletal injuries, electric shock from the use of corded electrical tools and equipment; potential dermal or eye exposure to site contaminants in groundwater and floating product; accidental release to ground.

8.0 Personal Protective Equipment

All work involving heavy equipment and drilling will proceed in Level D PPE, which shall include hard hat, high-visibility vest/jacket, steel-toed boots, hearing protection, eye protection, and nitrile gloves.

All personnel will be properly fitted and trained in the use of PPE. The level of protection will be upgraded by the HSO/SS whenever warranted by conditions present in the work area. The HSO/SS will periodically inspect equipment such as gloves and hard hats for defects.

9.0 Site Control and Communication

9.1 SITE CONTROL

Pedestrians and other unauthorized personnel will not be allowed in the work areas. Access to the work site will be restricted to designated personnel. The purpose of site control is to minimize the public's potential exposure to site hazards, to prevent vandalism in the work area, to prevent access by unauthorized persons, and to provide adequate facilities for workers. If members of the public enter the work area, field staff will stop work until the public have left the work area. The site will be fenced to prevent potential third party injuries.

Work area controls and decontamination areas will be provided to limit the potential for chemical exposure associated with site activities, and transfer of contaminated media from one area of the site to another. The support zone (SZ) for the site includes all areas outside the work area and decontamination areas. An exclusion zone/contamination reduction zone (EZ/CRZ) and SZ will be set up for work being conducted within the limits of the site. Only authorized personnel shall be permitted access to the EZ/CRZ. For work being conducted outside the limits of the site (road shoulders), the EZ/CRZ around work locations will be demarcated with cones and/or barrier hazard tape as needed to effectively limit unauthorized access. Staff will decontaminate all equipment and gear as necessary prior to exiting the CRZ. Decontamination areas will be constructed with plastic sheeting on the ground, to reduce transport of contaminated soils from the EZ to the SZ.

9.2 COMMUNICATION

All site work will occur in teams and the primary means of communication on-site and with off-site contacts will be via cell phones. An agreed-upon system of alerting via air horns and/or vehicle horns may be used around heavy equipment to signal an emergency if shouting is ineffective.

10.0 Decontamination

Decontamination procedures will be strictly followed to prevent off-site spread of contaminated soil or water. The HSO/SS will assess the effectiveness of decontamination procedures by visual inspection.

10.1 CONTAMINATION PREVENTION

To avoid personal contact with contaminants, do the following:

- Do not walk through areas of obvious or known contamination.
- Do not directly handle or touch contaminated materials.
- Make sure all PPE have no cuts or tears prior to donning.
- Fasten all closures on suits, and cover with tape, if necessary.
- Take particular care to protect any skin injuries.
- Stay upwind of airborne contaminants.
- Do not carry cigarettes, gum, food, drinks, or similar items into contaminated areas.

To avoid spreading equipment and sample contamination:

- Take care to limit contact with heavy equipment and vehicles.
- If contaminated tools are to be placed on non-contaminated equipment/vehicles for transport to the decontamination pad, use plastic to keep the non-contaminated equipment clean.
- Bag sample containers prior to emplacement of sample material.

The PM and SSO will specify the decontamination requirements for personnel and equipment to be implemented for each task. The exclusion zone and the work site in general must include an established SZ and personnel and equipment decontamination areas. The minimum decontamination that will be required for all field operations will consist of Level D decontamination as described below.

10.2 DECONTAMINATION

The majority of field activities are expected to be conducted using Level D or modified Level D PPE. Decontamination for activities requiring Level D protection will consist of the following:

- Remove and dispose of gloves.

Decontamination procedures are described below:

Decontamination Measures for Soiled PPE

Station Number	Operation	Procedure
1	Equipment Drop	Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths. Segregation at the drop reduces the probability of cross-contamination.
2	Glove Removal	Remove gloves. Deposit in container with plastic liner.
3	Field Wash	Hands and face are thoroughly washed. Shower as soon as possible.

11.0 Emergency Response and Contingency Plan

This section defines the emergency action plan for the Site. It will be rehearsed with all site personnel and reviewed whenever the plan is modified or the HSO/SS believes that site personnel are unclear about the appropriate emergency actions.

A muster point of refuge (that is clear of adjacent hazards and not located downwind of site investigation activities) will be identified by the HSO/SS and communicated to the field team each day. In an emergency, all site personnel and visitors will evacuate to the muster point for roll call. It is important that each person on-site understand their role in an emergency, and that they remain calm and act efficiently to ensure everyone's safety.

After each emergency is resolved, the entire project team will meet and debrief on the incident—the purpose is not to fix blame, but to improve the planning and response to future emergencies. The debriefing will review the sequence of events, what was done well, and what could be improved. The debriefing will be documented in a written format and communicated to the PM. Modifications to the emergency plan will be approved by the PM.

Reasonably foreseeable emergency situations include medical emergencies, accidental release of hazardous materials (such as gasoline or diesel) or hazardous waste, and general emergencies such as vehicle accident, fire, thunderstorm, and earthquake. Expected actions for each potential incident are outlined below.

11.1 MEDICAL EMERGENCIES

In the event of a medical emergency, the following procedures should be used:

1. Stop any imminent hazard if you can safely do so.
2. Remove ill, injured, or exposed person(s) from immediate danger if moving them will clearly not cause them harm and no hazards exist to the rescuers.
3. Evacuate other on-site personnel to a safe place in an upwind or cross-wind direction until it is safe for work to resume.
4. If serious injury or a life-threatening condition exists, call **911** for paramedics, fire department, and police.
    a. Clearly describe the location, injury, and conditions to the dispatcher. Designate a person to go to the site entrance and direct emergency equipment to the injured person(s). Provide the responders with a copy of this HASP to alert them to chemicals of potential concern.
5. Trained personnel may provide first aid/cardiopulmonary resuscitation if it is necessary and safe to do so. Remove contaminated clothing and PPE only if this can be done without endangering the injured person.
6. Call the PM and HSO/SS.
7. Immediately implement steps to prevent recurrence of the accident.

Refer to Figure 1 in Section 2.2 for a map showing the nearest hospital location with phone number and address.

11.2 ACCIDENTAL RELEASE OF HAZARDOUS MATERIALS OR WASTES

The steps to follow after the accidental release of hazardous materials or wastes are as follows:

1. Evacuate all on-site personnel to a safe place in an upwind direction until the HSO/SS determines that it is safe for work to resume.
2. Instruct a designated person to contact the PM and confirm a response.
3. Contain the spill, if it is possible and can be done safely.
4. If the release is not stopped, contact 911 to alert the fire department.
5. Contact the Washington Emergency Management Division at 1-800-258-5990 and the National Response Center at 1-800-424-8802 to report the release. In addition, notify Ecology's Central Regional Office at 1-509-575-2490.
6. Initiate cleanup.
7. The PM will submit a written report to Ecology in the event of a reportable release of hazardous materials or wastes.

11.3 GENERAL EMERGENCIES

In the case of fire, explosion, earthquake, or imminent hazards, work shall be halted and all on-site personnel will be immediately evacuated to a safe place. The local police/fire department shall be notified if the emergency poses a continuing hazard, by calling 911.

In the event of a thunderstorm, outdoor work will be discontinued until the threat of lightning has abated. During the incipient phase of a fire, the available fire extinguisher(s) may be used by persons trained in putting out fires, if it is safe for them to do so. Contact the fire department as soon as feasible.

11.4 EMERGENCY COMMUNICATIONS

In the case of an emergency, an air horn or vehicle horn will be used as needed to signal the emergency. One long (5-second) blast will be given as the emergency/stop work signal. If the air horn is not working, a vehicle horn and/or overhead waving of arms will be used to signal the emergency. In any emergency, all personnel will evacuate to the designated refuge area and await further instruction.

11.5 EMERGENCY EQUIPMENT

The following minimum emergency equipment will be readily available on-site and functional at all times:

- First Aid Kit—contents approved by the HSO/SS
- Portable fire extinguisher (2-A:10 B/C min)
- Spill Kit
- Flashlight

12.0 Administrative Requirements

12.1 RECORDKEEPING

The HSO/SS, or a designated alternate, will be responsible for keeping attendance lists of personnel present at site health and safety meetings, accident reports, and signatures of all personnel who have read this HASP.

13.0 Approvals

Project Manager	Date
Project Health & Safety Officer	Date

14.0 Signature Page

I have read this Health and Safety Plan and understand its contents. I agree to abide by its provisions and will immediately notify the HSO/SS if site conditions or hazards not specifically designated herein are encountered.

Name (Print)	Signature	Date	Company/Affiliation

Attachment 1
Tailgate Safety Meeting Form

DAILY TAILGATE SAFETY MEETING AND DEBRIEF FORM

Instructions
To be competed by supervisor prior to beginning of work each day, when changes in work procedures occur, or when additiona hazards are present. Please maintain a copy of this form with the site-specific HASP for the record.

PROJECT NAME AND ADDRESS:	WORK COMPLETED/TOOLS USED:

TOPICS/HAZARDS DISCUSSED:

Chemicals of concern:
Slip, trip, fall:
Heat or cold stress:
Required PPE:
Other Potential Hazards:
• **Environmental:**
• **Physical:**
• **Biological:**
• **Other :**

INFORMAL TRAINING CONDUCTED (Name, topics):

NAMES OF EMPLOYEES:

ADDITIONAL HAZARDS IDENTIFIED AT END OF WORK DAY:

Near Misses/Incidents? If so proceed to Page 2 Near Miss and Incident Reporting Form

Supervisors Signature/Date: _____

NEAR MISS AND INCIDENT REPORTING FORM

INCIDENTS:

INJURIES:

NEAR MISSES:

CORRECTIVE ACTIONS:

Supervisors Signature/Date: _____

Big B Mini Mart

Site Investigation Work Plan

Appendix B
Sampling and Analysis Plan and Quality Assurance Project Plan

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List of Abbreviations and Acronyms

Acronym/ Abbreviation	Definition
DO	Dissolved oxygen
Ecology	Washington State Department of Ecology
EIM	Environmental Information Management
LCS	Laboratory control sample
LNAPL	Light non-aqueous phase liquid
mg/L	Milligrams per liter
MS/MSD	Matrix spike/matrix spike duplicate

Acronym/ Abbreviation	Definition
NTU	Nephelometric Turbidity Unit
PID	Photoionization detector
PVC	Polyvinyl chloride
QA/QC	Quality assurance/quality control
RI/FS	Remedial Investigation/Feasibility Study
RPD	Relative percent difference
SAP/QAPP	Sampling and Analysis Plan/Quality Assurance Project Plan
USCS	Unified Soil Classification System
USEPA	U.S. Environmental Protection Agency
VOC	Volatile organic compound

1.0 Project Description

This Sampling and Analysis Plan/Quality Assurance Project Plan (SAP/QAPP) presents the specific field protocols and field and laboratory quality assurance/quality control (QA/QC) procedures associated with the draft Remedial Investigation/Feasibility Study (RI/FS) Work Plan activities for the Big B Mini Mart Site located in Ellensburg, Washington.

1.1 INTRODUCTION

The RI/FS Work Plan describes general site investigation field activities to be performed as part of the RI, including the following:

- **Utility surveys** via existing maps and conductible survey
- **Groundwater and light non-aqueous phase liquid (LNAPL) sampling** via new and existing wells
- **Soil sampling** via test pits
- **Site survey** of well elevations and site features

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2.0 Project Organization and Responsibility

The various QA field, laboratory, and management responsibilities of key project personnel are defined below.

2.1 MANAGEMENT RESPONSIBILITIES

Tom Colligan—Floyd|Snider Project Manager

Tom Colligan, Project Manager, will have overall responsibility for project implementation. As Project Manager he will be responsible for maintaining QA on this project and ensuring that the RI/FS Work Plan objectives are met. The Project Manager will perform the following:

- Approve the SAP/QAPP.
- Monitor project activity and quality.
- Provide overview of field activities to Washington State Department of Ecology (Ecology).
- Prepare and review the draft Site Investigation and RI/FS reports.
- Provide technical representation of project activities at meetings.

2.2 QUALITY ASSURANCE RESPONSIBILITIES

Chell Black—Floyd|Snider Data Manager

The Data Manager will be responsible for the data validation of all sample results from the analytical laboratories and for entering the data into a database. Additional responsibilities include the following:

- Review laboratory reports.
- Load analytical data to Ecology's Environmental Information Management (EIM) database.
- Advise on data corrective action procedures.
- Perform QA/QC on analytical data reports.
- Perform database management and queries.

2.3 LABORATORY RESPONSIBILITIES

An Ecology-accredited laboratory will perform all analytical services in support of the RI/FS work activities.

Laboratory Project Manager
The Laboratory Project Manager will be responsible for the following:

- Coordinating laboratory analyses with Floyd|Snider.
- Reviewing and approving of final analytical reports.
- Scheduling sample analyses.
- Overseeing data review.

2.4 FIELD RESPONSIBILITIES

Gabriel Cisneros—Floyd|Snider Field Lead

The Field Lead will be responsible for leading and coordinating the day-to-day activities in the field. The Field Lead will report directly to the Floyd|Snider Project Manager.

Specific responsibilities include the following:

- Coordinating with the Project Manager.
- Coordinating and managing field staff including sampling staff and drillers.
- Reviewing field data including field logs and field measurement data.
- Adhering to the work schedule.
- Coordinating and overseeing subcontractors.
- Preparing the Site Investigation and RI/FS Reports.

3.0 Laboratory Quality Assurance Objectives

The objective of this section is to clarify laboratory data QA objectives for field sampling and laboratory analyses. Specific procedures for sampling, chain of custody, laboratory instrument calibration, laboratory analysis, reporting of data, internal QC, audits, preventative maintenance of field/laboratory equipment, and corrective actions are described in subsequent sections of this SAP/QAPP.

3.1 LABORATORY QUALITY ASSURANCE OBJECTIVES

The quality of analytical data generated is assessed by the frequency and type of internal QC checks developed for analysis type. Laboratory results will be evaluated against QA objectives by reviewing results for analysis of method blanks, matrix spikes (MS), duplicate samples, laboratory control samples, calibrations, performance evaluation samples, and interference checks as specified by the specific analytical methods. Data quality objectives are summarized in Table B.1.

3.2 PRECISION

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, precision is a quantitative measure of the variability of a group of measurements compared to their average values. Analytical precision is measured through MS/matrix spike duplicate (MSD) samples for organic analysis and through laboratory duplicate samples for inorganic analyses.

Analytical precision measurements will be carried out on project-specific samples at a minimum laboratory duplicate frequency of 1 per laboratory analysis group or 1 in 20 samples, whichever is more frequent per matrix analyzed, as practical. Laboratory precision will be evaluated against quantitative relative percent difference (RPD) performance criteria.

Field precision will be evaluated by the collection of blind field duplicates at a minimum frequency of 1 per laboratory analysis group or 1 in 20 samples. Currently, no performance criteria have been established for field duplicates. Field duplicate precision will, therefore, be screened against a RPD of 75 percent for all samples. However, no data will be qualified based solely on field duplicate precision.

Precision measurements can be affected by the nearness of a chemical concentration to the method detection limit, where the percent error (expressed as RPD) increases. The equation used to express precision is as follows:

$$RPD = \frac{(C_1 - C_2) \times 100\%}{(C_1 + C_2)/2}$$

Where:

RPD = relative percent difference
C_1 = larger of the two observed values
C_2 = smaller of the two observed values

3.3 ACCURACY

Accuracy is an expression of the degree to which a measured or computed value represents the true value. Analytical accuracy may be assessed by analyzing "spiked" samples with known standards (surrogates, laboratory control samples [LCS], and/or MS) and measuring the percent recovery. Accuracy measurements on MS samples will be carried out at a minimum frequency of 1 in 20 samples per matrix analyzed. Because MS/MSDs measure the effects of potential matrix interferences of a specific matrix, the laboratory will perform MS/MSDs only on samples from this investigation and not from other projects. Surrogate recoveries will be determined for every sample analyzed for organics.

Laboratory accuracy will be evaluated against quantitative laboratory control sample, MS, and surrogate spike recoveries using limits for each applicable analyte. Accuracy can be expressed as a percentage of the true or reference value, or as a percent recovery in those analyses where reference materials are not available and spiked samples are analyzed. The equation used to express accuracy is as follows:

$$\%R = 100\% \times (S-U)/C_{sa}$$

Where:

%R = percent recovery
S = measured concentration in the spiked aliquot
U = measured concentration in the unspiked aliquot
C_{sa} = actual concentration of spike added

3.4 REPRESENTATIVENESS

Representativeness expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Care will be taken in the design of the sampling program to ensure sample locations are properly selected, sufficient numbers of samples are collected to accurately reflect conditions at the location(s), and samples are representative of the sampling location(s). A sufficient volume of sample will be collected at each sampling location to minimize bias or errors associated with sample particle size and heterogeneity.

3.5 COMPARABILITY

Comparability is a qualitative parameter expressing the confidence with which one dataset can be compared to another. In order to insure results are comparable, samples will be analyzed using standard U.S. Environmental Protection Agency (USEPA) methods and protocols. Calibration and reference standards will be traceable to certified standards and standard data reporting formats will be employed. Data will also be reviewed to verify that precision and accuracy criteria were achieved and, if not, that data were appropriately qualified.

3.6 COMPLETENESS

Completeness is a measure of the amount of data that are determined to be valid in proportion to the amount of data collected. Completeness will be calculated as follows:

$$C = \frac{\text{(Number of acceptable data points)} \times 100}{\text{(Total number of data points)}}$$

The data quality objective for completeness for all components of this project is 95 percent. Data that were qualified as estimated because the QC criteria were not met will be considered valid for the purpose of assessing completeness. Data that were qualified as rejected will not be considered valid for the purpose of assessing completeness.

3.7 QUALITY CONTROL PROCEDURES

QC samples will be collected and analyzed as described in this section.

3.7.1 Field Quality Control Procedures

Trip blanks will be included in each cooler with samples being analyzed for volatile organic compounds (VOCs) to ensure the sample containers do not contribute to any detected analyte concentrations and to identify any artifacts of improper sample handling, storage, or shipping. All field QC samples will be documented in the field logbook and verified by the QA Manager or designee. A blind field duplicate will be collected at a frequency of 1 in 20 samples to assess site heterogeneity.

3.7.2 Laboratory Quality Control Procedures

Laboratory Quality Control Criteria. Certain samples will be spiked and the recoveries of spiked compounds compared to the QC criteria. Results of the laboratory QC samples from each sample group will be reviewed by the analyst immediately after a sample group has been analyzed. The QC sample results will then be evaluated to determine whether control limits were exceeded. If control limits are exceeded in the sample group, corrective action (e.g., method modifications followed by reprocessing the affected samples) will be initiated prior to processing a subsequent group of samples.

All primary chemical standards and standard solutions used in this project will be traceable to documented and reliable commercial sources. Standards will be validated to determine their accuracy by comparison with an independent standard. Any impurities identified in the standard will be documented.

The following paragraphs summarize the procedures that will be used to assess data quality throughout sample analysis.

Laboratory Duplicates. Analytical duplicates provide information on the precision of the analysis and are useful in assessing potential sample heterogeneity and matrix effects. Analytical duplicates are subsamples of the original sample that are prepared and analyzed as a separate

sample. A minimum of 1 laboratory duplicate will be analyzed per sample group or for every 20 samples, whichever is more frequent.

Matrix Spikes and Matrix Spike Duplicates. Analysis of MS samples provides information on the extraction efficiency of the method on the sample matrix. By performing MSD analyses, information on the precision of the method is also provided for organic analyses. A minimum of 1 MS/MSD will be analyzed for every sample group or for every 20 samples analyzed by the laboratory.

Laboratory Control Samples. A LCS is a method blank sample carried throughout the same process as the samples to be analyzed, with a known amount of standard added. The blank spike compound recovery assesses analytical accuracy in the absence of any sample heterogeneity or matrix effects.

Surrogate Spikes. All project samples analyzed for organic compounds will be spiked with appropriate surrogate compounds as defined in the analytical methods. Surrogate recoveries will be reported by the laboratories; however, no sample result will be corrected for recovery using these values.

Method Blanks. Method blanks are analyzed to assess possible laboratory contamination at all stages of sample preparation and analysis. A minimum of 1 method blank will be analyzed for every extraction batch or for every 20 samples, whichever is more frequent.

4.0 Sample Handling and Custody Documentation

Sample possession and handling must be traceable from the time of sample collection, through laboratory and data analysis, to the time sample results are reported. A sample log form and field logbook entries will be completed for each location occupied and each sample collected.

4.1 SAMPLE HANDLING

To control the integrity of the samples during transit to the laboratory and during hold prior to analysis, established preservation and storage measures will be taken. Sample containers will be labeled with the client name, location name/number, sample number, sampling date and time, required analyses, and initials of the individual processing the sample. The Field Lead will check all container labels, custody form entries, and logbook entries for completeness and accuracy at the end of each sampling day.

4.2 SAMPLE CHAIN-OF-CUSTODY

Sample labeling and custody documentation will be performed as described in this document. Custody procedures will be used for all samples at all stages in the analytical or transfer process and for all data and data documentation, whether in hardcopy or electronic format.

4.3 SAMPLE PRESERVATION

Samples requiring field preservation will be placed into pre-preserved sample jars supplied by the laboratory (i.e., VOCs and metals depending on media). Immediately after the sample jars are filled with each media, they will be placed in the appropriate cooler with a sufficient number of ice packs (or crushed ice) to keep them cool through the completion of that day's sampling and transport to the laboratory.

4.4 SAMPLE SHIPMENT

Technical field staff will be responsible for all sample tracking and custody procedures in the field. The Field Lead will be responsible for final sample inventory and will maintain sample custody documentation. At the end of each day, and prior to transfer, custody form entries will be made for all samples. Each shipment of coolers will be accompanied by custody forms; the forms will be signed at each point of transfer and will include sample numbers. All custody forms will be completed in indelible ink. Copies of all forms will be retained as appropriate and included as appendices to QA/QC reports to management.

Prior to shipping, sample containers will be wrapped and securely packed inside the cooler with ice packs or crushed ice by the field technician or designee. The original, signed custody forms will be transferred with the cooler. The cooler will be secured and appropriately sealed and labeled for immediate shipping or transport via vehicle. Samples will be delivered to the laboratory under custody following completion of sampling activities.

4.5 SAMPLE RECEIPT

The designated sample custodian at the laboratory will accept custody of the samples and verify that the chain-of-custody form matches the samples received. The laboratory Project Manager will ensure that the custody forms are properly signed upon receipt of the samples and will note questions or observations concerning sample integrity on the custody forms. The laboratory will contact the QA Manager immediately if discrepancies are discovered between the custody forms and the sample shipment upon receipt. The Laboratory Project Manager, or designee, will specifically note any coolers that do not contain ice packs or are not sufficiently cold upon receipt.

5.0 Data Reduction, Validation, and Reporting

Initial data reduction, evaluation, and reporting at the laboratory will be carried out as described in the appropriate analytical protocols and the laboratory's QA Manual. QC data resulting from methods and procedures described in this document will also be reported.

5.1 DATA REDUCTION AND REPORTING

The laboratory will be responsible for internal checks on data reporting and will correct errors identified during the QA review. The analytical laboratories will be required, where applicable, to report the following:

- **Project Narrative.** This summary, in the form of a cover letter, will discuss problems, if any, encountered during any aspect of analysis. This summary should discuss, but not be limited to, QC, sample shipment, sample storage, and analytical difficulties. Any problems encountered (actual or perceived) and their resolutions will be documented in as much detail as necessary.
- **Sample IDs.** Records will be produced that clearly match all blind duplicate QA samples with laboratory sample IDs.
- **Chain-of-Custody Records.** Legible copies of the custody forms will be provided as part of the data package. This documentation will include the time of receipt and condition of each sample received by the laboratory. Additional internal tracking of sample custody by the laboratory will also be documented.
- **Sample Results**. The data package will summarize the results for each sample analyzed. The summary will include the following information when applicable:
    - All field sample identification codes and the corresponding laboratory identification codes:
        - Sample matrix.
        - Date of sample extraction.
        - Date and time of analysis.
        - Weight and/or volume used for analysis.
        - Final dilution volumes or concentration factor for the sample.
        - Percent moisture in solid samples.
        - Identification of the instrument used for analysis.
        - Method reporting and quantitation limits.
    - Analytical results reported with reporting units identified.
    - All data qualifiers and their definitions.
    - Electronic data deliverables.
- **Quality Assurance/Quality Control Summaries.** This section will contain the results of all QA/QC procedures. Each QA/QC sample analysis will be documented with the

same information required for the sample results (refer above). No recovery or blank corrections will be made by the laboratory. The required summaries are listed below; additional information may be requested.

- **Method Blank Analysis.** The method blank analyses associated with each sample and the concentration of all compounds of interest identified in these blanks will be reported.
- **Surrogate Spike Recovery.** All surrogate spike recovery data for organic compounds will be reported. The name and concentration of all compounds added, percent recoveries, and range of recoveries will be listed.
- **Matrix Spike Recovery.** All MS recovery data for metals and organic compounds will be reported. The name and concentration of all compounds added, percent recoveries, and range of recoveries will be listed. The RPD for all duplicate analyses will be reported.
- **Matrix Duplicate.** The RPD for all matrix duplicate analyses will be reported.
- **Blind Duplicates.** Blind duplicates will be reported in the same format as any other sample. RPDs will be calculated for duplicate samples and evaluated as part of the data quality review.

5.2 DATA VALIDATION

Once data are received from the laboratory, the Floyd|Snider data manager will perform QC of the data. Specific procedures will be followed to assess data precision, accuracy, and completeness of the laboratory data.

A data quality review of the analytical data will follow USEPA National Functional Guidelines in accordance with the QAPP limits (USEPA 2013a and USEPA 2013b). All chemical data will be reviewed with regard to the following:

- Chain of custody/documentation.
- Sample preservation and holding times.
- Instrument performance (calibration, tuning, sensitivity).
- Method blanks.
- Reporting limits.
- Surrogate recoveries.
- MS/MS recoveries.
- LCS recoveries.
- Laboratory and field duplicate RPDs.

A brief Data Validation Summary Report will be prepared documenting the QC review. Final validated data will be entered into the Floyd|Snider project database and uploaded to Ecology's EIM system.

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6.0 Corrective Actions

Corrective action procedures are described in this section.

Corrective Action for Field Sampling. The Field Lead will be responsible for correcting field errors in sampling or documenting equipmen malfunctions during the field sampling effort and will be responsible for resolving situations in the field that may result in non-compliance with this SAP/QAPP. All corrective measures will be immediately documented in the field logbook. Substantial deviations from the RI/FS Work Plan will be reported immediately to the project manager who will then report the deviation to Ecology.

Corrective Action for Laboratory Analyses. The laboratory is required to comply with their Standard Operating Procedures. The Laboratory Project Manager will be responsible for ensuring that appropriate corrective actions are initiated as required for conformance with this SAP/QAPP. All laboratory personnel will be responsible for reporting problems that may compromise the quality of the data.

If any QC sample exceeds the project-specified control limits, the analyst will identify and correct the anomaly before continuing with the sample analysis. The analyst will document the corrective action taken in a memorandum submitted to the QA Manager. A narrative describing the anomaly, the steps taken to identify and correct the anomaly, and the treatment of the relevant sample batch (i.e., recalculation, reanalysis, and/or re-extraction) will be submitted with the data package.

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7.0 Field Investigation Procedures

The following sections describe the specific protocols that will be used to gather site data to be used in the Site Investigation Work Plan. Refer to the work plan for the specific sampling methods.

7.1 UNDERGROUND UTILITY INVESTIGATION PROTOCOLS

A public utility locate notification will be completed in accordance with state law at least 3 business days prior to the start of the investigation. Public utility locate information will be provided to the drilling contractor prior to the start of work. In addition, a private locate will be performed to define the location of the underground storage tank piping and utilities beneath the property.

7.2 GROUNDWATER AND LNAPL SAMPLING PROTOCOL

Up to four new groundwater monitoring wells will be installed and developed according to standard industry procedures. The wells will be 2-inch-diameter polyvinyl chloride (PVC) and drilled using an 8–inch outside diameter hollow-stem auger with samples collected at 2.5-foot intervals. The screened interval shall be 10 feet long and the well will be screened across the water table observed at the time of drilling. All wells will be surface-mounted as described in the Site Investigation Work Plan.

Groundwater samples will be collected from all monitoring wells after purging with low-flow techniques, using a peristaltic pump and disposable polyethylene tubing as described below.

7.2.1 Monitoring Well Development

All newly installed wells will be developed by surging with a bailer or surge block followed by well evacuation. All down-hole well development tools will be decontaminated prior to use for each well. Surging and evacuation will be repeated until evacuated water is visibly clean and essentially sand-free. During well evacuation, water samples will be collected for field determination and documentation of temperature, specific conductivity, and pH. Well development will proceed until field parameters stabilize to within ±10 percent on three consecutive measurements or until 10 well volumes have been purged.

7.2.2 Monitoring Well Sampling Procedure

Groundwater and LNAPL samples will be collected from all site wells adhering to following the procedure:

1. After the protective casing has been opened, the condition of the monument/well will be observed and noted on the field log.
2. A decontaminated water level indicator will be used to measure depth-to-water from the top of the PVC well casing. The depth-to-water measurement will be accurate to the nearest 0.01 foot.

3. Wells will be gauged for measurable LNAPL thickness using an interface probe.
4. If LNAPL is observed, a disposable bailer will be used to collect a product sample instead of a sample of groundwater for dissolved constituents.
5. Disposable, new polyethylene tubing will be lowered into the well to the midpoint depth of the screened interval or, if the groundwater level is below this depth, the midpoint depth of the water column. A peristaltic pump will be used to begin purging the water. Purge water will be collected and disposed of as described in Section 7.6.
6. The well will be purged at rates that maintain less than 0.1 foot of drawdown in the well and generate non-turbid water (less than 10 Nephelometric Turbidity Units [NTU]). Generally this translates to a flow-rate of less than 0.5 liters/minute.
7. During purging, field parameters (temperature, pH, dissolved oxygen [DO], conductivity, salinity, and turbidity) in the purge water as well as depth-to-water will be recorded at 3- to 5-minute intervals. If the field measurements for turbidity, DO, and electrical conductivity are approximately stable (within 10 percent) for three consecutive readings, the groundwater sample will be collected. If DO is less than 5 milligrams per liter (mg/L), three consecutive readings within 1 mg/L will be considered stable. If turbidity readings are negative values, the measurement will be recorded as less than 1 NTU. Because these field parameters (particularly turbidity) may not reach these stringent stabilization criteria at a particular well, collection of each groundwater sample will be based on the field personnel's best professional judgment at the time of sampling. The last set of field parameters measured during purging will represent field parameters for the groundwater sample.
8. The groundwater sample will be collected by directly filling the laboratory-provided bottles from the pump discharge line (maintaining the same flow rate as purging). All labeled, filled bottles will immediately be placed in coolers packed with ice. Samples collected for dissolved metals analysis will be filtered at the laboratory.

7.2.3 Groundwater and LNAPL Sample Nomenclature and Handling Procedures

The sample number format for monitoring well groundwater samples will be the well number. Groundwater screening samples will be "boring number-screen top depth-screen bottom depth" For example, an example collected from MW-4 from 4 to 14 feet would be labeled "MW4-4-14'." Every groundwater sample will have a unique identifier, and the collection date will be known from the bottle label and chain-of-custody form. The sample format for monitoring wells with LNAPL will be the same as above but with "LNAPL" at the end of the identifier. For example, an LNAPL sample from Monitoring Well MW-2 would be labeled "MW2-4-14-LNAPL." Sample labels will also include the time of collection and initials of sampler on the bottle label.

The samples will be shipped overnight or delivered to the laboratory on the day following collection to ensure that the analytical holding times, specified in Table B.2, are met.

7.2.4 Laboratory Analysis

The analyses to be performed on groundwater and LNAPL samples collected during the site investigation are summarized in Table B.3.

7.3 SOIL SAMPLING PROTOCOL

Soil samples will be collected from excavated test pits. Soil samples will be collected from selected test pit locations shown on Figure B.1. Test pit locations may be moved to a limited degree if underground or aboveground utility locations, and/or site operational constraints are present.

7.3.1 Test Pit Sampling Procedure

Test pits will be excavated and sampled according to the following procedure:

1. An excavator will be used to remove soil at the direction of a field technician.
2. The test pit sidewall soils will be photographed and logged by a field technician according to Unified Soil Classification System (USCS) and standard practices for the environmental industry. Test pit logs will record the location, date, name of person logging, and sample depth. The presence of debris, photoionization detector (PID) readings, and other evidence of contamination (visual and/or odors) will also be noted by a field technician according to USCS and consistent with the procedures outlined above.
3. Soil samples from the test pit sidewalls will be screened for organic vapors using a PID. Selected intervals showing elevated PID response will be analyzed. These soil intervals will be sampled directly from the sidewall using USEPA Method 5035A (for VOCs and gasoline-range organics/benzene, toluene, ethylbenzene, and xylenes only). This preservation method uses a Teflon corer to collect a sealed sample that minimizes loss of volatiles during sampling and transport.
4. Soil samples for other analyses will be collected from sand-sized material in the test pit sidewall, or from the excavator bucket if the test pit is not accessible, using a decontaminated stainless steel scoop or trowel. Soil samples will be placed in a decontaminated stainless steel bowl and homogenized until the soil is uniform in color and texture. Homogenized samples will be placed in laboratory-provided clean jars.
5. All labeled, filled sample jars will be placed in a field cooler packed with ice. Standard chain-of-custody procedures will be implemented for all sampling events.
6. Soil from the test pits will be stockpiled on the property within the fenced area. Samples from the stockpiled soil will be collected and processed as described in Section 7.3.3.
7. The test pit will be backfilled with clean stockpiled soil or clean imported soil.

7.3.2 Soil Sample Nomenclature and Handling Procedures

The sample number format for test pit soil samples will be "test pit location-top depth-bottom depth." For example, a surface sample collected from TP-5 from 0 to 0.5 feet would be labeled "TP5-0-0.5." A duplicate sample would be labeled "TP5-0-0.5'-B." Every soil sample will have a

unique identifier, and the collection date will be known from the sample bottle and chain-of-custody form. Sample labels will include the time of collection and initials of sampler on the bottle label.

The samples will be shipped overnight or delivered to the laboratory on the day following collection or as soon as possible following collection to ensure that analytical holding times specified in Table B.2 are met.

7.3.3 Stockpiled Soil

During test pit activities, visibly-impacted soil will be stockpiled separately from otherwise clean soil. Only clean overburden soil from test pits will be placed back into the test pit and compacted following completion of test pit sampling. Visibly contaminated soil from all the test pits will be combined into a single stockpile along with soil from the monitoring well installation activities. The stockpiled soil will be covered with plastic, and surrounded by a straw waddle, and sampled for disposal according to Table 6.9 in Ecology's September 2011 Guidance for Remediation Petroleum Contaminated Soil (Ecology 2011).

7.3.4 Laboratory Analysis

The analyses to be performed on soil samples collected from the test pits and stockpiled soil during the site investigation are summarized in Table B.3.

7.4 EQUIPMENT DECONTAMINATION

Field sampling equipment, such as the augers, split-spoons, and a water level indicator will be cleaned between each use. Equipment for reuse will be decontaminated according to the procedure below, before each sample interval.

1. Water will be sprayed over equipment to dislodge and remove any remaining sediments.
2. Surfaces of equipment contacting sample material will be scrubbed with brushes using an Alconox solution.
3. Scrubbed equipment will be rinsed and scrubbed with clean water.
4. Equipment will undergo a final spray rinse of deionized water.

7.5 SURVERYING

All wells, test pits, and site features, such as building corners, will be professionally surveyed after sampling is complete. Site mapping will be conducted using the Washington State Plane North Coordinate System and the North American Vertical Datum of 1988.

7.6 INVESTIGATION-DERIVED WASTE MANAGEMENT

Investigation-derived waste solids, including soil, if free of visual evidence of contamination, will be placed in their original location at the site when possible. Visibly contaminated soil from all

the test pits will be combined into a single stockpile along with soil from the monitoring well installation activities. Profiling and disposal of contaminated waste will be coordinated by Floyd|Snider.

Investigation-derived waste liquids, such as well development waters and decontamination fluids will be drummed on-site and appropriately labeled. Profiling and disposal of contaminated waste waters will be coordinated by Floyd|Snider.

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8.0 References

U.S. Environmental Protection Agency (USEPA). 2013a. *USEPA Contract Laboratory Program, National Functional Guidelines for Organic Data Review*. OSWER 9200-2.134, EPA 540-R-014-002. October.

———. 2013b. *USEPA National Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*. OSWER 9355.0-131, EPA 540-R-013-001. Office of Superfund Remediation and Technology Innovation (OSRTI), Washington, D.C. October.

Washington State Department of Ecology. 2011. *Guidance for Remediation of Petroleum Contaminated Sites*. Toxics Cleanup Program. Publication No. 10-09-057 – September.

Big B Mini Mart

Site Investigation Work Plan

Appendix B
Sampling and Analysis Plan and Quality Assurance Project Plan

Tables

Table B.1
Data Quality Assurance Criteria

Parameter	Reference	Precision (Relative Percent Difference)	Accuracy (Percent Difference from Standard)	Completeness (Percentage of Data Validated)
Soil				
DRO	NWTPH-Dx	± 20%	± 50%	95%
GRO	NWTPH-Gx	± 20%	± 50%	95%
VOCs				
Benzene				
Toluene				

GRO Gasoline-range organics
LNAPL Light non-aqueous phase liquid
VOC Volatile organic compound

Table B.2
Analytical Requirements, Methods, Preservation, Bottle Type, and Holding Times

Parameter	Reference	Bottle Type	Preservative	Holding Time
Soil				
DRO	NWTPH-Dx	(1) 4-oz WMG	None, cool to ≤6°C	14 days to extract, then 40 to analyze
GRO	NWTPH-Gx	(4) Glass 40 ml VOA vials with PTFE Septum	Methanol and cool to ≤6 °C or none and cool to ≤6 °C	14 days to analyze with MeOH preservation or if none, 2 days at ≤6 °C, 14 days at ≤-7 °C
VOCs				
Metals (total)				
Lead	USEPA Method 6020	(1) 500-mL HDPE	Nitric acid, cool to ≤6 °C	6 months

Abbreviations:

°C	Degrees Celsius
BTEX	Benzene, toluene, ethylbenzene, xylenes
DRO	Diesel-range organics
GRO	Gasoline-range organics
HDPE	High-density polyethylene
MeOH	Methanol
mL	Milliliter
oz	Ounce
PTFE	Polytetrafluoroethylene (Teflon)
VOA	Volatile organic analysis
VOC	Volatile organic compound
WMG	Wide-mouth glass jar
oz	Ounce
PTFE	Polytetrafluoroethylene (Teflon)

Table B.1
Data Quality Assurance Criteria

Parameter	Reference	Precision (Relative Percent Difference)	Accuracy (Percent Difference from Standard)	Completeness (Percentage of Data Validated)
Soil				
DRO	NWTPH-Dx	± 20%	± 50%	95%
GRO	NWTPH-Gx	± 20%	± 50%	95%
VOCs				
Benzene	USEPA Method 8260	± 20%	± 50%	95%
Toluene				
Ethylbenzene				
Xylenes				
Ethanol				
Naphthalene				
Methyl tert-Butyl Ether				
Ethylene Dichloride				
n-Hexane				
Ethylene Dibromide				
Metals				
Lead	USEPA Method 6020	± 20%	± 50%	95%
Water or LNAPL				
DRO	NWTPH-Dx	± 20%	± 60%	95%
GRO	NWTPH-Gx	± 20%	± 60%	95%
VOCs				
Benzene	USEPA Method 8260	± 20%	± 50%	95%
Toluene				
Ethylbenzene				
Xylenes				
Ethanol				
Naphthalene				
Methyl tert-Butyl Ether				
Ethylene Dichloride				
n-Hexane				
Ethylene Dibromide	USEPA Method 8011			
Metals (total)				
Lead	USEPA Method 6020	± 20%	± 50%	95%

Abbreviations:
BTEX Benzene, toluene, ethylbenzene, and xylenes
DRO Diesel-range organics
GRO Gasoline-range organics
LNAPL Light non-aqueous phase liquid
VOC Volatile organic compound

Table B.2
Analytical Requirements, Methods, Preservation, Bottle Type, and Holding Times

Parameter	Reference	Bottle Type	Preservative	Holding Time
Soil				
DRO	NWTPH-Dx	(1) 4-oz WMG	None, cool to ≤6°C	14 days to extract, then 40 to analyze
GRO	NWTPH-Gx	(4) Glass 40 ml VOA vials with PTFE Septum	Methanol and cool to ≤6 °C or none and cool to ≤6 °C	14 days to analyze with MeOH preservation or if none, 2 days at ≤6 °C, 14 days at ≤-7 °C
VOCs				
Benzene	USEPA Method 8260	(4) Glass 40 ml VOA vials with PTFE Septum (GRO and VOCs taken from the same 4 VOA vials)	Methanol and cool to ≤6 °C or none and cool to ≤6 °C	14 days to analyze with MeOH preservation or if none, 2 days at ≤6 °C, 14 days at ≤-7 °C
Toluene				
Ethylbenzene				
Xylenes				
Ethanol				
Methyl tert-Butyl Ether				
Ethylene Dichloride				
Naphthalenes				
n-Hexane				
Ethylene Dibromide				
Metals				
Lead	USEPA Method 6020	(1) 4-oz WMG	None, cool to ≤6 °C	6 months (or freeze for 1 year) 28 days for mercury
Water or LNAPL				
DRO	NWTPH-Dx	(2) 500-mL amber glass	None, cool to ≤6 °C	7 days to extract, then 40 days to analyze
GRO	NWTPH-Gx	(5) 40-mL VOA vials with PTFE Septum	Hydrochloric acid to pH ≤2.0, cool to ≤6 °C	14 days to analyze
VOCs				
Benzene	USEPA Method 8260	(5) 40-mL VOA vials with PTFE Septum (GRO and VOCs taken from the same 5 VOA vials)	Hydrochloric acid to pH ≤2.0, cool to ≤6 °C	14 days to analyze
Toluene				
Ethylbenzene				
Xylenes				
Methyl tert-Butyl Ether				
Ethylene Dichloride				
Naphthalenes				
n-Hexane				
Ethylene Dibromide	USEPA Method 8011			
Metals (total)				
Lead	USEPA Method 6020	(1) 500-mL HDPE	Nitric acid, cool to ≤6 °C	6 months

Abbreviations:

°C	Degrees Celsius
BTEX	Benzene, toluene, ethylbenzene, xylenes
DRO	Diesel-range organics
GRO	Gasoline-range organics
HDPE	High-density polyethylene
MeOH	Methanol
mL	Milliliter
oz	Ounce
PTFE	Polytetrafluoroethylene (Teflon)
VOA	Volatile organic analysis
VOC	Volatile organic compound
WMG	Wide-mouth glass jar
oz	Ounce
PTFE	Polytetrafluoroethylene (Teflon)

Table B.3
Analytical Methods, Detection Limits, and Reporting Limits

Parameter	Reference	Units	Estimated Detection Limit	Reporting Limit/PQL
Soil				
DRO	NWTPH-Dx	mg/kg	5	25–50
GRO	NWTPH-Gx		0.3	2
VOCs				
Benzene	USEPA Method 8260C	mg/kg	0.006	0.02
Toluene			0.002	0.02
Ethylbenzene			0.002	0.02
Xylenes			0.006	0.06
Ethanol			25	50
Naphthalene			0.002	0.02
Methyl tert-Butyl Ether			0.00004-0.00007	0.005
Ethylene Dibromide			0.0025	0.005
Ethylene Dichloride			0.00004–0.00007	0.005
n-Hexane			0.00004–0.00007	0.005
Metals				
Lead	USEPA Method 6020	mg/kg	0.02	1
Water or LNAPL				
DRO	NWTPH-Dx	µg/L	9	50
GRO	NWTPH-Gx		6	100
VOCs				
Benzene	USEPA Method 8260C	µg/L	0.02	1
Toluene			0.03	1
Ethylbenzene			0.03	1
Xylenes			0.09	3
Ethanol			500	1,000
Naphthalene			0.14	2
Methyl tert-Butyl Ether			0.07	2
Ethylene Dichloride			0.05	2
n-Hexane			0.17	5
Ethylene Dibromide	USEPA Method 8011B		0.002	0.01
Metals (total)				
Lead	USEPA Method 6020A or 200.8	µg/L	0.07	1

Abbreviations:

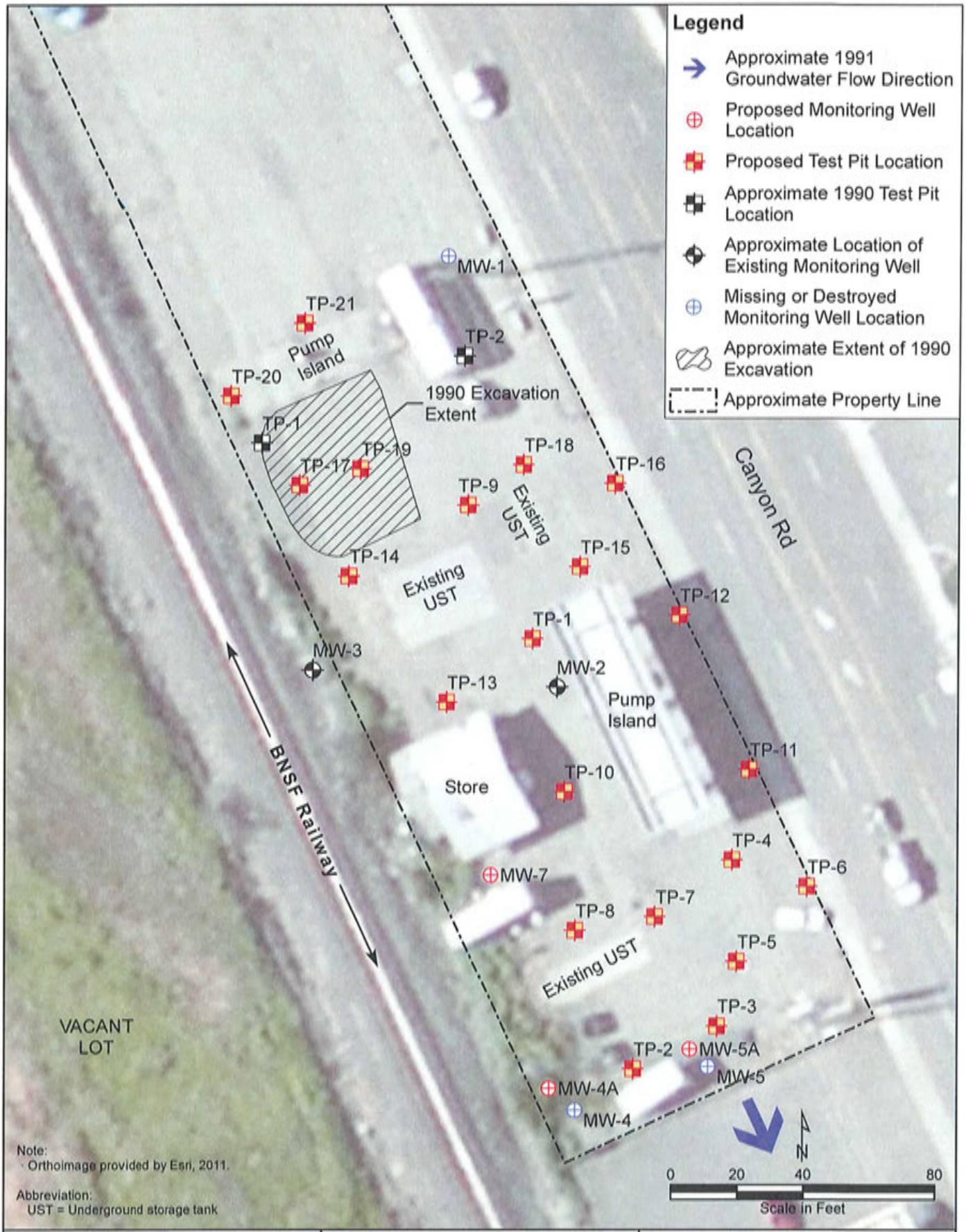
BTEX	Benzene, toluene, ethylbenzene, xylenes
DRO	Diesel-range organics
GRO	Gasoline-range organics
µg/L	Micrograms per liter
µg/kg	Micrograms per kilogram
mg/L	Milligrams per liter
mg/kg	Milligrams per kilogram
PQL	Practical quantitation limit
VOC	Volatile organic compound

Big B Mini Mart

Site Investigation Work Plan

Appendix B
Sampling and Analysis Plan and Quality Assurance Project Plan

Figure



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Site Investigation Work Plan
Big B Mini Mart
Ellensburg, Washington

Figure B.1
Proposed Well and Test Pit Locations

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