Blaine Mini Mart
Groundwater Monitoring
Blaine, WA

Sampling and Analysis Plan / Quality Assurance Project Plan

Prepared for

Toxics Cleanup Program
Northwest Regional Office
Washington State Department of Ecology
Bellevue, Washington

Prepared by

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July 2012

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List of Acronyms

BTEX	benzene, toluene, ethylbenzene, total xylenes
Cascade	Cascade Drilling LLC
CCV	continuing calibration verification
COC	chain of custody
CUL	cleanup level
dCAP	draft Cleanup Action Plan
Ecology	Washington State Department of Ecology
EDB	ethylene dibromide
EDC	1, 2-dichlorethane
EIM	Environmental Information Management
HC1	hydrochloric acid
LCS/LCSD	laboratory control sample/laboratory control sample duplicate
MS/MSD	matrix spike/matrix spike duplicate
MTBE	methyl-tertiary-butyl ether
MTCA	Model Toxics Control Act
NAPL	non-aqueous phase liquid
QAPP	Quality Assurance Project Plan
QA/QC	quality assurance/quality control
MDL	method detection limits
NWTPH	Northwest Total Petroleum Hydrocarbons
RL	reporting limit
RPD	relative percent difference
SAIC	Science Applications International Corporation
SAP	Sampling and Analysis Plan
SIM	selected ion monitoring
TPH-G	total petroleum hydrocarbons – gasoline
TPH-Dx	total petroleum hydrocarbons – diesel and motor oil
USEPA	United States Environmental Protection Agency
VOA	volatile organic analysis
VOC	volatile organic compounds

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1.0 Introduction

The Blaine Mini Mart is an active gas station located at 2530 Peace Portal Drive within the city limits of Blaine, Washington (Figure 1). The property is a one-half acre triangular lot bounded by Peace Portal Drive on the southwest and Bell Road to the west. Vacant land is present between the property and Interstate 5 to the north, and an abandoned former Rocky Mountain Trading Post building is located on the southeast. The property is located within a mixed commercial/ residential area and was previously identified as 1828 Peace Portal Drive. The property is entirely covered with asphalt, concrete, or structures, and the surface slopes gently to the southwest, toward Peace Portal Drive. Dakota Creek is located approximately 1,000 feet south of the property and discharges to Drayton Harbor of Puget Sound, roughly 1,500 feet southwest of the site (Environmental Associates 2005). Shallow groundwater at the site generally flows in a south to southwest direction (SAIC 2010a).

In April and May 2011, the Washington State Department of Ecology (Ecology) performed a remedial excavation on the site (SAIC 2011), per the draft Cleanup Action Plan (dCAP) (SAIC 2010b). Following remediation, three monitoring wells were installed. Science Applications International Corporation (SAIC) has been asked by Ecology to perform two rounds of groundwater monitoring at this site to obtain data to assess onsite groundwater contamination, if any.

This document provides information regarding the sampling locations and descriptions of the sample collection and handling procedures, analytical methods, data quality objectives, and quality assurance/quality control (QA/QC) requirements for this study. This document contains the Sampling and Analysis Plan (SAP) in Section 3.0, and the Quality Assurance Project Plan (QAPP) in Section 4.0.

2.0 Project Organization and Responsibilities

SAIC and its subcontractors will implement this Sampling and Analysis Plan/Quality Assurance Project Plan (SAP/QAPP) under the direction of Ecology. The following sections identify the key roles and responsibilities of the project team.

2.1 Project Planning and Coordination

Isaac Standen is the Ecology Project Manager who will conduct overall project coordination, define the scope and objectives of this project, review reports, and coordinate with contractors. Alisa Wells will serve as the SAIC project manager and be responsible for executing the approved SAP/QAPP, overseeing the collection and analysis of field samples, and reporting analytical results.

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2.2 Sample Collection

Michael Pagel will serve as the SAIC field manager responsible for the collection, processing, and transporting of samples from the site to the analytical laboratory for analysis. Mr. Pagel will ensure that all sampling equipment, decontamination, and collection procedures are in accordance with this SAP/QAPP.

2.3 Laboratory Coordination and Data Management

Marina I. Mitchell of SAIC will serve as project chemist, laboratory coordinator, and data manager responsible for subcontracting state-certified laboratories, and ensuring observation of established protocols for decontamination, sample preservation, holding times, chain-of-custody (COC) documentation, and analytical reporting. She will provide quality assurance oversight for the analytical program, ensuring that the data are considered valid, and that procedures meet the required quality control limits. Ms. Mitchell is also responsible for proper database storage and uploading of field and analytical data into Ecology's Environmental Information Management (EIM) database.

2.4 Health and Safety Manager

The SAIC health and safety officer is Michael Pagel, who is responsible for ensuring that all personnel are properly trained and are aware of potential site hazards. He shall ensure that all work is conducted in a safe manner and that all personnel wear appropriate personal protective equipment and abide by the conditions set forth in the site-specific Health and Safety Plan. He is

responsible for identifying and mitigating potential hazards while field work is being performed and ensuring health and safety procedures are implemented and followed.

2.5 Subcontractor Support

The SAIC project team will include the following subcontractor to support the data collection activities and laboratory analytical services:

- Analytical Chemistry

  Test America Seattle
  Kristine Allen
  5755 8th Street East
  Tacoma, WA 98424
  Phone: (206) 922-2310
  kristine.allen@testamericainc.com

- Data Validation

  EcoChem, Inc.
  Christine Ransom
  710 Second Avenue
  Suite 660
  Seattle, WA 98104
  Phone: (206) 233-9332 x110
  Fax: (206) 233-0114
  cransom@ecochem.net

2.6 Project Schedule

The project schedule is as follows:

- The Ecology project manager, SAIC project manager, and SAIC field manager performed a site walk on July 12, 2012, to assess the condition of the wells and to discuss field activity logistics.
- Groundwater samples will be collected from the three monitoring wells in July – September 2012 and January – March 2013, and from one observation well in July – August 2012. Field sampling is expected to last one to three days, depending on the condition of the wells and amount of water available.
- Following the completion of each sampling effort, the preliminary analytical results will be available approximately three weeks later.
- Following the receipt of the data package for each sampling event from Test America, data validation will be completed by EcoChem within four weeks.
- Draft sampling reports will be submitted biannually to Ecology within 30 days of the receipt of the validated data.
- SAIC will incorporate Ecology's comments, if any, and submit final sampling reports to Ecology within one week of the receipt of comments on the draft version.

2.7 Sampling Report

A written sampling report summarizing the results and activities associated with collection and chemical analyses of samples will be prepared for each biannual sampling event. At a minimum, the following items will be included in the sampling report:

- A description of the sampling and analysis activities,
- A summary of chemical results and data validation,
- Copies of the analytical and data validation reports,
- COC records, and
- Potentiometric map.

SAIC will provide all deliverables electronically in MS Word or Excel formats as appropriate and Adobe .pdf format for all documents. Additionally, two hardcopies of the sampling reports will be submitted to Ecology. In addition, the validated chemistry data will be uploaded into Ecology's EIM database. Information for entering environmental data into EIM can be found on Ecology's website: http://www.ecy.wa.gov/eim/.

3.0 Sampling and Analysis Plan

The purpose of this field sampling and analysis plan is to describe the procedures by which sample collection and analysis will be performed. This section describes the procedures for the development of monitoring wells, groundwater sample collection, identification, processing, documentation, equipment decontamination, sample handling, and waste disposal for the field investigation. The laboratory methods for chemical analysis are presented in Section 3.7.

3.1 Monitoring Well Development

Groundwater from three monitoring wells and one observation well installed on the site will be collected. Monitoring well locations are in proximity to the fuel dispenser island, located at the north, northwest, and south sides of the fuel dispensers as shown on Figure 2. The exact locations of the wells will be surveyed by Clearcreek Contractors and will be presented in the sampling reports. Sampling locations are listed in Table 1.

Table 1. Sampling Locations

Type of Well	Well ID	Depth of well (in feet from top of casing)
Monitoring	MW-6	17.08
	MW-7	16.77
	MW-8	19.59
Observation	OW-1	unknown

Monitoring wells consist of 2-inch, flush-thread PVC risers and 10-foot long pre-packed screens to a total depth of approximately 16 – 20 feet below ground surface. Well screens are set so that the water table intersects the well screen even during potential seasonal variation. Wells are completed with flush-mount vaults and equipped with watertight locking plugs. All well materials (screen, riser, etc.) were delivered from the manufacturer pre-cleaned and sealed.

Prior to the first sampling event, the monitoring wells will be developed by surging the well with a steel bailer or surge block and then over-pumping with an electric down-well pump. Disposable discharge tubing will be used at each well. The bailer, surge block, or pump will be decontaminated before use at each well using Liquinox™ (or equivalent) and distilled water rinse.

3.2 Groundwater Sample Collection

Two rounds of groundwater sample collection will be conducted during this monitoring program. Groundwater samples will be collected during both sampling events at three existing monitoring wells (MW-6, MW-7, and MW-8) and during the first round of sampling only at one observation well (OW-1). This observation well was selected for sampling because a sample collected from this well during remediation of the site contained concentrations of benzene, toluene, ethylbenzene, total xylenes (BTEX) and total petroleum hydrocarbons – gasoline (TPH-G) above Model Toxics Control Act (MTCA) Method A cleanup levels (CULs) (SAIC 2011).

Groundwater sampling will be conducted using low-flow techniques (USEPA 1996) with a peristaltic pump and disposable polyethylene tubing. Wells will be purged at a low-flow rate until field measurements of pH, conductivity, temperature, and turbidity stabilize. Monitoring well samples will be collected using an YSI-6820 with flow cell, peristaltic pump, and disposable tubing. A disposable bailer or low flow sampler will be used to collect the sample from the observation well.

Water levels will be measured in each well prior to purging. Groundwater elevations will be determined by measuring the static depth to water in each monitoring well, using a Solinst Water Level Meter. The groundwater elevation is then measured by calculating the surveyed top of casing elevation by the static ground water depth.

All non-disposable sampling equipment will be decontaminated between sampling locations using a Liquinox™ (or equivalent) detergent solution and a distilled water rinse. Field sampling parameters will be recorded on groundwater sampling field form (Appendix A).

If non-aqueous phase liquid (NAPL) is encountered during sample collection, the field manager will immediately inform the SAIC project manager. All decisions to proceed with, relocate, postpone, or cancel sample collection and analysis for samples containing NAPL will be made in consultation with the Ecology project manager. During the pre-sampling site walk on July 12, 2012, no NAPL was observed in the monitoring wells.

Field instruments will be calibrated prior to delivery by the vendor according to the manufacturer's recommended procedure. If recalibration is needed, or if the instrument is suspected to not give reliable readings (such as does not zero out), then the vendor must be contacted and related information recorded in the field log book.

3.3 Field Documentation

A complete record of field activities will be maintained. Documentation necessary to meet quality assurance objectives for this project include field logbooks and field forms, sample container labels, COC forms. The field records will provide descriptions of all sampling activities, sampling personnel, and weather conditions, and will document all modifications, decisions, and/or corrective actions to the study design and procedures identified in this SAP.

Photocopies or electronic scans of the field logbooks will be made at the end of each field event and maintained in the project file. Sample collection data sheets will be completed for each groundwater sample location. Sample data sheets will contain date and time of sample collection, sample number, sample location, field measurements (e.g., pH, conductivity, temperature), and analyses collected. Field sampling parameters will be recorded on groundwater sampling field form (Appendix A).

3.3.1 Field Logbooks and Forms

Field logbook(s) will be kept on site during field operations. Daily activities will be recorded in a bound field logbook of water-resistant paper. All entries will be made legibly, in indelible ink, and will be signed and dated. Information recorded will include the following:

- Date, time, place, and location of sampling;
- Onsite personnel and visitors;
- Daily safety discussion and any safety issues;
- Field QC samples (i.e., field duplicate samples);
- Observations about site, location, and samples (weather, odors, appearance, etc.); and
- Equipment decontamination verification.

Field logbooks are intended to provide sufficient information to enable a full understanding of the events that occurred during field activities. Entries will be factual, detailed, and objective. Unless restricted by weather conditions, all original data recorded in field logbooks and on sample identification tags, COC records, and field forms will be written in waterproof ink. If an error correction is made, the individual responsible may make corrections simply by crossing out the error and recording the correct information adjacently. The incorrect information must not be obliterated and all corrections must be initialed and dated. All documentation, including voided entries, must be maintained within project files.

3.3.2 Chain-of-Custody Procedures

The field crew will keep all samples securely in their possession at all times until the samples are delivered or shipped to the laboratory. COC forms will be initiated at the time of sample collection to ensure that all collected samples are properly documented and traceable through storage, transport, and analysis. When all line items on the form are completed or when the samples are relinquished, the sample collection custodian will sign and date the form, list the time, and confirm the completeness of all descriptive information contained on the form. Each individual who subsequently assumes responsibility for the sample will sign the COC form. The field manager's chain of custody responsibilities ends when the laboratory receives the samples. The field manager will provide a copy of the completed, signed COC form(s) to the project chemist. An example COC form can be found in Appendix A.

3.4 Sample Identification, Containers, and Labels

All samples collected during the investigation will be labeled clearly and legibly. Sample labels will be affixed to the sample jar with self-adhering, waterproof material. Indelible ink will be used to complete each label. Each sample label will contain the project name, sample identification, date and time of collection, complete list of analyses to be conducted, and the initials of the person preparing the sample.

Groundwater from monitoring wells: *MW-x-mmddyy* (for example, MW-2-072412)
Where "x" is the well number, and "mmddyy" is the date.

Water from observation wells: O*W-x-mmddyy* (for example, OW-1-072512)
Where "x" is the well number, and "mmddyy" is the date.

3.5 Sample Storage and Delivery

All samples will be stored and transported in sturdy, insulated coolers, and placed on ice or frozen gel-packs immediately following sample collection (i.e., at 0–6°C). Samples will be

delivered to the laboratory upon completion of sampling event by courier or shipped overnight using FedEx. The COC will be signed by the individual relinquishing samples for transport to the laboratory. Upon receipt of samples at the laboratory, the shipping container seal will be broken and the condition of the samples recorded.

Field personnel are responsible for:

- Packaging the samples,
- Signing the COC before placing inside the cooler or delivering to the laboratory,
- Notifying the laboratory coordinator of when the samples are being delivered to the laboratory, and
- Storing samples under the proper chain-of-custody procedures until they are delivered to the laboratory.

Preparing the samples for shipment to the laboratory includes the following:

1. Label the jars with sample ID, sample date and time, analytical method, preservative (if any), and project name.
2. Fill the glass amber 1-L bottles to the neck of the bottle. Fill all volatile organic analysis (VOA) vials completely so that zero headspace remains.
3. Wipe or decontaminate the outside of filled, capped sample bottles to ensure there is no sample residual on the outside of the container.
4. Secure labels with clear packaging tape.
5. Record the samples on the COC form.
6. Place individual sample containers in plastic bubble-pack bags, or zip-lock and wrap in bubble wrap and secure with packaging tape or rubber bands.
7. Prepare an empty insulated cooler by placing three to four ice packs at the bottom of the cooler; it is recommended to place the ice packs in a garbage bag first to prevent leakage during ice melt. Place sample containers in the garbage bag on ice (if applicable) and fill the cooler with jars and additional packing material to ensure adequate protection to prevent breakage. Add additional bags of ice as needed to surround the sample containers (or the garbage bag containing samples).
8. Sign the COC form before placing inside the cooler to be sealed. Apply a shipping label and air bill (if applicable). Seal the cooler with strapping tape and apply custody seals to two sides of the cooler. The samples must be shipped in accordance with the maximum holding times allowed for the analyses to be performed.

3.6 Laboratory Analyses

Samples will be transported to Test America in Tacoma, Washington, for analysis of BTEX, 1,2-dichlorethane (EDC), methyl-tertiary-butyl ether (MTBE), naphthalene, 1-methylnapthalene, 2-methylnapthalene, TPH-G, and total petroleum hydrocarbons – diesel and motor oil (TPH-Dx). This laboratory is accredited by Ecology to perform these analytical methods. Samples will be transported in securely packaged coolers under proper COC procedures within required holding times and preservation requirements. The analytical methods, sampling containers, preservation requirements, and minimum holding times for all analyses are listed in Table 2.

Table 2. Analytical Methods, Sample Containers, Preservation and Holding Time Requirements

Chemical	Analytical Method	Sampling Containers [a]	Preservative	Holding Time
BTEX, MTBE, EDB, EDC	USEPA 8260	(3) 40mL VOA vial with zero headspace	HCl; cool (0-6°C)	14 days
TPH-G	NWTPH-G	(3) 40mL VOA vial with zero headspace	HCl; cool (0-6°C)	14 days
TPH-Dx (with acid/silica gel cleanup)	NWTPH-Dx	(2) 1-L amber glass	HCl; cool (0-6°C)	14 days to extraction; 40 days to analysis
Napthalenes	USEPA 8270-SIM	(2) 1-L amber glass	cool (0-6°C)	7 days to extraction; 40 days to analysis

a Triplicate sample volume will be collected for one sample in each sampling event for laboratory QA/QC.
BTEX = benzene, toluene, ethylbenzene, xylenes
EDB = ethylene dibromide
EDC = 1,2-dichloroethane
HCl = hydrochloric acid
MTBE = methyl-tertiary-butyl-ether
NWTPH= northwest total petroleum hydrocarbons
TPH-Dx = total petroleum hydrocarbons–diesel and motor oil
TPH-G = total petroleum hydrocarbons–gasoline
SIM = selected ion monitoring
VOA = volatile organic analysis

All excess sample volume should be retained for a minimum of 2 months from the date of receipt at the laboratory using the thermal preservation requirements listed in Table 2.

3.7 Investigation Derived Waste Management

The following investigation-derived waste will be generated during this investigation: decontamination water, development water, and purge water from the monitoring wells. All aqueous waste will be contained in 55-gallon drums approved by the U.S. Department of Transportation, and will be temporarily stored on site. Drums will be labeled with a generator contact name and phone number (Appendix A).

SAIC will provide Cascade Drilling LLC (Cascade) with the analytical data, when available. Cascade will arrange for transport from the site and disposal of this material in consultation with Ecology. Ecology is the generator and will sign all manifests, bill of lading, profile sheets, and any other shipping documents. Material wastes (e.g., disposable gloves, tubing, and paper towels) will be placed in plastic bags and disposed of as municipal waste.

4.0 Quality Assurance Project Plan

The purpose of the project QAPP is to provide confidence in the analytical results through a system of QA/QC performance checks with respect to data collection methods, laboratory analysis, data reporting, and appropriate corrective actions. Results and analytical procedures must be in compliance with established performance and data quality criteria. This section presents the QA/QC procedures used to ensure that the investigation's data are defensible and usable for their intended purpose.

4.1 Measurements of Data Quality

The quality of the analytical results will be assessed using accuracy, precision, representativeness, completeness, and comparability as described below.

Accuracy is the degree to which an observed measurement agrees with an accepted reference or true value. Accuracy is a measure of the bias in the system and is expressed as the percent recoveries of spiked analytes in matrix spike/matrix spike duplicate (MS/MSD) and laboratory control sample/laboratory control sample duplicate (LCS/LCSD) samples. Accuracy will also be evaluated through the surrogate spikes in each sample for organic chemistry analyses. The performance based laboratory control limits for accuracy will be used for the project.

Precision is a measure of the reproducibility of detected concentrations of a chemical in similar samples analyzed under the same conditions. Precision is assessed by comparing the results of MS/MSD samples and LCS/LCSD samples. The calculated relative percent differences (RPDs) for MS/MSD pairs provide information on the precision of sampling and analytical procedures, and the RPDs for LCS/LCSD pairs provide information on precision of the analytical procedures.

Representativeness expresses the degree to which data accurately and precisely represent an actual condition or characteristic at a particular sampling point. Representativeness is achieved by collecting samples representative of the matrix at the time of collection. Representativeness can be evaluated using replicate samples and blanks.

Completeness is calculated as the number of valid (i.e., not rejected) data points achieved divided by the total number of data points expected. For this project, completeness objectives are 95 percent.

Comparability will be achieved through the use of standard, well established methods for the analysis of the target chemicals on this project. The analytical procedures employed by the laboratories have been demonstrated to produce high quality results. The analysts will follow their written standard operating procedures to ensure reproducibility and comparability of the data.

4.2 Quality Control Samples

Field and laboratory QA/QC samples will be used to evaluate the data precision, accuracy, representativeness, and comparability of the analytical results. The field QA samples to be collected are described in Section 4.2.1. The laboratory QA samples are discussed in Section 4.2.2.

4.2.1 Field QA/QC Samples

Trip blank samples consisting of analyte free water will be provided by the laboratory, and shall accompany every sample shipment containing samples that are being analyzed for volatile organic compounds (VOCs) including BTEX, MTBE, EDB, EDC, and TPH-G. They are used to assess the potential for contamination during field sampling and transport. They will remain in the sampling cooler during field operations and will be returned to the laboratory for analysis of VOCs and TPH-G.

4.2.2 Laboratory QA/QC Samples

Laboratory calibration and QA/QC sample requirements are defined in the test methods and are listed in Table 3.

Table 3. Laboratory QA/QC Requirements

Analysis	Initial Calibration	CCV	LCS	Method Blanks	MS/MSD	Surrogates
VOCs	prior to analysis	start of analytical batch	one per analytical batch	one per analytical batch	MS/MSD at rate of 5% of samples	every sample
TPH-G	prior to analysis	start of analytical batch	one per analytical batch	one per analytical batch	na	every sample
TPH-Dx	prior to analysis	start of analytical batch	one per prep batch	one per prep batch	na	every sample
Napthalenes	prior to analysis	start of analytical batch	one per prep batch	one per prep batch	MS/MSD at rate of 5% of samples	every sample

CCV = continuing calibration verification
LCS = laboratory control sample; a LCS duplicate may be substituted for an MS/MSD if insufficient sample volume is provided
MS/MSD = matrix spike/matrix spike duplicate
TPH-G = total petroleum hydrocarbons–gasoline
TPH-Dx = total petroleum hydrocarbons–diesel and motor oil
VOCs = volatile organic compounds

4.3 Analytical Methods

All analyses will be conducted in accordance with Ecology and United States Environmental Protection Agency (USEPA) guidelines. Analyses will also be required to conform to accepted standard methods and the laboratory's internal QA Plan and standard operating procedures. The analytical laboratories will provide electronic copies (i.e., pdf) to SAIC and EcoChem. The data packages will contain sufficient information to allow for the data validation and review of all sample and laboratory QA/QC sample results (i.e., calibration, method blanks, LCS/LCSD, and MS/MSD).

Analytical laboratory reports will be accompanied by sufficient raw data and QC results to enable independent reviewers to evaluate the quality of the data and recalculate the results. The analytical laboratory deliverables will include but are not limited to the following:

- Method detection limits (MDLs) and reporting limits (RLs) for each sample;
- Laboratory qualifiers reported with analyte concentrations and a summary of qualifier definitions;
- Case narrative including any problems encountered, protocol modifications, and/or corrective actions taken;
- Sample analytical and QA/QC results with units and control limits;
- All method references used during analyses;
- Any protocol deviations from the approved sampling plan;
- Surrogate recovery results and control limits;
- MS/MSD results and control limits;
- Method blank results;
- LCS/LCSD results;
- Initial and continuing calibration results and control limits; and
- Sample custody records (including original COC forms).

Table 4 presents the target chemicals and their associated MTCA Method A CULs. All sample RLs must be below the CULs listed in Table 4. The laboratory must have established method detection limits to support the RLs, although the sample results for this project need only be reported at concentrations equal to or greater than the RL. All sample results will be reported in the electronic data deliverable format specified in Appendix B.

Table 4. MTCA Method A CULs (µg/L)

Chemical	MTCA Method A CUL (ug/L)
benzene	5
toluene	1,000
ethylbenzene	700
total xylenes	1,000
MTBE	20
total naphthalenes	160
TPH-G	800
TPH-diesel	500
TPH-motor oil	500

CUL = cleanup level
MTCA = Model Toxics Control Act
TPH = total petroleum hydrocarbons
TPH-G = total petroleum hydrocarbons–gasoline

4.4 Data Validation

All chemical results gathered during this investigation will undergo independent data validation by EcoChem, Inc. of Seattle, WA. EcoChem will perform a full level EPA Stage 4 data validation on the results of the one sampling event, and summary level EPA Stage 2b data

validation on the results of subsequent sampling events. Data validation will be performed following USEPA guidance (USEPA 2008, 2009). If data quality concerns are noted, the laboratory will be contacted and the data will be reanalyzed, qualified, and/or discussed in the data validation report. The results of the data validation will be summarized in a data validation report, which will be included as an appendix to the sampling report.

5.0 References

Environmental Associates, Inc. 2005. Subsurface Sampling and Testing Blaine Mini Mart (Gas Station and Convenience Store). December 08, 2005.

SAIC. 2010a. Site Characterization Report, Blaine Mini Mart, Blaine, Washington. Submitted to Ecology, July 21, 2010.

SAIC. 2010b. Draft Cleanup Action Plan, Blaine, Washington, Submitted to Ecology, September 14, 2010.

SAIC. 2011. Blaine Remedial Excavation Report, Blaine, Washington, Submitted to Ecology, August 2011.

USEPA, Office of Emergency and Remedial Response. June 2008. *USEPA Contract Laboratory Program, National Functional Guidelines for Organic Data Review*. EPA-540-R-08-01. Washington, DC.

USEPA, Office of Emergency and Remedial Response. January 2009. *Guidance for labeling externally validated laboratory analytical data for Superfund use.* EPA-540-R-08-005. Washington, DC.

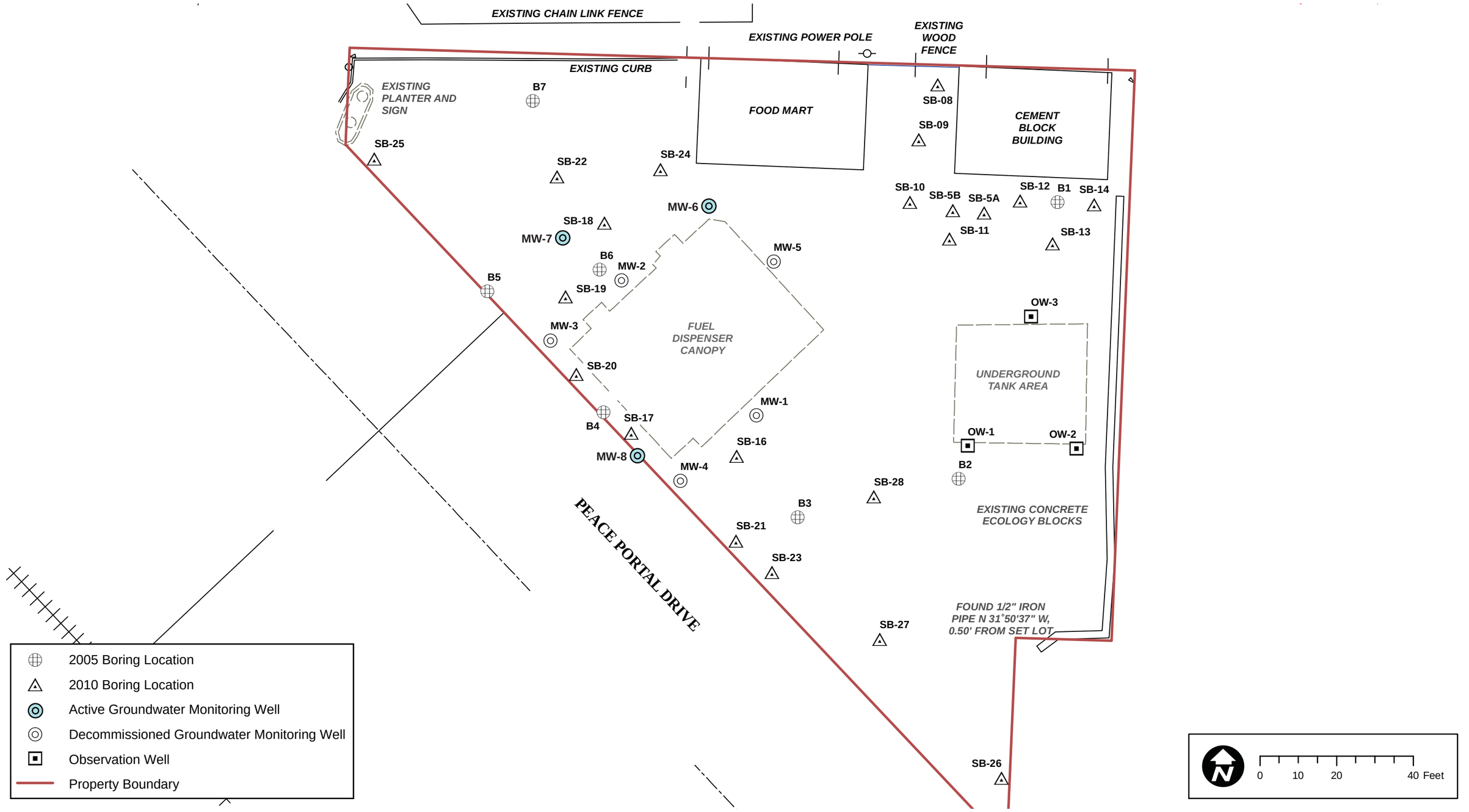
USEPA, Office of Research and Development. April 1996. *Groundwater Issue: Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures*. EPA/540/S-95/504.

Figures

DEPARTMENT OF ECOLOGY
State of Washington

Figure 1. Location Map for the Blaine Mini Mart Site

SAIC®
From Science to Solutions



DEPARTMENT OF ECOLOGY
State of Washington

Figure 2. Site Map

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Appendix A
Field Forms


NON-
HAZARDOUS
Waste
OPTIONAL INFORMATION
SHIPPER
ADDRESS
CITY, STATE, ZIP
CONTENTS
NON-HAZARDOUS WASTE
BRADY BRADYID.COM

GROUNDWATER SAMPLE COLLECTION FORM

Blaine Mini Mart

SAMPLE ID NO.: _____ **WELL ID**: _____

DATE/TIME: _____ **WEATHER**: _____

ANALYSIS: _____

WELL PURGING DATA

Initial depth to water:_____ Depth of well:_____

Screened interval: _____ Volume of water in well:_____

Method of purging:_____ Purge rate:_____

Method of decontaminating:_____

SAMPLE CONTAINER DATA:

Type	Preser-vative	Volume	No. Required	No. Filled

SAMPLE METHOD: Pump Bailer Other_____

FILTERED FOR METALS? Yes No

Photograph Taken? ☐

Sample Entered on C.O.C.? ☐

SAMPLE PRESERVATION METHOD: _____ Iced_____

[Volume of water in monitoring well (2-ich diameter PVC) = (0.655)*h', h = height of water column in well]

WATER QUALITY OBSERVATIONS DURING PURGING

Date/Time	Volume Purged (gallons)	Depth to Water (ft)	Temp (°C)	pH	Conductivity (µS/cm)	D.O. (mg/L)	Redox (mV)	Turbidity (NTU)

GROUNDWATER SAMPLE COLLECTION FORM

Page 2

Blaine Mini Mart

SAMPLE ID NO.: _____ **WELL ID**: _____

Date/Time	Volume Purged (gallons)	Depth to Water (ft)	Temp (°C)	pH	Conductivity (µS/cm)	D.O. (mg/L)	Redox (mV)	Turbidity (NTU)

Comments:

_____

Signature: _____ Date/Time: _____

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CHAIN OF CUSTODY RECORD

Project No.: ____________ Project Mgr: ____________
Project Name: ____________
Project Location: ____________
Sample Collectors: ____________
Client Name: ____________

Shipping Information

Number of Shipping Containers:

Date Shipped:

Carrier:

Waybill No.:

Sample ID	Depth	Matrix	Date	Time	# of Containers	Analyses / Tests										Comments

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature:	Signature:	Signature:	Signature:
Date/Time:	Date/Time:	Date/Time:	Date/Time:
Affiliation:	Affiliation:	Affiliation:	Affiliation:

• White: Lab Returns to Originator Upon Receipt of Samples • Canary: Lab Retains • Pink: Lab Returns to Project Manager with Final Report • Goldenrod: Retained by Sampler

Appendix B
Electronic Data Deliverable Format

Appendix B
Electronic Data Deliverable Format

Laboratory electronic data deliverables (EDDs) will be submitted as tab delimited text or csv files and will conform to the specifications listed below. This format provides all data required for data submittal to Ecology's Environmental Information Management (EIM) database. Information for entering environmental data into EIM database can be found on Ecology's website: http://www.ecy.wa.gov/eim/. EIM valid values must be used for reporting CAS_RN, ANALYTE, PREPMETHOD, ANLMETHOD, and MATTYPE.

Field	Name	Type[1]	Data Required[2]
1	PROJID	T	Special
2	STUDYID	T	No
3	FIELDID	T	No
4	LABID	T	Yes
5	LABBATCH	T	Yes
6	CAS_RN	T	Special
7	ANALYTE	T	Yes
8	RESULT	N	Yes
9	RESULTSF	N	Yes
10	LABQUAL	T	Special
11	UNITS	T	Yes
12	MDL	N	Special
13	REPLIMIT	N	Yes
14	ANLGROUP	T	No
15	PREPMETHOD	T	No
16	ANLMETHOD	T	Yes
17	MATTYPE	T	Yes
18	BASIS	T	Yes
19	LEACHDATE	D	Special
20	EXTRDATE	D	Special
21	ANLDATE	D	Yes
22	DILFACTOR	N	Yes
23	COLUMN	T	Yes
24	FRACTION	T	Yes
25	LABNAME	T	Yes
26	PARENTID	T	Special
27	SAMPLEQTY	N	No
28	QTYUNITS	T	No
29	MOISTURE	N	No
30	SAMPLETYPE	T	Yes
31	RESULTTYPE	T	Yes
32	SURROGATE	N	Special
33	SPIKE	N	Special
34	RECOVERY	N	No
35	RPD	N	No
36	LOWLIMIT	N	No

Field	Name	Type[1]	Data Required[2]
37	UPPLIMIT	N	No
38	RPDLIMIT	N	No

Notes:

1. ***Type*** field refers to the following data types:

   T Text, preferably left justified.

   N Numeric, no decimal defined.

   D Date/time, Date must be 8 characters long for the date with the format MM/DD/YY. Time must be 5 or 8 characters long in the format of HH:MM (hours and minutes) or HH:MM:SS (hours, minutes, and seconds). The time must be presented in 24 hour clock (not 12 hour clock).

2. ***Data required*** field indicates the following:

   Yes The field must contain some information and a blank value is not acceptable.

   No The field does not require information and if left blank, is assumed to mean no information was supplied.

   Special A special case where the field may be left blank if appropriate; however, a blank field does not represent a lack of information, rather, it indicates some meaning (*i.e.,* a blank in LABQUAL indicates a detected result).

Field Descriptions:

PROJID: Project name, provided by the client at the beginning of the work assignment and is also listed on the COC forms, sample labels, and other project documentation. This is required for field samples, not required for lab QC samples.

STUDYID: Unique 8 character ID to identify the study in the Washington Department of Ecology's EIM database.

FIELDID: The sample identification number as reported on the COC form and on sample labels, or the laboratory QC sample identification.

QC samples created by the Laboratory from field samples (*e.g.,* laboratory duplicates) must contain the exact SAMPID of the field sample. Other Laboratory QC samples (*e.g.,* blanks, spikes, duplicates) must have unique sample identifiers which may be identical to the LABID below.

LABID: The Laboratory internal identification number. The combination of the FIELDID and LABID field should be sufficient to uniquely define either an environmental or QC sample; but may not be sufficient to distinguish reanalyses and dilutions.

LABBATCH: The laboratory identification number used to associate laboratory generated QC samples.

CAS_RN: A unique identifying number assigned by the Chemical Abstracts Service (CAS) Division of the American Chemical Society to each distinct chemical substance recorded in the CAS Chemical Registry System. The CAS Number is accepted nationally and internationally as an identifier for specific, definable chemical substances.

ANALYTE: Analyte or parameter reported. All compounds should be reported in upper case.

RESULT: Concentration, value, or result of the compound tested, reported to the correct number of significant figures. The reporting limit (RL) will be reported for non-detect values for all

methods except high resolution gas chromatography/high resolution mass spectroscopy (HRGC/HRMS) isotope dilution methods. The SAIC project coordinator will provide project specific instructions for reporting the RESULT for non-detect results generated using HRGC/HRMS methods. Only numbers are acceptable for this field.

In the case of spiked results, the RESULT will be the spiked sample result and will not be adjusted for the original sample results. If spiked compounds are diluted beyond detection, then the reporting limit (RL) shall be reported in the VALUE field and a "U" added with other qualifiers in the LABQUAL field.

RESULTSF: The number of significant figures that should be reported for the RESULT field.

LABQUAL: Lab flags or qualifiers are reported in this field.

More than one qualifier may be used per record; multiple qualifiers must be concatenated without separator (*e.g.*, "UJ"). The laboratory must include a list of the definitions of the codes with the electronics. The list may be present as a paper copy or an electronic text file.

All non-detected results shall be reported with a "U" qualifier. The qualification "ND" for non-detected results is unacceptable. Blank values are acceptable and implied to mean a detected result. If a range will be reported (*e.g.*, greater than 50) the symbol ">" shall be reported in this field.

Non-numeric results (*e.g.*, "TNTC" or "Non-plastic") should be reported in this field.

UNITS: The units of measure for each record will be reported in this field. Micrograms must be represented with a "u" (not "µ").

MDL: Used to report the method detection limit (MDL), a value determined by MDL studies performed in accordance with 40 CFR or sample specific estimated detection limits (e.g., 2.5 x signal to noise ratio) for high resolution, isotope dilution test methods. This value is corrected for dilution, percent moisture, or related factors that affect the MDL and/or RL. MDLs are required for all results, as applicable (e.g., not applicable for total solids).

REPLIMIT: Used to report the reporting limit. Non-detect results reported in the VALUE field should contain the RL corrected for dilution, percent moisture, or related factors that affect the RL.

ANLGROUP: Field used to group results from various methods. For instance, an entry of 'METALS' may be entered to report results from methods SW-846 6010, SW-846 7041, and SW-846 7470.

PREPMETHOD: Indicate the extraction or digestion method used (*e.g.,* SW-846 3550B).

ANLMETHOD: Indicate the analytical method used (*e.g.,* SW-846 8270). Dissolved metals must be clearly identified versus total metals results.

MATTYPE: Indicate one of the following for the matrix analyzed: SOIL, SEDIMENT, TISSUE, and WATER. If a sample or laboratory QC material does not match one of these, indicate with a code of "X" and explain in the cover letter.

BASIS: Indicate whether results are reported on a dry weight or wet weight basis, using the terms DRY or WET. If a sample or laboratory QC material does not match one of these, indicate with a code of "X" and explain in the cover letter.

LEACHDATE: Date the sample was extracted for TCLP or SPLP test methods. If leaching extraction is not applicable, then the field must be left blank.

EXTRDATE: Date the sample was extracted or prepared. If an extraction or preparation step is not applicable, then the field may be blank.

ANLDATE: Date and time the sample was analyzed.

DILFACTOR: The dilution factor. This should also reflect "effective" dilutions achieved by increasing or decreasing sample or extracting solvent volumes from standard amounts. That is, pre-concentration steps will result in a dilution factor of less than 1; this is OK.

COLUMN: This field is used to identify the analytical column from which the result was reported, if applicable.

Code	Definition
1	Primary column
2	Secondary column, also known as conformational column
N	Not applicable

FRACTION: This field identifies when an aqueous sample is filtered prior to analysis to determine the "dissolved" portion of the chemical of interest. Unfiltered aqueous samples are reported as the "total" fraction. This nomenclature is typically used for metals analysis.

Code	Definition
T	Total
D	Dissolved
N	Not applicable

LABNAME: The full name (and location if appropriate) of or abbreviated name (and location) of the laboratory performing the analysis.

PARENTID: For duplicate samples only (i.e., laboratory duplicate, MSD, or LCSD). List the parent sample ID.

SAMPLEQTY: Quantity or weight of the sample aliquot used for analysis.

QTYUNITS: The units of measure for the quantity or weight of the sample used for analysis.

MOISTURE: Moisture content of solid samples, expressed as percent moisture.

SAMPLETYPE: This field is used to identify laboratory QC samples. One of the following codes must be used to identify the laboratory QC sample type:

Code	Definition
N	Normal sample (field sample)
DUP	Duplicate (Laboratory duplicates only; field duplicates will have a unique SAMPID)
LCS	Laboratory control sample (blank spike or ongoing precision and recovery check)
LCSD	Laboratory control sample duplicate
MB	Method blank
MS	Matrix spike
MSD	Matrix spike duplicate samples
OPR	Ongoing precision and recovery check
RM	Reference material
TRIP	Triplicate (Laboratory triplicates only; field triplicates will have a unique SAMPID)

RESULTTYPE: This field is used to identify analyte types, including tentatively identified compounds (TICs), surrogate compounds, internal standards (IS), and labeled compounds (LC). One of the following codes must be used to identify the analyte type:

Code	Definition
IS	Internal standard
SUR	Surrogate or labeled compound result
TIC	Tentatively identified compound
TRG	Target chemical

SURROGATE: If added, this refers to the surrogate or labeled compound concentration or amount expected, for example 100 for 100 ug/kg. Units of measure are implied from the UNITS field.

SPIKE: If added, this refers to the spike concentration or amount expected, for example 100 for 100 ug/kg. Units of measure are implied from the UNITS field.

RECOVERY: Percent (%) recovery. A blank value is acceptable, indicating a non-spiked, non-reference material result. This field should be filled in for surrogates and labeled compounds as well as spiked QC samples and reference materials.

RPD: Relative percent difference. This field should be filled in for field and laboratory duplicate, matrix spike duplicates, and laboratory control sample duplicates.

LOWLIMIT: Lower recovery control limit. This field should be filled in for surrogates, QC samples and reference materials.

UPPLIMIT: Upper recovery control limit. This field should be filled in for surrogates, QC samples and reference materials.

RPDLIMIT: Relative percent difference control limit. This field should be filled in for laboratory duplicates and spiked sample duplicates.

The EDD used for data validation will include all of the fields noted above with data populated by the laboratory, and the following additional fields populated by the data validator.

Field	Name	Type[1]	Data Required[2]
39	val_name	T	Yes
40	val_date	D	Yes
41	val_qual	T	Special
42	val_level	T	Yes
43	val_reason	T	Special
44	val_notes	T	No

Notes:

1. ***Type*** field refers to the following data types:
   - **T** Text, preferably left justified.
   - **D** Date/time, Date must be 8 characters long for the date with the format MM/DD/YY. Time must be 6 or 8 characters long in the format of HH:MM (hours and minutes) or HH:MM:SS (hours, minutes, and seconds). The time must be presented in 24 hour clock (not 12 hour clock).
2. ***Data required*** field indicates the following:
   - **Yes** The field must contain some information and a blank value is not acceptable.
   - **No** The field does not require information and if left blank, is assumed to mean no information was supplied.
   - **Special** A special case where the field may be left blank if appropriate; however, a blank field does not represent a lack of information, rather, it indicates some meaning (*i.e.,* a blank in LABQUAL indicates a detected result).

1. **val_name:** The full or abbreviated name of the data validation firm.
2. **val_date:** The date on which data validation was completed.
3. **val_qual:** Any data qualifiers added during data validation.
4. **val_level:** The level of data validation (e.g., full or summary, S2AVEM).
5. **val_reason:** The reason (or reason code) for data qualification. This field is required if validation qualifiers were added.
6. **val_notes:** Any additional notes. If numeric results changed during data validation, it must be noted here.